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ENVIRONMENTAL ASSESSMENT

Proposed Agreements to Resolve Revelstoke Filling Issues and Access Reservoir Storage Space in Canada

Office of Power and Resources Management
BONNEVILLE POWER ADMINISTRATION

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ENVIRONMENTAL ASSESSMENT

ON

PROPOSED AGREEMENTS TO RESOLVE REVELSTOKE RESERVOIR FILLING ISSUES AND ACCESS RESERVOIR STORAGE SPACE IN BRITISH COLUMBIA

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Office of Power and Resources Management
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NOTE

Words and phrases that are CAPITALIZED AND UNDERLINED are commonly used when discussing the Federal Columbia River Power System and the Columbia River Treaty. They have been highlighted in this manner the first time they are used in the text to facilitate reader understanding. These words and phrases appear at the end of this document in the Glossary (Appendix E).

Chapter 1.0

INTRODUCTION

The British Columbia Hydro and Power Authority (B.C. Hydro) is constructing Revelstoke Dam on the Columbia River in Canada (see Figure 1 for locations of projects referenced in this document). It had proposed to fill the resulting reservoir beginning this September in a manner which the Bonneville Power Administration (BPA) believes is contrary to the Columbia River Treaty (Treaty) and which would have adversely affected BPA operations and revenues. Similar circumstances had occurred in the past with the filling of the reservoir created by Seven Mile Dam, and other such circumstances may yet occur. B.C. Hydro also controls storage space in these and other reservoirs in British Columbia. BPA's operational flexibility would be enhanced if it could secure rights to use some of this space. The two utilities chose to negotiate to resolve the conflict concerning the filling of Revelstoke and other reservoirs, and to enter into mutually beneficial arrangements regarding reservoir storage space in British Columbia. The negotiated agreement is the primary subject of this environmental assessment (EA).

Any Canadian action which affects Columbia River flows at the U.S.-Canada border, such as filling a reservoir or storing water, also affects potential generation at Columbia River Dams (the mid-Columbia projects) owned and operated by non-Federal utilities. Therefore, a second negotiated agreement was needed with those affected utilities (the mid-Columbia purchasers) to compensate them for, or allow them to participate in, actions which would occur under the agreement with B.C. Hydro. This agreement with the mid-Columbia purchasers is also addressed in this EA.

1.1 PURPOSE AND NEED FOR PROPOSED ACTIONS

This section of the EA describes the purpose and need for the action; discusses legal, system operational, and power marketing issues related to the proposal; and sets forth the rationale for limitations in the EA's scope.

1.1.1 B.C. Hydro Contract

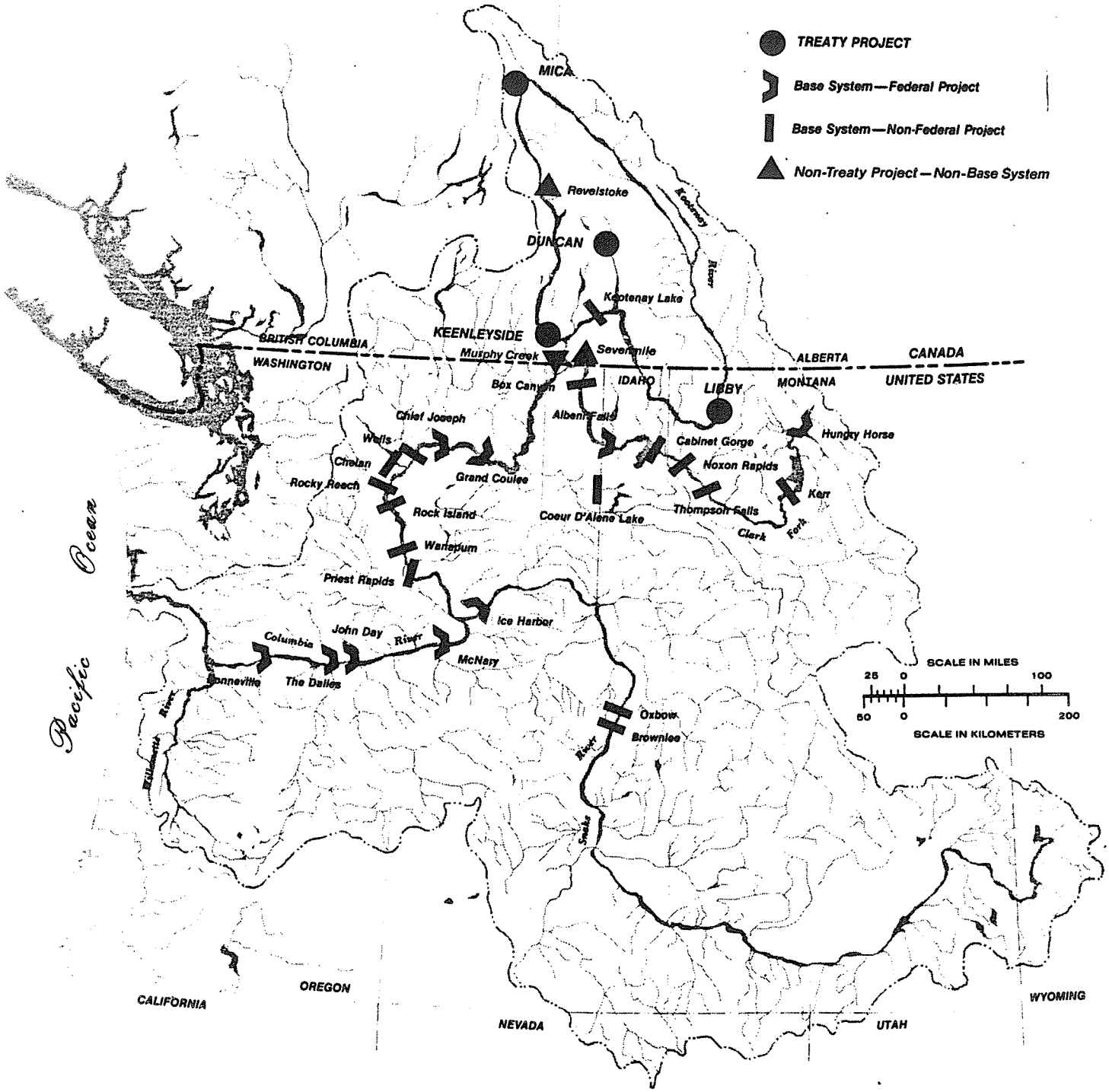
BPA's purposes in negotiating an agreement with B.C. Hydro are three-fold. The first purpose is to resolve a dispute over the filling of INACTIVE STORAGE SPACE at Revelstoke, Seven Mile, and, potentially, other B.C. Hydro reservoirs. The second purpose is to provide both BPA and B.C. Hydro the ability to use storage space in reservoirs in British Columbia to produce more usable energy than is possible under existing arrangements. The third purpose is to protect both parties from harm as a consequence of each other's actions under the agreement, that is, provide financial or energy compensation for losses suffered during storage. All three purposes are discussed in the following sections.

1.1.1.1 Resolve the Dispute over Filling of Inactive Storage Space

On August 10, 1982, B.C. Hydro notified BPA by letter that the Revelstoke Project would be completed in early fall of 1983 (see section 1.2.3). B.C. Hydro stated that inactive storage space at Revelstoke would be filled by

Figure 1

COLUMBIA RIVER BASE SYSTEM AND TREATY PROJECTS



reducing the outflow at Revelstoke to capture the natural inflow. Only that water released from Mica pursuant to the Columbia River Treaty operating plan would flow out of Revelstoke during filling. This would result in a reduction of flow at the U.S.-Canada border during the fall and winter of 1983-84. This process is discussed in section 3.1, Revelstoke Initial Fill.

A similar dispute had arisen over the filling of the Seven Mile Reservoir, a Canadian project much smaller than Revelstoke. It was anticipated that similar future disputes would arise were B.C. Hydro to fill the reservoir behind the proposed Murphy Creek Dam or raise the pool elevation of Seven Mile. B.C. Hydro may take these actions during the term of the proposed agreement.

The two legal positions are described as follows. B.C. Hydro's position is that B.C. Hydro has the right to fill the inactive storage space in NON-TREATY reservoirs in British Columbia without compensating those affected in the U.S. for reducing the flow of water in the Columbia River, and without being in breach of the Treaty. BPA's position is that BPA and other downstream U.S. power producers have a right pursuant to the Treaty to be compensated by B.C. Hydro for any losses of electric power caused by B.C. Hydro as a result of any reductions in the flow of water at the U.S.-Canadian border below that which would occur as a result of natural flows being augmented by operation of TREATY storage space in accordance with the Treaty operating plans.

Rather than pursue their respective legal positions, BPA and B.C. Hydro agreed to discuss ways of settling these initial filling disputes through negotiating a contract providing a mutually acceptable method for filling Revelstoke and Murphy Creek and for raising the Seven Mile pool elevation.

1.1.1.2 Access to Treaty and Non-Treaty Storage Space

The proposed agreement will give each party (BPA and B.C. Hydro) the right to store up to 1.0 MAF of water in non-Treaty storage space in Mica and to release that stored water and use the energy it can generate in both Canada and the United States for the duration of the agreement. (The duration will presumably be for 10 years although there are provisions both for extension and early termination.) The proposed agreement also will provide both parties the right to store equal amounts of water in additional non-Treaty storage space in reservoirs in British Columbia if, and to the extent that, B.C. Hydro makes such space available, and to obtain the energy generated at Canadian and U.S. dams resulting from release of such water. Further, the proposed agreement gives both BPA and B.C. Hydro some additional flexibility, which both desire, to store water in Treaty space in Mica. B.C. Hydro also obtains flexibility to store in Arrow Treaty space.

1.1.1.3 Protection from Harm

The agreement is intended to protect both BPA and B.C. Hydro from harm as a consequence of each other's storage of water in the Canadian reservoirs. This will be accomplished by the storing party providing compensation for loss of energy caused by water held back for storage which would have otherwise been generated on the nonstoring party's system. Such compensation is made by delivery of energy from the storing party to the nonstoring party.

1.1.2 Mid-Columbia Contract

The purposes of the agreement with the mid-Columbia purchasers are:

1. To protect the mid-Columbia purchasers from power related adverse effects resulting from the initial filling of Revelstoke and other reservoirs in British Columbia.

2. To obtain from such purchasers a release and discharge from claims they might make as a result of the initial filling of Revelstoke and other reservoirs in British Columbia.

3. To provide for the use of generators at the mid-Columbia plants by B.C. Hydro such that, when B.C. Hydro stores, it will deliver energy to the mid-Columbia purchasers based on the lost generating capacility of the mid-Columbia plants, and when B.C. Hydro releases water, it will receive the generation from the mid-Columbia plants.

4. To provide for the use of generators at the mid-Columbia plants by the mid-Columbia purchasers such that, when BPA stores, the purchasers will suffer the loss of generation at their plants and, when BPA releases water, the purchasers will keep the generation from their plant.

1.2 BACKGROUND

The circumstances which have led to the proposed agreements relate to the fact that the United States and Canada have entered into the Treaty; and the fact that B.C. Hydro is constructing Revelstoke Dam and wishes to fill the resulting reservoir beginning this fall.

1.2.1 Columbia River Treaty

The Treaty between Canada and the U.S. became effective in September 1964. It increased storage capability and access to storage capacity resulting in increased operational flexibility and other benefits to the regional power system. It is important to remember that the Treaty is and will continue to remain in effect and that it takes complete precedence over the proposed agreement between BPA and B.C. Hydro. A detailed discussion of the Treaty and its related projects is contained in Appendix A.

1.2.2 Non-Treaty Storage

Two of the Canadian Treaty reservoirs, Mica and Arrow (the reservoir impounded by Keenleyside Dam), have storage capacity in excess of that designated under the Treaty. This storage capacity is termed non-Treaty storage and is controlled by B.C. Hydro. The amounts of inactive storage, Treaty storage, and non-Treaty storage for each of the Canadian Treaty reservoirs is shown in Appendix A. Non-Treaty storage capacity will exist in the Revelstoke reservoir when it is operational, and more non-Treaty storage may be available in other B.C. Hydro reservoirs. Under current conditions, B.C. Hydro may from

time-to-time make non-Treaty storage available for use by BPA, but BPA has no long-term rights to the use of this storage. Until some agreement is reached, a separate storage agreement must be negotiated on each occasion.

1.2.3 Filling of Non-Treaty Reservoirs

Other dams and reservoirs which may affect power production at downstream dams in the United States have been or are being constructed in British Columbia since the Treaty was ratified. The reservoir behind Seven Mile Dam was filled at a time when the impounded water could have been used by BPA and mid-Columbia purchasers to produce energy, and, therefore, the impoundment adversely affected hydroelectric power benefits. This problem may occur again as additional dams are constructed or as the amount of inactive storage space is increased in existing B.C. Hydro reservoirs, such as Seven Mile Reservoir. Other projects that will be covered by the proposed agreement include Murphy Creek, a dam planned for construction on the Columbia River in Canada nearest the border; and, of course, Revelstoke Dam on the Columbia River downstream of Mica Dam and about 5 kilometers north of Revelstoke, British Columbia.

B.C. Hydro has proposed in a letter dated August 10, 1982 to Mr. Charles E. Cancilla, Secretary of the United States Entity, to fill the Revelstoke reservoir beginning September 26, 1983. Its plan for filling the reservoir was "to store all local inflow above Revelstoke in the reservoir from the time of closure until the reservoir is full. During this period all requirements for storage releases from Mica will be passed through Revelstoke to the extent possible. Should the discharge facilities at Revelstoke be unable to pass all the necessary storage at any stage, the difference between the required storage release and actual release will be made up by increasing the storage release from Arrow Reservoir.

"The need to fill Revelstoke more rapidly than possible using streamflow alone means that some of the non-Treaty storage in Mica will be temporarily transferred to Revelstoke by releasing more water from Mica than required by the Treaty. This storage will be returned to Mica at the same rate as it is displaced from Revelstoke by stored streamflow."

Revelstoke Dam is essentially a run-of-river project used for power production, and the Revelstoke reservoir will contain 3.5 MAF of inactive storage (i.e., it will permanently impound 3.5 MAF of water), and only a relatively small amount of potentially active storage, 0.8 MAF. Filling the Revelstoke reservoir will cause a loss of water to downstream U.S. projects and, therefore, would adversely affect hydroelectric power benefits. If Revelstoke were filled during a 12-month period, the amount of energy which could be generated by downstream U.S. dams with this water has been estimated as approximately 356 average megawatts (MW) at Federal dams, and 160 average MW at the mid-Columbia dams.

1.2.4 Short-Term Storage Agreement

BPA and B.C. Hydro entered into a short-term (until August 31, 1984) storage agreement in June 1983, in anticipation of the currently proposed long-term agreement. This agreement allowed the storage of up to 0.68 MAF (345 KSFD) in inactive storage space. A second agreement to allow additional storage was

prepared September, 1983. The short-term agreements were intended to enable storage of surplus water in the system to help fill the Revelstoke reservoir prior to any long-term agreement and reduce the risk of having to store at a later time when water was less abundant. Like the proposed long-term agreement, the short-term storage agreements were accompanied by an agreement with the mid-Columbia purchasers to compensate them for loss of energy they could market while flows were being reduced for storage.

BPA and B.C. Hydro stored approximately 0.430 MAF (or 215 ksfd) in B.C. Hydro reservoirs under the first short-term agreement. While the short-term storage agreements contain provisions to govern the disposition of the stored water in the event negotiations on a long-term agreement fail, the intent was and is that the stored water would be utilized in accordance with the long-term agreement now being proposed.

1.3 LIMITATIONS OF THE SCOPE OF THE ENVIRONMENTAL ASSESSMENT

Department of Energy guidelines (46 FR 1007-1011) relevant to proposals which have effects beyond the boundaries of the United States are discussed in Appendix B. Based on these guidelines, which implement Executive Order 12114, potential environmental impacts occurring in Canada as a result of the proposed agreement will not be evaluated.

Chapter 2.0

EXPLANATION OF ALTERNATIVES

This chapter will describe the alternatives, including the "no action" alternative. Each of the alternatives addresses five operational activities or aspects. These activiites were combined in a single agreement since none of them, considered independently, was beneficial enough for all parties to justify a long term agreement on its own merit. Each of the activities is, however, operationally independent and results in discrete changes in the physical environment of the mainstem Columbia River. A description of each of the five aspects is presented briefly below:

1. Initial Fill of Revelstoke Reservoir.

   B.C. Hydro has constructed Revelstoke Dam and desires to fill the reservoir. BPA seeks to protect itself from power-related impact due to the change in water flow associated with the fill.

2. Guaranteed Use of Active Storage Space.

   B.C. Hydro has non-Treaty storage space available in mainstem Columbia River reservoirs. BPA desires to use a portion of this space. B.C. Hydro has had insufficient incentive to allow BPA access to this space on a guaranteed basis.

3. Use of Mica Treaty Storage Space.

   Under some runoff conditions, Mica Reservoir has a lesser probability of refill than U.S. COORDINATED SYSTEM reservoirs. Mica also refills later in the year. These conditions result in the need to store in Mica at times when other Coordinated System reservoirs have a 95 percent confidence of refilling and Mica does not. Refill of Mica Treaty space benefits both BPA and B.C. Hydro. Enhancement of Mica refill has occurred in the past on an as needed basis through short-term contractual arrangements between both parties.

4. Use of Additional Non-Treaty Space.

   From time to time B.C. Hydro has non-Treaty storage space available in addition to that discussed in No. 2. above. BPA desires to use a portion of this space. In the past, BPA and B.C. Hydro have made short-term arrangements for use of a portion of this space.

5. Initial Fill of other Non-Treaty Space.

   B.C. Hydro has constructed Seven Mile Dam and filled the reservoir to an elevation of 1715 feet. It intends to fill Seven Mile Reservoir to its maximum permitted operating elevation of 1730 feet. It also expects to construct Murphy Creek Dam and fill its reservoir. BPA seeks to protect itself from power-related impacts due to the change in water flow associated with future fill activities and desires redress for past actions.

2.1 ALTERNATIVE: NO ACTION

Under the no action alternative, there would be no agreement between B.C. Hydro and BPA to resolve the issues related to the filling of the Revelstoke reservoir. If there was no agreement, BPA would seek to have the filling of Revelstoke halted through legal means unless B.C. Hydro compensated downstream U.S. interests for their losses. If legal attempts failed to halt the filling, B.C. Hydro would proceed to fill Revelstoke in the manner presented in its August 10, 1982, letter to Mr. Cancilla (see section 1.2.3).

In this assessment, we have assumed that BPA would not continue to make short-term ad hoc agreements with B.C. Hydro for storage in Mica Treaty space or in non-Treaty storage space in other reservoirs. No agreement resolving past filling of Seven Mile Reservoir would be provided under the no action alternative. There would be no resolution of future reservoir filling issues.

2.2 ALTERNATIVE: FILL AGREEMENT

A possible alternative to the proposed agreement would be for B.C. Hydro and BPA to enter into an agreement whose scope would be limited to the filling of the reservoir behind the Revelstoke Dam. This "fill agreement" alternative would specify the terms and conditions under which Revelstoke would fill. Such an agreement would be structured to compensate BPA and mid-Columbia purchasers for the loss of energy. This would involve delivering to BPA electric energy generated by B.C. Hydro to mitigate the effects of a reduced flow during filling. Such an agreement would not provide BPA with long-term rights to store water in B.C. Hydro reservoirs, an essential feature that distinguishes the proposed agreement from the fill agreement alternative.

In this assessment, we have assumed that, under the fill agreement alternative, BPA would continue to enter into ad hoc short-term agreements with B.C. Hydro for storage in Treaty space in Mica and for storage in other non-Treaty space. BPA would also seek other agreements for filling new B.C. Hydro reservoirs. Compensation for past filling of Seven Mile Reservoir could be included or addressed independently.

2.3 ALTERNATIVE: PROPOSED AGREEMENT

The proposal is to enter into two related agreements. One, with B.C. Hydro, is the principal agreement addressed by this EA, and the one which results in changes in hydroelectric operations. The second agreement, with the mid-Columbia purchasers, provides protection for these purchasers from the potential operational consequences of the B.C. Hydro agreement. Without concurrence of the mid-Columbia purchasers, the agreement with B.C. Hydro could not be implemented.

2.3.1 Proposed BPA-B.C. Hydro Agreement

The following discussion summarizes the major provisions of the proposed agreement with B.C. Hydro. In general, the agreement would provide reciprocal, equal rights and obligations for BPA and B.C. Hydro. See Appendix C for a copy of the proposed agreement.

2.3.1.1 Initial Fill of Revelstoke Reservoir

The actual filling of the Revelstoke reservoir will occur with water presently stored in the Mica non-Treaty space. The refilling of the space then created in Mica is the subject of this provision. In the proposed agreement, BPA and B.C. Hydro share equally the obligation to fill the Revelstoke reservoir. The space in Mica will be divided in two portions. Inactive storage of 2.3 MAF makes up the first portion. The second portion is 2.0 MAF of ACTIVE STORAGE. Each party has an obligation to fill one-half of each portion. Inactive storage must be filled by the October 1 which is at least 1-1/2 years after the inactive space has been declared available. Active storage may be filled at any time during the term of the agreement with surplus water.

Part of the 2.3 MAF obligation has already been fulfilled by the amount of water stored under the short-term storage agreement, Contract No. DE-MS79-83BP91290. This amounts to 0.43 MAF and reduces the remaining obligation to 1.87 MAF. BPA will fulfill its obligation to fill Revelstoke by requesting that B.C. Hydro reduce the flow out of Canada and store the water in Revelstoke. No energy will be scheduled in either direction. BPA will suffer any loss of energy production at U.S. projects and B.C. Hydro will suffer any loss of energy production at Canadian projects. B.C. Hydro will fulfill its obligation by reducing flow out of Canada and storing the water in Revelstoke and by delivering energy to BPA to compensate for the lost energy production at U.S. projects. BPA will then compensate each mid-Columbia purchaser based on their share of mid-Columbia generation.

This operation will fill the Revelstoke reservoir as desired by B.C. Hydro. BPA will be compensated for loss of energy associated with B.C. Hydro's obligation to fill Revelstoke. When B.C. Hydro commits stored water to inactive storage under this agreement, BPA will grant a release and discharge from any claims due to filling Revelstoke.

2.3.1.2 Guaranteed Use of Active Storage Space

In return for BPA's taking on the obligation to fill one-half of the Revelstoke reservoir, B.C. Hydro has made 2.0 MAF of storage available for use during the term of the agreement. BPA and B.C. Hydro will each have the right to store in 1.0 MAF. Either party may store more than 1.0 MAF if the space is not full, but the amount of water stored in excess of 1.0 MAF is subject to being forced out (if the other party wishes to store into that space) or purchased by the other party. It is intended that the parties leave the 2.0 MAF full at the end of the 10-year term of this agreement. However, in the event either party is unable to do this, those provisions of this agreement necessary to continue storing in this space will be extended for up to 7 years. At the end of the 7 years, BPA and B.C. Hydro must leave the 2.0 MAF full. During any extension, BPA will deliver energy to B.C. Hydro in amounts equal to B.C. Hydro's reduction in energy production at Mica due to reduced HEAD resulting from BPA's fill deficiency.

Active storage space will be initially filled in the same manner as inactive storage space. After a party has stored water in active space, that party may release the water and receive the generation produced at all projects (in both

Canada and the U.S.) downstream from the storage reservoir. When that party refills that space, it must compensate the other party for the loss of energy suffered by the other party.

The proposed agreement will give B.C. Hydro assurance that the inactive storage space created by the filling of Revelstoke will be full when the agreement expires. It will give BPA the assurance of use of 1.0 MAF for the term of the agreement.

2.3.1.3 Use of Treaty Storage Space

Treaty space in Mica is available at any time that Mica Reservoir's Treaty space is below its maximum flood control elevation. Each party has the right to store in one-half of the available space. If the space is not full, a party may store in more than one-half of the space. That water above one-half of the available space is subject to being forced out of the reservoir by the other party if that party wishes to fill the storage space.

B.C. Hydro may also store in Treaty space in Arrow. BPA does not require a similar right because it can store in Treaty space in Arrow up to its maximum flood control elevation under provisions of the Treaty.

Treaty space is filled in the same manner as the refilling of active storage space. When a party stores water in Treaty space, it must compensate the other party for lost energy. When the water is released, the releasing party receives the energy generated at all generating projects (in both Canada and the U.S.) downstream from the storage reservoir.

This provision allows BPA and B.C. Hydro flexibility, which they presently do not have, to fill Treaty space. BPA will use this capability to (1) improve the probability of refilling Mica Reservoir in years that inability to refill Mica will impact the ability of the Coordinated System to adopt the first year FIRM ENERGY LOAD CARRYING CAPABILITY (FELCC) and (2) store unusable SURPLUS water in the spring and summer.

Using the ability to store in Treaty space in Mica Reservoir will increase the probability of filling it (and other British Columbia reservoirs covered by the agreement) especially during average water years. (In low water years, there would be little energy to store, and in very good water years, the probability of refill is already high.)

2.3.1.4 Use of Additional Non-Treaty Space

B.C. Hydro may make additional non-Treaty storage space available from time to time. This space will be shared equally between the parties. Storage of water in more than one-half of the space is allowed but water in excess of one-half the space is subject to displacement or purchase by the other party.

Storage in this space will require that the storing party compensate the other party for the loss of energy. When a party releases water from this space, it will receive all of the energy generated at all projects (in both Canada and the U.S.) downstream from the storage reservoir.

This provision puts into a long-term agreement the mechanism for use of storage space that becomes available from time to time. These actions have been handled on an ad hoc basis in the past.

2.3.1.5 Initial Fill of Other Non-Treaty Space

The filling of the additional space in Seven Mile and Murphy Creek Reservoirs will be handled under this agreement if the space becomes available for filling within the term of the agreement. The parties will share the obligation to fill these spaces equally. There will be a fixed period of time in which these spaces must be filled. This space will be filled in the manner described in section 2.3.1.1, Initial Fill of Revelstoke Reservoir.

In addition, since Seven Mile has already been filled to an elevation of 1715 feet, B.C. Hydro will release an amount of water from non-Treaty storage space in Mica equal to that which was stored in Seven Mile to compensate for losses suffered at downstream U.S. projects. BPA will release and discharge B.C. Hydro from any claims on space filled under the terms of this agreement.

B.C. Hydro will benefit by securing rights to fill these reservoirs under this provision.

2.3.2 Proposed Agreement with Mid-Columbia Purchasers

The proposed agreement between BPA and the purchasers of power from the five non-Federal projects on the mid-Columbia (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) (see Figure 1) is a contract (see Appendix D) to account for the participation of each purchaser in the storage of water, return of water, payment of storage fees, and disbursement of generating fees. The purchasers are not permitted to store this water in Canada independently from BPA. However, when BPA chooses to store, each purchaser may elect to participate in such storage. Each participating purchaser is then credited for the amount stored. Those electing not to participate in such storage will receive energy to compensate for losses from the reduction in flow resulting from BPA's storing in Canada.

When the stored water is returned, those who elected to participate receive their share of the resulting energy and pay any associated fee. Those who elected not to participate must deliver to BPA all additional energy which can be produced at their project resulting from the return of stored water.

Chapter 3.0

IMPACTS OF THE ALTERNATIVES

This chapter will examine the physical changes caused by system operations and the resulting effects on power production and marketing as well as potential environmental impacts. This is done by using HYDROREGULATION STUDIES which contrast the proposed and no action alternatives against existing system conditions. For purposes of comparison, Figure 2 presents the mean and range of monthly inflow to Grand Coulee over 40 years of historical record. Grand Coulee inflow closely approximates the flow of water across the U.S.-Canadian border. Throughout this chapter where changes in flow are discussed (usually expressed in KCFS), reference levels are not given. Instead, the reader should refer to Figure 2 for the range of monthly flows against which those changes can be compared.

None of the three alternative evaluated causes flows or reservoir elevations to exceed project specific constraints. Impacts which occur within project constraints are evaluated in this chapter.

The physical changes resulting from the fill agreement alternative have not been evaluated in the same level of detail. The decision not to pursue detailed hydroregulation studies for the fill alternative results in large measure from a lack of sufficient detail concerning this alternative. While the general conditions surrounding the fill agreement alternative have been specified (section 2.2), the details have not been. These details could only have been developed through negotiation between BPA and B.C. Hydro, as has occurred under the proposed agreement. If we were to make assumptions about the details of the fill agreement alternative and use these assumptions as the basis for system modeling studies, we would have achieved extremely speculative definition of the location, magnitude, and timing of changes in system operations. For this reason, the studies have not been done. In place of studies of the fill agreement, a general assessment of the changes which would result from this agreement alternative has been made. The outcome of this assessment is used to describe the physical changes which would result from a fill agreement.

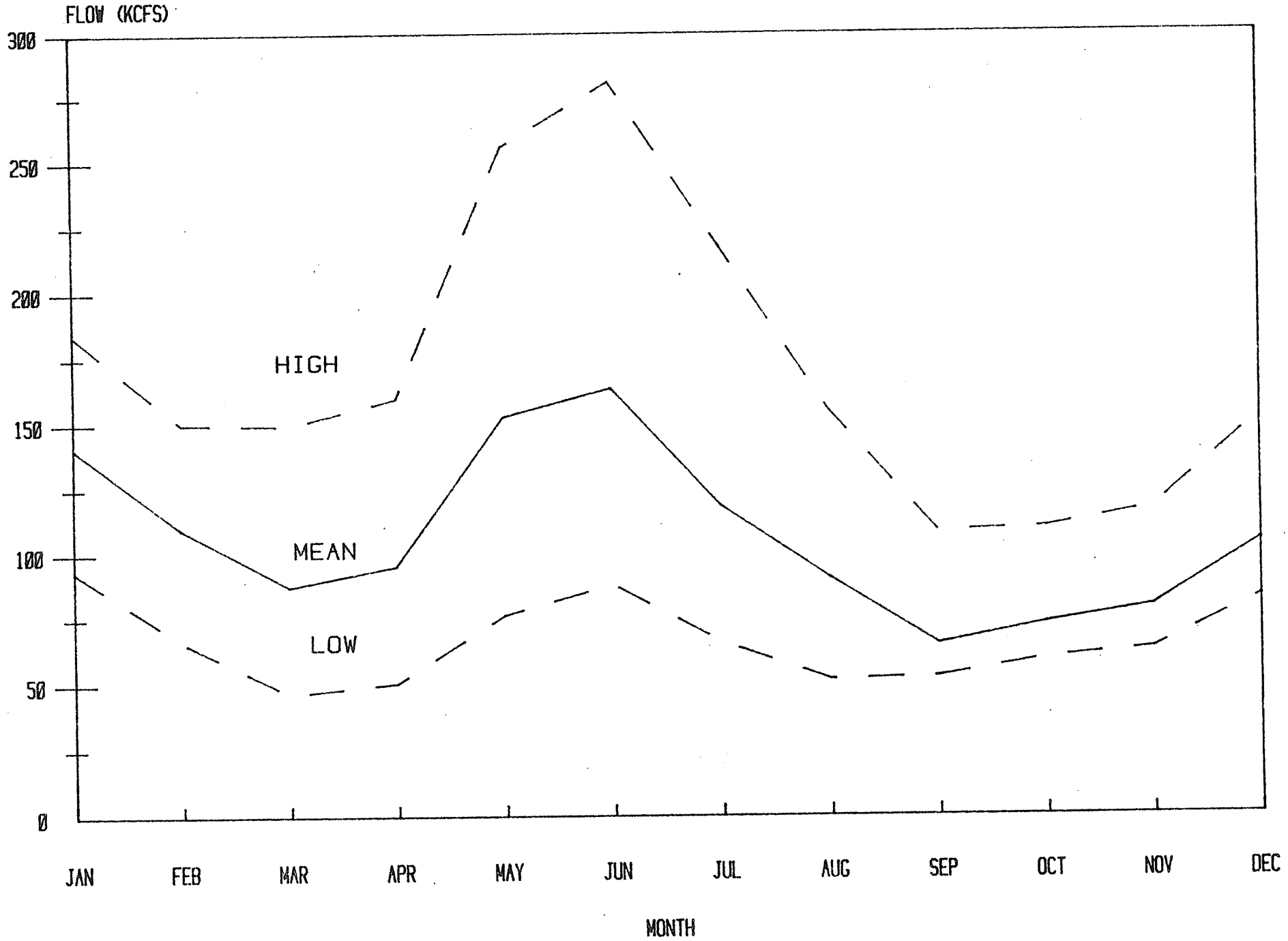
The following sections identify physical changes resulting from examination of each activity occurring under the proposed agreement. The effects on power production and marketing, as well as the effects on the environment which result from these physical changes, are evaluated.

When considering power marketing activities which affect the Columbia River and its tributaries, the primary environmental concerns addressed are those related to fish and wildlife, although minor beneficial effects on water quality are occasionally mentioned. The reason for this concentration on fish and wildlife is related to the magnitude of potential physical changes.

Most environmental impacts related to these power marketing activities are closely tied to the absolute flow or water level. Examples of such impacts are dewatering of wetlands or inundation of historic sites. Since these impacts relate directly to absolute water levels or flow, they are adequately

FIGURE 2: GRAND COULEE INFLOW

MEAN MONTHLY FLOW (40 YEARS OF RECORD)



covered by environmental documents prepared by the project operators. Those documents discuss establishment of these absolute constraints on flow and water level. These constraints are established by project operators.

The effect of power marketing activities on fish and wildlife populations differs substantially from this other category of environmental concerns since fish and wildlife often are impacted by rates of change or the amount of change over a period, which can occur within project constaints. A generic example of this occurs with small-mouth bass. These fish spawn in shallow water during the spring. Under this generic example, a significant impact to small-mouth bass populations can occur if water levels change by a certain amount over the period from spawning to hatching. In this example, absolute water levels mean very little. The amount of change during a fixed time period is the reason for concern. Project environmental documents do not thoroughly evaluate the potential for these types of impacts. For this reason, the focus of this EA is on impacts to fish and wildlife populations and not on those other environmental impacts addressed by project-specific documents. The following impact discussion analyzes each of the operational aspects explained in Chapter 2.

3.1 REVELSTOKE INITIAL FILL

The actual filling of the reservoir at Revelstoke will occur by moving water presently stored in the non-Treaty space of Mica Reservoir into the Revelstoke reservoir. The refilling of the space then created in Mica is the subject of this section.

3.1.1 Changes in System Operation

Refilling of Mica Reservoir will withhold 4.3 MAF of water from the volume which enters the United States from the mainstem Columbia River. Under the first short-term contract between BPA and B.C. Hydro, 0.43 MAF has already been stored in Mica and Arrow and an additional amount of up to 1.87 MAF may be stored under the second short-term agreement. If the additional 1.87 MAF were withheld, this would reduce the volume covered under the proposed agreement to 2.0 MAF. This volume can be stored over varying periods of time.

Under the no action alternative, the water would be withheld between October 1983 and June or July of 1984. The exact length of this period varies with streamflow conditions. Average daily flow over the period would be reduced by 6-7 kcfs. The reduction would be greatest during June when average daily flow would be reduced by 25 kcfs. Reduction during May would average 13.5 kcfs.

Flow reductions would not necessarily be passed through the mainstem Columbia River. In dry years, operators and regulators of U.S. reservoirs would need to draft their projects to meet firm requirements such as the WATER BUDGET. Analysis of the physical changes associated with this draft was not possible. The timing and location of such draft would vary greatly with flow conditions to such an extent as to make specific analysis meaningless. The possibility for such variation is further justification for not adopting the no action alternative.

Compared to the no action alternative, the proposed action would result in BPA obtaining greater flexibility in the timing and extent of flow reductions. Under the proposed agreement, the first 2.3 MAF of Mica refill storage would be removed between October 1, 1983, and October 1, 1985, assuming that all inactive space is declared available on October 1, 1984. Depending on conditions of load and streamflow, storage could occur in as little as 2 months or could be extended to as long as 18 months.

If very high fall streamflows, similar to that which occurred in 1933-34, were to occur in 1983, all storage could be withheld between October 1983 and December 1983. This would result in a daily average flow reduction of 12.6 kcfs.

Under average water conditions, similar to those which occurred in 1948-49, storage could occur in January 1984 and February 1984. This would reduce daily average flows by 19.3 kcfs.

Under very dry conditions, like those which occurred in 1928-29 through 1930-31, storage would be filled over an extended period of time. Storage would begin in January 1985 and be complete by September 30, 1985. Water would be stored in every month excepting the last half of April and the month of May. Average flow during periods of storage would be reduced by 5.1 kcfs.

The remaining 2.0 MAF would be filled beginning as soon as the 2.3 MAF has been stored. The initial filling of this 2.0 MAF could take as little as 1 month or as long as 45 months.

The time period varies to this extent since the 2.0 MAF of space will only be filled with surplus water. After the initial filling of the space, it will be used as guaranteed active storage (see section 3.2.1). The physical changes of this filling will be very similar to those occurring under the refilling of guaranteed active storage (section 3.2.1).

Physical impacts to the hydrosystem under the fill agreement alternative would have been similar to the impacts created by the proposed agreement.

3.1.2 Effects on Power Production and Marketing

The filling of the Revelstoke reservoir under the no action alternative would have required Northwest utilities to reduce the FELCC of the Coordinated System by 4.5 billion kWh in the CRITICAL PERIOD which began September 1, 1983. The FELCC of the Operating Year (OY) 1984-1985 through OY 1986-1987 critical period for the Coordinated System is 551.9 billion kWh. BPA's loss of FELCC would amount to 3.1 billion kWh. This loss of FELCC would result in a reduction in the amount of firm surplus available for sale by BPA.

The initial filling of Revelstoke under the proposed agreement will reduce the FELCC of the Coordinated System by 1.0 billion kWh, of which 0.7 billion kWh is suffered by BPA. This will result in a reduction in the amount of firm surplus available for sale by BPA.

3.1.3 Environmental Effects

None of the flow reductions associated with any of the alternatives would significantly impact downstream migrant ANADROMOUS SALMONIDS. During the fall and winter, migratory activity is at a minimum. The Water Budget provides adequate protection for spring migrants from the effects of flow reductions (BPA, 1983). Flow reductions occuring under each of the alternatives will result in a reduction of spring flows but not to a level less than that provided by the Water Budget. Preliminary results of current studies indicate that summer migrant juvenile salmonids are not affected by reductions in flow (Sims, 1982).

Reductions in flow may also reduce spill. At projects with inadequate bypass facilities, such spill is normally needed to prevent migrating juvenile salmonids from suffering significant turbine-related mortality. Each of the alternatives has the potential to substantially reduce spill. The Northwest Power Planning Council's (Council) Fish and Wildlife Program (Program) (Section 404(a) and (b)) requires operators of hydroelectric projects without effective bypass systems to provide spill which will achieve a level of smolt survival comparable to or better than that achievable by the best available bypass system. Under the proposed agreement, BPA will mitigate the potential for significant spill reductions by incorporating such spill programs into power planning and operations and will do nothing as a result of the proposed agreement which could hinder provision of fish passage spill provided for under the annual spill program developed in accordance with Section 404(a) and (b) of the Council's Program. Therefore, no significant effects on juvenile downstream migrant anadromous salmonids should be caused by spill reduction resulting from the proposed alternative.

No information is available in the literature to show a direct relationship between impacts to resident fish or wildlife populations of the mainstem Columbia River and changes in flow and spill.

Changes in reservoir elevations associated with Revelstoke initial fill under the no action alternative have the potential to affect resident fish and wildlife populations. Without further definition through the courts of the types of changes which might be expected, analysis of these impacts is impossible.

No change in reservoir elevations will result from the proposed agreement in association with the initial fill of the reservoir at Revelstoke.

3.2 GUARANTEED USE OF ACTIVE STORAGE SPACE

Mica Reservoir's non-Treaty storage space is, at the present time, filled and essentially inactive. This space is kept full by B.C. Hydro and has not been made available to BPA. B.C. Hydro will use a portion of its Mica non-Treaty storage to fill the reservoir behind Revelstoke. This will leave Mica Reservoir 4.3 MAF below full of which 2.3 MAF will be filled permanently as described in section 3.1.1. The consequent use of the remaining space is the topic to be discussed in this section.

3.2.1 Changes in System Operation

Under the no action alternative, B.C. Hydro will refill the space as discussed under the Revelstoke Initial Fill section (3.1.1). After this fill, the space would remain full and inaccessible to BPA. This would result in no physical changes other than those addressed under Revelstoke Initial Fill. Since the fill agreement does not provide for use of non-Treaty storage space, the impact of the fill agreement will look like the no action alternative.

Under the proposed agreement, 2.0 MAF of the vacated space will remain in use, 1.0 MAF by BPA and 1.0 MAF by B.C. Hydro. The other 2.3 MAF will be filled and become inactive. The physical changes associated with the filling of this 2.3 MAF have been addressed under the Revelstoke Initial Fill section (3.1.1).

The 2.0 MAF of storage which will remain in use over the life of the agreement has been termed active storage space. Active storage space will be filled at times when surplus water is available and used largely to generate NONFIRM ENERGY. In times of low runoff, this storage could also be used to generate firm energy or to meet firm nonpower obligations.

Analysis of how the storage space could be used by both parties indicates that storage may take place at any time of the year. Release of storage likewise may occur at any time. Flow reduction is most likely to occur between November and February and May through June. Flow reductions during times of storage on the mainstem Columbia at the U.S. border would average 11.6 kcfs for the November-February period and 10.8 kcfs for the May-June period. During June, the month when flow reductions are greatest, daily average flows may be reduced by as much as 27.6 kcfs or as little as 1.7 kcfs depending on the water year. Releases of storage will primarily increase flows between July and September. Average flow increases during periods of release are 19.4 kcfs. During July, the month when releases are greatest, daily average flows may change, depending on the water year, by as much as 32.5 kcfs or as little as 1.6 kcfs.

3.2.2 Effects on Power Production and Marketing

The primary purpose of this operational aspect is to improve the parties' ability to generate and market nonfirm energy. Under the terms of the proposed agreement, water will be stored when some portion of the 2.0 MAF is available, at times when it would otherwise be spilled. This reduces the amount of unmarketable energy. At a time when secondary markets become available, the previously stored water will be released and the resulting energy will be sold.

3.2.3 Environmental Effects

No significant adverse impacts associated with changes in flow have been identified. The discussion associated with the Revelstoke Initial Fill section (3.1.3) is applicable to this topic as well. Two potential beneficial effects have been identified. The ability to reduce spring flows in years of high runoff could assist in reducing dissolved gas supersaturation on the mainstem Columbia River. Supersaturation often causes substantial mortality in both anadromous and resident fishes. The storage may also be of benefit in

years when a wet fall is followed by a dry spring. In these cases, water saved in the fall could be used to meet firm commitments, including nonpower commitments such as the Water Budget. Although the effects produced in these situations are positive, the magnitude of change is relatively minor owing to the volume of storage involved.

Guaranteed use of active storage space will not result in alterations in reservoir elevations in the U.S.

3.3 USE OF TREATY STORAGE SPACE

Storage would be placed in Mica Reservoir's Treaty space in slightly submedian water years to enhance refill at Mica. These water conditions occur in approximately 10 percent of all water years.

3.3.1 Changes in System Operations

Under the no action alternative BPA would not seek agreements with B.C. Hydro in years when access to Mica Treaty storage would be beneficial. Therefore, there would be no effect on river operations.

Under the proposed agreement, storage would take place in Mica Treaty space. This would reduce flows on the mainstem Columbia River starting as early as February and continuing until as late as the end of July. In 1978, a year when BPA obtained agreement to use Mica Treaty space, flows were reduced between April 27 and July 14. The average flow reduction was 6.5 kcfs with a maximum hourly flow reduction during June of 25.0 kcfs. This water was released from July 17 to August 24 of that same year. The resultant average flow increase was 13.1 kcfs with a maximum hourly flow increase during August of 30 kcfs. This use of Mica storage to enhance project refill is a typical example.

The other potential use of this storage would be to redistribute runoff within any given spring and summer. This operation would be used in high volume runoff years which occur about 1 year in every 4. Storage could begin as early as February and continue into July. This storage, unless removed, would be forced out by July 31 when Mica refilled. Due to the short period of availability of this storage, its primary use would be to provide for nonpower system considerations and short-term power marketing strategies. Storage and removal would likely occur within a short period, for example, 1 month. It is very difficult to estimate the potential for flow reduction or augmentation, since there has been no past use of storage in this manner. A best approximation of the flow reductions associated with this storage can be obtained from using the changes resulting from storage in Mica Treaty space for refill enhancement, a maximum reduction of 25 kcfs.

With regard to the use of Mica Treaty storage space, the fill agreement will produce the same physical changes as the proposed alternative in years when agreement is reached. In years when there is no agreement, there will be no change in river operations, as in the no action alternative.

3.3.2 Effects on Power Production and Marketing

The primary purpose for BPA's use of Treaty storage space is to assure the filling of Mica at times when other Coordinated System reservoirs are expected to fill. If Mica fails to fill when all other Coordinated System reservoirs fill, the Coordinated System parties may not be able to adopt the first year FELCC. Adopting something other than the first year FELCC reduces each Coordinated System party's right to serve load.

Use of Mica Treaty storage space to enhance the filling of Mica will result in a redistribution of generation. During the period February 1 to July 31, generation and nonfirm sales will be reduced to aid in filling. After July 31 the storage will be released, resulting in an increase in generation and potentially, if the increased flows are not spilled, increasing nonfirm sales.

If Mica Treaty storage space is used to store surplus water, a portion of the surplus water will be stored through reduced flows. Another portion of the surplus water will be used to generate energy to deliver to B.C. Hydro. There is a chance that this stored energy will become usable for sales of nonfirm energy.

3.3.3 Environmental Effects

The discussion of flow-related impacts associated with the Revelstoke Initial Fill section (3.1.3) is applicable to this provision as well. Use of Mica Treaty space to provide for nonpower considerations can have a beneficial effect on resident and anadromous fish. Water can be stored in Mica Treaty space during periods of high dissolved gas supersaturation, thus reducing those levels (see section 3.2.3).

Use of Mica Treaty storage space will not result in changes in reservoir elevations in the U.S.

3.4 USE OF ADDITIONAL NON-TREATY SPACE

From time to time, B.C. Hydro has non-Treaty space available in addition to that provided for under guaranteed active storage.

3.4.1 Changes in System Operations

The no action alternative would not result in use of additional non-Treaty storage and, therefore, would not change physical conditions.

The proposed agreement would result in use of storage when it is made available by B.C. Hydro. At the present time, there is no way to assess the exact amount, location, timing, or duration of such storage. Potential effects can, however, be assessed through evaluation of how this storage has occurred in the past. Examples of such storage occurred in 1980 and 1981 when access was obtained to .26 MAF of storage in Arrow reservoir. In 1981, storage space was filled in August when flow was reduced by an average of 22 kcfs over a 6-day period to fill the storage. The flow reduction ranged from 17 kcfs to 25 kcfs. Under the condition of that agreement, one-half the storage belonged to B.C. Hydro. They released their storage in September,

raising flows by an average of 5 kcfs over a 14-day period. BPA released its half of the storage in December again raising flows by 5 kcfs over 14 days. Storage and release in 1980 was very similar to that which occurred in 1981.

Under the fill alternative, physical effects would be the same as under the no action alternative in years without an agreement, and the same as the proposed agreement in years when a short-term agreement was reached for use of additional space.

3.4.2 Effects on Power Production and Marketing

The impact of use of this additional non-Treaty storage space on power production and marketing will be like those discussed in Guaranteed Use of Active Storage Space (section 3.2.2) but of a lesser magnitude.

3.4.3 Environmental Effects

The discussion under section 3.2.3 covers all potential effects on fish and wildlife.

3.5 INITIAL FILL OF OTHER NON-TREATY SPACE

B.C. Hydro has constructed Seven Mile Dam and filled the reservoir to an elevation of 1715 feet. It intends to fill Seven Mile Reservoir to its maximum permitted operating elevation of 1730 feet. It also expects to construct Murphy Creek Dam and fill its reservoir.

3.5.1 Changes in System Operation

Under the no action alternative, the water which B.C. Hydro initially stored in Seven Mile would not be released; therefore, there would be no physical changes. The proposed agreement allows BPA to request the release of the 0.07 MAF any time between September 1, 1983, and March 31, 1985. The impact of this release will be an increase of flows of 2-3 kcfs if released over a 2-week period.

Filling Seven Mile from elevation 1,715 feet to 1,730 feet will require 0.02 MAF. The reduction in flows caused by this filling would be insignificant. Murphy Creek filling will require approximately 0.1 MAF. Filling this space over a 2-month period would result in a flow reduction of 0.8 kcfs. These impoundments are extremely small and, as a result, the physical changes resulting from fill will be insignificant regardless of which alternative is considered.

Under the fill agreement, physical effects would be the same as under the no action alternative in the absence of an agreement, and the same as the proposed agreement if there was an agreement.

3.5.2 Effects on Power Production and Marketing

Release of the water associated with the initial filling of Seven Mile will result in increased generation at U.S. projects on the mainstem Columbia River. This increase of approximately 70,000 MWh will be sold as nonfirm energy.

The effects of filling other non-Treaty reservoirs will be of the same type as those discussed in the Revelstoke Initial Fill section (3.1.2) but of a much smaller magnitude.

Under the no action alternative, these reservoirs would be filled by B.C. Hydro with no compensation to downstream U.S. power interests. This would result in a loss of FELCC of up to 125,000 MWh, 14.3 average MW over a 12-month period, for the Coordinated System. BPA's share of this loss would be 9.9 average MW over a 12-month period.

Under the proposed agreement, the impact of BPA is sharing in the filling of these two reservoirs would be minimal.

3.5.3 Environmental Effects

Flow reductions and augmentation associated with the initial fill of other non-Treaty space are minimal. These changes in flow will be so minor as to have no likelihood of producing measurable impact to fish or wildlife populations.

3.6 SUMMARY OF ENVIRONMENTAL EFFECTS

As stated earlier in this chapter, the primary environmental concerns addressed in the EA are with potential effects on fish and wildlife. For purposes of comparison, Table 1 summarizes the environmental impacts for the five operational aspects discussed in Chapters 2 and 3 for each of the three alternatives.

No significant effects on fish and wildlife have been identified for any of the alternatives except under the no action alternative where initial fill of the reservoir behind Revelstoke potentially may affect fish and wildlife. In this case, the impacts cannot be quantified because the location, timing, and extent of drawdown at U.S. reservoirs cannot be determined. Where the potential for significant impact may exist for the other two alternatives, mitigation has been provided. This is true with regard to the effect of flow changes on downstream spring migrant anadromous salmonids, where adoption of the Water Budget provides mitigation. It is also true where reductions in spill for passage of downstream migrant juvenile salmonids provide mitigation, as described earlier in this chapter.

The proposed agreement alternative, and to a lesser extent, the fill agreement alternative may also result in minor beneficial impacts. Supersaturation of dissolved gasses may be reduced during periods of high flow. Storage may also be used during times of adverse water conditions to meet firm nonpower commitments such as the Water Budget. Neither of these alternatives will result in the potentially significant effects of the no action alternative.

Allowing the no action alternative to occur may result in potentially significant impacts to fish and wildlife because of changes in U.S. reservoir levels during Revelstoke initial fill. This is the least favorable alternative. The proposed agreement alternative appears to have the fewest adverse environmental effect and is the preferred alternative.

TABLE 1

SUMMARY OF ENVIRONMENTAL IMPACTS FOR THE ALTERNATIVES

ACTIVITY	ALTERNATIVES		
	No Action	Fill Agreement	Proposed Agreement
Revelstoke Initial Fill	1, 2, 3	2, 3	2, 3
Guaranteed Storage	2, 3	2, 3	2, 3, 4, 5
Treaty Storage	2, 3,	2, 3, 4, 5	2, 3, 4, 5
Additional Non-Treaty Storage	2, 3	2, 3	2, 3, 4, 5
Other Initial Fill	6	6	6

Potentially Significant Impact

1 - Changes in U.S. reservoir elevations may affect fish and wildlife.

Fully Mitigated Potential Impact

2 - Changes in Flow--potential impacts mitigated by Water Budget.

3 - Changes in Spill--Potential impacts mitigated by modification of power operations as necessary to meet Corps of Engineers Annual Spill Program.

Potential Beneficial Impact

4 - May reduce supersaturation of dissolved gasses thereby lessening incidence of gas bubble disease in fish during times of excessive spill.

5 - Storage may be used to meet firm nonpower commitments including Water Budget.

No Potential for Impact

6 - Physical changes restricted to flow alterations. Magnitude is too small to produce significant impact.

Chapter 4.0

OTHER CONSIDERATIONS

In addition to their responsibilities under the National Environmental Policy Act (NEPA), Federal agencies are required to carry out the provisions of other Federal environmental laws. Most of the Federal actions related to the proposed agreement discussed in this EA do not require a detailed response with regard to the requirements in these other Federal laws. Those requirements are more concerned with specific proposals for development, and not actions such as that proposed in this EA which will merely enable different operation of existing facilities on a discretionary basis. Also, part of the effect of the proposed action will occur in Canada where these laws are not applicable.

The other Federal laws and requirements which will not be affected by the proposed agreements with B.C. Hydro and the mid-Columbia purchasers but which were considered during preparation of the EA include:

1. OMB Circular No. A-95 Review - The proposed agreement does not involve any direct Federal development.

2. The Coastal Zone Management Act of 1972 - The alternatives discussed in this EA are not included in Washington's or Oregon's list of Federal activities affecting their coastal zone programs.

3. Endangered Species Act of 1973 - The proposed agreement provides only for discretionary changes in operation of existing power resources within existing operational constraints. None of the alternatives will affect any endangered species, listed or proposed, or its critical habitat.

4. Heritage Conservation requirements - The proposed agreement provides only for discretionary changes in operation of existing power resources within existing constraints.

5. Laws or requirements to protect farmlands - None of the alternatives will convert farmlands to other uses.

6. Recreation resources - BPA's anticipated action does not adversely affect any park, designated or proposed wild and scenic rivers, the National Trail System, wilderness areas or other recreation resources.

7. Permits for structures in navigable waters - The proposed action does not include: (a) a structure or work in, under, or over a navigable water of the United States; (b) a structure or work affecting a navigable water of the United States; or (c) the deposit of fill material or an excavation that in any manner alters or modifies the course, location, or capacity of any navigable water of the United States.

8. Permits for discharges into waters of the United States - The proposed actions and its alternatives do not involve discharge of dredge or fill material into waters of the U.S.

9. Permit for right-of-way on public land - The proposed actions do not include use of public lands in a way not in accordance with the objective of the management of those lands.

4.1 FISH AND WILDLIFE LAWS

There are several key Fish and Wildlife Laws that may relate to BPA actions:

- The Fish and Wildlife Coordination Act.
- The Fish and Wildlife Conservation Act of 1980.
- The fish and wildlife provisions of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act).

The Water Budget Managers for State and Federal agencies and for the Columbia Basin Tribes have been consulted informally during preparation of this EA. The Water Budget Managers for State and Federal agencies represent the U.S. Fish and Wildlife Service and National Marine Fisheries Service in matters relating to downstream migration of anadromous salmonids. To accomplish the consultation required by these laws, the Water Budget Managers, Pacific Northwest Power Planning Council, Federal and State fish and wildlife agencies and tribes will have the opportunity to comment on this EA, and BPA will take their concerns under consideration before a decision is made to implement the anticipated action. The proposed agreements with B.C. Hydro and the mid-Columbia purchasers were described at a March 22, 1983, Fish and Wildlife Consultation meeting at BPA.

The Fish and Wildlife Conservation Act of 1980, 16 U.S.C. 2901 et seq., provides for States to develop "approved conservation plans" for the conservation of fish and wildlife. The Act is primarily aimed at conservation of non-game fish and wildlife, those not ordinarily taken for sport, fur, or food. It is BPA's obligation under the Act to share scientific information and any other appropriate information with States for the purpose of assisting States in developing and revising a conservation plan. By sending a copy of this EA to State fish and game agencies, BPA is meeting its obligation of sharing information it has with the State agencies. BPA asks that State agencies keep it informed of development of conservation plans so that information can be supplied if it is available.

4.2 FLOODPLAINS AND WETLANDS

Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands, establish a national policy to protect wetlands and floodplains and requires that Federal agencies avoid, to the extent possible, long- and short-term impacts associated with occupancy and modification of floodplains and destruction or modification of wetlands.

The proposed action is indirectly related to other entities' management of Federal and non-Federal dams and reservoirs in floodplains and that management may affect wetlands adjacent to and connected to the Columbia River and its tributaries. However, such impacts will not exceed the operational parameters (flood control, navigation, irrigation, etc.) established for each facility. Therefore, effects on floodplains and wetlands will not exceed those incurred during normal operation.

4.3 POLLUTION CONTROL AT FEDERAL FACILITIES

The proposal does not require procurement of goods, services, or materials, so the contract compliance provisions of the Clean Air Act, Clean Water Act, and other environmental laws do not apply. The proposed agreements with B.C. Hydro for storage will not alter the current status of any electrical generating resource with respect to compliance with environmental regulations governing air pollution, water pollution, solid waste transport and disposal, hazardous waste, drinking water standards, noise, pesticides, or polychlorinated biphenyls (PCB). Energy storage and energy recovery activities undertaken in accordance with the storage agreements may affect operations of certain resources at times, but resources would not be operated in such a manner as to violate currently applicable standards or permit conditions, nor would resources be operated to exceed a level of environmental impact that would not occur at least some time during normal operations in absence of the agreements.

4.4 ENERGY CONSERVATION AT FEDERAL FACILITIES

The proposal involves operation of Federal facilities in that, at times of storage of energy in the B.C. Hydro reservoirs and recovery of such storage, operation of Federal dams and the BPA transmission system will be altered accordingly. The agreement will result in transmission losses, head losses, and varying efficiencies of resources, but energy generation will be substantially increased as a consequence of storage of unusable water and subsequent release when it is salable. Within the level of control BPA has over the system, it will continue to strive for an optimally safe, reliable, efficient, and economical power supply for the region. The proposed action will be consistent with energy conservation requirements based on the system's adherence to general operating plans.

Chapter 5.0

LIST OF AGENCIES AND PERSONS CONSULTED

The U.S. Army Corps of Engineers and the mid-Columbia purchasers have been involved in BPA's contract negotiations with B.C. Hydro. In addition, the Water Budget Managers for State and Federal agencies and for the Columbia Basin Tribes, have been consulted informally during preparation of this EA. The Water Budget Manager for State and Federal agencies represents the U.S. Fish and Wildlife Service and National Marine Fisheries Service in matters relating to downstream migration of anadromous salmonids.

A description of the proposed agreements with B.C. Hydro and the mid-Columbia purchasers was presented during a BPA Fish and Wildlife Consultation meeting on March 22, 1983. Representatives of many organizations listed below attended that meeting (an asterisk indicates those agencies which were represented). In addition, a summary of the meeting discussion was distributed on May 20, 1983.

This EA will be distributed to the following Federal, State, Tribal, public interest, environmental, and other types of organizations, and selected individuals for formal review and comment. In addition, others will be notified of the availability of this EA, and will be able to request copies for review and make comments if they want.

Federal Agencies

* Water Budget Manager for State and Federal Agencies
Rural Electrification Administration, Washington, D.C.
* US Corps of Engineers, Portland, Oregon
US Corps of Engineers, Seattle, Washington
US Corps of Engineers, Walla Walla, Washington
* USDA, Forest Service, Portland, Oregon
US National Park Service, Pacific NW Region, Seattle, Washington
* USDOC, National Marine Fisheries Service, Seattle, Washington
USDOE, Federal Energy Regulatory Commission, San Francisco, California
USDOE, Federal Energy Regulatory Commission, Washington, D.C.
USDOI, Bureau of Indian Affairs, Nespelem, Washington
* USDOI, Bureau of Indian Affairs Regional Office, Portland, Oregon
USDOI, Bureau of Indian Affairs, Toppenish, Washington
USDOI, Bureau of Land Management, Portland, Oregon
* USDOI, Bureau of Reclamation, Boise, Idaho
* USDOI, Fish and Wildlife Service, Portland, Oregon
USDOJ, US Attorneys Office, Portland, Oregon

State Agencies

State of Idaho, Department of Fish and Game, Boise, Idaho
* State of Oregon, Department of Fish and Wildlife, Portland, Oregon
State of Oregon, Intergovernmental Relations Division, Salem, Oregon
State of Washington, Department of Ecology, Olympia, Washington
State of Washington, Department of Fisheries, Olympia, Washington
* State of Washington, Department of Game, Olympia, Washington

State of Washington, Department of Game, Wenatchee, Washington
State of Washington, Energy Office, Olympia, Washington
State of Washington, Office of Archaeology & Historic Preservation Olympia, Washington
State of Washington, Office of Financial Management, Olympia, Washington
State of Washington, Parks and Recreation Commission, Olympia, Washington
State of Washington, Planning and Community Affairs, Olympia, Washington

Tribes

* Water Budget Manager for the Columbia Basin Tribes
Affiliated Tribes of Northwest Indians, Tacoma, Washington
* Columbia River Inter-Tribal Fish Commission, Portland, Oregon
Colville Business Council, Nespelem, Washington
* Kalispel Business Committee, Usk, Washington
Kootenai Tribal Council, Bonners Ferry, Idaho
* Spokane Business Council, Wellpinit, Washington

Interest Groups

* Columbia Basin Fish and Wildlife Council, Portland, Oregon
Columbia River Citizens Compact, Hillsboro, Oregon
Forelaws on Board, Boring, Oregon
Friends of the Earth, Seattle, Washington
Izaak Walton League, Portland, Oregon
National Audubon Society, Sacramento, California
National Wildlife Federation, Portland, Oregon
Natural Resources Defense Center, San Francisco, California
Northwest Environmental Defense Center, Portland, Oregon
Northwest Indian Fisheries Commission, Olympia, Washington
Northwest Steelhead and Salmon Council, Olympia, Washington
Oregon Environmental Council, Portland, Oregon
Oregon Wildlife Federation, Eugene, Oregon
Pacific Marine Fisheries Council, Portland, Oregon
Trout Unlimited, East Wenatchee, Washington
Washington Environmental Council, Seattle, Washington

Customers/Others

ASWSU, Environmental Task Force, Pullman, Washington
Benton-Franklin Governmental Conference, Richland, Washington
British Columbia Hydro and Power Authority, Vancouver, British Columbia, Canada
* Chelan County PUD #1, Wenatchee, Washington
Colockum Transmission Company, Inc., Wenatchee, Washington
Cowlitz County PUD #1, Longview, Washington
* Direct Service Industries, Portland, Oregon
Douglas County PUD #1, East Wenatchee, Washington
* Eugene Water and Electric Board, Eugene, Oregon
City of Forest Grove, Forest Grove, Oregon
* Grant County PUD #2, Ephrata, Washington
Kittitas County PUD #1, Ellensburg, Washington
City of McMinnville, McMinnville, Oregon

City of Milton-Freewater, Milton-Freewater, Oregon
Okanogan County PUD #1, Okanogan, Washington
Oregon State University, Corvallis, Oregon
* Pacific Northwest Utilities Conference Committee, Portland, Oregon
* Pacific Northwest Power Planning Council, Portland, Oregon
* Pacific Power and Light Co., Portland, Oregon
* Portland General Electric Co., Portland, Oregon
* Public Power Council, Vancouver, Washington
Puget Sound Power and Light Co., Bellevue, Washington
* Seattle City Light, Seattle, Washington
Spokane Regional Planning Conference, Spokane, Washington
* Tacoma City Light, Tacoma, Washington
Trico Economic Development District, Colville Washington
West Kootenay Power and Light Co., Trail, Canada, British Columbia
University of Washington, Seattle, Washington
Washington State University, Pullman, Washington
The Washington Water Power Co., Spokane, Washington

Chapter 6.0

CONCLUSIONS

BPA has reviewed all aspects of the proposed agreements to resolve Revelstoke Reservoir filling issues and access reservoir storage space in British Columbia with B.C. Hydro and with the mid-Columbia project participants for compliance with legislative and executive mandates adopted to safeguard the integrity of the human environment. BPA has consulted with the Water Budget managers, various fish and wildlife agencies, and, through the contract negotiation process, the Corps, the mid-Columbia project participants concerning the proposed agreements. These represent the principal interests affected by the agreements. Further consultation is being undertaken through distribution of this environmental assessment to agencies and the public for review and comment.

In review of the proposed agreements, BPA has not uncovered any unresolved conflicts over alternative uses of available resources. BPA has found that the nature and extent of the environmental consequences resulting from the agreements, which are primarily effects on river flows and fish, are not significant. No extraordinary, controversial, unique, or hazardous circumstances or conditions will be created or furthered by these agreements.

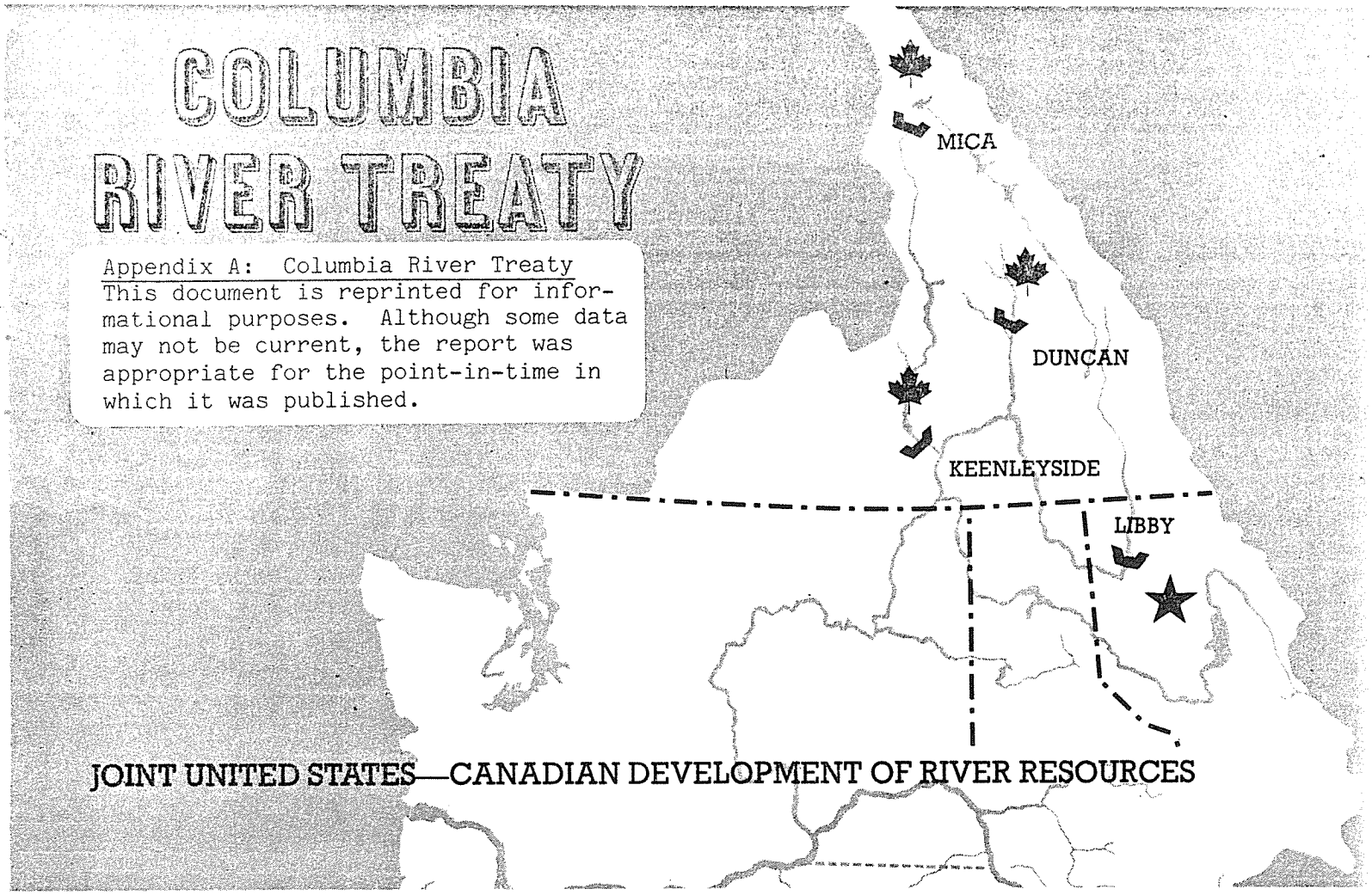
Unless public and agency review of this assessment reveals information that impacts may be more significant than BPA's analysis projected, an environmental impact statement does not appear to be needed for the proposed agreements. Preparation of a Finding of No Significant Impact is recommended.

APPENDIX A

REPRODUCTION OF BPA BROCHURE ON THE COLUMBIA RIVER TREATY

COLUMBIA RIVER TREATY

Appendix A: Columbia River Treaty
This document is reprinted for informational purposes. Although some data may not be current, the report was appropriate for the point-in-time in which it was published.



INTRODUCTION

Until the 60's, dams on the Columbia River had been built only in the United States. In 1964, however, the Columbia River Treaty between the Canadian and United States governments inaugurated a dam construction program in Canada to harness the upper reaches of the Columbia and its tributaries and develop their potential to the mutual advantage of both countries.

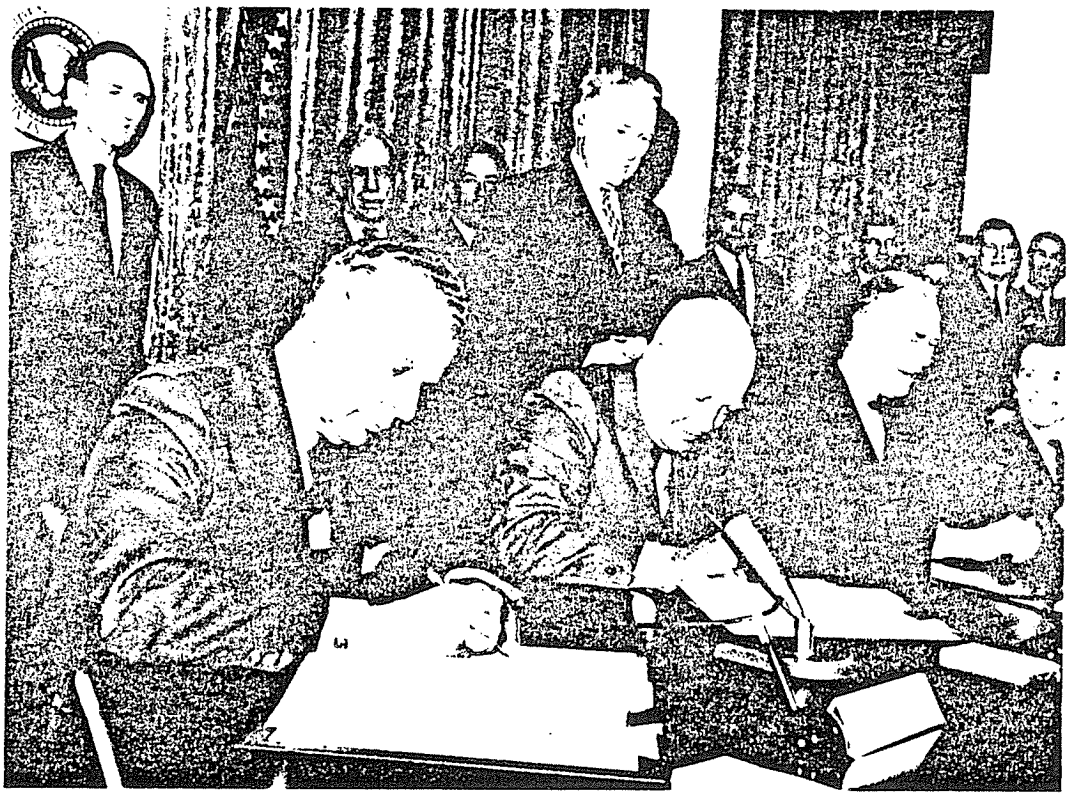
The United States derives two major benefits from the Treaty. One is flood control — ending the danger of serious flooding on both the Columbia and Kootenay rivers (Kootenai in the United States). The other is a large block of low-cost power. For her part, Canada also receives flood control on the Columbia and Kootenay and an equal share of low-cost power from the Columbia River.

In accordance with the Treaty, Canada built three dams in British Columbia which were completed between 1967 and 1973. The Treaty also allowed the United States to construct a fourth dam, Libby, in northwestern Montana. It backs water 42 miles into Canada. These dams have more than doubled the amount of water that can be stored to regulate flows on the main stem of the Columbia River.

This means that water formerly flowing unchecked to the sea can be held back to control floods and released as needed to produce power at dams downstream in Canada and in the United States.

There are now 11 dams operating on the Columbia in the United States. Six are owned by the Federal government and five by three public utility districts of the State of Washington.

The regulation of streamflows made possible by the three Canadian reservoirs enables dams in the United States to produce up to 2.8 million kilowatts of dependable capacity, which Canada and the United States share equally. Canada has sold her share in the United States on a long-term contract. One-half the downstream power bene-



Signing the Columbia River Treaty, January 17, 1961

fits attributable to each Canadian project go to the United States purchasers for 30 years after the completion date of each project. Thereafter, they revert to Canada.

Generation at Libby Dam will add to this supply about 750,000 kilowatts of firm power at site and downstream in the United States. Thus total Treaty power benefits in the United States, including Canada's share, amount to as much as 3.5 million kilowatts. Canada, too, can reap downstream benefits from Libby Dam, estimated by the British Columbia Hydro and Power Authority to be about 200,000 kilowatts. This includes the Kootenay Canal project on that river in Canada.

The Treaty and the Pacific Northwest-Pacific Southwest Intertie made feasible the construction of a third powerhouse at Grand Coulee Dam. Ultimately the third powerhouse is capable of having an installed nameplate generating capacity of 7.5 million kilowatts, for a total of almost 10.1 million kilowatts, larger than any existing hydro plant in the world.

THE COLUMBIA RIVER

Heavy snows and rains which fall on the Canadian Rockies create the Columbia River. From Columbia Lake in British Columbia, deep in the rocky spine of the North American continent, the Columbia River flows northward for 200 miles, then abruptly turns south. It enters the United States near Northport, Washington, about 90 miles north of Spokane. From its source in Columbia Lake to its mouth in the Pacific Ocean the river flows 1,240 miles and drops 2,650 feet. Five hundred miles and 1,350 feet of the river's descent are in Canada.

Although only 15 percent of the drainage area of the Columbia River is in Canada, about 30 percent of its total flow originates there. In the 1948 flood which destroyed Vanport, Oregon, about 28 percent of the Columbia waters came from Canada.

The flood control benefits achieved during 1974 as a result of the reservoir capacity of Arrow Lakes and Duncan in Canada and the Libby

reservoir in the United States were significant.

It is estimated that Libby, Duncan, and Keenleyside (referred to as "Arrow Lakes" in the Treaty) projects contributed about 23 percent of the total effective storage for flood control regulation of the lower Columbia River during the peak runoff month of June 1974.

The Columbia is the second largest river in the United States. Only the Mississippi travels farther and carries more water. The Columbia's flow is 10 times that of the Colorado, 2½ times that of the Nile. It has one-third of the hydroelectric potential of the United States. As a source of power, the Columbia is the mightiest stream on the North American continent.

The Columbia River and its tributaries drain a basin larger than France, a basin of 258,000 square miles.

Like the main stream, the tributaries of the Columbia, rising high in the region's mountains, are fed by snows and rain. As the seasons change and the snows melt, the flows of the Columbia River and its tributaries fluctuate widely. At Revelstoke, British Columbia, the Columbia River's largest measured flow is 99 times the lowest. At the International Boundary, 130 miles south of Revelstoke, the Columbia's largest flow is 680,000 cubic feet per second, its smallest 12,900 cfs.

These characteristics intensify the problems of flood control and power production. The solution to both of these problems is to build storage dams to control the river and thus alleviate flood losses while regulating the flow to increase firm power production. Although equivalent control could be achieved by building storage on Columbia River tributaries within the United States, the sites where the needed amount of storage could be built at the least initial cost were in Canada. The Treaty provided for development of this storage to benefit both Canada and the United States.

TREATY SUMMARY

Under the Treaty Canada was to develop 15.5 million acre-feet of water storage by building Duncan, Keenleyside (formerly Arrow Lakes), and Mica dams in British Columbia. All of this is usable for power production and for flood control.

Canada under the Treaty has agreed to operate 8,450,000 acre-feet of storage for flood control in the United States. The United States may call on Canada for additional flood control, but must then pay extra for it.

Two of the Canadian storage dams, Mica and Keenleyside, are on the main stream of the Columbia. The third, Duncan, is on a tributary of the Kootenay.

Duncan Dam was completed on July 31, 1967; Keeleyside Dam, October 10, 1968; and Mica Dam, March 29, 1973, all in advance of schedule.

The United States under the Treaty option built Libby Dam on the Kootenai River in Montana. Libby Dam adds nearly 5 million acre-feet of storage, all of it usable both for power and flood control. Storage was available for flood control July 1, 1973.

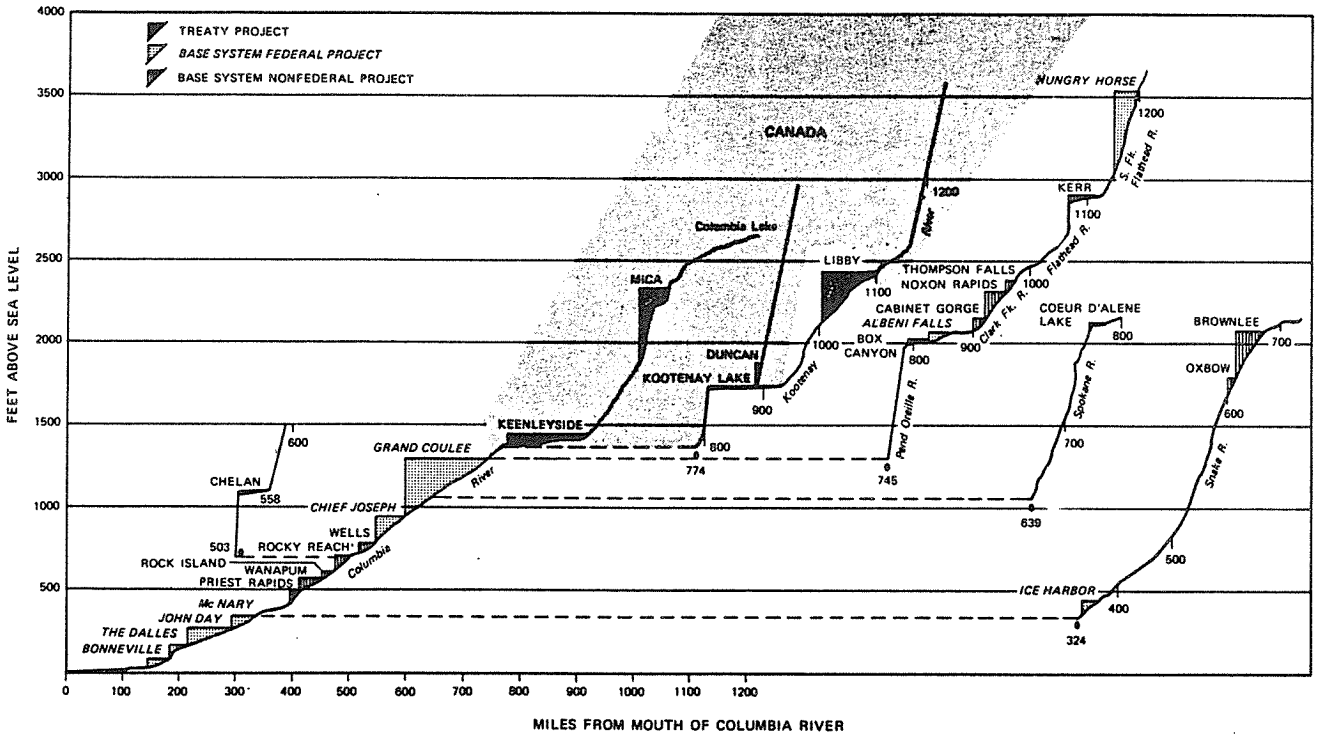
Existing non-treaty storage on the Columbia River and its tributaries, including non-Federal installations, totals 28 million acre-feet — all usable for power production and 16.9 million acre-feet usable for flood control.

Total storage on the Columbia and its tributaries is now some 43.5 million acre-feet of which over 25 million acre-feet are usable for flood control, as shown in the following table:

	Usable for power (million acre-feet)	Usable for flood control (million acre-feet)
Non-treaty Columbia River storage in the U.S. above The Dalles OR.	28.0	16.9
Three Canadian Treaty Dams	15.5	8.450[1]
Total	43.5	25.350

[1]*Under the Treaty the United States has paid for the use of 8,450,000 acre-feet of storage for flood control. The remaining 7 million acre-feet may be used on an "on-call" basis for control of large floods with additional payment to Canada.*

PROFILE SHOWING ELEVATIONS AND RIVER-MILE LOCATIONS OF PROJECTS IN THE COLUMBIA RIVER BASE SYSTEM



Operating Plan

Under the terms of the Treaty, each nation has designated an operating entity. Canada's entity is British Columbia Hydro and Power Authority. The United States entity consists of the Administrator of the Bonneville Power Administration, Chairman, and the Division Engineer, North Pacific Division, U.S. Army Corps of Engineers. The entities are charged with formulating and carrying out the operating arrangements necessary to implement the Treaty.

Canada operates her three storage dams in accordance with plans agreed upon for optimum power generation and flood control on the Columbia River in the United States and Canada. The three Canadian projects are operated in coordination with all U.S. Columbia Basin projects. The purpose is to make the most effective use of the improvement in streamflows resulting from storage at the three Canadian dams.

A base system of 24 projects was used in determining power benefits under the Treaty. This base system includes Kootenay Lake in British Columbia, the 11 dams on the main stem, and 12 dams on the Columbia tributaries.

Most of the Treaty power is produced at the 11 main stem dams. The six Federal dams are Bonneville, Grand Coulee, McNary, The Dalles, Chief Joseph and John Day. The five non-Federal main stem dams are Rock Island and Rocky Reach owned by Chelan County PUD; Priest Rapids and Wanapum owned by Grant County PUD; and Wells owned by Douglas County PUD.

The 12 base system projects on tributaries in the United States are in Federal, public and private ownership. They are Hungry Horse, Kerr, Thompson Falls, Noxon Rapids, Cabinet Gorge, Albeni Falls, Box Canyon, Brownlee, Oxbow, Ice Harbor, Chelan, and Coeur d'Alene.

Canada and the United States have agreed upon formulae for equal sharing of the power and flood control benefits that the United States will receive from three Canadian projects. This is explained in the succeeding sections.

TREATY POWER BENEFITS

Two terms are used to describe the increases in power production which result from the Treaty. These terms are "dependable capacity" and "energy." Both are common in the utility industry.

Dependable capacity credited to Canadian storage is the amount of firm peaking power that can be delivered from the base system in the United States at the average critical period load factor. Firm power is power that can be guaranteed for delivery when it is needed. Dependable capacity usually is expressed in kilowatts.

Energy is the amount of power produced by a plant in a given period expressed in kilowatt-hours.

The bulk of additional usable power made available under the Treaty results when the water stored behind the three Canadian dams is released to flow through the 11 United States dams on the main stem of the Columbia. The Canadian storage increases the amount of usable regulated streamflow at each downstream plant in the United States. This additional dependable supply of water increases both the "dependable capacity" and "energy" at each of these plants.

During winter, when Columbia Basin streamflows are lowest, electrical loads of the region are highest. During summer, when Columbia streamflows reach their peaks, electrical loads of the region are lowest, and large amounts of water spill unused over the dams and are wasted. The Canadian dams hold back part of this summer flow and make it available during winter when the need for dependable capacity and energy increases.

At their maximum in 1974-75, the extra power benefits amounted to nearly 2.8 million kilowatts of dependable capacity and approximately 13.3 billion kilowatt-hours of energy. By year 2003 it is estimated that the dependable capacity benefits will decline about 740,000 kilowatts and energy benefits to about 3.6 billion kilowatt-hours.

The actual production of power at United States dams does not decline. It is just that the value of storage, including Canadian storage, be-

Some general and physical characteristics of the three Canadian storage dams and of Libby Dam are:

	Duncan	Keenleyside	Mica	Libby
Location	**Outlet of Duncan Lake**	**5 miles upstream from Castlegar**	**90 miles upstream from Revelstoke**	**17 miles upstream from Libby, Montana**
Drainage area	930 sq. mi.	14,100 sq. mi.	8,220 sq. mi.	8,985 sq. mi.
Average flow	3,600 cfs	39,800 cfs	20,700 cfs	11,970 cfs
Max. rec. flow	21,400 cfs	220,000 cfs	112,000 cfs	121,000 cfs
Min. rec. flow	268 cfs	4,800 cfs	2,140 cfs	895 cfs
Dam type	Earthfill	Earthfill	Earth and rockfill	Concrete gravity
Dam height (above riverbed)	130 feet	170 feet	640 feet	370 feet
Dam crest length	2,600 feet	2,850 feet	2,600 feet	3,055 feet
Dam volume	6,400,000 cu. yds.	8,500,000 cu. yds.	42,200,000 cu. yds.	3,760,000 cu. yds.
Live storage capacity	1,400,000 ac. ft.	7,100,000 ac. ft.	Storage only: 7,000,000 ac. ft. With at-site gen., 12,000,000 ac. ft.	4,934,000 ac. ft.
Length of reservoir	28 miles	145 miles	135 miles [3]	90 miles
Initial Flood Control Payment in U.S. Dollars	$11,182,000[1]	$52,296,000[1]	$1,200,000	[2]

[1]*Total includes additional payment for early completion.*
[2]*Annual flood control benefits are estimated to be $3,055,000.*
[3]*Valemont on Canoe River to Donald on Columbia; Mica Dam to Donald is 85 miles.*

comes less as the region adds to its powerplants.

The reasons energy benefits credited to Canadian storage decline over the years are basically two: (1) As the region's power requirements increase, more hydro capacity (generators) is being installed at United States dam sites; (2) In a few years the remaining economic hydro sites will be fully developed and the region will continue to build thermal (steam) plants to produce addtional energy.

The combination of these two factors will enable the hydro generators to make increasingly effective use of the Columbia River flows, even without storage, and thus diminish the value assigned to storage. This requires further explanation.

At present the Northwest has a virtually all-hydro power system which is used to carry both base load and peak load. Base load is the minimum requirement around the clock. Peak load is the demand for power above the base load. Peak demands occur daily, during the breakfast and dinner hours, for example, and seasonally as in winter when lights go on earlier and electric heating systems run longer.

For a hydro system to carry a region's entire load it must be able to produce firm power — the kind of power, as explained above, that can be guaranteed for delivery any time of day or night as needed. The amount of firm power our hydro system can produce is limited by the amount of steady streamflow in the river under the lowest conditions of record. This is called "critical" streamflow. When streamflow is higher than critical, these hydro plants can produce additional power called secondary energy. Secondary energy cannot be guaranteed for delivery.

Storage of spring and summer high streamflow has the effect of increasing the critical streamflow. This is because storage releases in autumn and winter can be timed to maintain a steady additional flow. This enables our hydro projects to produce more firm power. It gives storage a high power value now.

Two of the Canadian storage dams, Duncan and Keenleyside, produce no at-site power under the Treaty; their sole function is to store water. At Mica, however, generating capacity has been installed by Canada. The Canadian storage dams also make it feasible for Canada to build several dams on the Columbia on her side of the border. Canada is considering a project at Revelstoke Canyon with an installed generating capacity of as much as 2 million kilowatts. The United States is not entitled to any portion of the power produced by generation installed in Canada as a result of the Treaty.

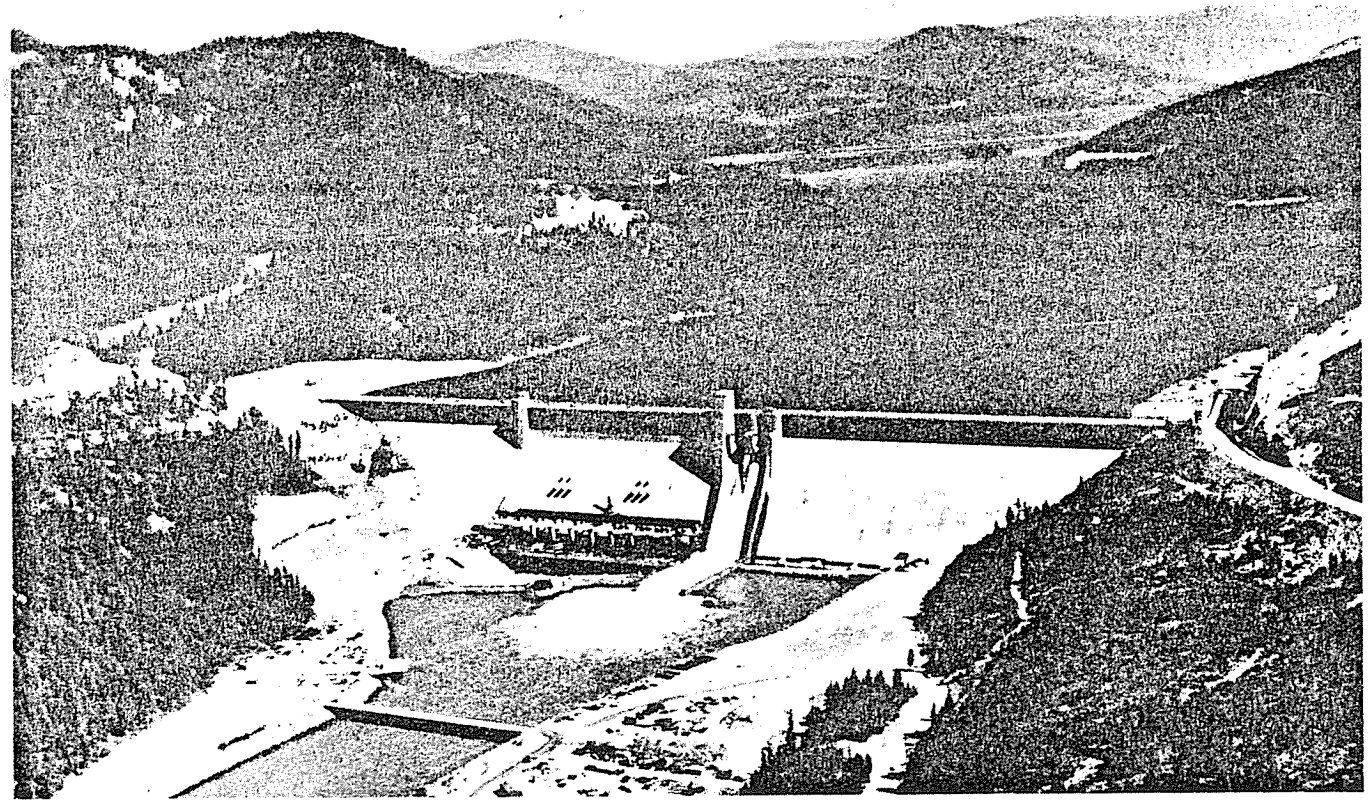
Libby Dam

Libby Dam provides nearly 5 million acre-feet of storage. It adds about 750,000 kilowatts of firm power at site and downstream in the United States and about 200,000 kilowatts downstream in Canada. The United States is entitled to all Libby power and flood control benefits on our side of the border, and Canada, in exchange for providing 42 miles of the Libby reservoir, to all downstream power and flood control benefits on her side of the border.

Benefits Shared

In return for building the three storage projects, Canada, under the Treaty, was to receive one-half of the increased dependable capacity — the extra power produced — at United States dams in the base system. The owners of the projects in the United States would retain the other half. The Treaty contemplated that Canada's share of Treaty power — 1.4 million kilowatts at the maximum — would be delivered at her International Border. The Treaty also provided, however, that if Canada so desired, and the United States agreed, Canada could sell her share in the United States. Canada chose the latter course and for 30 years after each Treaty project was completed has sold to the United States purchasers her share of downstream power attributable to each project for a total price of $253,930,000 in United States dollars paid in a lump sum on September 16, 1964.

The power was purchased by the Columbia Storage Power Exchange (CSPE), a nonprofit corporation described more fully later in this



Libby Dam

handbook, and simultaneously resold by CSPE to 41 participating public and private utilities through an exchange agreement with BPA. Four private utilities took 50 percent of the Canadian entitlement and 37 public agencies and cooperatives the other 50 percent. Revenue bonds sold by CSPE in the United States, secured by all of these contracts, financed the purchase.

Several major arrangements had to be completed by the utilities in the United States before the Treaty could take effect. They include a division of the benefits among the separate owners of the downstream dams, an agreement to coordinate operations of a number of hydroelectric projects in the river basin, and resale of the Canadian entitlement.

ALLOCATION AGREEMENTS

Allocation agreements were needed because the downstream benefits would be produced at 11 dams under different ownerships, and the owners had to agree on how the benefits were to be attributed to each project. The United States Government owns six of these dams and the PUDs five. About 74 percent of the Treaty power is generated at Federal projects and 26 percent at the PUD dams.

BPA has available to it as the Federal portion of the U.S. share more than 1,000,000 kilowatts of firm power resulting from Canadian storage and about 585,000 kilowatts of firm power from Libby (at site and downstream) or, initially, a total of about 1.6 million kilowatts.

The PUD owners of main stem dams receive about 365,000 kilowatts of power benefits from Canadian storage and about 165,000 kilowatts from Libby or, initially, a total of more than 500,000 kilowatts.

The table on page 14 shows the firm power increases at United States dams attributable to the Canadian Treaty.

TYPICAL DISTRIBUTION OF FIRM POWER INCREASES AT
U.S. COLUMBIA RIVER POWER PLANTS ATTRIBUTABLE TO CANADIAN TREATY

	Megawatts Without Treaty	Megawatts With Treaty	Gain
Grand Coulee	1,770	2,510	740
Chief Joseph	910	1,230	320
Wells	400	550	150
Rocky Reach	580	790	210
Rock Island	170	220	50
Wanapum	500	690	190
Priest Rapids	500	660	160
McNary	650	860	210
John Day	940	1,240	300
The Dalles	810	1,050	240
Bonneville	570	700	130
	7,800	10,500	2,700[1]
Libby	0	750	750
Total, including Libby	7,800	11,250	3,450

[1]*Excludes increases at "Base System" projects not directly affected by Canadian storage releases. When gains and losses at other base system projects are included, this figure is raised to about 2,800 megawatts.*

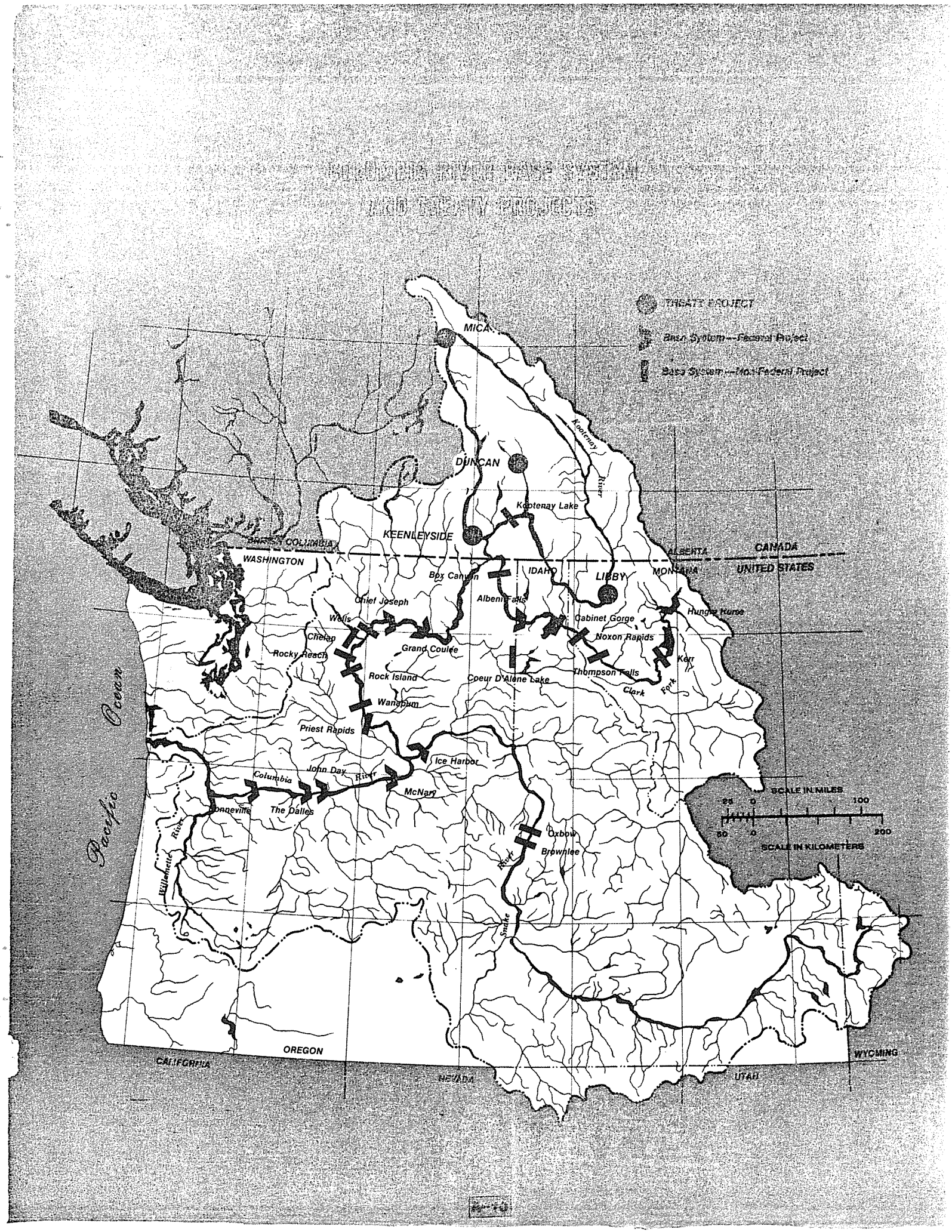
There are five allocation agreements, one for each PUD project on the main stem of the river. They are called the Canadian Entitlement Allocation Agreements. The became effective on September 16, 1964, and will terminate March 31, 2003. The parties to the agreeement are the PUDs and the BPA Administrator, who acts for BPA and the United States Entity in relation to these agreements.

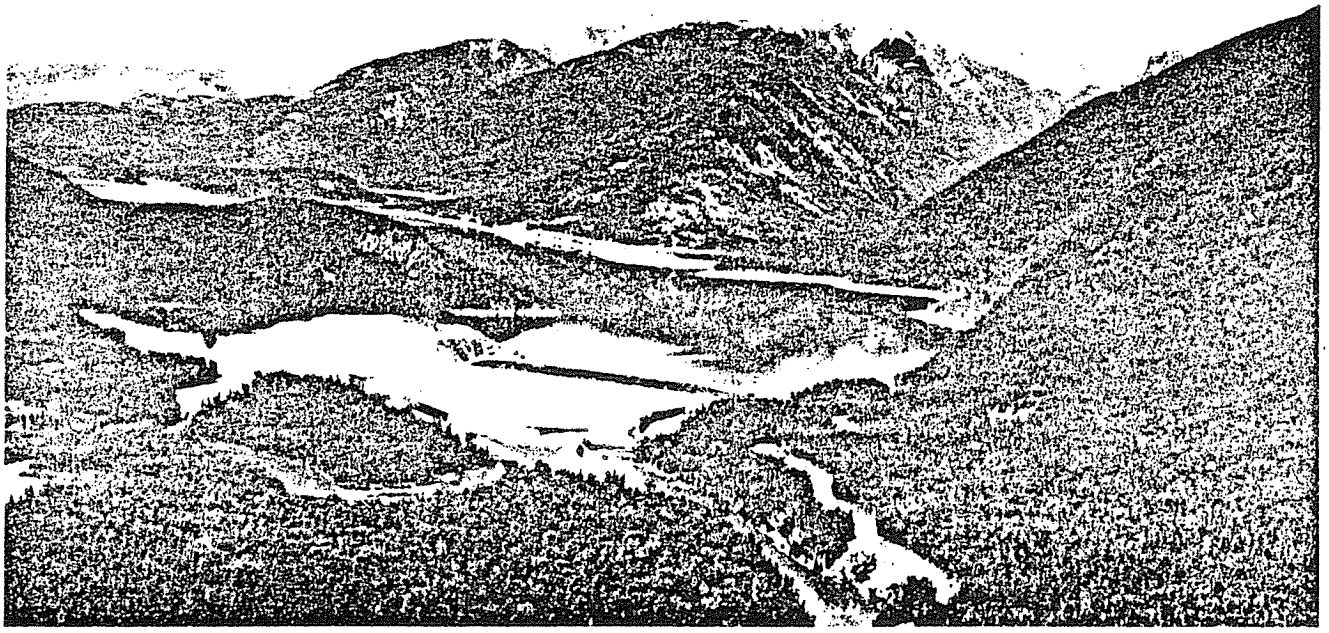
The PUD's have agreed to supply the Administrator with stipulated amounts of dependable capacity and average usable energy as the share of the Canadian entitlement attributable to their projects. If the Districts lack sufficient capacity at their own projects to make up their share of the Canadian entitlement, they may purchase this capacity from the Administrator. In addition, they may purchase capacity from the Administrator to firm up their share of the United States entitlement without installing additional generating capacity.

A set of assignment agreements accompanies the allocation agreements. These agreements are between the PUDs and those who purchase the output of their projects. In these agreements the purchasers consent to and approve the Districts' action in executing the allocation agreements.

Coordination Agreement

Under the Treaty the United States has to account to Canada for downstream benefits at all the downstream dams regardless of ownership on a formula which assumes that all the dams be operated as though under a single ownership. To produce benefits in accordance with the Treaty formula required an agreement among the various owners of the downstream dams to coordinate the operation of their dams, as well as other dams in the Columbia Basin. The purpose of the agreement is to coordinate operations of the dams owned by Federal, public and private interests to produce power and other benefits to meet the region's needs with the greatest possible efficiency, despite seasonal variations in streamflows. The coordination agreement involves complex technical details. It terminates in the year 2003.


TREATY PROJECT
Basin System—Federal Project
Basin System—Non-Federal Project
MICA
DUNCAN
Kootenay Lake
KEENLEYSIDE
Kootenay River
BRITISH COLUMBIA
WASHINGTON
ALBERTA
CANADA
UNITED STATES
IDAHO
MONTANA
LIBBY
Box Canyon
Albeni Falls
Chief Joseph
Wells
Chelan
Rocky Reach
Grand Coulee
Cabinet Gorge
Hungry Horse
Noxon Rapids
Kerr
Thompson Falls
Clark Fork
Rock Island
Coeur D'Alene Lake
Wanapum
Priest Rapids
Ice Harbor
John Day
Columbia River
McNary
Bonneville
The Dalles
Oxbow
Brownlee
Snake River
Willamette River
Pacific Ocean
SCALE IN MILES
25 0 100
50 0 200
SCALE IN KILOMETERS
OREGON
CALIFORNIA
NEVADA
UTAH
WYOMING



Duncan Dam

Exchange Agreement

The bonds issued by CSPE to finance the purchase were secured with power exchange agreements among CSPE, the United States (acting throught the Bonneville Power Administrator in his capacity as Administrator and on behalf of the United States Entity) and the 41 participating utilities. Under the exchange agreements CSPE assigns a portion of the Canadian entitlement to each participating utility for the 30 years that follow scheduled completion of each project. Each participating utility assigns to BPA its rights to the Canadian entitlement in exchange for an agreed upon amount of firm power from BPA, which BPA guarantees to deliver even if Canada, for any reason, should have failed to construct its projects or operate them as contemplated. Each of the participating utilities makes payments to a single trustee for its share of the power, and the trustee in turn pays off the revenue bonds. The aggregate of the payments by the participating utilities is sufficient to pay the principal, interest, and expenses of the bonds and pay administrative expenses of CSPE.

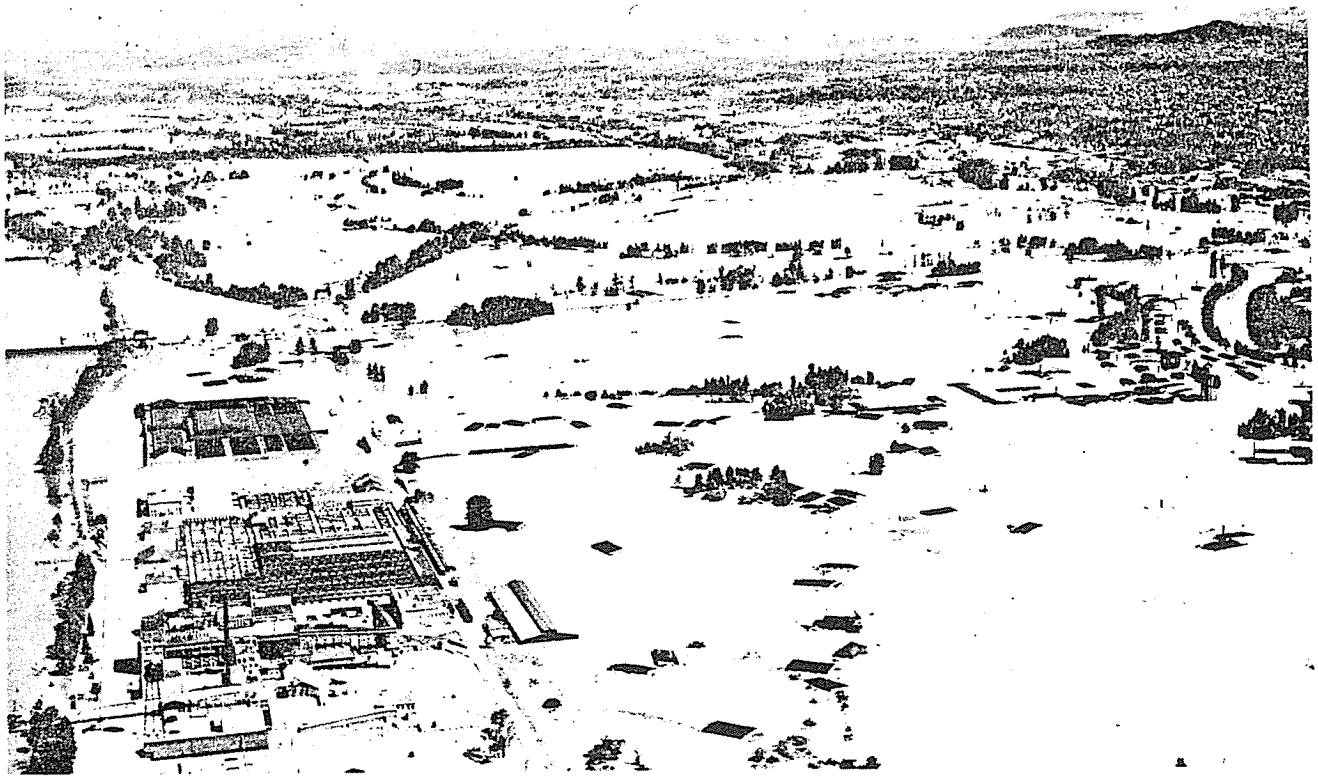
Cost

Based on the amount of capacity and energy to be made available to the paticipants, the Canadian entitlement costs $5.05 per kilowatt-year plus 2.48 mills per kilowatt-hour for energy. At 60 percent load factor the cost would be 3.44 mills per kilowatt-hour. Transmission costs, line losses and taxes are not included.

TREATY FLOOD CONTROL BENEFITS

The Columbia River has experienced four unregulated peak discharges in excess of 1,000,000 cubic feet per second since man began to measure and record its flows. Those peaks at The Dalles were 1,240,000 cfs in 1894; 1,010,000 cfs in 1948; 1,050,000 cfs in 1972; and 1,010,000 cfs in 1974.

The river level during the 1894 flood was 35.5 feet at the site of the Interstate Bridge between Portland, Oregon and Vancouver, Washington. If a flood of this size were to hit again, storage built



Additional storage provided by the treaty will help prevent recurrence of the Vanport Flood of 1948

to date in the United States, excluding Libby, would enable man to hold the level of the river at Portland to 31.1 feet, 4.4 feet less. The three Canadian storage projects and Libby would reduce the river level to 26.1 feet, 9.4 feet below the highest flood on record in Portland.

The 1974 unregulated flow of 1,010,000 cfs was the third highest on record and would have produced a peak stage of 30.6 feet at Portland. With all of the Treaty storage projects, the observed flow was reduced to 590,000 cfs at The Dalles with a 21.1 foot stage at Portland, nearly 10 feet below the unregulated stage.

This means that thousands of acres of land along the lower Columbia have been made safe from floods. Over 80,000 acres of unprotected lands were flooded during the 1948 high flow period. In 1974, more than $200 million of flood damage was prevented on the lower Columbia with the flood protection by the upstream reservoirs. Some of this land is suited for industrial uses. Its value for this and other uses has been greatly increased.

Flood Control Goals

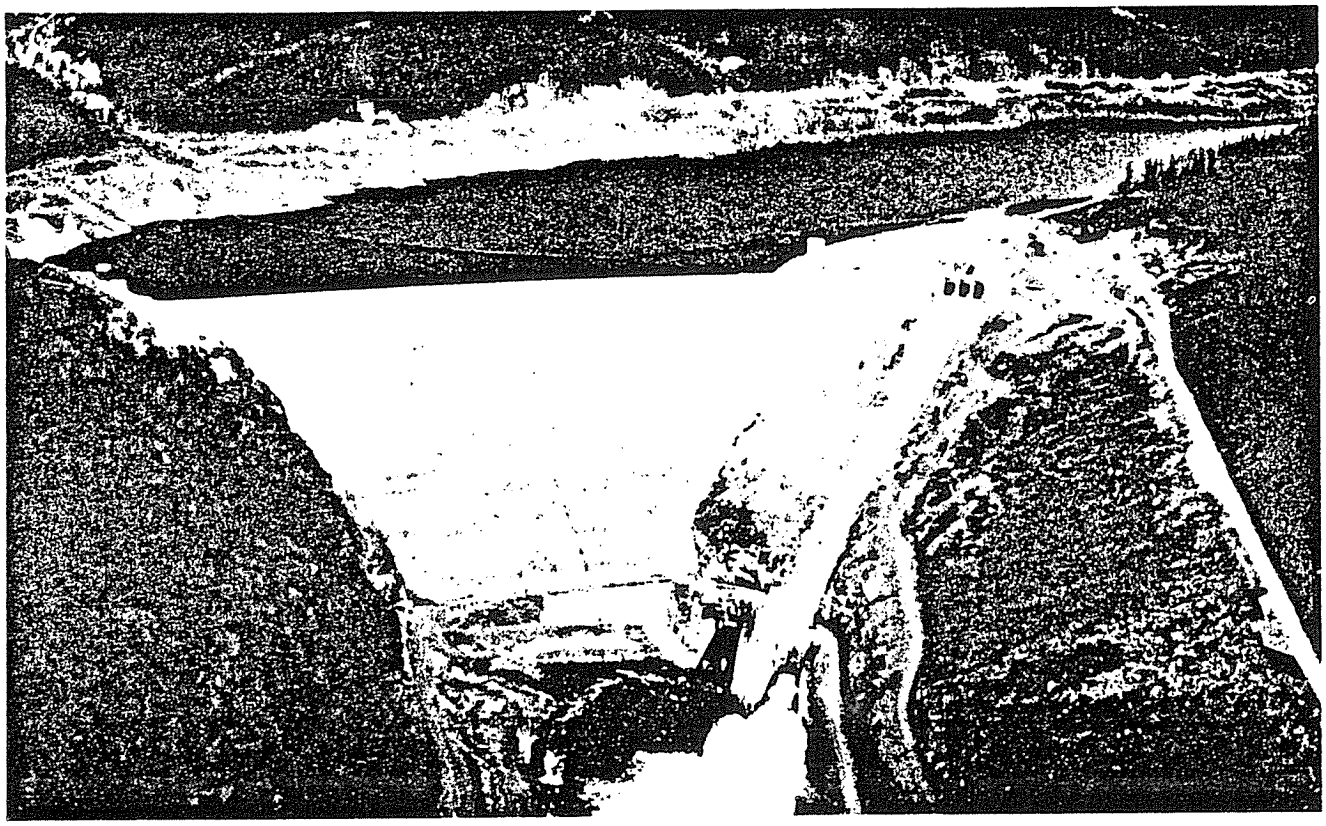
The Corps of Engineers set two objectives on flood control for the river in a 1958 report on water resources in the basin. The first objective was enough storage to hold a flow equal to the 1894 flood to 800,000 cfs at The Dalles, which corresponds to a stage at Vancouver of 27.1 feet. This would require a total of nearly 18 million acre feet of usable flood control storage well distributed over the basin.

As a secondary goal, the Corps recommended a maximum flow of 600,000 cfs equivalent to a stage of 22.2 feet at Vancouver. The Corps said this could be obtained with an additional 14 to 15 million acre feet of usable storage, or some 32 million acre feet in all.

Flood damage at Vancouver begins at a river stage of about 16 feet; major flooding occurs when the river stage exceeds 26 feet.

Flood Control Distributed

It would be possible for the United States to



Mica Dam

build the total storage capacity needed by adding new projects to those within its own boundary. Storage built under the Treaty, however, better distributes the flood control over the basin to include direct control over Canadian drainages which contribute major portions of the Columbia River flood flows.

The percentage which Kootenay River flood flows contributed to the total flows at The Dalles in 1894, 1948, 1972 and 1974 are shown below.

PERCENTAGE FLOOD CONTRIBUTION

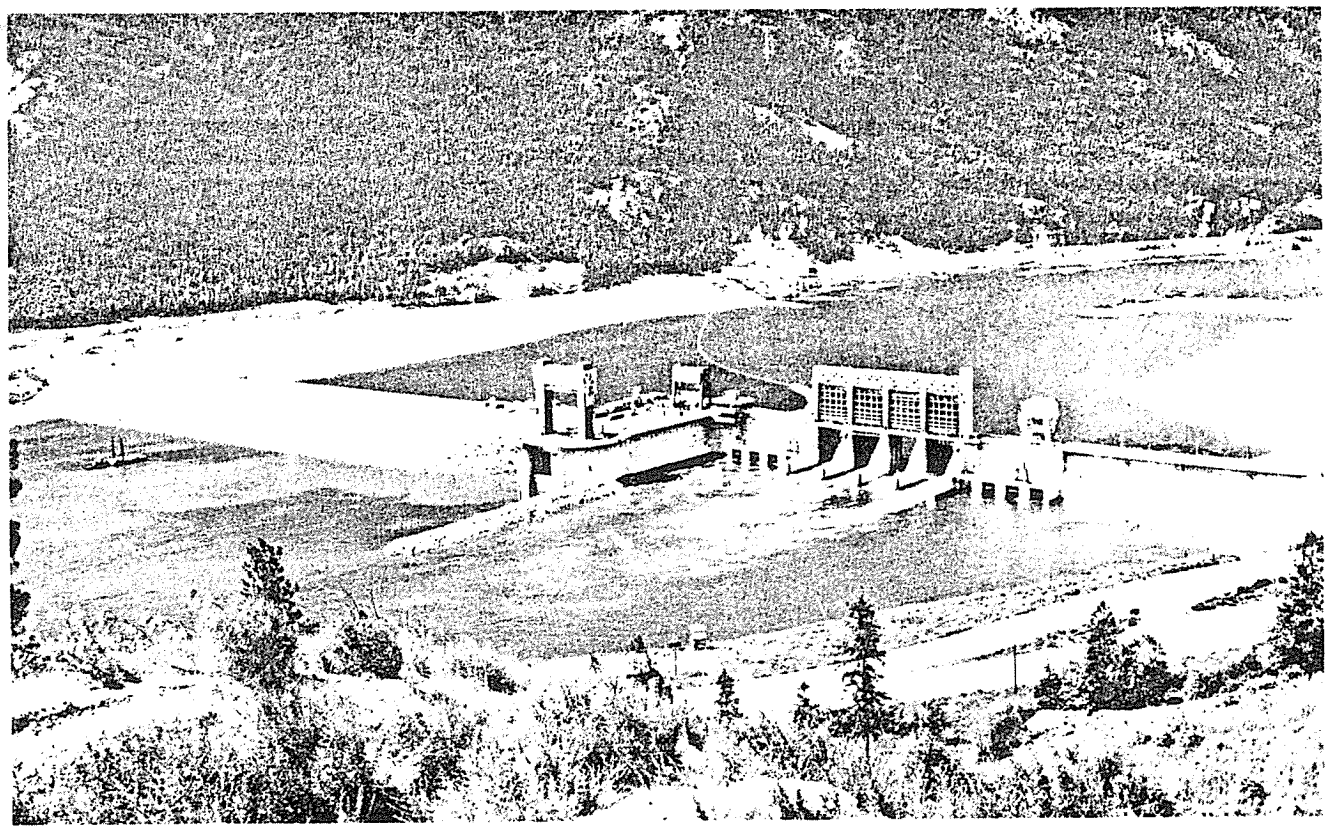
	1894 Flood	1948 Flood	1972 Flood	1974 Flood	Average
Columbia River Above the Kootenay	23%	16%	22%	23%	21%
Kootenay River Above its Mouth	17%	15%	16%	17%	16%
Columbia River at The Dalles, Oregon	100%	100%	100%	100%	100%

How Flood Control Benefits Computed

Despite the difficulties of predicting future floods and the damage they might cause, the value of Canadian storage for flood control must of necessity be based on forecasts. The damage prevented was estimated on a 1985 level of development for the areas lying in the path of floods. The estimate took into account increases in values for lands freed from floods.

Of the 15.5 million acre-feet of storage available, 8,450,000 acre-feet is assured for flood control on a year-to-year basis. The remaining 7 million acre-feet may be used on an "on-call" basis for control of large floods, with payment of additional funds to Canada. The Treaty provides that with the flood control payments this amount of storage will be operated for flood control needs of the United States through September 16, 2024.

The 8,450,000 acre-feet of storage usable for flood control consists of 7,100,000 acre-feet behind Keenleyside Dam in Arrow Lakes, 1,270,000 acre-feet in Duncan Lake and 80,000 acre-feet behind Mica Dam. Out of this total storage of 7,100,000 acre-feet at Arrow Lakes, only about



Keenleyside Dam

3,300,000 acre-feet would have been available through natural storage.

This storage was judged to be worth $5,700,000 a year in flood control benefits. The $64.4 million flood control payment to Canada was based on one-half of this annual benefit; capitalized for a period equal to 60 years minus the time required for construction at an annual interest rate of 3⅞ percent. The interest rate represents the average for long term United States government bonds outstanding in December 1960.

The $64.4 million required by the Treaty was paid to Canada in three installments. As each of the three projects was completed and began operation for flood control, that portion of the $64.4 million attributable to its storage became due. $11,182,00* was paid after Duncan Dam was declared operational July 31, 1967, $52,296,000* was paid when Keenleyside Dam was declared operational October 10, 1968, and $1,200,000 was paid when Mica was declared operational on March 29, 1973. As stated earlier, the United States may call on Canada for additional flood control at an added cost of $1,895,000 per call for the first four calls. No further charge will be made for additional calls.

*The United States paid sums higher that agreed to in the Treaty because of early completion of the dams.

Future Provisions

After the first 60 years have passed Canada will continue to operate its storage in the Columbia River Basin to control floods, when asked to do so by the United States. The United States has agreed to pay for this service. For each flood period for which this flood control is provided Canada is to be paid (a) the operating cost incurred in providing flood control and (b) compensation for the economic loss to Canada arising directly from "Canada foregoing alternative uses of the storage to provide the flood control."

TREATY HISTORY

The Columbia River is the central geographic fact of the Pacific Northwest. Development of the

river since 1933 has changed the character of the region. It is now the nation's principal source of hydroelectric energy, and supports a growing industrial and agricultural economy.

In an early stage of this development — on March 9, 1944 — the governments of Canada and the United States asked the International Joint Commission to determine whether the construction of projects on the Columbia would be advatageous to both nations. The Commission established the International Engineering Board. The Board made extensive technical studies and reported to the Commission in 1959 on possible plans.

Meanwhile the United States in 1951 applied to the Commission under the Boundary Waters Treaty of 1909 for approval to build Libby Dam. The United States later withdrew the application, and in 1954 resubmitted it. The Commission did not agree on approval. The Treaty gave the United States the Authority it needed from Canada to build Libby Dam.

In January 1959 the two nations asked the Commission for its report and recommendations on the principles to be used in determining the benefits and how they were to be apportioned between the two countries. The Commission reported in December 1959. It provided valuable guidelines for the delegations of the two governments who began formal treaty negotiations in early 1960. The United States delegation was composed of one representative each from the Department of the Interior, Department of State, and the Army Corps of Engineers.

Months later, and as the culmination of years of comprehensive study and negotiations, the Treaty was agreed upon. President Eisenhower and Prime Minister Diefenbaker signed it January 17, 1961, at Washington, D.C.

Ratification Delayed

The United States quickly ratified the Treaty. Canada, however, delayed ratification because of a difference between the Canadian national government and the Province of British Columbia over disposition of Canada's share of the Treaty power.

The issue was not resolved until after the April 1963 general election in Canada. The Canadian and British Columbia Governments then agreed Canada's entitlement should be sold in the United States but that the Treaty first should be clarified in certain particulars thought necessary by the new Canadian government to fully protect Canada's interests.

Treaty Ratification

In the round of negotiations which followed, the two countries arrived at a price for Canada's share of the power. And on January 22, 1964, notes were exchanged ratifying the agreement on terms of sale.

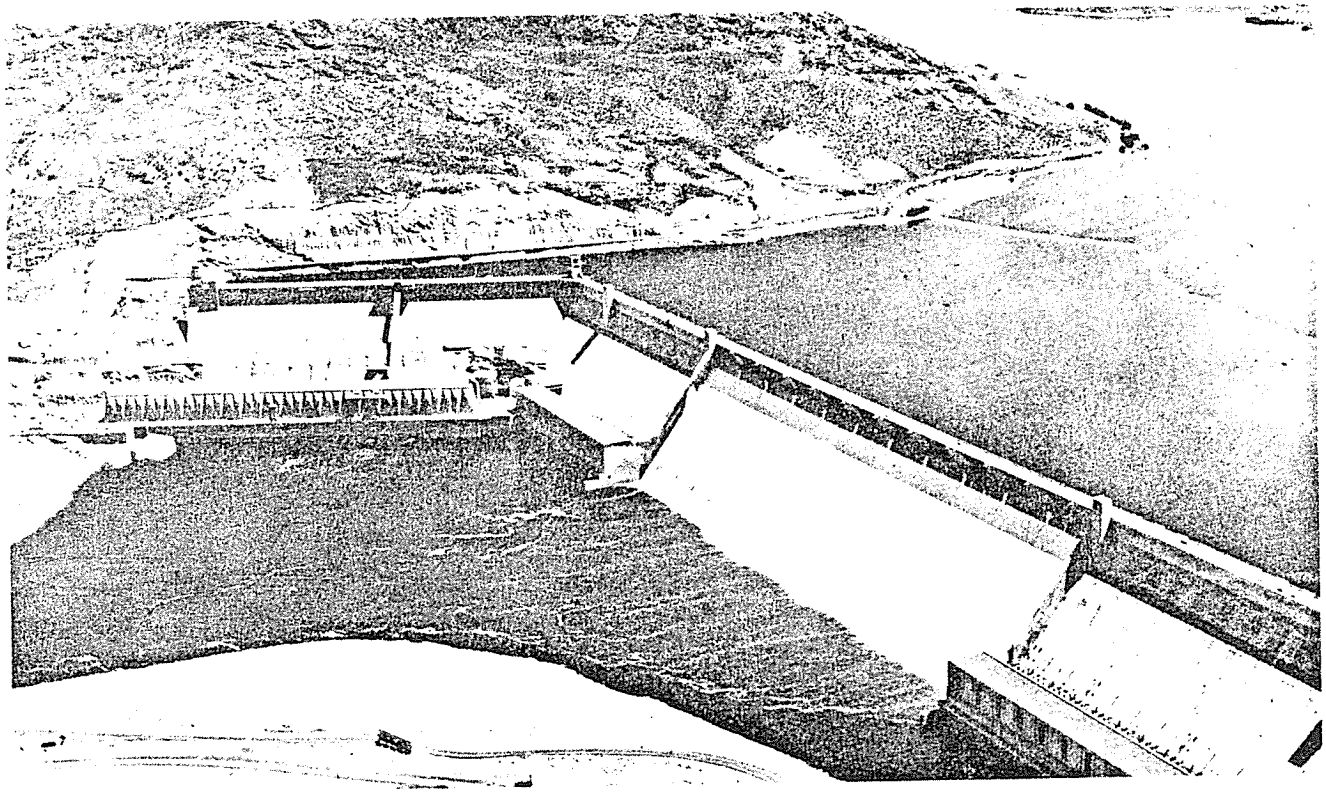
Among other things, these new documents contained a pledge by the United States that it would use its best efforts to arrange the sale of Canada's share of Treaty power for 30 years to a single purchaser in the United States for $254.4 million U.S. dollars ($274.8 million Canadian dollars) payable in full as of October 1, 1964. Canada pledged her best efforts for early ratification.

Because a great many things had to be done in a comparatively short time, leaders on both sides of the International Boundary moved quickly.

The Canadian Parliment approved ratification in June, subject to consummation of the sale, and payment of the purchase price, as described above. Approval by the House of Commons came on June 5, 1964, and by the Senate just five days later.

Columbia Storage Power Exchange

The single United States purchaser, a nonprofit corporation, Columbia Storage Power Exchange, was organized May 11, 1964. It was sponsored by Chelan, Douglas and Grant County Public Utility Districts. CSPE's purpose was to execute the contracts to buy Canada's Treaty power, to issue the bonds necessary to finance the purchase, and to resell the power to retire the indebtedness.



Grand Coulee Dam, showing third powerhouse on the left

The management of CSPE is vested in a board of trustees composed of 11 members. These members are appointed, one each, by five public utility districts, three municipalities, and three private power companies. The PUDs are Chelan, Douglas, Grant, Cowlitz and Pend Oreille, the cities Seattle, Tacoma and Eugene, and the private power companies are Portland General Electric Co., Puget Sound Power and Light Co. and Washington Water Power Co.

Cooperative Efforts

The major agreements, as well as lesser agreements, had to be negotiated and signed before the Treaty could take effect. Activity to meet the October 1 deadline was intense.

The work required the cooperative efforts of private firms, public utilities and government agencies. On August 13, 1964, a small mountain of documents was signed. The arrangements were extremely complicated. They included purchase agreements, power exchange agreements, power allocation agreements, agreements to coordinate generating projects, escrow agreements, and payment agreements. All of these documents were put in escrow pending the sale of the bonds.

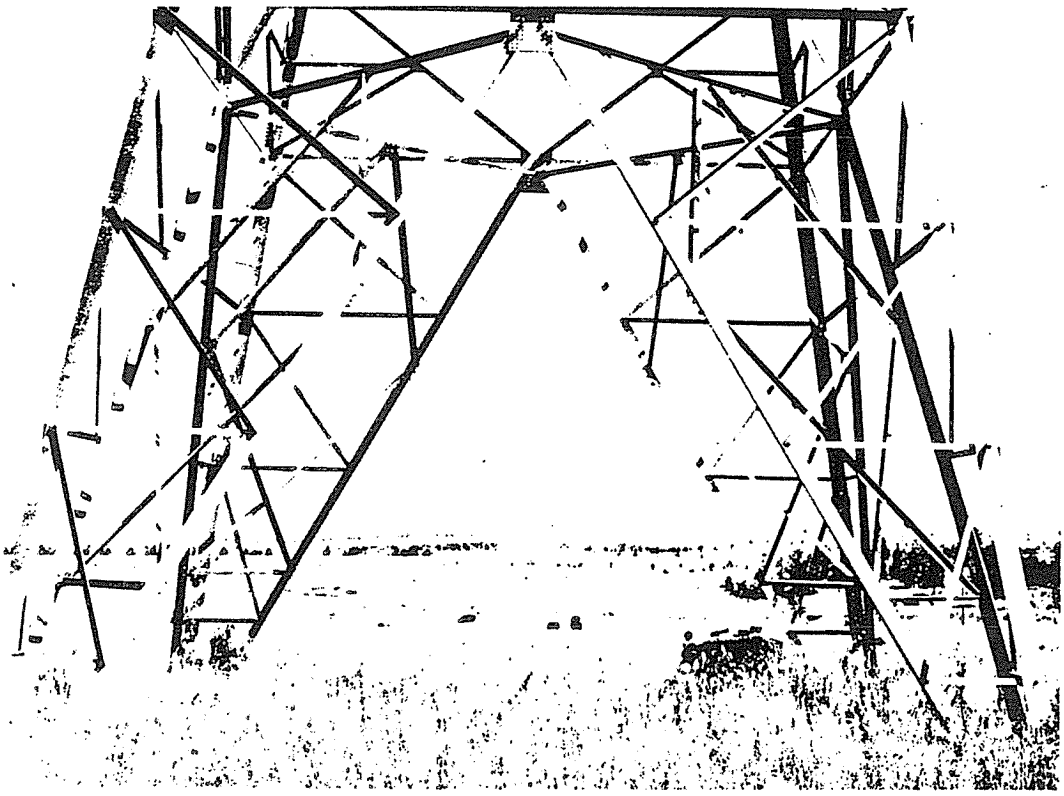
Bond Sale

The next big step was to sell the bonds.

Bond underwriters in the United States were kept informed as the arrangements progressed, and on August 26, 1964, a syndicate announced it would buy the bonds at an effective interest rate of 3.85 percent. The total amount of the issue was $314.1 million. (This figure includes interest during construction.) It was at that time the fourth largest revenue bond issue in the history of the country. At this interest rate the cost of power to United States purchasers was reduced to 3.44 mills per kilowatt-hour at 60 percent load factor.

Treaty and Intertie Are Related

The underwriters explained, after the issue



Intertie transmission lines, central Oregon.

was sold, that the favorable interest rate was possible because Congress earlier in August approved the Pacific Northwest-Pacific Southwest Intertie.

The Intertie assured that the Canadian entitlement could be resold to the California market during the early years of the Treaty when the Pacific Northwest did not need the entitlement. By April, 1970, the California utilities who purchased entitlement power were given 5-year notice of withdrawal. Until April 1, 1975, they had received a maximum of 1,086 megawatts on peak and 696 megawatts average energy. After that date they were reduced to 300 megawatts on peak and 160 megawatts average energy through March 1978, after which further reductions to 150 megawatts on peak and 75 megawatts average energy were made. All power will be withdrawn by April 1, 1983.

The formal exchange of ratifications which implemented the Treaty occured in Ottawa September 16, 1964. That same day President Johnson and Prime Minister Pearson appeared together at an historic ceremony on the International Boundary at the Peace Arch at Blaine, Wash. Meanwhile, in New York City, bankers handed representatives of the Canadian government the check for $253,930,000. The actual payment was somewhat less that the $254.4 million agreed upon because the payment was made two weeks before the October 1, deadline and was adjusted for interest. The events occured almost simultaneously. The Treaty became a reality.

APPENDIX B

LIMITATIONS ON SCOPE OF ENVIRONMENTAL ASSESSMENT

The proposed agreements, the no action alternative, and the filling agreement alternative would each affect the environment in both Canada (particularly the Province of British Columbia) and the United States. The Department of Energy, pursuant to Executive Order 12114 of January 4, 1979, has issued guidelines (46 FR 1007-1011) for the scope of environmental analyses undertaken for proposals having effects abroad. Section 4 of these guidelines lists four categories of actions abroad for which environmental review is mandatory. These are as follows:

A. "4.1 Major Federal actions significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., the oceans or Antarctica)."

B. "4.2 Major Federal actions significantly affecting the environment of a foreign nation not participating with the United States and not otherwise involved in the action."

C. "4.3 Major Federal actions significantly affecting the environment of a foreign nation which provide to that nation:

(a) A product, or physical project producing a principal product or an emission or effluent, which is prohibited or strictly regulated by Federal law in the United States because its toxic effects on the environment create a serious public health risk (see Appendix A): or

(b) A physical project which in the United States is prohibited or stricly regulated by Federal law to protect the environment against radioactive substances."

D. "4.4 Major Federal actions outside the United States, its territories and possessions which significantly affect natural or ecological resources of global importance designated for protection by the President pursuant to section 2-3(d) of Executive Order 12114 or, in the case of such a resource protected by international agreements binding on the United States, by the Secretary of State."

The proposed agreement with B.C. Hydro will not impact the global commons, or natural or ecological resources of global importance to any identifiable degree, and it does not result in any toxic products or emissions. Therefore, subsections 4.1, 4.3, and 4.4 are not applicable. With respect to subsection 4.2, B.C. Hydro is the "Entity," or appointed representative, of the Canadian Government for matters relating to the Columbia River Treaty, and is also a provincial Crown corporation with a Board of Directors appointed by the Lieutenant Governor in Council of British Columbia. The agreement is conditional upon B.C. Hydro's obtaining necessary licenses and approvals from the Province of British Columbia and the Canadian government. Therefore, the foreign nation is participating in the action, and subsection 4.2 also appears to be inapplicable. Thus, environmental review of impacts abroad is not required in this case.

APPENDIX C

PROPOSED AGREEMENT BETWEEN BPA AND B.C. HYDRO

B.C. HYDRO

Contract No. DE-MS79-83BP90945

DRAFT

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) Initial Filling of Non-Treaty Reservoirs;
(2) Use of Columbia River Non-Treaty Storage;
and
(3) Mica and Arrow Reservoir Refill Enhancement

Operations Engineering Division

AGREEMENT RELATING TO:
(1) INITIAL FILLING OF NON-TREATY RESERVOIRS,
(2) THE USE OF COLUMBIA RIVER NON-TREATY STORAGE AND
(3) MICA AND ARROW RESERVOIR REFILL ENHANCEMENT

BPA CONTRACT NO. DE-MS79-83BP90946

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This AGREEMENT, executed on the _____ day of _____, 1983, by the UNITED STATES OF AMERICA (the Government, Department of Energy, acting by and through the BONNEVILLE POWER ADMINISTRATION (BPA)), and BRITISH COLUMBIA HYDRO AND POWER AUTHORITY (BCH), established by legislation of the Province of British Columbia and continued under the Hydro and Power Authority Act, Revised Statutes of British Columbia 1979, chapter 188, as amended

W I T N E S S E T H T H A T:

WHEREAS BCH is engaged in the sale and delivery of electric power and energy to customers in British Columbia, and is the owner of an electric generation, transmission and distribution system which is used by it to supply electric power and energy to such customers; and

WHEREAS BPA is authorized pursuant to U.S. law to dispose of electric power generated at various Federal hydroelectric projects in the Pacific Northwest, or acquired from other resources, to construct and operate transmission facilities, to provide transmission and other services, and to enter into agreements to carry out such authority; and

WHEREAS the Governments of the United States of America and Canada on 16 September 1964 ratified the Treaty Between Canada and the United States of America Relating to the Cooperative Development of the Water Resources of the Columbia River Basin signed at Washington on 17 January 1961, and by an Exchange of Notes dated 22 January 1964, the two Governments agreed upon the terms of a Protocol with effect from the date of the exchange of instruments of ratification of the aforesaid Treaty (which Treaty and Protocol are hereinafter referred to as the "Treaty"); and

WHEREAS BCH has constructed Mica and Arrow dams pursuant to the Treaty providing approximately 7,000,000 acre-feet of storage at Mica, (hereinafter called "Mica"), and approximately 7,100,000 acre-feet of storage at Keenleyside (hereinafter called "Arrow") and BCH is authorized to operate such storage; and

WHEREAS the Parties desire by this Agreement to settle a dispute which has arisen between the Parties and others concerning past and anticipated permanent filling of inactive storage space at BCH Storage Reservoirs and to provide means whereby BCH may acquire release and discharge from any and all claims associated with the dispute; and

WHEREAS BPA desires to enhance the probability of Mica refill and to obtain additional flexibility and other benefits in the operation of its system by delivering energy to BCH for storage in Treaty Storage Space in Mica; and

WHEREAS BCH desires to obtain additional flexibility and other benefits in the operation of its system by delivering energy to BPA for storage in Treaty Storage Space in Mica and Arrow; and

WHEREAS the Parties desire to obtain further flexibility and other benefits in the operation of their systems by storing water in non-Treaty storage space;

NOW, THEREFORE, the Parties hereto mutually agree as follows:

1 DEFINITION OF TERMS

In this Agreement:

"Active Storage Space" shall mean that non-Treaty storage space which, pursuant to Section 5(a), has been declared available and remains available at BCH Storage Reservoirs.

"BCH Project" shall mean any hydroelectric generating facility at or downstream from a BCH Storage Reservoir which BCH is or shall be entitled to determine the operation of by virtue of ownership, contract or otherwise.

"BCH Storage Reservoir" shall mean any reservoir on the Columbia River and its tributaries in Canada which BCH is or shall be entitled to determine the operation of by virtue of ownership, contract or otherwise. BCH Storage Reservoirs shall include, but shall not be limited to, Mica, Revelstoke, and Arrow.

"Contract Year" shall mean 1 August through 31 July.

"Daily Conversion Factor" shall mean the incremental or decremental rate, in kilowatts per cfs, at which water being released or stored under this Agreement can be, or could have been, converted to energy at specified projects. The incremental or decremental rate at which water can be converted to energy at each project shall be based on a change in water release equivalent to the amount of water being released or stored and shall be computed on the same day as the return or storage.

"Delivering Party" shall mean the Party who is returning energy generated from a release of water stored under this Agreement to the Party who requested the release.

"Detailed Operating Plan" shall mean those hydroelectric operating plans prepared in accordance with Article XIV Section 2 (k) of the Treaty.

"Downstream U.S. Projects" shall mean the six Federal (Grand Coulee, Chief Joseph, McNary, John Day, The Dalles, and Bonneville) and five non-Federal (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) hydroelectric generating facilities on the Columbia River in the United States.

"Federal Energy" shall mean any energy generated at the six Federal hydroelectric generating facilities on the Columbia River in the United States.

"Heavy Load Hours" shall be 0700 hours through 2200 hours on Monday through Saturday.

"Inactive Storage Space" shall mean that non-Treaty storage space which, pursuant to Section 4, both Parties have an equal obligation to fill and from which no water can be released for generation under this Agreement.

"Light Load Hours" shall be all hours not included in Heavy Load Hours.

"Non-Federal Energy" shall mean any energy generated at the five non-Federal hydroelectric generating facilities on the Columbia River in the United States.

"Normal Service Area" shall mean: for BCH - the province of British Columbia and those adjacent areas in which BCH normally serves firm loads; for BPA - the states of Oregon, Washington, Idaho, and that portion of Montana west of the continental divide and those adjacent areas in which BPA normally serves firm loads.

"Recallable Storage Space" shall mean that non-Treaty storage space which, pursuant to Section 5(b), has been declared available and remains available at BCH Storage Reservoirs.

"Receiving Party" shall mean the Party who is receiving energy generated by the Delivering Party from a release of water stored under this Agreement.

"Treaty Storage Space" shall mean any part of the 7.0 million acre-feet of space in Mica or the 7.1 million acre-feet in Arrow, or both, as the case may be, which is operated pursuant to the Treaty and which is vacant as a result of operations under the Detailed Operating Plan.

2 TERM

(a) Term of Agreement

Subject to Section 17, this Agreement shall be effective beginning 1 October 1983, and all of its provisions other than Section 15 and those provisions which are necessary to enable the Parties to fulfill their obligations under Section 4(a)(2) (hereinafter called Extended Provisions) shall terminate at 2400 hours on 31 July 1993; provided, however, that either Party may terminate this Agreement other than the Extended Provisions at 2400 hours on 31 July of any year between 1988 and 1992 by the following procedure:

(1) Either Party desiring to terminate this Agreement shall give written notice to the other Party not later than 1 September of any year of its intent to terminate at 2400 hours on 31 July of the Contract Year ending 4 years following the end of the Contract Year in which such notice was given. Such notice shall include such Party's causes for desiring to terminate the Agreement.

(2) Both Parties to this Agreement shall, between the time any notice is given pursuant to Section 2(a)(1) and the time the subsequent notice is to be given pursuant to Section 2(a)(3), negotiate in good faith in an attempt to resolve the cause(s) for termination given in the notice.

(3) If the causes(s) for desiring to terminate this Agreement have not been resolved during negotiation pursuant to Section 2(a)(2), the Party who gave notice of intent to terminate shall give final written notice of termination to the other Party not later than 1 February of the same Contract Year in which notice was given pursuant to Section 2(a)(1) and the Agreement shall terminate on the date given in the notice pursuant to Section 2(a)(1).

The date that the Agreement, other than the Extended Provisions, terminates shall be called the Initial Termination Date.

(b) Extension of Agreement

The Extended Provisions shall remain in force until the Final Termination Date which shall be the earlier of: (i) 7 years after the Initial Termination Date or (ii) the date the Inactive Storage Accounts referred to in Section 4 are filled.

3 INITIAL FILLING OF BCH NON-TREATY STORAGE RESERVOIRS AND SETTLEMENT OF DISPUTE REGARDING INITIAL FILLING BY RELEASE AND DISCHARGE

(a) Dispute and Settlement Generally

It is understood and agreed between the Parties that, at the commencement of this Agreement, BCH's position regarding initial filling, which position BPA wholly disputes, is that BCH has, and has always had, the right to initially fill non-Treaty storage reservoirs in Canada, and without limiting the generality thereof, those non-Treaty storage reservoirs identified in Section 3(b) without making any compensation to BPA or anyone for the withholding, storing or otherwise interrupting the flow of water to so initially fill them, and without being in breach of the Treaty or anything.

It is understood and agreed between the Parties that, at the commencement of this Agreement, BPA's position regarding initial filling, which position BCH wholly disputes, is that BPA and other downstream United States power generators have a right pursuant to the Treaty to be compensated by BCH for any losses of electric power occurring as a result of any reduction caused by BCH in the flow of water at the U.S.-Canadian border below that which would occur as a result of natural flows being augmented by operation of

Treaty storage space in accordance with the Detailed Operating Plan.

It is also understood and agreed between the Parties that BCH and BPA by entering into this Agreement, and by accepting whatever individual releases and discharges that may be granted, admit no liability of whatever nature or kind, and maintain their positions regarding initial filling as understood and agreed above.

It is further understood and agreed between the Parties that, except insofar as BPA grants to BCH and BCH accepts from BPA release and discharge satisfactory to BCH in respect of any initial filling, BPA and BCH are at liberty to seek to have their rights under the Treaty declared or damages assessed by a tribunal or court of competent jurisdiction in respect of that initial filling; provided, however, that each Party agrees that in such event it shall not directly or indirectly introduce this Agreement or any of its provisions into the proceedings before the tribunal or court or in any way refer in such proceedings to the Agreement or any of its provisions.

(b) General

BCH shall endeavour to initially fill the following of its non-Treaty storage reservoirs, constructed, or yet to be constructed which become operable prior to the Initial Termination Date, to the levels and volumes indicated below by one or more of the methods provided hereinafter, and BPA agrees to grant to BCH, subject to it being earned, release and discharge as set out in Section 3(d) from the claims that BPA and the utilities listed in Schedule I to this Agreement assert or may assert against BCH in connection with such initial filling:

(1) Revelstoke to maximum permitted operating elevation but not to exceed El. 1880 based on geodetic survey of Canada datum which represents a volume of water of approximately 2168 kcfs-days;

(2) Seven Mile from El. 1715 to maximum permitted operating elevation but not to exceed El. 1730 based on geodetic survey of Canada datum which represents a volume of water of approximately 7.7 kcfs-days; and

(3) Murphy Creek to maximum permitted operating elevation but not to exceed El. 1401 based on geodetic survey of Canada datum which represents a volume of water of approximately 55 kcfs-days.

(c) Method of Initial Filling and Discharge of Obligations

(1) Method of Initial Filling

The Parties agree that to the extent it is practicable or available the method by which each of the reservoirs identified in Section 3(b) will be initially filled is by BCH transferring water from non-Treaty storage space to such reservoirs.

(2) Discharge of BCH's Obligation

Subject to Section 4(b), BCH's obligation to initially fill each of the reservoirs identified in Section 3(b) will be wholly discharged by BCH permanently storing an amount of water equal to one-half the available storage space at such reservoir in non-Treaty storage space under Section 6(a) in the BCH Inactive Storage Accounts.

(3) Discharge of BPA's Obligation

Subject to Section 4(b), BPA's obligation to initially fill each of the reservoirs identified in Section 3(b) will be wholly discharged by BPA permanently storing an amount of water equal to one-half of the available storage space at such reservoir in non-Treaty storage space under Section 7(a) in the BPA Inactive Storage Accounts.

(d) Form and General Terms of Release and Discharge

Subject to Section 3(c)(2), BPA shall grant on the Final Termination Date and on 1 October of each Contract Year, in the form set out in Schedule II to this Agreement, a release and discharge generally in the terms set out below for each of the reservoirs identified in Section 3(b):

BPA for and on behalf of itself and the utilities listed in Schedule I to this Agreement shall remise, release and forever discharge BCH, its successors and assigns, from any and all claims, damages, actions, causes of action, suits, costs, expenses or the like that it or they has or have now or may have in the future in connection with BCH's initial filling of reservoirs pursuant to this Agreement. BPA hereby warrants and represents that it has obtained the requisite authority from the utilities listed in Schedule I to this Agreement to give this Release and Discharge on their behalf.

BCH shall be entitled to demand, and BPA shall grant, a release and discharge for initial filling of each of the reservoirs identified in Section 3(b) in direct proportion to the amount of water BCH has

permanently stored under Section 6(a) in the BCH Inactive Storage Accounts.

(e) Initial Filling of Seven Mile to El. 1715

BCH and BPA acknowledge and agree that the initial filling of Seven Mile to El. 1715 was accomplished in November 1979 under mutually satisfactory circumstances. BCH shall earn, and BPA shall grant, a release and discharge from any and all claims of BPA and the utilities listed in Schedule I arising from the initial filling of Seven Mile to El. 1715 by releasing from Mica Storage 34.3 kcfs-days of water at such times and at such rates of release between 1 October 1983 and 31 March 1985 as BPA may request; provided, however, that such rates of release shall be consistent with BCH's operational constraints.

(f) Disposition of Water Stored in 1983

Water stored in Mica and Arrow between 1 June and 30 September 1983 under BPA Contract No. DE-MS79-83BP91290 shall be credited one-half to the BCH Inactive Storage Account and one-half to the BPA Inactive Storage Account at such times as Inactive Storage Space is declared available.

4 OBLIGATIONS FOR FILLING OF STORAGE

(a) Reservoir Filling

BCH and BPA agree as hereinafter provided to share equally the costs and responsibilties associated with the initial filling of the amount of storage space in each of the reservoirs identified in Section 3(b). It is recognized in Section 3(c)(1) that such obligation for initial filling may actually consist of an obligation to refill non-Treaty storage space. To accomplish this, the Parties agree to the following:

(1) Each Party shall have an obligation to fill an amount of non-Treaty storage space equal to one-half of the storage space declared available by BCH at Revelstoke less 2.0 MAF (1008 kcfs-days) by 1 October of each year which follows by at least 18 months each declaration of available storage space at Revelstoke. Each Party's filling obligation shall not exceed 1.15 MAF (580 kcfs-days). Subject only to the availability of operable storage space at Revelstoke after project closure, BCH shall declare 2.3 MAF (1160 kcfs-days) (1.15 MAF [580 kcfs-days] for each account) available as Inactive Storage Space for filling by BCH and BPA under this Agreement.

(2) On the Initial Termination Date each Party shall have an obligation to fill an additional amount of Inactive Storage

Space. Such amount for each Party shall be 1.0 MAF (504 kcfs-days) reduced by the product of (i) 0.215 MAF (108 kcfs-days) and (ii) the number of years the Initial Termination Date preceeds 31 July 1993; provided, however, that if the Initial Termination Date is 31 July 1988, such amount shall be zero. All of the water in each Party's Active Storage Accounts on the Initial Termination Date shall be transferred into each respective Party's Inactive Storage Account. If, after such transfer, the amount of water in each Party's Inactive Storage Account is less than that Party's obligation to fill Inactive Storage Space, the Extended Provisions shall continue in force as provided in Section 2(b).

(3) Each Party shall have an obligation to fill one-half of the available storage space at each of the projects identified in Sections 3(b)(2) and 3(b)(3) within 12 months of the date the space is declared available. Subject only to the availability of operable storage space at such projects BCH shall declare such space available as Inactive Storage Space for filling by BCH and BPA under this Agreement.

Water stored by each Party to accomplish this requirement for filling shall be accounted for in two special storage accounts, namely, the BPA Inactive Storage Account and the BCH Inactive Storage Account.

5 AVAILABILITY OF COLUMBIA RIVER NON-TREATY STORAGE SPACE

(a) Active Storage Space

BCH shall, subject only to the availability of operable storage space after the closure of Revelstoke, declare 2.0 MAF (1008 kcfs-days) of vacant storage space available as Active Storage Space for use by BCH and BPA until the Initial Termination Date.

(b) Recallable Storage Space

When BCH determines that it will make additional vacant space available as Recallable Storage Space for use under the terms of this Agreement, BCH shall notify BPA 30 days in advance of the date

when such space shall become available. BCH shall concurrently advise BPA how such non-Treaty storage space is categorized amongst the following:

(1) available until the Initial Termination Date unless recalled by BCH,

(2) available for a specific period of time each year unless recalled by BCH, or

(3) available for any other period of time specified by BCH unless recalled by BCH.

When BCH determines that it is reasonably necessary to recall any Recallable Storage Space, BCH shall, except as provided in Section 5(d), notify BPA in writing at least 180 days in advance of the date by which the recall must be complete. Such notice shall specify the date of the beginning and end of such recall and the rates at which Recallable Storage Space shall be recalled.

(c) Refill Space

BCH shall maintain the right to fill, pursuant to Section 6(a), vacant non-Treaty storage space that is not available as Active Storage Space, Inactive Storage Space or Recallable Storage Space. BCH shall notify BPA 30 days in advance of the date such space shall become available for filling by BCH. No water can be released from such space for generation at Downstream U.S. Projects under this Agreement.

(d) Emergency Evacuation of Non-Treaty Storage Space

BCH shall maintain the right to evacuate any non-Treaty storage space which was wholly or partly filled with water belonging to either BCH or BPA if BCH determines that evacuation is necessary for flood control in British Columbia, safety, protection of structures, or any other cause that BCH reasonably determines constitutes an emergency. If such storage space is evacuated in this manner, the Recallable Storage Accounts shall be evacuated first, followed by the Active Storage Accounts and finally the Inactive Storage Accounts subject to the provisions of Section 11(a). In the event of an emergency evacuation of Inactive Storage Space the date by which refill of the BCH and BPA Inactive Storage Accounts must be accomplished and the procedures for such refill will be equitably adjusted.

6 BCH STORAGE TRANSACTIONS

(a) Storage

When BCH determines that:

(1) it has energy available for storage under this Agreement, and

(2) it can accept flow reductions at the affected BCH Storage Reservoirs,

BCH shall designate one or more of the accounts specified in Section 6(c) into which it desires to store; and if BPA determines that:

(1) it can accept such energy, and

(2) it can accept the resulting reduction in flow at Downstream U.S. Projects,

BCH shall reduce the release of water from the affected BCH Storage Reservoir(s) below the levels which would otherwise occur as a result of operation pursuant to the Detailed Operating Plan and make a corresponding reduction in flow of the Columbia River at the U.S.-Canadian border on the same day; and BCH shall schedule to BPA the energy that would have been produced at Downstream U.S. Projects, based on the Daily Conversion Factor, if such reductions had not been made, at delivery rates and times as agreed upon in advance by the Parties. These delivery rates shall be subject to the provisions in Section 12. To be considered responsive to BCH's request to store water, BPA's determination shall be made and communicated to BCH promptly.

Prior to scheduling energy hereunder, BCH shall give BPA as much notice as is practicable as to the amounts of energy that it expects to have available for the following day or days, and BPA shall give BCH similar notice of the amounts of energy that it expects to be able to accept.

(b) Return

When BCH requests release of water stored under Section 6(a) in one or more of the following accounts, namely, BCH Active Storage Accounts, BCH Recallable Storage Accounts, BCH Mica Storage Account and BCH Arrow Storage Account, and if BPA determines that:

(1) it can provide energy for return, and

(2) it can accept the resulting increase in flow at Downstream U.S. Projects,

BCH shall release the requested amount of water by increasing the discharge at the affected BCH Storage Reservoir(s) above the levels which would otherwise occur as a result of operation pursuant to the Detailed Operating Plan and by increasing the flow of the Columbia River at the U.S.-Canadian border by a corresponding amount on the same day; and BPA shall schedule to BCH the energy which can be produced at Downstream U.S. Projects, based on the Daily Conversion Factor, by such releases at delivery rates and times as agreed upon in advance by the Parties. To be considered responsive to BCH's request to release water, BPA's determination shall be made and communicated to BCH promptly. BPA shall take reasonable efforts to avoid spill of storage releases and shall notify BCH with as much notice as practicable if it appears likely that released water will be subject to spill.

BPA shall take reasonable efforts to return energy hereunder; however, BPA shall not be obligated to return energy at a rate of delivery in excess of the hydro generating capacity of its system which it determines is available for that purpose, or to operate its system in such a manner as to affect adversely its sales to utilities or service to its customers. The delivery rates shall be subject to the provisions of Section 12.

BPA shall have no obligation to return to BCH energy which can be generated from release of any water remaining in the accounts referred to in Section 6(c) after the Initial Termination Date.

(c) Storage Accounts

Water stored under Section 6(a) or returned under Section 6(b) shall be accounted for in one or more of the following special storage accounts kept in units of water (kcfs-days):

(1) BCH Mica Storage Account

Water stored in this account shall be located in Treaty Storage Space in Mica.

(2) BCH Arrow Storage Account

Water stored in this account shall be located in Treaty Storage Space in Arrow.

(3) BCH Active Storage Accounts

A separate account shall be maintained for each BCH Storage Reservoir which has Active Storage Space. Water stored in these accounts shall be located in Active Storage Space as designated by BCH.

(4) BCH Recallable Storage Accounts

A separate account shall be maintained for each BCH Storage Reservoir which has Recallable Storage Space. Water stored in these accounts shall be located in Recallable Storage Space as designated by BCH.

(5) BCH Inactive Storage Accounts

A separate account shall be maintained for each BCH Storage Reservoir which has Inactive Storage Space. Water stored in these accounts shall be located in Inactive Storage Space as designated by BCH. BPA shall not be obligated to return energy which can be generated from any releases from the BCH Inactive Storage Accounts.

(6) BCH Refill Account

Water stored in this account shall be located in non-Treaty storage space. BPA shall not be obligated to return energy which can be generated from any releases from the BCH Refill Account.

(d) Transfer of Water into the BCH Inactive Storage Accounts

BCH may, but shall not be obligated to, transfer water stored in any of the above storage accounts into the BCH Inactive Storage Accounts.

No charge shall be applied to such transfers.

7 BPA STORAGE TRANSACTIONS

(a) Storage

When BPA desires to store water in the BPA Inactive Storage Account, or to initially fill the BPA Active Storage Account, it shall do so under the provisions of Section 7(a)(1). Otherwise BPA shall store water under the provisions of Section 7(a)(2).

(1) Initial Filling

When BPA determines that:

(A) it can accept reductions in energy generated at downstream U.S. Projects, and

(B) it can accept flow reductions at downstream U.S. Projects,

BPA shall, subject to the provisions below, designate one or more of the following accounts, namely, BPA Inactive Storage Accounts and BPA Active Storage Accounts into which it desires to store; and if BCH determines that:

(A) it can accept the resulting reduction in energy generation on its system, and

(B) it can accept the resulting reduction in flow at affected BCH Storage Reservoirs,

BCH shall reduce the release of water from the affected BCH Storage Reservoirs below the levels which would otherwise occur as a result of operation pursuant to the Detailed Operating Plan and make a corresponding reduction in flow of the Columbia River at the U.S.-Canadian border on the same day. To be considered responsive to BPA's request to store water, BCH's determination shall be made and communicated to BPA promptly.

Prior to storing water hereunder, BPA shall give BCH as much notice as practicable of the amounts of water that it expects to store in the following day or days, and BCH shall give BPA similar notice of the amounts of water that it expects to be able to accept.

In addition to accounting for the water stored under this Section in either the BPA Active Storage Accounts or the BPA Inactive Storage Accounts, this water shall be accounted for in a special storage account. The amount of water stored in this account shall not exceed one-half of the sum of the Active Storage Space and the Inactive Storage Space. This account will not be reduced even if this water is withdrawn from the BPA Active Storage Accounts under Section 7(b).

(2) <u>Other Filling</u>

When BPA determines that:

(A) Federal or Non-Federal Energy is available for storage under this Agreement, and

(B) it can accept flow reductions at Downstream U.S. Projects,

BPA shall designate one or more of the following accounts, namely, BPA Recallable Storage Accounts, BPA Active Storage Accounts, BPA Mica Storage Account, and, subject to the conditions in Section 7(c)(2), the BPA Mica Surplus Storage Account, into which it desires to store; and if BCH determines that:

(A) it can accept such energy, and

(B) it can accept the resulting reduction in flow at the affected BCH Storage Reservoirs,

BCH shall reduce the release of water from the affected BCH Storage Reservoirs below the levels which would otherwise occur as a result of operation pursuant to the Detailed Operating Plan and make a corresponding reduction in flow of the Columbia River at the U.S.-Canadian border on the same day; and BPA shall schedule to BCH the energy that would have been produced at BCH Projects, based on the Daily Conversion Factor, if such reductions had not been made, at delivery rates and times as agreed upon in advance by the Parties. These delivery rates shall be subject to the provisions in Section 12. To be considered responsive to BPA's request to store water, BCH's determination shall be made and communicated to BPA promptly.

Prior to scheduling energy hereunder, BPA shall give BCH as much notice as is practicable of the amounts of energy that it expects to have available for the following day or days, and BCH shall give BPA similar notice of the amounts of energy that it expects to be able to accept.

(b) Return

When BPA requests release of water stored under Section 7(a) in one or more of the following accounts, namely, BPA Recallable Storage Accounts, BPA Active Storage Accounts, BPA Mica Storage Account and BPA Mica Surplus Storage Account, and if BCH determines that:

(1) it can provide energy for return, and

(2) it can accept the resulting increase in flow at the affected BCH Storage Reservoirs,

BCH shall release the requested amount of water by increasing the discharge at the affected BCH Storage Reservoirs above the levels which would otherwise occur as a result of operation pursuant to the Detailed Operating Plan and by increasing the flow of the Columbia River at the U.S.-Canadian border by a corresponding amount on the same day; and BCH shall schedule to BPA the energy which can be produced at BCH Projects, based on the Daily Conversion Factor, by such releases at delivery rates and times as agreed upon in advance by the Parties. To be considered responsive to BPA's request to release water, BCH's determination shall be made and communicated to BPA promptly. BCH shall take reasonable efforts to avoid spill of storage releases and shall notify BPA with as much notice as practicable if it appears likely that released water may be subject to spill.

BCH shall take reasonable efforts to return energy hereunder, however BCH shall not be obligated to return energy at a rate of delivery in excess of the hydro generating capacity of its system which it determines is available for that purpose, or to operate its system in such a manner as to affect adversely its sales to utilities or service to its customers. The delivery rates shall be subject to the provisions of Section 12.

BCH shall have no obligation to return to BPA energy which can be generated at BCH Projects from release of any storage remaining in the accounts referred to in Section 7(c) after the Initial Termination Date.

(c) Storage Accounts

Water stored under Section 7(a) or returned under Section 7(b) shall be accounted for in one or more of the following special storage accounts kept in units of water (kcfs-days):

(1) BPA Mica Storage Account

Water stored in this account shall be located in Treaty Storage Space in Mica.

(2) BPA Mica Surplus Storage Account

Water stored in this account shall be located in Treaty Storage Space in Mica. BPA may store in this account only if BCH and BPA mutually agree upon an advance storage payment which must be not less than 20 percent and not more than 50 percent of the amount of energy delivered to BCH for storage. Such percentage shall be deducted from the amount of energy delivered before the energy is put into the BPA Mica Surplus Storage Account. Such deduction shall constitute full compensation to BCH for the storage service.

(3) BPA Active Storage Accounts

A separate account shall be maintained for each BCH Storage Reservoir which has Active Storage Space. Water stored in these accounts shall be located in Active Storage Space as designated by BPA.

(4) BPA Recallable Storage Accounts

A separate account shall be maintained for each BCH Storage Reservoir which has Recallable Storage Space. Water stored in these accounts shall be located in Recallable Storage Space as designated by BPA.

(5) BPA Inactive Storage Accounts

A separate account shall be maintained for each BCH Storage Reservoir which has Inactive Storage Space. Water stored in these accounts shall be located in Inactive Storage Space as designated by BPA. BCH shall not be obligated to return to BPA any energy which can be generated from any releases from the BPA Inactive Storage Accounts.

(d) Transfer of Water into the BPA Inactive Storage Accounts

BPA may, but shall not be obligated to, transfer water stored in any of the above storage accounts into the BPA Inactive Storage Accounts.

No charge shall be applied to such transfers.

8 DISPLACEMENT OF STORAGE

(a) Displacement by BCH

BCH shall have the right to displace:

(1) any water stored by BPA in a Recallable Storage Account in an amount greater than one-half of the Recallable Storage Space in each BCH Storage Reservoir,

(2) any water stored by BPA in an Active Storage Account in an amount greater than one-half of the Active Storage Space in each BCH Storage Reservoir, and

(3) any water stored by BPA in Mica Treaty Storage Space in an amount greater than one-half of the Mica Treaty Storage Space.

When BCH desires to displace any water which it has a right to displace, BCH shall designate one or more of the BPA storage accounts subject to displacement provided, however, if the displacement is from Mica Treaty Storage Space BPA shall determine which account will be displaced. Such displacement will be accomplished by BCH delivering to BPA the energy that BPA would receive under Section 7(b) plus the energy that BPA would receive under Section 6(a). For the purpose of the calculations under this section, the water being displaced will be considered to be an increment of water released which is subsequently replaced by an increment of water stored. If the displacement right is exercised, the designated BPA storage accounts shall be reduced by the amount of the displacement and the corresponding BCH storage accounts shall be increased by the amount of the displacement.

(b) Displacement by BPA

BPA shall have the right to displace:

(1) any water stored by BCH in a Recallable Storage Account in an amount greater than one-half of the Recallable Storage Space in each BCH Storage Reservoir,

(2) any water stored by BCH in an Active Storage Account in an amount greater than one-half of the Active Storage Space in each BCH Storage Reservoir, and

(3) any water stored by BCH in Mica Treaty Storage Space in an amount greater than one-half of the Mica Treaty Storage Space.

When BPA desires to displace any water which it has a right to displace, BPA shall designate one or more of the BCH storage accounts subject to displacement. Such displacement will be accomplished by BPA delivering to BCH the energy that BCH would receive under Section 6(b) plus the energy that BCH would receive under Section 7(a). For the purpose of the calculations under this section, the water being displaced will be considered to be an increment of water released which is subsequently replaced by an increment of water stored. If the displacement right is exercised, the designated BCH storage accounts shall be reduced by the amount of the displacement and the corresponding BPA storage accounts shall be increased by the amount of the displacement.

9 PURCHASE OF NON-TREATY STORAGE

(a) Purchase by BCH

BCH shall have the right to purchase:

(1) any water stored by BPA in a Recallable Storage Account in an amount greater than one-half of the Recallable Storage Space in each BCH Storage Reservoir, and

(2) any water stored by BPA in an Active Storage Account in an amount greater than one-half of the Active Storage Space in each BCH Storage Reservoir.

When BCH desires to purchase any water which it has a right to purchase, BCH shall designate one or more of the BPA storage accounts subject to purchase. The purchase price shall be as specified in Section 14(c). If the purchase right is exercised, the designated BPA storage accounts shall be reduced by the amount of the purchase and the corresponding BCH storage accounts shall be increased by the amount of the purchase.

(b) Purchase by BPA

BPA shall have the right to purchase:

(1) any water stored by BCH in a Recallable Storage Account in an amount greater than one-half of the Recallable Storage Space in each BCH Storage Reservoir, and

(2) any water stored by BCH in an Active Storage Account in an amount greater than one-half of the Active Storage Space in each BCH Storage Reservoir.

When BPA desires to purchase any water which it has a right to purchase, BPA shall designate one or more of the BCH storage accounts subject to purchase. The purchase price shall be as specified in Section 14(c). If the purchase right is exercised, the designated BCH storage accounts shall be reduced by the amount of the purchase and the corresponding BPA storage accounts shall be increased by the amount of the purchase.

10 FORCED TRANSFER OF STORAGE

If Active Storage Space, Recallable Storage Space or Inactive Storage Space is available and BPA or BCH water stored in Treaty Storage Space would be displaced by operation pursuant to the Detailed Operating Plan because: (i) such water would otherwise exceed Treaty Storage Space, or (ii) flood control space must be maintained as prescribed by the Columbia River Treaty Flood Control Operating Plan, each Party may elect either to return their storage pursuant to Section 11(b) or to transfer their storage to Active Storage Space, Recallable Storage Space, or Inactive Storage Space. If a Party elects to transfer their storage to Active Storage Space, Recallable Storage Space, or Inactive Storage Space, the daily amount of water that shall be deducted from any balance remaining in the BPA Mica Storage Account or the BPA Mica Surplus Storage Account, at BPA's option, or the BCH Mica or Arrow Storage Accounts and transferred to the respective BPA storage account designated by BPA or the BCH storage account designated by BCH shall be that water which is actually displaced from Treaty Storage Space. If both Parties have water stored pursuant to this Agreement in Mica Treaty Storage Space and have elected to transfer their storage to Active Storage Space, Recallable Storage Space, or Inactive Storage Space and any such stored water is displaced from Treaty Storage Space, water from the BPA account designated by BPA and from the BCH account shall be transferred in equal amounts for both Parties. Both Parties shall notify each other as much in advance as practicable if it appears likely that water will be displaced.

11 FORCED EVACUATION OF STORAGE

(a) Forced Evacuation of Storage from Non-Treaty Storage Space

If water stored by BPA or BCH in any non-Treaty account must be evacuated because the storage space is no longer available, the storage space has been recalled as specified pursuant to Section 5(b), emergency evacuation of the storage space is necessary pursuant to Section 5(d), or on-call flood control operation is required pursuant to the Treaty:

(1) If the amount of water stored in such account of one Party is greater than the amount of water stored in the corresponding account of the other Party, all water that must be evacuated shall be deducted from the account of the Party having the larger amount of water so stored until the amount of water stored by that Party is reduced to the amount of water stored in such account by the other Party.

(2) If the amounts of water stored in such accounts of both Parties are equal, the accounts of both Parties shall each be reduced by one-half of the water that must be evacuated.

If water must be evacuated to provide on-call flood control space, the order of evacuation of accounts shall be the same as for emergency evacuation as set forth in Section 5(d).

Available generating facilities shall be used to generate energy from return of storage pursuant to Section 6(b) or 7(b) before being used to generate energy from forced evacuation of storage pursuant to Section 11(a).

(b) Forced Evacuation of Storage from Treaty Storage Space

If any water stored by BPA or BCH in any Treaty Storage Space must be evacuated due to operation pursuant to the Detailed Operating Plan because: (i) such water would otherwise exceed Treaty Storage Space; or (ii) flood control space must be maintained as prescribed by the Columbia River Treaty Flood Control Operating Plan, and either no Active Storage Space, Recallable Storage Space, or Inactive Storage Space is available for transfer of such water or one or both Parties have elected to return their storage rather than transfer their storage to Active Storage Space, Recallable Storage Space, or Inactive Storage Space, the daily amount of water that shall be deducted from any balance in the BPA Mica Storage Account or the BPA Mica Surplus Storage Account, at BPA's option, or the BCH Mica or Arrow Storage Account shall be that water which is actually evacuated from Treaty Storage Space. If both Parties have water stored pursuant to this Agreement in Mica Treaty Storage Space, and any such stored water must be evacuated from Mica Treaty Storage Space:

(1) If the amount of water stored in such space by one Party is greater than the amount of water stored in such space by the other Party, all water that must be evacuated shall be deducted from the account of the Party having the larger amount of water so stored until the amount of water stored by that Party is reduced to the amount of water stored in such space by the other Party.

(2) If the amounts of water stored in such space by the Parties are equal, the accounts of both Parties shall each be reduced by one-half of the water that must be evacuated.

If water must be deducted from a BPA account and BPA has water stored in both the BPA Mica Storage Account and the BPA Mica Surplus Storage Account, BPA shall designate which account shall be reduced first.

Both Parties shall notify each other as much in advance as practicable if it appears likely that water must be evacuated.

Available generating facilities shall be used to generate energy from return of storage pursuant to Section 6(b) and 7(b) before being used to generate energy from forced evacuation of storage pursuant to Section 11(b). Either Party may elect not to receive energy generated by releases of storage made under Section 11(b) to avoid the service charges referred to in Section 14(a) or 14(b).

12 PRIORITY OF USE OF FACILITIES

(a) Priority of the Columbia River Treaty

The use of Treaty space and the use of all other facilities at Mica and Arrow and Downstream U.S. Projects to fulfill the requirements of the Treaty shall receive priority over all uses provided for in this Agreement.

(b) Reservoir Operation

(1) Priority Between This and Other Agreements

The Party responsible for the operation of any reservoir shall have the right to determine which requests can be met between requests under this Agreement and other conflicting third party requests for the operation of such reservoir (including the ability of reservoir discharges to be decreased to discharge minimums or increased to discharge maximums).

(2) Priority of Requests Under This Agreement

When concurrent requests by BPA and BCH under this Agreement would result in a reservoir operation outside normal operating limits, reservoir operation shall be in accordance with this paragraph.

(A) If concurrent requests by BPA and BCH to store water pursuant to Sections 6(a) and 7(a) would result in a reduction of project discharges below minimum discharge limits as defined by the owner or operator of such project or would result in filling of more than all the reservoir space available under this Agreement on the day of such requests, such requests shall be reduced as necessary to conform to such limits first by reducing the larger request by up to the amount it exceeds the smaller request and then by reducing each request by equal amounts.

(B) If concurrent requests by BPA and BCH to release stored water pursuant to Sections 6(b) and 7(b) would result in a discharge at any at-site or downstream project in excess of that project's available generating capacity or maximum discharge limit as defined by the owner or operator of such project, such requests shall be reduced as necessary to conform to such limits first by reducing the larger request by up to the amount it exceeds the smaller request and then by reducing each request by equal amounts; provided, however, that one or both Parties may request the release of additional water which will produce additional energy at one or more projects but will produce a discharge in excess of the available generating capacity at one or more at-site or downstream generating projects. To the extent that such requests by both Parties for the release of additional water would result in a discharge in excess of the available generating capacity of the at-site or downstream generating project which would be next to spill, such requests shall be reduced as necessary to release equal daily amounts of water for use by each Party at each such project.

(3) Spill at Projects

The Delivering Party shall take reasonable efforts to avoid spill of water stored hereunder and shall notify the Receiving Party with as much notice as practicable if it appears likely that water returned under this Agreement will be spilled.

(c) Generating Facilities

(1) Priority Between This and Other Agreements

The Party responsible for the operation of any generating facility shall have the right to determine which requests can be met between requests under this Agreement and other conflicting third party requests for use of such generating facilities.

(2) Return of Energy

The Delivering Party shall take reasonable efforts to return energy to the other Party at uniform hourly rates within each day; however, if the Receiving Party requests the return of energy at hourly rates that are other than uniform because such Party's system cannot use the returned energy at a uniform hourly rate, the Delivering Party shall take reasonable efforts to return the energy as requested by the Receiving Party.

(3) Return of Energy when Exporting

If the generating capacity available at BCH or Downstream U.S. Projects limit the amounts of energy which can be generated hourly at any such project to return energy during any day as provided in Section 12(c)(2), the Delivering Party shall forego all or a portion of its nonfirm energy sales during such hours to entities outside its Normal Service Area to the extent necessary to return energy under this Agreement as provided in Section 12(c)(2), unless the Receiving Party is also making nonfirm energy sales to entities outside its Normal Service Area during such hours.

(4) Other Return of Energy

Energy not returned pursuant to Section 12(c)(2) and Section 12(c)(3) shall be returned at times and rates as agreed by the Parties.

13 SCHEDULING

Schedules for delivery and return of energy hereunder shall be effective at the Blaine or Boundary points of interconnection between the Parties, with no losses being assessed either Party as a result of these storage transactions. Schedules of energy hereunder shall be subject to appropriate terms of the Exchange Agreement between the Parties (BPA Contract No. 14-0333266, as amended or replaced). Notwithstanding the other provisions of this Agreement, all schedules for delivery or return of energy hereunder shall be limited to available transmission capacity.

14 PAYMENTS

All charges in mills per kilowatthour referred to in this Section shall be in U.S. Currency. A bill shall be issued for each of the charges described in Section 14(a), 14(b), and 14(c) and all payments shall be made in full on or before the thirtieth day after the bill is issued.

(a) BPA Payments

BPA shall pay BCH each month during the term hereof: (i) 5.3 mills for each kilowatthour of energy returned by BCH during Light Load Hours and 7.3 mills for each kilowatthour of such energy returned by BCH during Heavy Load Hours by release of water from the BPA Mica Storage Account; and (ii) 6.3 mills for each kilowatthour of energy transferred from the BPA Mica Storage Account to the BPA Active Storage Accounts or the BPA Recallable Storage Accounts. No charge shall be assessed for energy transfered from the BPA Mica Surplus Storage Account to the BPA Active Storage Accounts or the BPA Recallable Storage Accounts.

(b) BCH Payments

BCH shall pay BPA each month during the term hereof: (i) 5.3 mills for each kilowatthour of energy returned by BPA during Light Load Hours and 7.3 mills for each kilowatthour of such energy returned by BPA during Heavy Load Hours by release of water from the BCH Mica or Arrow Storage Account; and (ii) 6.3 mills for each kilowatthour of energy transfered from the BCH Mica or Arrow Storage Accounts to the BCH Active Storage Accounts or the BCH Recallable Storage Accounts.

(c) Payments for Purchase of Storage

If either Party elects to purchase the other Party's stored water pursuant to Section 9, the purchasing Party shall pay the other Party 16.8 mills per kilowatthour times the amount of energy purchased. The amount of energy purchased shall be computed from the volume of water purchased and the following water-to-energy conversion factors (expressed in MW-days per ksfd):

Mica	43.0
Revelstoke	31.4
Arrow	2.4
Murphy Creek	3.3
Downstream U.S. Projects	86.35

If water is purchased prior to the installation of generating facilities at Arrow or Murphy Creek, a zero water-to-energy conversion factor shall be used for such project to calculate the amount of energy purchased.

(d) Adjustment of Charges

It is the intent of both Parties to adjust each of the service charges set forth in Sections 14(a), 14(b), and 14(c) from time to time to reflect the then current value of nonfirm energy in the Pacific Northwest. Unless either Party notifies the other Party in writing that it desires to use another method, such service charges shall be adjusted each time BPA revises its wholesale nonfirm rate schedule by multiplying each such charge by the contract rate specified in BPA's then current wholesale nonfirm power rate schedule, dividing the results by 11.2 mills per kilowatthour and rounding the result to the nearest 0.1 mills per kilowatthour. If either Party gives such notice, both Parties hereby agree to negotiate in good faith another method of adjusting such service charges which more closely represents the intent of the Parties. If another method is agreed upon, it shall be evidenced by an exchange of letters between the Parties and shall replace the method set forth in this subsection.

15 MICA HEAD LOSSES

Beginning on the Initial Termination Date, BPA shall deliver energy to BCH to compensate for energy generation losses at Mica due to reduced head at Mica. Such energy generation losses shall be computed and delivered as described below.

A shadow elevation at Mica shall be computed daily by BCH. Such elevation shall be the elevation corresponding to the sum of Mica's actual storage content on such day and the amount by which BPA's Inactive Storage Account on such day is less than BPA's obligation to fill Inactive Storage Space as provided in Section 4(a)(2); provided, however, that if the shadow elevation so computed exceeds the maximum elevation at which Mica could be operated on such day because (i) it exceeds Mica's normal full elevation, (ii) it exceeds the maximum flood control elevation on such day as prescribed in the Columbia River Treaty Flood Control Operation Plan, or (iii) it exceeds any other limits on maximum elevations at Mica as determined by BCH, such shadow elevation shall be deemed to be equal to the lowest of any of the three such maximum elevations on such day. The amount of such head loss energy in megawatthours shall be computed daily and shall be equal to the product of: (i) 24; (ii) the average turbine discharge in kcfs at Mica on such day; and (iii) the difference in the Mica energy conversion factor as determined from Column 3 of Schedule III using Mica's actual elevation and its shadow elevation on such day. BPA shall deliver the amount of head loss energy so computed during each week to BCH at a uniform hourly rate during the Light Load Hours of the immediately following week.

IN WITNESS WHEREOF, the Parties hereto have executed this agreement in several counterparts.

UNITED STATES OF AMERICA
Department of Energy

By _____

Bonneville Power Administrator

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

By _____

Title _____

ATTEST:

By _____

Title _____

DRAFT

This is SCHEDULE I to, and forms part of, the Agreement between BPA and BCH.

The following are the utilities referred to in this Agreement.

1. Puget Sound Power and Light Co.
2. Portland General Electric Co.
3. Pacific Power and Light Co.
4. The Washington Water Power Co.
5. Seattle City Light
6. Tacoma City Light
7. PUD No. 2 of Grant County
8. Eugene Water and Electric Board
9. PUD No. 1 of Cowlitz County
10. PUD No. 1 of Kittitas County
11. City of Forest Grove
12. City of McMinville
13. Milton-Freewater Light and Power
14. Okanogan County PUD
15. Colockum Transmission Co., Inc.
16. PUD No. 1 of Douglas County
17. PUD No. 1 of Chelan County

Contract No. DE-MS79-83BP90946

SCHEDULE II

Form of

RELEASE AND DISCHARGE

Whereas the Administrator of the Bonneville Power Administration and British Columbia Hydro and Power Authority (B.C. Hydro) entered into an Agreement dated _____ (Contract No. DE-MS-83BP90946) providing, inter alia, for B.C. Hydro to earn and the Administrator to grant, for and on behalf of itself and others, release and discharge from any claims arising from B.C. Hydro's filling inactive storage space at certain Canadian reservoirs in the Columbia River basin;

Whereas the Administrator for, and on behalf of itself and in its representative capacity, acknowledges that, as of ____(date)_____, B.C. Hydro has earned this Release and Discharge for filling _____ MAF (cfs-days) of inactive storage space at (name reservoir);

NOW THEREFORE,

The Administrator hereby grants B.C. Hydro release and discharge for such filling.

Date _____

UNITED STATES OF AMERICA
Department of Energy

By _____
Bonneville Power Administrator

SCHEDULE III

MICA PLANT CHARACTERISTICS

Column (1) Reservoir Elevation Feet	Column (2) Storage Contents kcfs-days	Column (3) Water-to-Energy Conversion Factor kW/cfs*1
2475.0	10121.1	45.56
2470.0	9854.8	45.19
2465.0	9592.7	44.83
2460.0	9334.8	44.46
2455.0	9081.0	44.09
2450.0	8831.4	43.72
2445.0	8586.0	43.35
2440.0	8344.8	42.97
2435.0	8107.8	42.59
2430.0	7874.9	42.21
2425.0	7646.2	41.83
2420.0	7421.6	41.44
2415.0	7201.3	41.05
2410.0	6985.1	40.66
2405.0	6773.0	40.27
2400.0	6565.1	39.87
2395.0	6363.4	39.47
2390.0	6170.1	39.07
2385.0	5984.8	38.67
2380.0	5806.7	38.26
2375.0	5635.2	37.85
2370.0	5469.9	37.44
2365.0	5310.2	37.02
2360.0	5155.7	36.60
2355.0	5005.8	36.18
2350.0	4860.1	35.76
2345.0	4718.3	35.33
2340.0	4580.0	34.90
2335.0	4444.1	34.47
2330.0	4310.2	34.03
2325.0	4178.2	33.59
2320.0	4048.1	33.15

*1 Tailwater elevation assumed to be 1880.7 feet based on 30,000 cfs Mica discharge with Revelstoke in-service.

APPENDIX D

PROPOSED AGREEMENT BETWEEN BPA AND THE MID-COLUMBIA PURCHASERS

Contract No. DE-MS79-83BP90945

PRELIMINARY 9-2-83

DRAFT

CONTRACT

executed by the

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

acting by and through the

BONNEVILLE POWER ADMINISTRATION

and

MID-COLUMBIA PURCHASERS

DRAFT

Relating to Federal and Canadian

Columbia River Storage

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This CONTRACT, executed_____, 1983, by the UNITED STATES OF AMERICA (Government), Department of Energy, acting by and through the BONNEVILLE POWER ADMINISTRATION (Bonneville), PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY, WASHINGTON, a municipal corporation of the State of Washington (Chelan); COLOCKUM TRANSMISSION COMPANY, INC., a corporation (Colockum); PUBLIC UTILITY DISTRICT NO. 1 OF COWLITZ COUNTY, WASHINGTON, a municipal corporation of the State of Washington (Cowlitz); PUBLIC UTILITY DISTRICT NO. 1 OF DOUGLAS COUNTY, WASHINGTON, a municipal corporation of the State of Washington (Douglas); the CITY OF EUGENE, OREGON, a municipal corporation of the State of Oregon (Eugene); the CITY OF FOREST GROVE, OREGON, a municipal corporation of the State of Oregon (Forest Grove); PUBLIC UTILITY DISTRICT NO. 2 OF GRANT COUNTY, WASHINGTON, a municipal corporation of the State of Washington (Grant); PUBLIC UTILITY DISTRICT NO. 1 OF KITTITAS COUNTY, WASHINGTON, a municipal corporation of the State of Washington (Kittitas); the CITY OF McMINNVILLE, OREGON, a municipal corporation of the State of Oregon (McMinnville); the CITY OF MILTON-FREEWATER, OREGON, a municipal corporation of the State of Oregon (Milton-Freewater); the PUBLIC UTILITY DISTRICT NO. 1 OF OKANOGAN COUNTY, WASHINGTON, a municipal corporation of the State of Washington (Okanogan); PACIFIC POWER & LIGHT COMPANY, a corporation (Pacific);

PORTLAND GENERAL ELECTRIC COMPANY, a corporation (Portland); PUGET SOUND POWER & LIGHT COMPANY, a corporation (Puget); the CITY OF SEATTLE, WASHINGTON, a municipal corporation of the State of Washington (Seattle); the CITY OF TACOMA, WASHINGTON, a municipal corporation of the State of Washington (Tacoma); and THE WASHINGTON WATER POWER COMPANY, a corporation (Water Power), (each hereinafter called "Purchaser," and collectively, "Purchasers") who are owners or purchasers of the output of the Mid-Columbia hydro projects, Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids (Projects),

W I T N E S S E T H :

WHEREAS Bonneville and the British Columbia Hydro and Power Authority (B.C. Hydro) wish to provide additional flexibility and other benefits in the operation of their systems by storing water in Columbia River storage facilities in Canada pursuant to Exhibit A; and

WHEREAS Bonneville and the Purchasers wish to coordinate the operation of generation and storage facilities on the Columbia River in the United States in order to implement Exhibit A for the benefit of Bonneville and the Purchasers; and

WHEREAS Bonneville and the Purchasers wish to settle a dispute which has arisen with B.C. Hydro concerning past and anticipated initial filling of B.C. Hydro reservoirs and to provide a means for Bonneville to obtain the right to give B.C. Hydro a release and discharge from any and all claims for water and energy associated with the dispute; and

WHEREAS Bonneville is authorized pursuant to law to dispose of electric power generated at various Federal hydroelectric projects in the Pacific Northwest, or acquired from other resources, to construct and operate transmission facilities, to provide transmission and other services, and to enter into agreements to carry out such authority;

NOW, THEREFORE, the Parties hereto mutually agree as follows:

1. Term.

(a) Term of Contract. This Contract shall become effective at 2400 hours on September 30, 1983, and continue in effect until the last date on which any of the provisions of Exhibit A are in effect.

(b) Notice. Bonneville shall immediately forward to the Purchasers copies of any notices Bonneville gives or receives pursuant to sections 2(a)(1) or 2(a)(2) of Exhibit A.

2. Definitions.

(a) Any capitalized terms in this Contract that are not defined herein shall have the definitions stated in Exhibit A.

(b) "Coordination Agreement" shall mean the Agreement for Coordinated Operations among Power Systems of the Pacific Northwest (BPA Contract No. 14-03-48221), as amended or replaced.

(c) "Storage Account(s)," including "BCH Storage Account(s)" and "BPA Storage Account(s)" shall mean those accounts established pursuant to sections 6(c) and 7(c), respectively, of Exhibit A.

(d) "Workday" shall mean any day during which Bonneville and the respective Purchaser normally prepare schedules for delivery of power.

3. Exhibits. Exhibits A through D, attached hereto, are by this reference incorporated herein and made part of this Contract.

4. Revision of Exhibit B.

(a) In the event that the shares of any Purchasers in any of the Projects change and, as a result, such Purchasers' water-to-energy conversion factors listed in Exhibit B change, each Purchaser having a changed share shall notify Bonneville in writing of the amount of the share change and of its corresponding water-to-energy conversion factor(s) and of the effective date

of such change. Prior to such effective date, Bonneville shall issue a revised Exhibit B incorporating the changes.

(b) In the event the Purchaser who is the owner of a Project reasonably determines that it is necessary to change the water-to-energy conversion factor of such Project, and either the balances in all BPA and BCH Storage Accounts which are not Inactive Storage Accounts are zero or Bonneville agrees to such change, such Purchaser shall notify Bonneville in writing of the amount of the change in the water-to-energy conversion factor for the Project. Bonneville shall issue a revised Exhibit B incorporating the change.

5. Storage and Release of Water by B.C. Hydro. Bonneville shall notify each Purchaser by 1000 hours of each Workday before any storage or release of water pursuant to section 6 of Exhibit A which would decrease or increase the flow of the Columbia River at the Purchaser's Project(s).

(a) Storage by B.C. Hydro. Whenever the flow at the Purchaser's Project(s) decreases due to storage of water by B.C. Hydro pursuant to section 6(a) of Exhibit A, Bonneville shall deliver to each Purchaser, at delivery rates and times agreed upon in advance by Bonneville and the Purchaser, the energy which the stored water would have produced at the Purchaser's Project(s) on the day of the change of flows at the Purchaser's Project(s) based on the water-to-energy conversion factors listed in Exhibit B and the available turbine capacities of the Project(s) on such day.

(b) Release by B.C. Hydro. Whenever the flow at the Purchaser's Projects increases due to release of water by B.C. Hydro pursuant to section 6(b) of Exhibit A, each Purchaser shall deliver to Bonneville, at delivery rates and times agreed upon in advance by Bonneville and the Purchaser, the energy which the released water is able to produce at the Purchser's Project(s) on the day of the change of flows at the Purchaser's Project(s) based on the

water-to-energy conversion factors listed in Exhibit B and the available turbine capacities of the Project(s) on such day.

(c) Effects of Water Stored by B.C. Hydro on the Coordination Agreement. Water stored by B.C. Hydro in BCH Storage Account(s) shall neither increase nor decrease any of the rights or obligations of any of the parties to the Coordination Agreement. The normal full, normal empty, and rule curve elevations of BCH Storage Reservoirs, as such elevations are used in the Coordination Agreement, shall be increased by the amounts of water stored by B.C. Hydro into such accounts pursuant to section 6(a) of Exhibit A and shall be decreased by the amounts released by B.C. Hydro from such accounts pursuant to section 6(b) of Exhibit A.

6. Storage and Release of Water by Bonneville. Bonneville shall notify each Purchaser by 1000 hours of each Workday before any storage or release of water pursuant to section 7 of Exhibit A which would decrease or increase the flow of the Columbia River at the Purchaser's Project(s).

(a) Filling of the BPA Inactive Storage Space. Whenever the flow at the Purchaser's Project(s) decreases due to storage of water by Bonneville into the BPA Inactive Storage Account or into a BPA Active Storage Account for the purpose of meeting Bonneville's obligation to leave water in Inactive Storage Space, Bonneville shall deliver to the Purchaser at delivery rates and times agreed upon in advance by Bonneville and the Purchaser, the energy which the stored water would have produced at the Purchaser's Project(s) on the day of the change of flows at the Purchaser's Project(s) based on the water-to-energy conversion factors listed in Exhibit B and the available turbine capacities of the Project(s) on such day. The first water stored by Bonneville into the BPA Inactive Storage Account or a BPA Active Storage Account up to an amount equal

to Bonneville's obligation as of that time to leave water in Inactive Storage Space shall be considered stored for such purpose. Bonneville's obligation to leave water in Inactive Storage Space as of any time shall be Bonneville's one-half of the Revelstoke non-Treaty storage space in excess of 2.0 million acre-feet declared available at such time pursuant to section 4(a)(1) of Exhibit A, plus Bonneville's one half of up to 2.0 million acre-feet as determined at such time pursuant to section 4(a)(2) of Exhibit A, plus Bonneville's one-half of any storage space at Murphy Creek or any storage space between elevations 1715 and 1730 feet at Seven Mile declared available at such time pursuant to section 4(a)(3) of Exhibit A. As such obligations increase from time to time, the next water stored into such accounts after such increase shall be considered stored for the purpose of meeting Bonneville's obligation to leave water in the Inactive Storage Space.

(b) Release by Bonneville from the BPA Inactive Storage Account. There are no provisions in Exhibit A for the release of water stored in the BPA Inactive Storage Account except when such releases are required to provide on-call flood control space pursuant to the Treaty or when required by an emergency. In the event such releases are required, the provisions of section 5(b) for release of water by B.C. Hydro shall apply.

(c) Storage into and Release from the BPA Active Storage Account(s). Whenever the flow at the Purchaser's Project(s) decreases due to storage of water by Bonneville into the BPA Active Storage Account for other than the purpose set forth in section 6(a), the Purchaser shall be responsible for any reduction in generation at the Purchaser's Project(s).

Whenever the flow at the Purchaser's Project(s) increases due to release of water by Bonneville from the BPA Active Storage Account(s) pursuant to section 7(b) of Exhibit A, the Purchaser shall retain for its own use the energy which the water released from the BPA Active Storage Account(s) is able to produce at the Purchaser's Project(s).

Except for the Purchaser's rights to in-lieu energy and obligations to return in-lieu energy, as provided by section 6(f) hereof and the Coordination Agreement, no energy shall be delivered by Bonneville to the Purchaser or the Purchaser to Bonneville when Bonneville releases water from or refills water into BPA Active Storage Account(s).

(d) Storage into and Release from the BPA Recallable Storage Account(s) or the BPA Mica Storage Account. Whenever the flow at the Purchaser's Project(s) decreases due to storage of water by Bonneville into the BPA Recallable Storage Account(s) or the BPA Mica Storage Account pursuant to section 7(a)(2) of Exhibit A, each Purchaser shall be responsible for any reduction in generation at the Purchaser's Project(s).

Whenever the flow at the Purchaser's Project(s) increases due to release of water by Bonneville from the BPA Recallable Storage Account(s) or the BPA Mica Storage Account pursuant to section 7(b) of Exhibit A, the Purchaser shall retain for its own use the energy which the water released from such account(s) is able to produce at the Purchaser's Project(s).

Except for the Purchaser's rights to in-lieu energy and obligations to return in-lieu energy, as provided in section 6(f) hereof and the Coordination Agreement, no energy shall be delivered by Bonneville to the Purchaser or by the Purchaser to Bonneville when Bonneville stores water into or releases water from the BPA Recallable Storage Account(s) or the BPA Mica Storage Account.

(e) Storage into and Release from the BPA Mica Surplus Storage Account. Whenever the flow at the Purchaser's Project(s) decreases due to storage of water by Bonneville into the BPA Mica Surplus Storage Account pursuant to section 7(a)(2) of Exhibit A, Bonneville shall deliver to the Purchaser at delivery rates and times agreed upon in advance by Bonneville and the Purchaser a percentage of the energy which such decrease in flow would have produced at the Purchaser's Project(s) on the day of the change of flows at the Purchaser's Project(s) based on the water-to-energy conversion factors listed in Exhibit B and the available turbine capacities of the Project(s) on such day, and the Purchaser shall be responsible for the balance of the reduction in generation at the Purchaser's Project(s). Such percentage shall be the same as the percentage of the energy deducted from the energy delivered by Bonneville to B.C. Hydro pursuant to section 7(c)(2) of Exhibit A as compensation for the storage service

Whenever the flow at the Purchaser's Project(s) increases due to release of water by Bonneville from the BPA Mica Surplus Storage Account pursuant to section 7(b) of Exhibit A, the Purchaser shall retain for its own use the energy which the water released from such account(s) is able to produce at the Purchaser's Project(s).

Except for the percentage of the energy delivered by Bonneville to the Purchaser pursuant to this section (e) and the Purchaser's rights to in-lieu energy and obligations to return in-lieu energy, as provided in section 6(f) hereof and the Coordination Agreement, no energy shall be delivered by Bonneville to the Purchaser or by the Purchaser to Bonneville when Bonneville stores water into or releases water from the BPA Mica Surplus Storage Account.

(f) Effects of Water Stored by Bonneville on the Coordination Agreement. Water stored by Bonneville in the BPA Inactive Storage Account shall neither increase nor decrease any of the rights or obligations of any of the parties to the Coordination Agreement. The normal full, normal empty, and rule curve elevations of BCH Storage Reservoirs, as such elevations are used in the Coordination Agreement, shall be increased by the amounts of water stored by Bonneville into such account.

Water stored by Bonneville in the BPA Mica Storage Account or the BPA Mica Surplus Storage Account shall be treated the same as any other water stored in Treaty space in Mica for the purpose of determining all rights and obligations, including in-lieu energy rights and obligations, under the Coordination Agreement. If the Coordination Agreement Annual Operating Procedures then in effect provide for accounting water stored in Federal reservoirs upstream from the mid-Columbia Projects in a composite pond, Bonneville shall include water stored in the BPA Mica Storage Account or the BPA Mica Surplus Storage Account as water stored in Treaty space in Mica and included in such composite pond.

Water stored by Bonneville in the BPA Active Storage Account(s) and the BPA Recallable Storage Account(s) shall be subject to the terms of subsection 9(k) of the Coordination Agreement for the purpose of determining the rights and obligations of the parties to in-lieu energy, but such stored water shall have no effect on other rights and obligations of the parties to the Coordination Agreement, including but not limited to interchange energy rights and obligations and headwater benefit payments. Bonneville shall maintain a separate account for each BPA Active Storage Account and each BPA Recallable Storage Account for the purposes of determining in-lieu energy rights and obligations under the Coordination Agreement, however the conversion factors

and relative discharge maximums associated with the composite pond shall be used if the Coordination Agreement Annual Operating Procedures then in effect provide for accounting water stored in Federal reservoirs upstream from the mid-Columbia Projects in a composite pond. The energy content curve used in the Coordination Agreement for the purpose of determining in-lieu energy rights and obligations shall be considered to be equal to a zero balance in each BPA Active Storage Account and each BPA Recallable Storage Account. The Purchaser's rights to terminate its further requests for release of water from such accounts and to designate water releases as assigned water releases for the purpose of returning in-lieu energy shall be limited to those times when and to the extent that Bonneville can, pursuant to Exhibit A, store water into the BPA Storage Account to which in-lieu energy is being returned or can decrease its release of water from such account.

7. Adjustment of In-lieu Energy Rights for Changes in Exhibit B. Each time a revision in Exhibit B becomes effective, the rights of each Purchaser having a decrease in its total water-to-energy conversion factor, as set forth in column 6 of Exhibit B, to in-lieu energy based on water in BPA Storage Accounts shall be decreased in proportion to such Purchaser's decrease in total water-to-energy conversion factor, and the rights of each Purchaser having an increase in such total conversion factor to such in-lieu energy shall be increased in proportion to such Purchaser's increase in such total conversion factor. To the extent that such decrease causes the amount of in-lieu energy which such Purchaser then has outstanding to exceed such Purchaser's rights to in-lieu energy, such Purchaser shall promptly return such excess to Bonneville at rates and times mutually agreed by Bonneville and the Purchaser, but in no case later than 30 days after such Exhibit B is effective.

8. Transfer of Stored Water. Transfers of stored water between BPA Storage Accounts as permitted by sections 7(d) and 10 of Exhibit A and as required by section 4(a)2 of Exhibit A may cause a change in the Purchaser's rights to water in such accounts. If Bonneville makes such transfers, the account from which water has been transferred shall be decreased by the amount of water transferred, and the account into which water has been transferred shall be increased by the same amount on the date the transfer is effective; provided, however, that for the purpose of accounting the Purchaser's rights to receive energy pursuant to section 6(a) and the Purchaser's rights to receive and obligations to return in-lieu energy pursuant to section 6(f) hereof and the Coordination Agreement, Bonneville shall, beginning on the day such transfer is effective, treat the transfer from one account to another as a release from the one account at the rate of 10,000 second-foot-days per day and a simultaneous storing in the other account at the same rate until the first account has been reduced by the amount transferred. Bonneville shall not deliver to the Purchaser, as provided in section 6(a), the energy which the water being transferred into the BPA Inactive Storage Account would have produced at the Purchaser's Project(s) to the extent such water is transfered from a BPA Active Storage Account on which such deliveries have already been made.

9. Purchase of Stored Water.

(a) Purchase by B.C. Hydro. Purchase by B.C. Hydro, as permitted by section 9(a) of Exhibit A, of water stored in a BPA Storage Account will have an effect on the Purchaser's rights to the water stored in such accounts and the Purchaser's right to receive part of the money received by Bonneville from B.C. Hydro. If B.C. Hydro purchases water stored in a BPA Storage Account,

such BPA Storage Account shall be decreased by the amount of water purchased, and the BCH Storage Account designated by B.C. Hydro shall be increased by the same amount on the date the purchase is effective; provided, however, that for the purpose of determining the Purchaser's obligation, if any, to return in-lieu energy to Bonneville pursuant to section 6(f) hereof and the Coordination Agreement, Bonneville shall, beginning on the day such purchase is effective, treat the water purchased as though it had been released from such BPA Storage Account at the rate of 10,000 second-foot-days per day until such BPA Storage Account has been reduced by the amount purchased. Bonneville shall pay the Purchaser pursuant to section 12(b) its prorata share of the money received by Bonneville from B.C. Hydro.

(b) Purchase by Bonneville. Purchase of water by Bonneville, as permitted by section 9(b) of Exhibit A, of water stored in a BCH Storage Account may have an effect on the Purchaser's rights to such stored water and may result in the Purchaser paying to Bonneville part of the money paid by Bonneville to B.C. Hydro.

If Bonneville purchases water stored in a BCH Storage Account and uses such water for the purpose of meeting its obligation to leave water in Inactive Storage Space, the BPA Storage Account designated by Bonneville shall be increased by the amount of the water purchased, the appropriate BCH Storage Account shall be decreased by the same amount on the date the purchase is effective, and Bonneville shall bear all the costs of such purchase.

If Bonneville purchases water stored in a BCH Storage Account and uses such water for other than the purpose of meeting its obligation to leave water in Inactive Storage Space, the BPA Storage Account designated by Bonneville shall be increased by the amount of the water purchased, and the appropriate BCH Storage Account

shall be decreased by the same amount on the date the purchase is effective. Promptly after such purchase, or in advance if practicable, Bonneville shall notify each Purchaser in writing of the terms of such purchase. Within 30 days after the receipt of such notice, each Purchaser shall notify Bonneville in writing whether the Purchaser elects to participate in such purchase. If the Purchaser elects not to participate, the Purchaser's obligations to return in-lieu energy to Bonneville shall be increased as if the Purchaser had already exercised its in-lieu energy rights on all of the water so purchased and stored in such BPA Storage Account. If the Purchaser elects to participate, no such increase to in-lieu energy obligations shall be made, and the Purchaser shall pay Bonneville pursuant to section 12(c) its pro rata share of the amount of money paid by Bonneville to B.C. Hydro for such purchase.

10. Provisions Relating to Scheduling. Schedules for delivery of power between Bonneville and each Purchaser will be effective at mid-Columbia points of delivery defined in the Purchaser's contract as listed in Exhibit C. Except as modified herein, scheduling of energy hereunder shall be subject to the appropriate terms of the Purchaser's contract listed in Exhibit C.

11. Priority on the Use of Facilities.

(a) Priority of the Columbia River Treaty. The use of Treaty space and the use of all other facilities at Mica and Arrow and Downstream U.S. Projects to fulfill the requirements of the Treaty shall receive priority over all uses provided for in this Contract.

(b) Generating Facilities.

(1) Priority of Own Use - The Purchaser shall have the right to determine which requests can be met between requests under this Contract and other conflicting third party requests for use of its generating facilities. The Purchaser shall take reasonable efforts to return energy hereunder; however, the Purchaser shall not be obligated to return energy at a rate of delivery in excess of the generating capacity of the units at its Project(s) available for that purpose, or to operate its system in such a manner as to affect adversely its sales to utilities or service to its customers.

(2) Generating Unit Availability - The Purchaser responsible for operating each Project shall take reasonable efforts to have generating units (turbine capacities) available for the purpose of converting water releases to energy and thereby avoiding spill of water released pursuant to sections 6(b) and 7(b) of Exhibit A. Bonneville shall give the Purchaser as much notice of the release of stored water as practicable, and the Purchaser shall give Bonneville as much notice of the nonavailability of generating units as practicable.

(3) Return of Energy - The Purchaser shall take reasonable efforts, but shall not be obligated, to return energy to Bonneville at uniform hourly rates within each day; however, if Bonneville requests the return of energy at hourly rates that are other than uniform because the Receiving Party (Bonneville or B.C. Hydro) cannot use the returned energy at a uniform rate, the Purchaser shall take reasonable efforts to return the energy as requested by Bonneville.

(4) Return of Energy When Exporting - If the generating capacity available to the Purchaser limits the amounts of energy which can be generated hourly at its Project(s) to return energy during any day as provided in paragraph (3) above, the Purchaser shall, unless the Receiving Party (Bonneville or B.C. Hydro) is making nonfirm energy sales to entities outside its Normal Service Area, forego all or a portion of its nonfirm energy sales during such hours to entities outside the Bonneville Normal Service Area to the extent necessary to return energy as required by paragraph (3) above.

(5) Other Return of Energy - Energy not returned pursuant to paragraphs (3) and (4) above will be returned at times and rates as agreed by Bonneville and the Purchaser.

12. Payments.

(a) Payment of Service Charges by Bonneville. Bonneville shall disburse to each Purchaser its pro rata share of any service charges Bonneville receives from B.C. Hydro pursuant to section 14(b) of Exhibit A for energy returned from release of water from the BCH Mica or Arrow Storage Accounts. The share for Bonneville and each Purchaser shall be prorated based on the number of kilowatthours generated for return at each party's generating facilities. Bonneville shall make such disbursement promptly upon receipt of payments from B.C. Hydro.

(b) Payment for Purchase of Storage by B.C. Hydro. Bonneville shall disburse to each Purchaser its pro rata share of any payments Bonneville receives from B.C. Hydro pursuant to section 14(c) of Exhibit A for the purchase of water stored in BPA Storage Accounts. The share for each Purchaser shall be prorated based on the ratio of: (1) the water-to-energy conversion factors for such Purchaser's Project(s) which were included in the

water-to-energy conversion factors set forth in section 14(c) of Exhibit A; to (2) the total of those water-to-energy conversion factors set forth in section 14(c) of Exhibit A which were used as the basis for payment to Bonneville by B.C. Hydro. Bonneville shall make such disbursement promptly upon receipt of payments from B.C. Hydro.

(c) Payment for Purchase of Storage by the Purchaser. The Purchaser shall pay Bonneville its pro rata share of the payments Bonneville is required to make to B.C. Hydro for the purchase of water stored in one or more BCH Storage Accounts if the Purchaser elects, pursuant to section 9(b), to participate in such purchase. Such Purchaser's share of the cost to Bonneville for such purchase shall be prorated based on the ratio of: (1) the water-to-energy conversion factors for such Purchaser's Project(s) which were included in the water-to-energy conversion factors set forth in section 14(c) of Exhibit A; to (2) the total of those water-to-energy conversion factors set forth in section 14(c) of Exhibit A which were used as the basis for payment to B.C. Hydro by Bonneville. Bonneville shall bill the Purchaser for its share of the cost of such purchase in a manner consistent with Bonneville's obligation to pay B.C. Hydro pursuant to section 14(c) of Exhibit A and the Purchaser shall pay Bonneville in full on or before the thirtieth day after the date of such bill.

13. Release and Discharge of Claims. The Purchaser hereby gives Bonneville the right to release and discharge B.C. Hydro on the Purchaser's behalf, pursuant to sections 3(b) and 3(e) of Exhibit A, from any claim which may be asserted by the Purchaser against B.C. Hydro arising from B.C. Hydro's filling of Inactive Storage Space in a BCH Storage Reservoir to the extent such filling is accomplished pursuant to Exhibit A. The Purchaser agrees not to assert any claim arising from such filling against B.C. Hydro or Bonneville in any court or tribunal.

IN WITNESS WHEREOF, the parties have executed this Contract in several counterparts.

UNITED STATES OF AMERICA
Department of Energy

By _____
Bonneville Power Administrator

MID-COLUMBIA PURCHASER

By _____

Title _____

Date _____

ATTEST:

By _____

Title _____

Date _____

(WP-PKI-1672c)

DRAFT

PURCHASER'S SHARES (Percent)

Utility	(1) Wells	(2) Rocky Reach	(3) Rock Island	(4) Wanapum	(5) Priest Rapids
Chelan	0	10.63	5.58	0	0
Colockum	0	23.0	0	0	0
Cowlitz	0	0	0	6.03	5.33
Douglas	13.2	2.77	0	0	0
Eugene	0	0	0	3.24	2.36
Forest Grove 1/	0	0	0	1.93	1.37
Grant	0	0	0	26.24	28.2
Kittitas 1/	0	0	0	0	0.4
McMinnville 1/	0	0	0	1.93	1.37
Milton-Freewater 1/	0	0	0	1.93	1.37
Okanogan	6.0	0	0	0	0
Pacific	9.0	5.3	0	21.0	15.6
Portland	26.5	12.0	0	18.7	13.9
Puget	40.8	43.4	94.42	10.8	8.0
Seattle	0	0	0	0	8.0
Tacoma	0	0	0	0	8.0
Water Power	4.5	2.9	0	8.2	6.1
Total	100	100	100	100	100

PURCHASERS' WATER-TO-ENERGY CONVERSION FACTORS (kW/CFS).

Utility	(1) Wells	(2) Rocky Reach	(3) Rock Island	(4) Wanapum	(5) Priest Rapids	(6) Total
Chelan	0	0.7813	0.1603	0	0	0.9416
Colockum	0	1.6905	0	0	0	1.6905
Cowlitz	0	0	0	0.314	0.309	0.623
Douglas	0.594	0.2036	0	0	0	0.7976
Eugene	0	0	0	0.168	0.137	0.305
Forest Grove 1/	0	0	0	0.100	0.079	0.179
Grant	0	0	0	1.366	1.637	3.003
Kittitas 1/	0	0	0	0	0.023	0.023
McMinnville 1/	0	0	0	0.100	0.079	0.179
Milton-Freewater 1/	0	0	0	0.100	0.079	0.179
Okanogan	0.270	0	0	0	0	0.270
Pacific	0.405	0.38955	0	1.092	0.905	2.79155
Portland	1.192	0.8820	0	0.972	0.806	3.852
Puget	1.836	3.1899	2.7127	0.562	0.464	8.7646
Seattle	0	0	0	0	0.464	0.464
Tacoma	0	0	0	0	0.464	0.464
Water Power	0.203	0.21315	0	0.426	0.354	1.19615
Total	4.500	7.350	2.873	5.200	5.800	25.723

1/ These utilities' shares have been exchanged to Bonneville pursuant to their services and exchange agreements with Bonneville.

Purchaser Contracts With Bonneville

Purchaser	Contract Number
Chelan	DE-MS79-81BP90487
Colockum	14-03-83061
Cowlitz	DE-MS79-81BP90493
Douglas	DE-MS79-81BP90494
Eugene	DE-MS79-81BP90456
Forest Grove	DE-MS79-81BP90445
Grant	DE-MS79-81BP90498
Kittitas	DE-MS79-81BP90501
McMinnville	DE-MS79-81BP90448
Milton-Freewater	DE-MS79-81BP90459
Okanogan	DE-MS79-81BP90507
Pacific	14-03-29245
Portland	14-03-37017
Puget	14-03-37050
Seattle	DE-MS79-81BP90460
Tacoma	DE-MS79-81BP90455
Water Power	14-03-29242

(WP-PKI-1672c)

APPENDIX E
GLOSSARY

Active Storage Space - Space is a reservoir which may be filled and lowered upon need of the user.

Anadromous - Species of fish (such as salmon) that are hatched in fresh water, mature in salt water, and return to fresh water to spawn.

Coordinated System - The Coordinated System consists of the Corps, Bureau, and BPA, and 14 of the area generating utilities who signed the Pacific Northwest Coordination Agreement in August 1964. The object of the Coordinated System is to operate projects as if operated by a single entity to make optimum use of the water and storage resources of the region.

Critical Period - An application of historical lowest streamflows to current storage capacity to determine the maximum firm load-carring capability of the present system under "worst-case" condition; the interval during which all reservoirs are drafted from maximum to minimum elevations without failing to meet a given firm load requirement.

Firm Energy - Electric energy which is intended to have assured availability to the customer to meet all or any agreed upon portion of customer load requirements over a defined period. FIRM POWER is power which is guaranteed by the supplier to be available at all times except for reason of certain uncontrollable forces or continuity of service provisions.

Firm Energy Load Carrying Capability (FELCC) - The level of energy capable of being produced by the hydrogeneration system using all of the reservoir storage in combination with critical period streamflows.

Head - The vertical height of the water in a reservoir above the tailwater (the water surface immediately downstream from a dam or hydroelectric powerplant). The difference between the elevations of the reservoir and the tailrace at the foot of the dam.

Hydroregulation Study - A computer model which simulates the operation of the hydroelectric system. The studies are used to measure effects of alternative methods of operating major power storage reservoirs.

Inactive Storage Space - Space in a reservoir which is kept filled to produce head.

KCFS - THOUSAND CUBIC FEET PER SECOND - A measure of water flows or discharge equal to a thousand cubic feet of water passing a given point in one second's time.

KSFD - THOUSAND SECOND FOOT DAYS - The volume of water produced by a flow of one thousand cubic feet per second over the period of 24 hours.

MAF - MILLION ACRE FEET - An acre foot is the volume of water needed to cover one acre of land one foot deep.

Nonfirm Energy - Energy supplied or available under an arrangement which does not have the guaranteed continous availability feature of firm power.

Non-Treaty - Storage space that was not included as part of the Columbia River Treaty.

Salmonid - Member of the family SALMONIDAE.

Secondary - Excess energy above firm energy (or power) to be furnished to a customer when, as, and if available.

Surplus - Water which cannot be used to generate salable energy or to meet project constraints of firm nonpower commitments.

Treaty - Storage space that both the United States and Canada agreed to develop and operate, for flood control and power production, to the benefit of both countries.

Water Budget - Concept developed by the Regional Council in its F&W Program to provide certain volumes of water to achieve desired flows at Priest Rapids and Lower Granite control points during April 15 to June 15 to increase the flow velocities of the water between dams.

APPENDIX F
REFERENCES

Bonneville Power Administration, 1980, The Role of the Bonneville Power Administration in the Pacific Northwest Power Supply System, Final Environmental Impact Statement, December.

Bonneville Power Administration (BPA), 1983, Environmental Assessment on Proposed Power System Changes to Implement the Water Budget, May.

British Columbia Hydro and Power Authority, 1982, letter to Mr. Charles Cancilla re "Proposed Filling of Revelstock in September 26, 1983; August 10.

Sims, Carl W. and David R. Miller, 1982, "Effects of Flow on Migratory Behavior and Survival of Juvenile Fall and Summer Chinook Salmon in John Day Reservoir", June.

Northwest Electric Power Planning and Conservation Council, 1982, Final Fish and Wildlife Program, November 15, 1982.

U.S. Congress, 1980, Public Law 96-501, "Pacific Northwest Electric Power Planning and Conservation Act," 16 U.S.C. 839, December 5.

JOHN SPELLMAN
Governor

JAN TVETEN
Director

STATE OF WASHINGTON
WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane, KY-11 • Olympia, Washington 98504 • (206) 753-5755

December 1, 1983

Re: 35-6550-0000 (R-413)
EA - Proposed Agreements to
Resolve Revelstoke Filling Issues
& Access Reservoir Storage
Space in Canada

Mr. John B. Pyrch
Environmental Coordinator - PGC,
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208

Dear Mr. Pyrch:

The staff of the Washington State Parks and Recreation Commission has reviewed the above-noted document and does not wish to make any comment.

Thank you for the opportunity to review and comment.

Sincerely,

David W. Heiser/bh

David W. Heiser, E.P.
Chief, Environmental Coordination

bh

DEC 1983
RECEIVED

United States Department of the Interior
BUREAU OF RECLAMATION
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
PACIFIC NORTHWEST REGION
FEDERAL BUILDING & U.S. COURTHOUSE
BOX 043-550 WEST FORT STREET
BOISE, IDAHO 83724

IN REPLY REFER TO: PN 150
120.1

OCT 31 1983

Mr. John B. Pyrch
Environmental Coordinator - PGC
P.O. Box 3621
Portland, Oregon 97208

Dear Mr. Pyrch:

Bonneville Power Administration's environmental assessment on Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia has been reviewed by appropriate members of our staff, and we have no objections to the content of the document. Please let us know if we can be of further assistance in the review process.

Sincerely yours

John R. Woodworth

John R. Woodworth
Regional Environmental Officer

NOV 1983
RECEIVED

VICTOR ATIYEH
GOVERNOR

Executive Department

155 COTTAGE STREET NE., SALEM, OREGON 97310

November 22, 1983

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management
Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208

SUBJECT: Revelstoke Storage Space in Canada
PNRS # OR831025-031-4

Thank you for submitting the subject Environmental Assessment for the State of Oregon review and comment.

Your EA was referred to the appropriate state agencies for review. No pertinent comments were received on this project.

Sincerely,

INTERGOVERNMENTAL RELATIONS DIVISION

Dolores Streeter

Dolores Streeter
Clearinghouse Coordinator

DS:bm

NOV 1983
RECEIVED

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NOV 8 1983

Planning Branch

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management
Bonneville Power Administration
Post Office Box 3621
Portland, Oregon 97208

Dear Mr. Pyrch:

We have reviewed the environmental assessment on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia, Canada, with respect to the U.S. Army Corps of Engineers' areas of responsibility for flood control, navigation, hydropower, and regulatory functions. We have no comments.

We appreciate the opportunity to review this assessment and regret that our response was delayed because of the limited review period.

Sincerely,

for George W. Ploudre, P.E.
Acting Chief, Engineering Division

NOV 1983
RECEIVED

MONTANA

DEPARTMENT OF

FISH, WILDLIFE AND PARKS

1420 East 6th Avenue
Helena, Montana 59620
November 3, 1983

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Dear John:

Our comments on the EA prepared for Resolving Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia are restricted to potential impacts on Montana storage reservoirs, particularly Libby Reservoir. There is little reference to potential impacts on operation of Libby and Hungry Horse reservoirs. We assume Libby outflow could be impacted in the proposed agreement as it flows into the Columbia above the U.S.-Canada border.

Our concern is that the agreement does not adversely impact resident fish in Libby Reservoir on the Kootenai River. Also, we do not want this agreement to constrain the results of ongoing studies to evaluate minimum reservoir levels to protect fish in Libby and Hungry Horse reservoirs.

The EA appears to be well done and is generally intelligible despite complex technical issues addressed. We appreciate the opportunity to comment.

Sincerely,

Patrick Graham

Patrick J. Graham, Chief
Research and Special Proj. Bur.
Fisheries Division

PJG/bjm

NOV 1983
RECEIVED

OREGON PROJECT NOTICE ACKNOWLEDGEMENT

State Clearinghouse
Intergovernmental Relations Division
155 Cottage Street N.E.
Salem, Oregon 97310

Phone (503) 378-3732 or Toll Free in Oregon 1-800-422-3600

APPLICANT: BONNEVILLE POWER ADMINISTRATION

PROJECT TITLE: REVELSTOKE STORAGE SPACE IN CANADA

DATE RECEIVED: OCTOBER 25, 1983

PNRS # OR 831025-031-4

Your project notice has been assigned the file title and number that appear above. Please use it in correspondence and, if applicable, enter it in Block 3A on the 424 form for the project. Your project notice must also be submitted for review to any affected areawide clearinghouse.

A 45 day review of your project began on the above date.

[ ] FEDERAL GRANT

[ ] HUD HOUSING

[ ] DIRECT FEDERAL DEVELOPMENT

[X] ENVIRONMENTAL ASSESSMENT

[ ] DRAFT ENVIRONMENTAL IMPACT STATEMENT

[ ] FINAL EIS

[ ] STATE PLAN/AMENDMENT

Your project notice was circulated to state agencies checked below:

ECONOMIC DEV. & CONSUMER SVCS
- __ Agriculture
- __ Soil and Water
- __ Economic Development
- __ Fire Marshal
- __ Housing
- __ Labor
- __ Real Estate

EDUCATION
- __ Education
- __ Educ. Coordinating
- __ Higher Education

EXECUTIVE
- __ Budget

HUMAN RESOURCES
- __ Adult and Family Services
- __ Children's Services
- __ Community Services
- __ Corrections
- __ Employment
- __ Health
- __ Mental Health
- __ Senior Services
- __ Vocational Rehabilitation

NATURAL RESOURCES
- X Governor's Office
- X DEQ
- X Energy
- X Fish and Wildlife
- X Forestry
- __ Geology
- X Lands
- X LCDC
- X Water Resources

TRANSPORTATION
- __ Aeronautics
- __ Director
- __ Highway Division
- __ Historic Preservation
- __ Parks Division
- __ Public Transit

MISCELLANEOUS
- __ Dev. Disabilities Council
- __ Extension Service
- __ Other

State Clearinghouse use only:
St. Agency Due Date: _____
Federal Agency: _____
County: _____

PNRS #6
Revised 10/83

OCT 1983
RECEIVED

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
155 Cottage St. NE, Salem, Oregon 97310
Phone: 378-3732

STATE CLEARINGHOUSE REVIEW ADDENDUM

APPLICANT: BONNEVILLE POWER ADMINISTRATION

PROJECT TITLE: REVELSTOKE STORAGE SPACE IN CANADA

PNRS #: CR831025-031-4

DATE: 12/15/83

The State Clearinghouse has received additional comments from

Department Fish & Wildlife

subsequent to our conclusion letter of 12/22/83

please see copy (ies) attached for your attention.

Additional Clearinghouse comments: —

(XX) Please consider this letter and enclosure(s) an addendum to our previous letter.

( ) A copy of this letter and enclosure(s) should be forwarded to the federal funding agency.

If you have questions please contact the State Clearinghouse at the above address and telephone number.

DEC 1983
RECEIVED

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
155 Cottage St. NE, Salem, Oregon 97310
Phone: 378-3732

INTERGOVERNMENTAL RELATIONS DIV.
DEC 12 1983

PNRS STATE REVIEW

Project #: OR 331025-031-4 Return Date: DEC 02 1983

The Attached proposal is for your review and comment. Please notify us immediately if you will be unable to respond by the indicated due date. If no response is received by the due date, it will be assumed that you have no comment and the file will be closed.

ENVIRONMENTAL ASSESSMENT

(X) The Environmental Assessment is adequate. No significant effect on the environment is indicated and a negative declaration is justified.

( ) The Environmental Assessment is adequate. There is a significant effect on the environment and an Environmental Impact Statement should be prepared as required by the National Environmental Protection Act.

( ) The Environmental Assessment is inadequate; further documentation is necessary. See remarks below.

- -

REMARKS

Every effort should be made to assume that flows necessary for the Water Budget and FERC ordered spills in the mid-Columbia are met.

DEC 1983
RECEIVED

Agency Fish & Wildlife By Tony Faast

Revised 10/83

1/18/84
J. Piccinini
EQ 4-2 alpha
Revelstoke EA

January 18, 1984

PGC

Lawrence A. Dean, Director
Division of Power Supply - PS

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Revelstoke Environmental Assessment

I wish to express my appreciation for your Division's technical assistance on the Revelstoke environmental assessment (EA). I want to especially thank Doug Faulkner for the excellent formatting and writing he did on Chapters 2 and 3 of the EA. As the document evolved, Mr. Faulkner and Dick Harper played the major roles in transforming what had been a series of complex, technical issues and related contract actions into a readable document describing the alternatives (Chapter 2) and identifying impacts associated with the B.C. Hydro agreement and its alternatives (Chapter 3). Their contribution to the EA necessitated many hours of intensive effort, often under less-than-ideal work loads.

I also want to thank you for your personal involvement in revising portions of the text, "educating" management, and encouraging its acceptance of the EA.

JPiccininni:crw (WP-PGC-2587K)

cc:
E. Sienkiewicz - P
B. Dodge - PA
J. McLennan - PG
D. Faulkner - PS
OPF (Faulkner) - SPOD
Official File - PGC

J Piccininni
1/18/84

January 18, 1984

PGC

John R. Palensky, Director
Division of Fish and Wildlife - PJ

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Revelstoke Environmental Assessment

I wish to express my appreciation for your Division's technical assistance on the Revelstoke environmental assessment (EA). I want to especially thank Dick Harper for the excellent formatting and writing he did for Chapters 2 and 3 of the EA. As the document evolved, Mr. Harper and Doug Faulkner played major roles in transforming what had been a series of complex technical issues and related contract actions into a readable document which describes the alternatives (Chapter 2) and identifies impacts associated with the multi-faceted B.C. Hydro agreement and its alternatives (Chapter 3). Their contribution to the EA necessitated many hours of intensive work, often under less-than-ideal work loads.

JPiccininni:crw (WP-PGC-2588K)

cc:
E. Siekiewicz - P
B. Dodge - PA
R. Harper - PJI
S. Smith - PJI
OPF (Harper) - SPOD
Official File - PGC

12-9-83

Also filed in FONSI Book

U.S. DEPARTMENT OF ENERGY
Bonneville Power Administration

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia

Bonneville Power Administration (BPA) proposes to enter into agreements with British Columbia Hydro and Power Authority (B.C. Hydro) and with the group of utilities which operate non-Federal dams on the Columbia River referred to as the mid-Columbia purchasers. These agreements will last for up to 10 years with a possible extension of up to 7 years.

BPA's purposes in negotiating an agreement with B.C. Hydro are threefold. The first purpose is to resolve a dispute over the filling of inactive storage space (space in a reservoir which is kept filled to produce head) at Revelstoke, Seven Mile, and, potentially, other B.C. Hydro reservoirs. The inactive storage space behind Revelstoke Dam will be filled by releasing water from Mica Dam upstream. The second purpose is to provide both BPA and B.C. Hydro the ability to use storage space in reservoirs in British Columbia to produce more usable energy than is possible under existing arrangements. The third purpose is to protect both parties from harm as a consequence of each other's actions under the agreement; that is, to provide financial or energy compensation for losses suffered during storage. All three purposes are discussed in pages 1-3 of the environmental assessment (EA) published in October 1983.

The purposes of the agreement with the mid-Columbia purchasers are:

1. To protect the mid-Columbia purchasers from power-related adverse effects resulting from the initial filling of Revelstoke and other reservoirs in British Columbia.

2. To obtain from such purchasers a release and discharge from claims they might make as a result of the initial filling of Revelstoke and other reservoirs in British Columbia.

3. To provide for the participation of the mid-Columbia plants for B.C. Hydro's benefit when B.C. Hydro stores and releases water.

4. To provide for the participation of the mid-Columbia plants for the purchasers' benefit when BPA stores and releases water.

REASONS WHY THE PROPOSED ACTION WILL NOT HAVE A SIGNIFICANT EFFECT ON THE HUMAN ENVIRONMENT

1. The proposed action is a power planning and marketing function. There will be no construction. Nothing will be built, altered, or torn down. There will be no direct effects on air, land, or water. Page 24 of the EA indicates that there will be no direct Federal development as a result of the proposed agreement.

2. Operation of existing Federal dams on the Columbia River will be similar to existing conditions. The operators of these dams have established constraints related to flood control, irrigation, navigation, etc., which represent absolute limits on flow and water levels. The proposed action will not result in operational changes which would cause these constraints to be exceeded. See Chapter 3, pages 12 and 14 of the EA.

3. Under certain runoff conditions, spring flows may be reduced under the proposed agreement, but not to a level less than that provided by the Water Budget developed by the Northwest Power Planning Council. BPA, the Corps of Engineers, and the Bureau of Reclamation have adopted the Council's Water Budget as a fixed planning constraint. The EA (page 16, section 3.1.3, and page 21, section 3.6) indicates that the Water Budget will mitigate any adverse environmental impacts resulting from BPA's operations and related to these flow reductions.

4. Storage of water in reservoirs controlled by B.C. Hydro under the proposed action will reduce supersaturation of dissolved gasses at times when affected dams in the U.S. on the Columbia River would ordinarily have excessive spill. Therefore, the incidence of gas bubble disease will be reduced as discussed in sections 3.2, 3.3, and 3.4 of the EA. The storage would represent a small portion of the total flow of the Columbia River at affected dams. For example, page 17, section 3.2.1 of the EA, indicates that flow reductions on the mainstem Columbia at the U.S.-Canada border would average 10.8 kcfs (thousand cubic feet per second) for the May-June period. For purposes of comparison, the graph on page 13 of the EA indicates an average flow of 150-165 kcfs for the same period below the border.

5. The proposed action may result in reduced spill at dams on the Columbia River, particularly during the initial filling of Revelstoke and other reservoirs mentioned in the EA. Such spill is needed at dams with inadequate bypass facilities to reduce mortality of migrating smolts. The Council's Fish and Wildlife Program (Section 404(a) and (b)) requires operators of hydroelectric projects without effective bypass systems to provide spill which will achieve a level of smolt survival comparable to or better than that achievable by the best available bypass system. BPA will do nothing as a result of the proposed agreement which could hinder provisions of fish passage spill provided for under the annual spill program developed in accordance with Section 404(a) and (b) of the Council's Program. See page 16, Section 3.1.3 of the EA.

6. In years with a wet fall followed by a dry spring, the stored water can be used to meet firm nonpower commitments, such as increasing the flexibility of the Water Budget. The volume of water involved is low compared to normal flow of the Columbia River.

7. The proposed action will result in a reduction of Firm Energy Load Carrying Capability (FELCC) of the Coordinated System by 1.0 billion kWh of which 0.7 billion kWh will be suffered by BPA during the initial fill of the Revelstoke reservoir. The agreement will result in transmission losses, head losses, and varying efficiencies of

resources, but energy generation will be substantially increased as a consequence of storage of unusable water and subsequent release when it is more marketable. These power marketing changes, however, have no foreseeable effect on air, land, or water, particularly on river flows and fish.

RELATED DOCUMENTS

Bonneville Power Administration, May 1983, Environmental Assessment on Proposed Power System Changes to Implement the Water Budget (DOE/EA-0214).

PUBLIC AVAILABILITY

Copies of the EA were sent to potentially affected utilities and agencies, and other organizations and individuals who expressed interest in power marketing actions which affect the Columbia River and its tributaries. Review of the EA by these agencies, utilities, and interested groups and individuals did not reveal any additional environmental consequences from the proposed action. Copies of this finding will be sent to all persons and agencies who were sent copies of the EA. Additional copies of either document are available upon request from the Environmental Manager, Bonneville Power Administration - SJ, P.O. Box 3621, Portland, Oregon 97208; telephone (503) 230-5136.

DETERMINATION

On the basis of the information contained in the EA as summarized above, the Department of Energy determines that this proposal is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act, 42 U.S.C. 4321 et seq., and, therefore, an environmental impact statement will not be prepared.

Issued in Washington, D.C., on December 9, 1983

William A. Vaughan

WILLIAM A. VAUGHAN
Assistant Secretary
Environmental Protection, Safety,
and Emergency Preparedness

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

DEC 13 1983

In reply refer to: PGC

Interested Organization and Individuals

On October 18, 1983, Bonneville Power Administration (BPA) distributed its Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia. Comments were accepted through November 1, 1983, and BPA received 5 comment letters, including several after the closing date.

Based upon the EA and the public review, a Finding of No Significant Impact (FONSI) has been made with respect to the proposed agreements. Enclosed for your information is the FONSI. If you have any questions, contact John B. Pyrch, Environmental Coordinator, Office of Power and Resources Management - PGC, P.O. Box 3621, Portland, Oregon 97208.

Sincerely,

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

Enclosure

U.S. DEPARTMENT OF ENERGY
Bonneville Power Administration

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia

Bonneville Power Administration's (BPA) proposes to enter into agreements with British Columbia Hydro and Power Authority (B.C. Hydro) and with the group of utilities which operate non-Federal dams on the Columbia River referred to as the mid-Columbia purchasers. These agreements will last for up to 10 years with a possible extension of up to 7 years.

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4. To provide for the participation of the mid-Columbia plants for the purchasers' benefit when BPA stores and releases water.

REASONS WHY THE PROPOSED ACTION WILL NOT HAVE A SIGNIFICANT EFFECT ON THE HUMAN ENVIRONMENT

1. The proposed action is a power planning and marketing function. There will be no construction. Nothing will be built, altered, or torn down. There will be no direct effects on air, land, or water. Page 24 of the EA indicates that there will be no direct Federal development as a result of the proposed agreement.

2. Operation of existing Federal dams on the Columbia River will be similar to existing conditions. The operators of these dams have established constraints related to flood control, irrigation, navigation, etc., which represent absolute limits on flow and water levels. The proposed action will not result in operational changes which would cause these constraints to be exceeded. See Chapter 3, pages 12 and 14 of the EA.

3. Under certain runoff conditions, spring flows may be reduced under the proposed agreement, but not to a level less than that provided by the Water Budget developed by the Northwest Power Planning Council. BPA, the Corps of Engineers, and the Bureau of Reclamation have adopted the Council's Water Budget as a fixed planning constraint. The EA (page 16, section 3.1.3, and page 21, section 3.6) indicates that the Water Budget will mitigate any adverse environmental impacts resulting from BPA's operations and related to these flow reductions.

4. Storage of water in reservoirs controlled by B.C. Hydro under the proposed action will reduce supersaturation of dissolved gasses at times when affected dams in the U.S. on the Columbia River would ordinarily have excessive spill. Therefore, the incidence of gas bubble disease will be reduced as discussed in sections 3.2, 3.3, and 3.4 of the EA. The storage would represent a small portion of the total flow of the Columbia River at affected dams. For example, page 17, section 3.2.1 of the EA, indicates that flow reductions on the mainstem Columbia at the U.S.-Canada border would average 10.8 kcfs (thousand cubic feet per second) for the May-June period. For purposes of comparison, the graph on page 13 of the EA indicates an average flow of 150-165 kcfs for the same period below the border.

5. The proposed action may result in reduced spill at dams on the Columbia River, particularly during the initial filling of Revelstoke and other reservoirs mentioned in the EA. Such spill is needed at dams with inadequate bypass facilities to reduce mortality of migrating smolts. The Council's Fish and Wildlife Program (Section 404(a) and (b)) requires operators of hydroelectric projects without effective bypass systems to provide spill which will achieve a level of smolt survival comparable to or better than that achievable by the best available bypass system. BPA will do nothing as a result of the proposed agreement which could hinder provisions of fish passage spill provided for under the annual spill program developed in accordance with Section 404(a) and (b) of the Council's Program. See page 16, Section 3.1.3 of the EA.

6. In years with a wet fall followed by a dry spring, the stored water can be used to meet firm nonpower commitments, such as increasing the flexibility of the Water Budget. The volume of water involved is low compared to normal flow of the Columbia River.

7. The proposed action will result in a reduction of Firm Energy Load Carrying Capability (FELCC) of the Coordinated System by 1.0 billion kWh of which 0.7 billion kWh will be suffered by BPA during the initial fill of the Revelstoke reservoir. The agreement will result in transmission losses, head losses, and varying efficiencies of

resources, but energy generation will be substantially increased as a consequence of storage of unusable water and subsequent release when it more marketable. These power marketing changes, however, have no forseeable effect on air, land, or water, particularly on river flows and fish.

RELATED DOCUMENTS

Bonneville Power Administration (BPA), 1983, Environmental Assessment on Proposed Power System Changes to Implement the Water Budget, May.

PUBLIC AVAILABILITY

Copies of the EA were sent to potentially affected utilities and agencies, and other organizations and individuals who expressed interest in power marketing actions which affect the Columbia River and its tributaries. Review of the EA by these agencies, utilities, and interested groups and individuals did not reveal any adverse consequences to the environment from the proposed action. Copies of this finding will be sent to all persons and agencies who were sent copies of the EA. Additional copies of either document are available upon request from the Environmental Manager, Bonneville Power Administration - SJ, P.O. Box 3621, Portland, Oregon 97208; telephone (503) 230-5136.

DETERMINATION

On the basis of the information contained in the EA as summarized above, the Department of Energy determines that this proposal is not a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA 42 U.S.C. 4321 et seq., and, therefore, an environmental impact statement will not be prepared.

Issued in Washington, D.C., on DEC 0 9 1983

/s/ William A. Vaughan

William A. Vaughan
Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness

DEC 1 3 1983

PGC

Interested Organization and Individuals

On October 18, 1983, Bonneville Power Administration (BPA) distributed its Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia. Comments were accepted through November 1, 1983, and BPA received 5 comment letters, including several after the closing date.

Based upon the EA and the public review, a Finding of No Significant Impact (FONSI) has been made with respect to the proposed agreements. Enclosed for your information is the FONSI. If you have any questions, contact John B. Pyrch, Environmental Coordinator, Office of Power and Resources Management - PGC, P.O. Box 3621, Portland, Oregon 97208.

Sincerely,

(Sgd.) JOHN B. PYRCH

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Enclosure

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J Piccinni 12/1/83

PGC

DEC 0 1 1983

Mr. Patrick J. Graham, Chief
Research and Special Projects Bureau
Fisheries Division
Montana Department of Fish, Wildlife, and Parks
1420 East Sixth Avenue
Helena, Montana 59620

Dear Mr. Graham:

Thank you for your November 3, 1983, letter commenting on this agency's Revelstoke environmental assessment (EA).

In preparation of the EA, Bonneville Power Administration considered the effects of the proposed agreement and its alternatives on Libby and Hungry Horse reservoirs. We determined that any potential effects would be limited to the mainstem Columbia River, not to its tributaries.

If you have any additional concerns, please contact me or John Piccininni of my staff at (503) 230-4261.

Sincerely,

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

JPiccininni:crw (WP-PGC-2584K)

cc:
R. Harper - PJI
D. Faulkner - PS
N. Stas - SJ
Official File - PGC

November 7, 1983

PGC

11/7/83

Anthony R. Morrell, Environmental Officer
Office of Management Services - SJ

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Transmittal of Revelstoke FONSI for DOE Clearance

Please find attached the final version of the Finding of No Significant Impact (FONSI) based on the Revelstoke EA. The EA was distributed to agencies, utilities, and interested groups and individuals. Only one comment letter was received, that from the Bureau of Reclamation Office in Boise, supporting the EA. Comments from the Department of Energy on the advance copy of the FONSI has been incorporated.

I request your office to initiate a 568 for formal transmittal to DOE for their clearance. If you have any questions, please call me or John Piccininni at extension 4261.

Attachment

JPiccininni:dg (WP-PGC-2546K)

cc:
J. McLennan - PG
N. Stas - SJ
Official File - PGC

U.S. DEPARTMENT OF ENERGY
Bonneville Power Administration

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia

Bonneville Power Administration's (BPA) proposes to enter into agreements with British Columbia Hydro and Power Authority (B.C. Hydro) and with the group of utilities which operate non-Federal dams on the Columbia River referred to as the mid-Columbia purchasers. These agreements will last for up to 10 years with a possible extension of up to 7 years.

BPA's purposes in negotiating an agreement with B.C. Hydro are three-fold. The first purpose is to resolve a dispute over the filling of inactive storage space (space in a reservoir which is kept filled to produce head) at Revelstoke, Seven Mile, and potentially, other B.C. Hydro reservoirs. The inactive storage space behind Revelstoke Dam will be filled by releasing water from Mica Dam upstream. The second purpose is to provide both BPA and B.C. Hydro the ability to use storage space in reservoirs in British Columbia to produce more usable energy than is possible under existing arrangements. The third purpose is to protect both parties from harm as a consequence of each other's actions under the agreement, that is, to provide financial or energy compensation for losses suffered during storage. All three purposes are discussed in pages 1-3 of the environmental assessment (EA) published in October 1983.

The purposes of the agreement with the mid-Columbia purchasers are:

1. To protect the mid-Columbia purchasers from power-related adverse effects resulting from the initial filling of Revelstoke and other reservoirs in British Columbia.

2. To obtain from such purchasers a release and discharge from claims they might make as a result of the initial filling of Revelstoke and other reservoirs in British Columbia.

3. To provide for the participation of the mid-Columbia plants for B.C. Hydro's benefit when B.C Hydro stores and releases water.

4. To provide for the participation of the mid-Columbia plants for the purchasers' benefit when BPA stores and releases water.

REASONS WHY THE PROPOSED ACTION WILL NOT HAVE A SIGNIFICANT EFFECT ON THE HUMAN ENVIRONMENT

1. The proposed action is a power planning and marketing function. There will be no construction. Nothing will be built, altered, or torn down. There will be no direct effects on air, land, or water. Page 24 of the EA indicates that there will be no direct Federal development as a result of the proposed agreement.

2. Operation of existing Federal dams on the Columbia River will be similar to existing conditions. The operators of these dams have established constraints related to flood control, irrigation, navigation, etc., which represent absolute limits on flow and water levels. The proposed action will not result in operational changes which would cause these constraints to be exceeded. See Chapter 3, pages 12 and 14 of the EA.

3. Under certain runoff conditions, spring flows may be reduced under the proposed agreement, but not to a level less than that provided by the Water Budget developed by the Northwest Power Planning Council. BPA, the Corps of Engineers, and the Bureau of Reclamation have adopted the Council's Water Budget as a fixed planning constraint. The EA (page 16, section 3.1.3, and page 21, section 3.6) indicates that the Water Budget will mitigate any adverse environmental impacts resulting from BPA's operations and related to these flow reductions.

4. Storage of water in reservoirs controlled by B.C. Hydro under the proposed action will reduce supersaturation of dissolved gasses at times when affected dams in the U.S. on the Columbia River would ordinarily have excessive spill. Therefore, the incidence of gas bubble disease will be reduced as discussed in sections 3.2, 3.3, and 3.4 of the EA. The storage would represent a small portion of the total flow of the Columbia River at affected dams. For example, page 17, section 3.2.1 of the EA, indicates that flow reductions on the mainstem Columbia at the U.S.-Canada border would average 10.8 kcfs (thousand cubic feet per second) for the May-June period. For purposes of comparison, the graph on page 13 of the EA indicates an average flow of 150-165 kcfs for the same period below the border.

5. The proposed action may result in reduced spill at dams on the Columbia River, particularly during the initial filling of Revelstoke and other reservoirs mentioned in the EA. Such spill is needed at dams with inadequate bypass facilities to reduce mortality of migrating smolts. The Council's Fish and Wildlife Program (Section 404(a) and (b)) requires operators of hydroelectric projects without effective bypass systems to provide spill which will achieve a level of smolt survival comparable to or better than that achievable by the best available bypass system. BPA will do nothing as a result of the proposed agreement which could hinder provisions of fish passage spill provided for under the annual spill program developed in accordance with Section 404(a) and (b) of the Council's Program. See page 16, Section 3.1.3 of the EA.

6. In years with a wet fall followed by a dry spring, the stored water can be used to meet firm nonpower commitments, such as increasing the flexibility of the Water Budget. The volume of water involved is low compared to normal flow of the Columbia River.

7. The proposed action will result in a reduction of Firm Energy Load Carrying Capability (FELCC) of the Coordinated System by 1.0 billion kWh of which 0.7 billion kWh will be suffered by BPA during the initial fill of the Revelstoke reservoir. The agreement will result in transmission losses, head losses, and varying efficiencies of

resources, but energy generation will be substantially increased as a consequence of storage of unusable water and subsequent release when it more marketable. These power marketing changes, however, have no forseeable effect on air, land, or water, particularly on river flows and fish.

RELATED DOCUMENTS

Bonneville Power Administration (BPA), 1983, Environmental Assessment on Proposed Power System Changes to Implement the Water Budget, May.

PUBLIC AVAILABILITY

Copies of the EA were sent to potentially affected utilities and agencies, and other organizations and individuals who expressed interest in power marketing actions which affect the Columbia River and its tributaries. Review of the EA by these agencies, utilities, and interested groups and individuals did not reveal any adverse consequences to the environment from the proposed action. Copies of this finding will be sent to all persons and agencies who were sent copies of the EA. Additional copies of either document are available upon request from the Environmental Manager, Bonneville Power Administration - SJ, P.O. Box 3621, Portland, Oregon 97208; telephone (503) 230-5136.

DETERMINATION

On the basis of the information contained in the EA as summarized above, the Department of Energy determines that this proposal is not a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA 42 U.S.C. 4321 *et seq.*, and, therefore, an environmental impact statement will not be prepared.

Issued in Washington, D.C., on _____

_____
William A. Vaughn
Assistant Secretary for Environmental
Protection, Safety, and Emergency
Preparedness

October 31, 1983

PGC

Anthony R. Morrell, Environmental Officer
Office of Management Services - SJ

John B. Pyrch, Environmental Coordinator (Sgd.) JOHN B. PYRCH
Office of Power and Resources Management - PGC

Transmittal of Revelstoke Draft FONSI for DOE Review

Please find attached for your transmittal to DOE, an advance copy of a Finding of No Significant Impact (FONSI) for the Revelstoke EA. The EA has been distributed to agencies, utilities, and interested groups and individuals. Review comments are due back by November 1, 1983. A decision about finalizing the FONSI will be made once the DOE and public comments are available.

As before, we would appreciate any assistance you can provide in moving the document through the review process. If you have any questions, please contact me or John Pyrch at extension 4261.

Attachment

JPiccininni:dg (WP-PGC-2523K)

cc:
J. McLennan - PG
N. Stas - SJ
Official File PBC

4-2-10

PGC

OCT 1 9 1983

To Interested Persons and Organizations:

The Bonneville Power Administration has recently published an Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia.

Comments on the EA will be accepted through November 1, 1983, and will assist us in determining whether or not a Finding of No Significant Impact can be made for the proposed agreements. If you would like to review the EA, you may request a copy from John B. Pyrch, Environmental Coordinator - PGC, P.O. Box 3621, Portland, Oregon 97208, or call at (503) 230-4261.

Sincerely,

SPrice

for John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

SPrice:sp (WP-PGC-2445K)

cc:
Official File - PGC

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: PGC

OCT 19 1983

To Interested Persons and Organizations:

The Bonneville Power Administration has recently published an Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia.

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Sincerely,

John P. Piccinini

for John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

4-2-10

10/18/83

PGC

October 18, 1983

To Interested Persons and Organizations:

Enclosed for your review and comment is the Bonneville Power Administration's Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia. Written comments on the EA will be accepted through Tuesday, November 1, 1983. They should be submitted to John B. Pyrch, Environmental Coordinator - PGC, P.O. Box 3621, Portland, Oregon 97208.

Your comments will assist us in determining whether a Finding of No Significant Impact can be made on the proposed agreements.

Sincerely,

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

Enclosure

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In reply refer to: PGC

October 18, 1983

To Interested Persons and Organizations:

Enclosed for your review and comment is the Bonneville Power Administration's Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia. Written comments on the EA will be accepted through Tuesday, November 1, 1983. They should be submitted to John B. Pyrch, Environmental Coordinator - PGC, P.O. Box 3621, Portland, Oregon 97208.

Your comments will assist us in determining whether a Finding of No Significant Impact can be made on the proposed agreements.

Sincerely,

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

Enclosure

00 8 10/17/83 @ 506

REVELSTOKE EA

FEDERAL AGENCY

00497
DISTRICT MGR
BONNEVILLE POWER ADM
IDAHO FALLS OFFICE
PO BOX 2558
IDAHO FALLS
ID
83401

00961
NOAA
NATIONAL WEATHER SERVICE
220 NW 8TH AVE RM 121
PORTLAND
OR
97209

00401
COMMANDER (DPL)
THIRTEENTH COAST GUARD DIST
915 2ND AVE
SEATTLE
WA
98174

00403
USA CORPS OF ENGINEERS
MCNARY PROJECT OFFC
PO BOX 1441
UMATILLA
OR
97882

00214
USDA FOREST SERVICE
PAYETTE NATIONAL FOREST
PO BOX 1026
MCCALL
ID
83638

00404
FOREST SUPERVISOR
USDA FOREST SERVICE
KOOTENAI NATL FOREST
BOX AS
LIBBY
MT
59923

00843
REGIONAL DIRECTOR
USDOC NMFS
7600 SANDPOINT WAY NE BIN C15700
SEATTLE
WA
98115

00405
USDOI BIA
RIGHTS PROTECTION
316 N 6TH ST
BILLINGS
MT
59102

00408
DISTRICT MGR
USDOI BLM
1808 N 3RD
COEUR D'ALENE
ID
83814

00496
STATE DIRECTOR
USDOI BLM
IDAHO STATE OFFICE
3380 AMERICAN TERRACE
BOISE
ID
83706

00411
WESTERN FIELD OP CTR
USDOI BUREAU OF MINES
E 360 3RD AVE
SPOKANE
WA
99202

00409
FIELD SUPERVISOR
USDOI F&W SERVICE
727 NE 24TH
PORTLAND
OR
97232

00413
FISHERIES ASST OFFICE
USDOI F&W SERVICE
9317 HWY 99 STE 1
VANCOUVER
WA
98665

00960
TOM
BONDE
FISH BIOLOGIST
USA CORPS OF ENGINEERS
SEATTLE DIST OFC
PO BOX C-3755
SEATTLE
WA
98124

00223
ALAN A
BRATKOVICH
USDA FOREST SERVICE
RT 2 BOX 275
LIBBY
MT
59923

00437
CHARLES F
BROOKS
RESOURCES STAFF
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LIBBY
MT
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00024
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OR
97232

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CHANG
USDOI BIA
OLYMPIC PENINSULA AGENCY
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HOQUIAM
WA
98550

00018
KENT
CHURCHILL
USDA FOREST SERVICE
PO BOX 3623
PORTLAND
OR
97208

00225
ALAN S
DEFLER
PROJ MGR
USDA FOREST SERVICE
HELLS CANYON NATL RECREATION AREA
PO BOX 490
ENTERPRISE
OR
97828

00463
CHUCK
DUNN
USDOI F&W SERVICE
ECOLOGICAL SERVICES
2625 PARKMONT LN SW BLDG B-3
OLYMPIA
WA
98502

00043
WES
EBEL
USDOC NMFS
2725 MOUNTLAKE BLVD E
SEATTLE
WA
98112

00048
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97208

~~00520~~ 517
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move to EA

00052
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00210
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ID
83705

00058
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OR
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00242
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98121

00062
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JUSTUS
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BOISE
ID
83724

00065
KEN
LISCOM
USDOC NMFS
2725 MONTLAKE BLVD E
SEATTLE
WA
98112

00066
CLIFFORD W
LONG
USDOC NMFS
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SEATTLE
WA
98112

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OR
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WA
98112

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OR
97208

00094
HOWARD
RAYMOND
USDOC NMFS
COASTAL ZONE & ESTUARIES ST DIV
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SEATTLE
WA
98112

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REINSEL
USDA FOREST SERVICE
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59807

00096
LYNN
SECREST
USDOC NMFS
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SEATTLE
WA
98112

00772
DEAN
SHUMWAY
USDOE FERC
825 N CAPITOL NE
WASHINGTON
DC
20426

00331
CARL N
SHUSTER JR
USDOE FERC (RC-726 MS-304)
WASHINGTON
DC
20426

00102
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SLATICK
USDOC NMFS
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CLARKSTON
WA
99403

00340
MIKE
STEMPL
USDOI F&W SERVICE
PO BOX 1157
MOSES LAKE
WA
98837

00352
D HARVEY
ULRICH
USA CORPS OF ENGINEERS
RT 3 BOX 1480-3
LIBBY
MT
59923

STATE AGENCY

00315
CHIEF BUREAU OF FISHERIES
STATE OF IDAHO
DEPT OF FISH & GAME
PO BOX 25
BOISE
ID
83707

00397
WESTERN REGION OFFICE
STATE OF IDAHO
DEPT OF WATER RESOURCES
450 W STATE ST
BOISE
ID
83720

00399
ENVIRON COORD
STATE OF MONTANA
DEPT OF ST LANDS DIV OF FORESTRY
2705 SDPUYIN RD
MISSOULA
MT
59801

01045
HIST PRESERV OFFICER
STATE OF OREGON
DEPT OF TRANS PARKS & REC DIV
525 TRADE ST SE
SALEM
OR
97310

00400
LOCATION DESIGN ENG
STATE OF WASHINGTON
DEPT OF TRANSPORTATION
TRANSPORTATION BLDG
OLYMPIA
WA
98504

00427
M TAYLOR
BARRETT
PLNG & COMM AFFAIRS AGENCY
9TH & COLUMBIA BLDG MS/G+51
OLYMPIA
WA
98504

00430
KIRK
BEININGEN
STATE OF OREGON
DEPT OF F&W
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PORTLAND
OR
97208

00029
GERALD
BOESE
STATE OF WASHINGTON
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MAIL STOP PV-11
OLYMPIA
WA
98504

00212
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CHRISTENSEN
IDAHO FISH & GAME COMMISSION
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NAMPA
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83651

00450
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CLAPP
STATE OF IDAHO
DEPT OF WATER RESOURCES
STATEHOUSE
BOISE
ID
83720

00959
AL
COOK
STATE RECREATION PLANNER
STATE OF OREGON
525 TRADE SE
SALEM
OR
97310

00028
TOM
ELWELL
STATE OF WASHINGTON
DEPT OF ECOLOGY
MAIL STOP PV-11
OLYMPIA
WA
98504

00053
BOB
GERKE
STATE OF WASHINGTON
DEPT OF FISHERIES
115 GENERAL ADM BLDG
OLYMPIA
WA
98504

00054
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STATE OF MONTANA
DEPT OF FISH WILDLIFE & PARKS
PO BOX 67
KALISPELL
MT
59901

00859
SUZY
GRAVES
STATE OF WASHINGTON
DEPT OF GAME
PO BOX 85
WOODLAND
WA
98674

00489
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GRIGGS
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PO BOX 3503
PORTLAND
OR
97208

00055
DAVE
GUFLER
STATE OF WASHINGTON
DEPT OF GAME
600 N CAPITOL WAY
OLYMPIA
WA
98504

00492
WAYNE T
HAAS
STATE OF IDAHO
DEPT OF WATER RESOURCES
STATEHOUSE
BOISE
ID
83720

00491
DAVID
HANSON
STATE OF IDAHO
DEPT OF FISH & GAME
PO BOX 25
BOISE
ID
83707

~~00234~~ 232
SUE
HIGGINS
STATE OF MONTANA
DEPT NAT RES & CONS WTR MGNT BR
32 S EWING
HELENA
MT
59620

move to EA

00238
LIZ
HOOK
STATE OF OREGON
DIVISION STATE LAND
1445 STATE ST
SALEM
OR
97310

00060
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HOWERTON
STATE OF WASHINGTON
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OLYMPIA
WA
98504

00253
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STATE OF WASHINGTON
DEPT OF FISHERIES HABIT MGMT
115 GENERAL ADMIN BLDG
OLYMPIA
WA
98504

00260
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KONIGSBERG
STATE OF MONTANA
DEPT OF NAT RES ENERGY DIV
32 S EWING
HELENA
MT
59601

00258
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OR
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00268
CARLA
LEVINSKI
STATE OF IDAHO
DEPT HEALTH & WELFARE DIV OF ENV
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BOISE
ID
83720

00269
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LICHATOWICH
STATE OF OREGON
DEPT OF FISH & WILDLIFE
303 EXTENSION HALL OSU
CORVALLIS
OR
97331

00271
HERBERT
LUNDY
OREGON F&W COMMIS
13150 SW FIELDING RD
LAKE OSWEGO
OR
97034

00287
ROBERT
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STATE OF IDAHO
DEPT OF PARKS & RECREATION
STATEHOUSE
BOISE
ID
83720

00296
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MUNDINGER
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00301
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WALLOWA HATCHERY - RT 1 BOX 278
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OR
97828

00304
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PEHRSON
STATE OF IDAHO
DEPT OF FISH & GAME
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ID
83707

00246
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83501

00493
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STATE OF MONTANA
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MT
59620

00308
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BOISE
ID
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00317
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SALEM
OR
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DEPT OF GAME
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STARBUCK
WA
99359

00323
WILLIAM A
SCRIBNER
STATE OF IDAHO
DEPT OF LANDS
STATEHOUSE
BOISE
ID
83720

00325
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SEXSON
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DEPT OF WATER RESOURCES
555 13TH ST NE
SALEM
OR
97378

00347
THOMAS
TISCHER
STATE OF WASHINGTON
UTIL & TRANSP COMMIS
HWY-LICENSES BLDG 7TH FL
OLYMPIA
WA
98504

00363
CHUCK
WILLIS
STATE OF OREGON
DEPT OF FISH & WILDLIFE
17330 SE EVELYN ST
CLACKAMAS
OR
97015

00368
ROD
WOODIN
HABITAT MGNT DIV
STATE OF WASHINGTON
DEPT OF FISHERIES
115 GENERAL ADMIN BLDG
OLYMPIA
WA
98504

00124
FRANK
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PROGRAM LEADER
STATE OF OREGON
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OR
97208

TRIBES

00032
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GENERAL COUNCIL
PO BOX 71
BURNS
OR
97720

00036
CHAIRMAN
CHEHALIS BUSINESS COUNCIL
PO BOX 536
OAKVILLE
WA
98568

00039
CHAIRMAN
COEUR D'ALENE TRIBAL COUNCIL
PLUMMER
ID
83851

00382
CHAIRMAN
CONF TRIBES OF UMATILLA RES
BOARD OF TRUSTEES
PO BOX 638
PENDLETON
OR
97801

00499
CHAIRMAN
CONF TRIBES OF WARM SPRINGS RES
TRIBAL COUNCIL
WARM SPRINGS
OR
97761

00099
CHAIRMAN
DUCK VALLEY SHOSHONE-PAIUTE
TRIBAL COUNCIL
PO BOX 219
OWYHEE
NV
89832

00049
CHAIRMAN
FORT HALL BUSINESS COUNCIL
FORT HALL
ID
83201

00051
CHAIRMAN
FORT MCDERMITT
PO BOX 457
MCDERMITT
NV
89421

00059
CHAIRMAN
HOH TRIBAL BUSINESS COMM
STAR ROUTE 1 BOX 917
FORKS
WA
98331

00177
CHAIRMAN
JAMESTOWN CLALLAM INDIAN TRIBE
150 S 5TH AVE SUITE 6
SEQUIM
WA
98382

00067
CHAIRMAN
LOWER ELWHA TRIBAL COUNCIL
PO BOX 1370
PORT ANGELES
WA
98362

00068
CHAIRMAN
LUMMI BUSINESS COUNCIL
2616 KWINA RD
BELLINGHAM
WA
98225

00071
CHAIRMAN
MAKAH TRIBAL COUNCIL
PO BOX 115
NEAH BAY
WA
98357

00078
CHAIRMAN
MUCKLESHOOT TRIBAL COUNCIL
39015 172ND SE
AUBURN
WA
98002

00082
CHAIRMAN
NISQUALLY BUSINESS COMM
4820 SHE-NAH-NUM SE
OLYMPIA
WA
98503

00083
CHAIRMAN
NOOKSACK INDIAN TRIBAL COUNCIL
PO BOX 157
DEMING
WA
98244

00089
CHAIRMAN
PORT GAMBLE BUSINESS COMM
PO BOX 280
KINGSTON
WA
98346

00091
CHAIRMAN
PUYALLUP TRIBAL COUNCIL
2215 E 32ND ST
TACOMA
WA
98404

00348
ARADA TOUT-STOPS
PUYALLUP TRIBE
PLANNING DEPT
2002 E 28TH ST
TACOMA
WA
98404

00093
CHAIRMAN
QUILEUTE TRIBAL COUNCIL
PO BOX 279
LAPUSH
WA
98350

00092
CHAIRMAN
QUINAULT BUSINESS COMM
PO BOX 1118
TAHOLAH
WA
98587

00098
CHAIRMAN
SHOALWATER BAY TRIBAL COUNCIL
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TOKELAND
WA
98590

00396
CHAIRMAN
SHOSHONE BANNOCK TRIBES
PO BOX 306
FORT HALL
ID
83203

00100
CHAIRMAN
SILETZ TRIBAL COUNCIL
PO BOX 549
SILETZ
OR
97380

00101
CHAIRMAN
SKOKOMISH TRIBAL COUNCIL
ROUTE 5 BOX 432
SHELTON
WA
98584

00104
CHAIRMAN
SQUAXIN ISLAND TRIBAL COUNCIL
ROUTE 1 BOX 257
SHELTON
WA
98584

00107
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WA
98392

00108
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WA
98257

00030
CHAIRMAN
TRIBAL BUSINESS COUNCIL
BLACKFEET INDIAN AGENCY
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MT
59417

00111
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WA
98270

00113
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00037
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OR
97801

00472
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39015 172ND AVE SE
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WA
98002

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BILL
FRANK JR
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2625 PARKMONT LN SW BLDG C
OLYMPIA
WA
98502

00229
LYNN
HATCHER
YAKIMA TRIBE
PO BOX 157
TOPPENISH
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00248
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NEZ PERCE TRIBE OF IDAHO
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00279
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MAYS
CONF SALISH & KOOTENAI TRIBES
FLATHEAD RES
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PABLO
MT
59855

00009
THOMAS
PABLO
CHAIRMAN
CONF SALISH & KOOTENAI TRIBES
FLATHEAD INDIAN RES
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MT
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00302
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NESPELEM
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99155

00095
WILFRED A
SCOTT
CHAIRMAN
NEZ PERCE TRIBE OF IDAHO
EXECUTIVE COMM
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83540

INTEREST GROUPS

00047
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59901

00389
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83814

00412
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00421
ELISE
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WA NATURAL HERITAGE PROG
3111 SEMINAR BLDG SE 3109
OLYMPIA
WA
98505

00247
KATRINA
BERMAN
LEAGUE OF WOMEN VOTERS OF IDAHO
1304 S MAIN ST
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ID
83843

00433
JOHN
BLACK
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2303 N 38TH
SEATTLE
WA
98103

00443
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OR COUNCIL/FED OF FLYFISHERS
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OR
97306

00038
WALTER L
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NW STEELHEADERS
5437 SW GARDEN HOME RD
PORTLAND
OR
97219

00224
MIKE
DIEKER
NW STEELHEADERS
7500 SW GREENWOOD DR
TIGARD
OR
97223

~~00220~~ 218
HOWARD
ELLIS
ASSOC OF NW STEELHEADERS
4045 N LONGVIEW
PORTLAND
OR
97227

move to EA

00384
LILL
ERICKSON
IDAHO CONSERVATION LEAGUE
BOX 1922
SALEM
OR
83467

00474
PAT
FORD
IDAHO CONSERVATION LEAGUE
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ID
83701

00487
LIZ
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WASHINGTON ENVIRONMENTAL COUNCIL
PO BOX 9578
SEATTLE
WA
98109

00231
ROBERT
HAUGLAND
PROTECT THE PENINSULA'S FUTURE
51 FIR PL CAPE GEORGE
PORT TOWNSEND
WA
98368

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JENNINY
SNAKE RIVER ALLIANCE
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BOISE
ID

00249
ND
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OR
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KONDO
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3601 HILLCROFT WAY
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WA
98901

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MADRAS
OR
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98902

00310
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MT
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00316
ALAN D
RILEY
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SEATTLE
WA
98155

00318
MARCIA
RUNDLE
MONTANA COMMON CAUSE
1130 MOUNTAIN VIEW
MISSOULA
MT
59802

00329
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SHORT
COLUMBIA R CITIZENS COMPACT
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WA
98661

00330
BEN
SHUEY
WASHINGTON ENVIRONMENTAL COUNCIL
1010 4TH & PIKE BLDG
SEATTLE
WA
98101

00333
JEAN L
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OR RARE & ENDANG PLANT STUDY CTR
535 ATWATER RD
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OR
97034

00337
MIKE
SPRANGER
WASHINGTON SEA GRANT
1919 NE 78TH ST
VANCOUVER
WA
98665

00339
LEONARD
STEINER
E LAKE WASHINGTON AUDUBON SOC
13239 NE 100TH
KIRKLAND
WA
98033

00105
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STREAM
VICE PRESIDENT
IZAAK WALTON LEAGUE OF AMERICA
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OR
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00345
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00112
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UHTOFF
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PORTLAND
OR
97210

00114
CHARLES
VOSS
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WA
98674

00358
DAVID F
WERSCHKUL
DIRECTOR
OR SHORES CONSER COALITION
STAR RT BOX 87
AGNESS
OR
97406

00118
RAYMOND D
WILLMS
WASHINGTON STATE COUNCIL
FEDERATION OF FLYFISHERMEN
7211 28TH AVE NE
SEATTLE
WA
98115

OTHERS

00377
ADA CO FISH & GAME LEAGUE
2309 N RAYMOND
BOISE
ID
83704

00379
BOISE PUBLIC LIBRARY
REFERENCE DEPT
715 CAPITOL BLVD
BOISE
ID
83702

move to EA

~~00386~~ 384
LIBRARIAN
BOUNDARY CO FREE LIBRARY
BOX Y
BONNERS FERRY
ID
83805

00385
ENERGY EXTENSION SERVICE
PO BOX 9183
MOSCOW
ID
83843

00387
FREDERIKSEN KAMINE & ASSOC
116 LEE ST SE STE A
TUMWATER
WA
98501

00390
LIBRARIAN
LINCOLN CO LIBRARY
220 W 6TH ST
LIBBY
MT
59923

00391
MISSOULA CITY-CO LIBRARY
REFERENCE DEPT
101 ADAMS
MISSOULA
MT
59802

00221
CONSERVATION
MOUNTAINEERS
719 PIKE ST
SEATTLE
WA
98101

00393
SANDPOINT DAILY BEE
PO BOX 159
SANDPOINT
ID
83864

move to EA

~~00394~~ 392
DOCUMENTS LIBRARIAN
SEATTLE PUBLIC LIBRARY
1000-4TH AVE
SEATTLE
WA
98104

00414
KENNETH L
ADKISSON
NEZ PERCE NATL HISTORICAL PARK
PO BOX 93
SPALDING
ID
83551

00415
CHARLES E
ALLEN
CONSULTANT
4190 DEEPWOOD LANE NW
SALEM
OR
97304

00416
DR D L
ALVERSON
NATURAL RESOURCES CONS
4055 21ST AVE WEST
SEATTLE
WA
98199

00417
FRANK W
AMATO
PUBLISHER
FLYFISHING & SALMON
TROUT STEELHEADER MAG
PO BOX 02112
PORTLAND
OR
97202

00420
MIKE
ARNZEN
IDAHO CO LIGHT & POWER
PO DRAWER B
GRANGEVILLE
ID
83530

00216
MARK
BACKMANN
THE FLY FISHING SHOP
PO BOX 368
WELCHES
OR
97067

00422
GRANT
BAILEY
URS
4TH & VINE BLDG
SEATTLE
WA
98121

00428
TOM
BEARHEAD
CS&KT
BOX 339
ST IGNATIUS
MT
59865

00429
PAUL
BEEBE
IDAHO STATE JOURNAL
PO BOX 431
POCATELLO
ID
83201

00227
ROGER
BEERS
BEERS & BICKSON
380 HAYES ST STE 1
SAN FRACISCO
CA
94102

00432
GERALD E
BLACK
PE
KAISER ALUM & CHEM CO
3400 TAYLOR WAY
TACOMA
WA
98421

00435
JANET L
BOEHCHER
NW SMALL HYDRO ASSOC
PO BOX 6513
BEND
OR
97708

00440
FLORENCE D
BRODIE
PRESIDENT EMERITUS
NISQUALLY DELTA ASSOC
1821 S WATER ST
OLYMPIA
WA
98501

00439
HARVEY L
BROWN
CP NATIONAL
1355 WILLOW WAY
CONCORD
CA
94520

00445
SAM L
CAMPAGNA
PP&L CO
920 SW 6TH AVE
PORTLAND
OR
97204

00446
J L
CAVANAUGH
WORKS MGR/PLANT ENG
KAISER ALUMINIM & CHEMICAL CORP
TRENWOOD WORKS
SPOKANE
WA
99215

00451
MICHAEL
CLARK
NORTHERN LIGHTS RES INST
BOX 904
HELENA
MT
59624

00918
R W
CLUBB
PUGET SOUND POWER & LIGHT CO
PUGET POWER BLDG
BELLEVUE
WA
98009

00452
JOEL
CONNELLY
SEATTLE POST-INTELLIGENCER
521 WALL ST
SEATTLE
WA
98121

00495
MICHAEL L
COOK
BURLINGTON NORTHERN RAILROAD
810 3RD AVE
SEATTLE
WA
98104

00454
JERRY
CRAIG
DAILY JOURNAL OF COMMERCE
83 COLUMBIA ST
SEATTLE
WA
98104

00042
DOUGLAS P
CRAMER
PGE
121 SW SALMON
PORTLAND
OR
97204

00457
C
CUNNINGHAM
SMUD
PO BOX 15830
SACRAMENTO
CA
95813

00459
STACEY R
DEAN MD
CLEARWATER FLYCASTERS
SW 165 SKYLINE DR
PULLMAN
WA
99163

00460
MICHAEL
DELAPA
CREST
PO BOX 175
ASTORIA
OR
97103

00462
KAREN
DORN
SPOKANE REVIEW-CHRONICLE
PO BOX 2160
SPOKANE
WA
99210

00464
ED
DURHAM
UNION PACIFIC RR CO
2525 N LORRABEE AVE
PORTLAND
OR
97227

00465
RICHARD E
DYER
PGE CO
121 SW SALMON ST SB-5
PORTLAND
OR
97204

00126
RON
EACHUS
CONGRESSMAN JIM WEAVERS OFFICE
211 E 7TH
EUGENE
OR
97404

00046
GEORGE
EICHER
EICHER ASSOCIATES INC
8787 SW BECKER DR
PORTLAND
OR
97223

466

move to EA

00469 Harold
DR H M
ETTER manager
BC HYDRO Environmental + Socioeconomic Services
BOX 12121-555 W HASTINGS ST
VANCOUVER
BC
V6B 4T6

00470
FOREST
FARRIS
MONTANA GRANGE
550-3 MILE DR
KALISPELL
MT
59901

00226
JIM
FELL
GENERAL COUNSEL
NW POWER PLANNING COUNCIL
700 SW TAYLOR
PORTLAND
OR
97205

00471
JEFF
FEREDAY
DAVIS GRAHAM & STUBBS
BOX 185
DENVER
CO
80201

00475
DOUGLAS R
FORREST
PE/MGR
BC HYDRO
CANADIAN ENTITY SERVICES
970 BURRAD ST
VANCOUVER
BC
V6Z 143

00476
PEGGY Y
FOWLER
PGE CO
121 SW SALMON ST OMP-8
PORTLAND
OR
97204

00477
ANNETTE
FRAHM
NW POWER PLANNING COUNCIL
700 SW TAYLOR STE 200
PORTLAND
OR
97205

00479
HELEN
FREEMAN
WOODLAND PARK ZOO
5500 PHINNEY AVE
SEATTLE
WA
98103

00480
BLAINE
FREER
SEATTLE POST-INTELLIGENCER
6TH & WALL
SEATTLE
WA
98121

move to EA

00481
H PAUL
FRIESEMA
~~CUAPR~~ Center for Urban Affairs and Policy Research
NW UNIVERSITY
EVANSTON
IL
60201

478

00483
GLEN
GALLISON
PRESIDENT
PENINSULA FLY FISHERS
332 VIEWER
PORT ANGELES
WA
98362

00485
JAMES E
GARRETT
PENINSULA FLY FISHERS
311 FISH HATCHERY RD
SEQUIM
WA
98382

00228
ARVIN
GIBSON
EXEC VICE PRES
UTAH POWER & LIGHT
1407 W N TEMPLE
SALT LAKE CITY
UT
84110

00021
JOHN
GREGG
DOUGLAS COUNTY PUD NO 1
1151 VALLEY MALL PARKWAY
E WENATCHEE
WA
98801

00490
TOM
GROTE
EDITOR
CENTRAL IDAHO STAR-NEWS
BOX 985
MCCALL
ID
83638

00002
DALE W
HAGEY
EUGENE WATER & ELECTRIC BOARD
PO BOX 10148
EUGENE
OR
97440

move to EA

~~00056~~
MIKE J
HANSON
NW POWER POOL COORDINATING COMM
430 PUBLIC SERVICE BLDG
PORTLAND
OR
97204

55

00003
LARRY
HITTLE
LINDSAY HART NEIL WEIGLER
111 SW COLUMBIA SUITE 700
PORTLAND
OR
97201

00236
DON
HODGES
MANAGER
CAL GAS LIBBY
PO BOX 783
LIBBY
MT
59923

move to EA

~~00023~~
~~JEAN~~ JIM
HUFFMAN
CHELAN COUNTY PUD NO 1
PO BOX 1231
WENATCHEE
WA
98801

22

00240
HAROLD E
HUGHES
THE OREGONIAN
1320 SW BROADWAY
PORTLAND
OR
97201

00241
BOB
HUNTER
ROGUE FLYFISHERS INC
1175 E MAIN
MEDFORD
OR
97501

00243
BOB
HYSLOP
CORINTHIAN YACHT CLUB
4018 SW IOWA
PORTLAND
OR
97221

00251
JIM
KADERA
THE OREGONIAN
1320 SW BROADWAY
PORTLAND
OR
97201

00022
STAN
KATKANSKY
PGE
121 SW SALMON ST OMP-8
PORTLAND
OR
97204

00252
JOHN C
KEENAN
CONGRESSMAN LARRY E CRAIG
PO BOX 1406
BOISE
ID
83701

00259
CHRIS
KORTE
FED FLY FISHERS
773 MEAGHAN
BOISE
ID
83702

00005
KENNETH B
KRAL
SUPX FISH/WILDLIFE/REC
CITY OF TACOMA
DEPT OF PUBLIC UTI LIGHT DIV
PO BOX 11007
TACOMA
WA
98411

00262
LARK
LAHART
PGE CO
121 SW SALMON ST TB-7
PORTLAND
OR
97204

00261
BOB
LANE
SEATTLE TIMES
PO BOX 70
SEATTLE
WA
98111

00263
LOANNE
LARSON
SHOREWOOD HIGH SCHOOL LIBRARY
17300 FREMONT AVE N
SEATTLE
WA
98133

00265
MIKE
LAYTON
SEATTLE POST-INTELLIGENCER
BOX 607
OLYMPIA
WA
98501

00267
R M
LEED
WEC
1411 4TH AVE STE 520
SEATTLE
WA
98101

00006
E W
LUBKING
CHELAN COUNTY PUD NO 1
PO BOX 1231
WENATCHEE
WA
98801

00069
JOHN V
MACK
FREDERICKSEN KAMIN & ASSOCIATES
340 NE 108TH PLACE
PORTLAND
OR
97220

00965
STEVE
MANAS
NORTHWESTERN LAW
10015 SW TERWILLIGER
PORTLAND
OR
97219

00274
TOM
MARLIN
CASSH
3830 SE 64
PORTLAND
OR
97206

00277
GARY D
MASON
RAVALLI CO ELECTRIC COOP
PO BOX 109
CORVALLIS
MT
59828

00281
A
MCDONALD
HANFORD GENERATING PROJ
PO BOX 968 MAIL DROP 1015
RICHLAND
WA
99352

00282
DALE J
MCGREER
POTLACH CORP
PO BOX 1016
LEWISTON
ID
83501

00209
DON
MCQUILLAN
NAVAL RADIO STATION (T)
CODE OJ3
OSO
WA
98223

00286
HAROLD
MEDLER
CITY OF GRANITE
GRANITE RT BOX 19
SUMPTER
OR
97877

00074
ROY G
METZGAR
SNOHOMISH CO PUD
PO BOX 1107
EVERETT
WA
98201

00075
DAVID
MEYERS
IDAHO POWER CO
BOX 70
BOISE
ID
83707

00957
DON
MEYERS
ATTORNIES AT LAW
JONES GREY BAYLEY
1 UNION SQUARE BLDG
600 UNIVERSITY 36TH FLR
SEATTLE
WA
98101

00076
ROBERT L
MILLER
MONTANA POWER CO
40 E BROADWAY
BUTTE
MT
59701

00289
VINCE B
MILLER
UFCW -367
BOX 3
BOSBURGH
WA
98643

00290
MARTIN
MONTGOMERY
NW POWER PLNG COUNCIL
STATEHOUSE MAIL 3RD FL TOWERS BLDG
BOISE
ID
83720

00292
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MORSE
WILDLIFE MGNT INSTITUTE
1617 NE BORAZEE ST
PORTLAND
OR
97212

00079
JIM
MUDGE
FISHERY BIOLOGIST
POWER SUPPLY SYSTEM
PO BOX 968
RICHLAND
WA
99352

00295
E L
MULVIHILL
BEAK CONSULTANTS INC
317 SE ALDER
PORTLAND
OR
97204

00081
DICK
NASON
F&W SUPERVISOR
CHELAN COUNTY PUD NO 1
PO BOX 1231
WENATCHEE
WA
98801

00298
RICH
NASSIEF
PNUCC
520 SW 6TH AVE STE 505
PORTLAND
OR
97204

00084
DUANE A
NEITZEL
SCIENTIST
BATTELLE PACIFIC NW LABORATORIES
ENVIRONMENTAL SCIENCES DEPT
BATTELLE BOULEVARD
RICHLAND
WA
99352

00303
GARY C
PALMER
CLEARWATER IRONHEADERS ASSOC
PO BOX 361
LEWISTON
ID
83501

00305
WAYNE
PETERSON
PRESIDENT
ADA CO FISH & GAME LEAGUE
6220 ROBERTSON DR
BOISE
ID
83709

00306
ARDITH M
PEYOPE
SHOSHONE-BANNOCK LIBRARY
PO BOX 306
FORT HALL
ID
83203

00307
TED M
PHILLIPS
PP&L CO
920 SW 6TH AVE 808EB
PORTLAND
OR
97204

00087
FRANK J
PICKETT
DIR ENV SCIENCES
MONTANA POWER CO
40 E BROADWAY
BUTTE
MT
59701

00027
ROGER
PURDOM
CHELAN COUNTY PUD NO 1
PO BOX 1231
WENATCHEE
WA
98801

00011
DANA
REEDY
PGE
POWER OPERATIONS DEPT
121 SW SALMON ST
PORTLAND
OR
97204

00313
MARK
REIS
NCAC
BOX 20458
SEATTLE
WA
98102

00012
TIM
RIMPO
PUBLIC POWER COUNCIL
500 W 8TH ST SUITE 110
VANCOUVER
WA
98660

00320
J L
SANDERS
CLARK CO PUD
PO BOX C-005
VANCOUVER
WA
98668

00097
HARRY
SENN
FISH MANG CONSULTANTS
5211 BLVD EXT RD
OLYMPIA
WA
98501

00324
JAMES A
SEWELL
JAMES A SEWELL & ASSOC
PO BOX 160
NEWPORT
WA
99156

00334
JOHN
SIMMONS
BOYER PARK & MARINA
RT 3 BOX 69
COLFAX
WA
99111

00158
TED C
SPRINGER
HOPKINS FRENCH CROCKETT SPRINGER
BOX 1219
IDAHO FALLS
ID
83402

00338
ROBERT W
STAHMAN
IDAHO POWER CO
PO BOX 70
BOISE
ID
83707

00013
DENNIS
STEINBERG
PP&L
920 SW 6TH AVE
PORTLAND
OR
97204

00341
DAVID W
STEVENS
OFFICE OF THE GOVERNOR
LEGISLATIVE BLDG AS-13
OLYMPIA
WA
98504

00106
PAM
STROMBERG
PNW UTILITIES CONFERENCE COMM
520 SW 6TH AVE STE 505
PORTLAND
OR
97204

00344
ALLEN
THOMAS
THE COLUMBIAN
9315 NE 212TH AVE
VANCOUVER
WA
98662

00349
JACK
TRUEBLOOD
CONTRIBUTING EDITOR
FIELD & STREAM
RT 3 BOX 3496
NAMPA
ID
83651

00356
LARRY
WERKEMA
WA STATE SPORTSMEN'S COUNCIL
101 E 38TH ST
VANCOUVER
WA
98663

00365
CURT
WINTERFELD
NW POWER PLNG COUNCIL
STATEHOUSE MAIL
BOISE
ID
83720

00119
KENNETH R
WISE
POWER SUPPLY SYSTEM
PO BOX 968
RICHLAND
WA
99352

00120
LINCOLN
WOLVERTON
DIRECTOR OF TECH PROJECT
PUBLIC POWER COUNCIL
500 W 8TH ST STE 110
VANCOUVER
WA
98660

00367
DOUGLAS
WOODFILL
APPLIED ECONOMICS ASSOC
SMITH TOWER STE 821
SEATTLE
WA
98104

00369
STEVE
WOODRUFF
MISSOULIAN
PO BOX 8029
MISSOULA
MT
59801

00370
ROGER
WOODWORTH
WASHINGTON WATER POWER
PO BOX 3727
SPOKANE
WA
99220

00025
HAL
WORCESTER
EUGENE WATER & ELECTRIC BOARD
PO BOX 10148
EUGENE
OR
97440

00122
AL
WRIGHT
ENVIRONMENTAL SUPERVISOR
GRANT COUNTY PUD #2
PO BOX 878
EPHRATA
WA
98823

move to EA

00372
ROGER A
YOTT
PGE
121 SW SALMON ST
PORTLAND
OR
97204

370

00374
RICHARD L
YOUNG
CITY OF GLENDALE
PUBLIC SERVICE DEPT
119 N GLENDALE AVE
GLENDALE
CA
91206

00375
BARBARA
ZEPEDA
WDC
1937-25TH E
SEATTLE
WA
98112

00418
JOHN
AMOS
2896 NW SAVIER
PORTLAND
OR
97210

00886
WILT
ANDERSON
811 S JEFFERSON
MOSCOW
ID
83843

00419
BEN HUR
ARNDT
PFMC
16053 HWY 101 S
BROOKINGS
OR
97415

00424
JOHN
BAKER
BOX 122
ILWACO
WA
98624

00426
KENT
BALL
RT 1 BOX 181C
SALMON
ID
83467

00958
VERNE
BISSELL
220 NW 8TH ST RM 121
PORTLAND
OR
97209

00436
ALDRICH
BOWLER
STAR ROUTE BOX 15
BLISS
ID
83314

00441
JAMES
BUELL
CONSULTING BIOLOGIST
RT 3 BOX 706
BEAVERTON
OR
97002

00033
JANE G
CAPIZZI
5440 SW SKYVIEW AVE
CORVALLIS
OR
97333

00034
MARION D
CASTLE
915 12TH ST
HOOD RIVER
OR
97031

00448
DAVE
CHARLTON
255 SW HARRISON #22H
PORTLAND
OR
97201

00453
TOM
COTTON
202 N ST SW
QUINCY
WA
98848

00455
TIMOTHY C
CROLL
512 N 71ST
SEATTLE
WA
98103

00456
MEL
CUMMINGS
1704 63RD AVE NE
SALEM
OR
97305

00461
HARRY
DENARAY
576 WELCOME AVE
SALEM
OR
97302

00217
POLLY
DYER
13245-40TH AVE NE
SEATTLE
WA
98125

43

move to EA

~~00044~~
NORMAN
EDMISTEN, OMNI Environmental Services Inc.
~~ENGINEERING SCIENCE~~
~~31944 S DRYLAND RD~~ 10950 SW 5th Suite 245
~~MOLALLA~~ Beaverton
OR
~~97038~~ 97005

00020
RONALD J
EGGERS
935 SW RIDGE DR
PORTLAND
OR
97219

464

move to EA

00~~407~~
~~DON~~ JANE M.
ERICKSON
2424 162ND DR E
SNOHOMISH
WA
98290

00468
AL
ESPINOSA
PO BOX 907
OROFINO
ID
83544

00473
JOHN
FISHER
512 4TH AVE
LEWISTON
ID
83501

00482
ELIZABETH
FRENKEL
1431 NW VISTA PL
CORVALLIS
OR
97330

00484
DAVID V
GALVIN
6238 29TH AVE NE
SEATTLE
WA
98115

00233
SIDNEY
HERBERT
2750 ONYX ST
EUGENE
OR
97403

00239
NED
HORNER
2320 GOUT WY
COEUR D'ALENE
ID
83814

00245
KEITH
JENSEN
7244 SW 29TH
PORTLAND
OR
97219

00254
ALAN D
KIRCHER
11890 SW CHESHIRE
BEAVERTON
OR
97005

00266
CARL
LEHMAN
13255 SE RANSTAD CT
MILWAUKIE
OR
97222

00278
DR RUSSELL
MAYNARD
56305 SPRUCE RD
OTIS
OR
97368

00283
JOHN
MCGLENN
9007 POINTS DR
BELLEVUE
WA
98004

00291
ALAN
MOOMAN
PO BOX 150
NESPELEM
WA
99155

00293
ELLEN
MOSIER
80 S JACKSON #308
SEATTLE
WA
98104

00153
STERLING
MUNRO
1202 S HILLS DR
WENATCHEE
WA
98801

00297
DOUGLAS
NASH
PO BOX 1539
PENDLETON
OR
97801

00299
HARRY
NEHLS
2736 SE 20TH AVE
PORTLAND
OR
97202

00300
WILLIAM D
NELSON
714 NW BERNIE DR
VANCOUVER
OR
98663

00086
DR THOMAS L
PAGE
BATTELLE PACIFIC NW LAB
ECOLOGICAL SCIENCES DEPT
BATTELLE BOULEVARD
RICHLAND
WA
99352

00218
DIANNA L
POPE
4728 NE 17TH
PORTLAND
OR
97211

00311
SCOTT
REED
PO BOX A
COEUR D'ALENE
ID
83814

00314
JAN
REYNOLDS
RT 3 BOX 649
SPOKANE
WA
99203

~~00194~~ 491
J
SANCHEZ
2615 S MISSION
TUCSON
AZ
85713

move to EA

00321
PHILLIP W
SCHNEIDER
8755 SW WOODSIDE DR
PORTLAND
OR
97225

00326
SUSAN
SEYL
2315 NE EVERETT
PORTLAND
OR
97232

00328
MARTY
SHERMAN
1216 NE 155
PORTLAND
OR
97230

00213
JACQUELINE J
SWENSON
STAR ROUTE 2 BOX 60
LIBBY
MT
59928

00342
LARRY
SWISHER
IDAHO STATESMAN
PO BOX 40
BOISE
ID
83705

00110
JAMES
THOMAS
219 N 65TH PLACE
YAKIMA
WA
98908

00346
NANCY
THOMAS
3024 N 25
TACOMA
WA
98406

00858
HUGO J
TURECK
PROFESSOR
RR
COFFEE CREEK
MT
59424

00353
TERENCE R
WAHL
3041 ELDRIDGE
BELLINGHAM
WA
98225

00966
JIM
WEBER
11240 SW BOONES FERRY RD
PORTLAND
OR
97219

00357
WINTON
WEYDEMEYER
FORTINE
MT
59918

00361
CARL
WIKMAN
809 N 53 AVE #A
YAKIMA
WA
98908

00362
PETER
WILLING
PO BOX 2021
SEATTLE
WA
98111

00364
NEAL
WILSON
5 BROOK RD
ENFIELD
CT
06082

00373
RALPH
YOUNG
PO BOX 131
BEAVERTON
OR
97075

UNIVERSITIES

00488
JACK
GRIFFITH
IDAHO STATE UNIV
BOX 8007
POCATELLO
ID
83209

00230
JIM
HECKEL
LEWIS & CLARK PUBLIC LIBRARY
120 S LAST CHONCH MALL
HELENA
MT
59601

00319
DR RICHARD
RUTZ
UNIVERSITY OF WASHINGTON
DEPT OF BIOCHEMISTRY
SJ-70
SEATTLE
WA
98195

00327
MARK
SHEEHAN
WASHINGTON NATURAL HERITAGE PROG
THE EVERGREEN STATE COLLEGE
3111 SEMINAR BLDG SE 3109
OLYMPIA
WA
98505

00376
DR JACK A
STANFORD
UNIVERSITY OF MONTANA
BIOLOGICAL STATION
EAST SHORE
BIGFORK
MT
59911

00500
WILLIAM
TOMLINSON
DIRECTOR
ENVIRONMENTAL LIBRARY
UNIVERSITY OF MONTANA
MISSOULA
MT
59812

00351
RICHARD
TYLER
FISHERIES RESEARCH INST
UNIVERSITY OF WASHINGTON
260 FISHERIES CTR
SEATTLE
WA
98195

00791
BILL
VERMEERE
UNIVERSITY OF OREGON
DEPT OF RADIOLOGY
PORTLAND
OR
97201

00354
JIM
WALTON
PENINSULA COLLEGE
1502 E LAURIDSEN
PORT ANGELES
WA
98362

00116
ROBERT G
WHITE
LEADER MT COOP FISHERY RES UNIT
MONTANA STATE UNIVERSITY
BIOLOGY DEPT
BOZEMAN
MT
59717

00117
RICHARD R
WHITNEY
UNIT LEADER
UNIVERSITY OF WASHINGTON
WA COOP FISHERIES RES UNIT WH-10
SEATTLE
WA
98195

00359
NORMAN K
WHITTLESEY
WASHINGTON STATE UNIVERSITY
DEPT OF AGRIC ECONOMICS
PULLMAN
WA
99164

00360
WILLIAM Q
WICK
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SEA GRANT COLLEGE PROG
OREGON STATE UNIVERSITY ADS
A320
CORVALLIS
OR
97331

00371
V CRANE
WRIGHT
INSTITUTE FOR ENV STUDIES FM-12
UNIVERSITY OF WASHINGTON
SEATTLE
WA
98195

CUSTOMERS

00173
DEAN
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NW POWER MGR
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4-2-10

OCT 07 1983

PGC

To Interested Persons and Organizations:

The Bonneville Power Administration has recently published an Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia.

Comments on the EA will be accepted through October 25, 1983, and will assist us in determining whether or not a Finding of No Significant Impact can be made for the proposed agreements. If you would like to review the EA, you may request a copy from John B. Pyrch, Environmental Coordinator - PGC, P.O. Box 3621, Portland, Oregon 97208, or call at (503) 230-4261.

Sincerely,

(Sgd.) JOHN B. PYRCH

John B. Pyrch
Environmental Coordinator
Office of Power and Resources Management

SPrice:sp (WP-PGC-2445K)

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Official File - PGC

SQ 4-2-10 J. Piccininni 9/21

SEP 23 1983

PGC

Anthony R. Morrell, Environmental Manager
Office of Management Services - SJ

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Transmittal of Final Environmental Assessment (EA) on the Filling of Revelstoke and Gaining Access to Reservoir Storage Space in British Columbia

Please find attached 10 copies of the final EA on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in British Columbia. These copies of the EA are for your office to initiate a 568 for formal transmittal to DOE. It incorporates comments received from internal review.

We would appreciate expedited transmittal of the final EA to DOE as we are planning on distributing the EA to the public October 7, 1983, and hope to sign the contract with B.C. Hydro by November 15.

Attachments

SPrice:dg (WP-PGC-2409K)

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ENVIRONMENTAL ASSESSMENT

ON

PROPOSED AGREEMENTS TO RESOLVE REVELSTOKE RESERVOIR FILLING ISSUES AND ACCESS RESERVOIR STORAGE SPACE IN BRITISH COLUMBIA

September 1983

Office of Power and Resources Management
Bonneville Power Administration

PRELIMINARY
FOR DISCUSSION ONLY

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NOTE

Words and phrases that are CAPITALIZED AND UNDERLINED are commonly used when discussing the Federal Columbia River Power System and the Columbia River Treaty. They have been highlighted in this manner the first time they are used in the text to facilitate reader understanding. These words and phrases appear at the end of this document in the Glossary (Appendix E).

Chapter 1.0

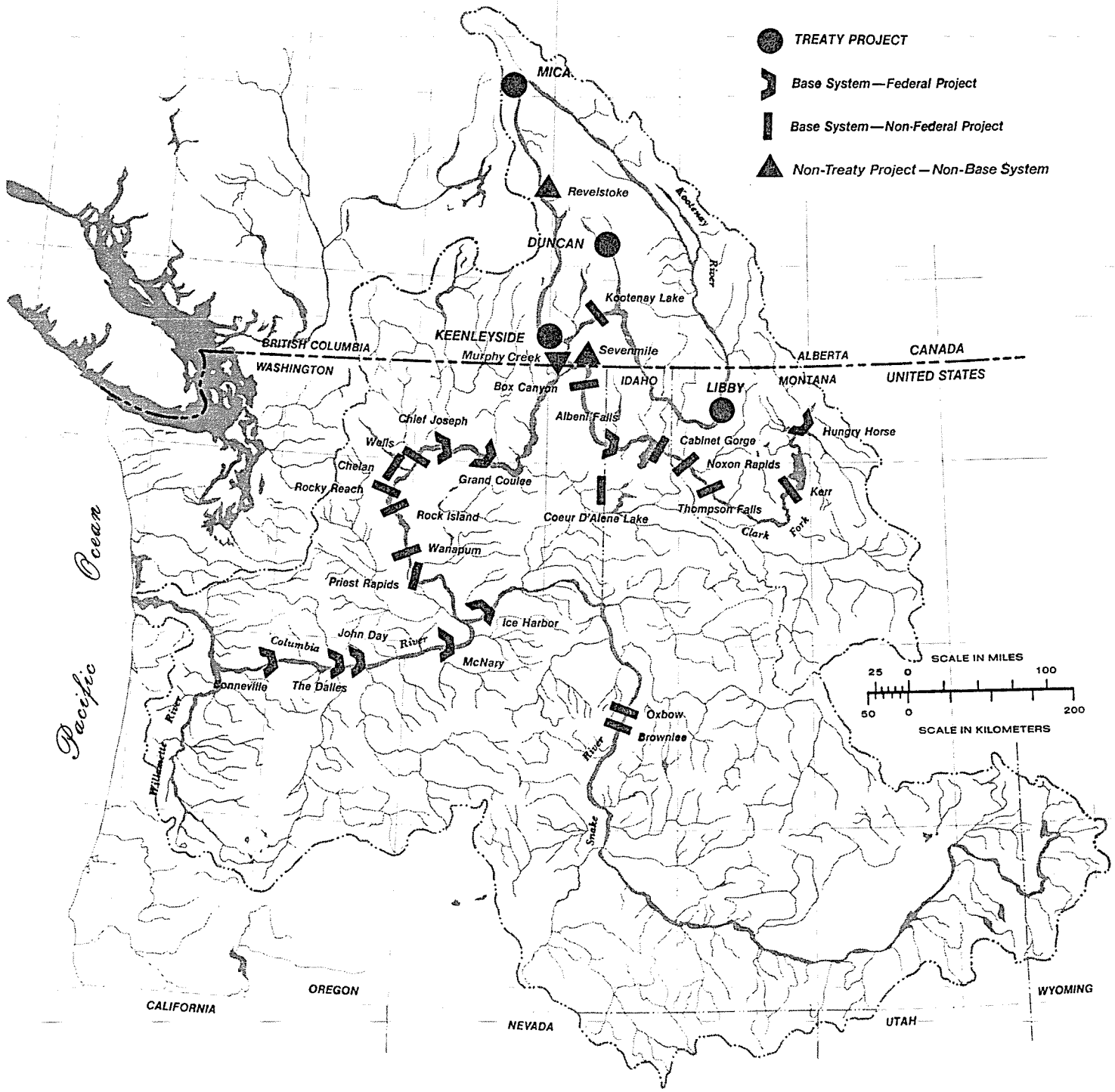
INTRODUCTION

The British Columbia Hydro and Power Authority (B.C. Hydro) is constructing Revelstoke Dam on the Columbia River in Canada (see Figure 1 for locations of projects referenced in this document). It had proposed to fill the resulting reservoir beginning this September in a manner which the Bonneville Power Administration (BPA) believes is contrary to the Columbia River Treaty (Treaty) and which would have adversely affected BPA operations and revenues. Similar circumstances had occurred in the past with the filling of the reservoir created by Seven Mile Dam, and other such circumstances may yet occur. B.C. Hydro also controls storage space in these and other reservoirs in British Columbia. BPA's operational flexibility would be enhanced if it could secure rights to use some of this space. The two utilities chose to negotiate to resolve the conflict concerning the filling of Revelstoke and other reservoirs, and to enter into mutually beneficial arrangements regarding reservoir storage space in British Columbia. The negotiated agreement is the primary subject of this environmental assessment (EA).

Any Canadian action which affects Columbia River flows at the U.S.-Canada border, such as filling a reservoir or storing water, also affects potential generation at Columbia River Dams (the mid-Columbia projects) owned and operated by non-Federal utilities. Therefore, a second negotiated agreement was needed with those affected utilities (the mid-Columbia purchasers) to compensate them for, or allow them to participate in, actions which would occur under the agreement with B.C. Hydro. This agreement with the mid-Columbia purchasers is also addressed in this EA.

Figure 1

COLUMBIA RIVER BASE SYSTEM AND TREATY PROJECTS



1.1 PURPOSE AND NEED FOR PROPOSED ACTIONS

This section of the EA describes the purpose and need for the action; discusses legal, system operational, and power marketing issues related to the proposal; and sets forth the rationale for limitations in the EA's scope.

1.1.1 B.C. Hydro Contract

BPA's purposes in negotiating an agreement with B.C. Hydro are three-fold. The first purpose is to resolve a dispute over the filling of INACTIVE STORAGE SPACE at Revelstoke, Seven Mile, and, potentially, other B.C. Hydro reservoirs. The second purpose is to provide both BPA and B.C. Hydro the ability to use storage space in reservoirs in British Columbia to produce more usable energy than is possible under existing arrangements. The third purpose is to protect both parties from harm as a consequence of each other's actions under the agreement, that is, provide financial or energy compensation for losses suffered during storage. All three purposes are discussed in the following sections.

1.1.1.1 Resolve the Dispute over Filling of Inactive Storage Space

On August 10, 1982, B.C. Hydro notified BPA by letter that the Revelstoke Project would be completed in early fall of 1983 (see Section 1.2.3). B.C. Hydro stated that inactive storage space at Revelstoke would be filled by reducing the outflow at Revelstoke to capture the natural inflow. Only that water released from Mica pursuant to the Columbia River Treaty operating plan would flow out of Revelstoke during filling. This would result in a reduction of flow at the U.S.-Canada border during the fall and winter of 1983-84.

A similar dispute had arisen over the filling of the Seven Mile Reservoir, a Canadian project much smaller than Revelstoke. It was anticipated that similar future disputes would arise were B.C. Hydro to fill the reservoir behind the proposed Murphy Creek Dam or raise the pool elevation of Seven Mile. B.C. Hydro may take these actions during the term of the proposed agreement.

The two legal positions are described as follows. B.C. Hydro's position is that B.C. Hydro has the right to fill the inactive storage space in non-Treaty reservoirs in British Columbia without compensating those affected in the U.S. for reducing the flow of water in the Columbia River, and without being in breach of the Treaty. BPA's position is that BPA and other downstream U.S. power producers have a right pursuant to the Treaty to be compensated by B.C. Hydro for any losses of electric power caused by B.C. Hydro as a result of any reductions in the flow of water at the U.S.-Canadian border below that which would occur as a result of natural flows being augmented by operation of Treaty storage space in accordance with the Treaty operating plans.

Rather than pursue their respective legal positions, BPA and B.C. Hydro agreed to discuss ways of settling these initial filling disputes through negotiating a contract providing a mutually acceptable method for filling Revelstoke and Murphy Creek and for raising the Seven Mile pool elevation.

1.1.1.2 Access to Treaty and Non-Treaty Storage Space

The proposed agreement will give each party (BPA and B.C. Hydro) the right to store up to 1.0 MAF of water in non-Treaty storage space in Mica and to release that stored water and use the energy it can generate in both Canada

and the United States for the duration of the agreement. (The duration will presumably be for 10 years although there are provisions both for extension and early termination.) The proposed agreement also will provide both parties the right to store equal amounts of water in additional NON-TREATY storage space in reservoirs in British Columbia if, and to the extent that, B.C. Hydro makes such space available, and to obtain the energy generated at Canadian and U.S. dams resulting from release of such water. Further, the proposed agreement gives both BPA and B.C. Hydro some additional flexibility, which both desire, to store water in Treaty space in Mica. B.C. Hydro also obtains flexibility to store in Arrow Treaty space.

1.1.1.3 Protection from Harm

The agreement is intended to protect both BPA and B.C. Hydro from harm as a consequence of each other's storage of water in the Canadian reservoirs. This will be accomplished by the storing party providing compensation for loss of energy caused by water held back for storage which would have otherwise been generated on the nonstoring party's system. Such compensation is made by delivery of energy from the storing party to the nonstoring party.

1.1.2 Mid-Columbia Contract

The purposes of the agreement with the mid-Columbia purchasers are:

1. To protect the mid-Columbia purchasers from power related adverse effects resulting from the initial filling of Revelstoke and other reservoirs in British Columbia.

2. To obtain from such purchasers a release and discharge from claims they might make as a result of the initial filling of Revelstoke and other reservoirs in British Columbia.

3. To provide for the participation of the mid-Columbia plants for B.C. Hydro's benefit when B.C. Hydro stores and releases water.

4. To provide for the participation of the mid-Columbia plants for the purchasers' benefit when BPA stores and releases water.

1.2 BACKGROUND

The circumstances which have led to the proposed agreements relate to the fact that the United States and Canada have entered into the Treaty; and the fact that B.C. Hydro is constructing Revelstoke Dam and wishes to fill the resulting reservoir beginning this fall.

1.2.1 Columbia River Treaty

The Treaty between Canada and the U.S. became effective in September 1964. It increased storage capability and access to storage capacity resulting in increased operational flexibility and other benefits to the regional power system. It is important to remember that the Treaty is and will continue to remain in effect and that it takes complete precedence over the proposed agreement between BPA and B.C. Hydro. A detailed discussion of the Treaty and its related projects is contained in Appendix A.

1.2.2 Non-Treaty Storage

Two of the Canadian Treaty reservoirs, Mica and Arrow (the reservoir impounded by Keenleyside Dam), have storage capacity in excess of that designated under the Treaty. This storage capacity is termed non-Treaty storage and is controlled by B.C. Hydro. The amounts of inactive storage, TREATY STORAGE, and non-Treaty storage for each of the Canadian Treaty reservoirs is shown in Appendix A. In addition, non-Treaty storage capacity will exist in the Revelstoke reservoir when it is operational, and more non-Treaty storage may be available in other Canadian reservoirs controlled by B.C. Hydro. Under current conditions, B.C. Hydro may from time-to-time make non-Treaty storage available for use by BPA, but BPA has no long-term rights to use of this storage. Until some agreement is reached, a separate storage agreement must be negotiated on each occasion.

1.2.3 Filling of Non-Treaty Reservoirs

Other dams and reservoirs which may affect power production at downstream dams in the United States have been or are being constructed in British Columbia since the Treaty was ratified. The reservoir behind Seven Mile Dam was filled at a time when the impounded water could have been used by BPA and mid-Columbia purchasers to produce energy, and, therefore, the impoundment adversely affected hydroelectric power benefits. This problem may occur again as additional dams are constructed or as the amount of inactive storage space is increased in existing B.C. Hydro reservoirs, such as Seven Mile Reservoir. Other projects that will be covered by the proposed agreement include Murphy

Creek, a dam planned for construction on the Columbia River in Canada nearest the border; and, of course, Revelstoke Dam on the Columbia River downstream of Mica Dam and about 5 kilometers north of Revelstoke, British Columbia.

B.C. Hydro has proposed in a letter dated August 10, 1982 to Mr. Charles E. Cancilla, Secretary of the United States Entity, to fill the Revelstoke reservoir beginning September 26, 1983. Its plan for filling the reservoir was "to store all local inflow above Revelstoke in the reservoir from the time of closure until the reservoir is full. During this period all requirements for storage releases from Mica will be passed through Revelstoke to the extent possible. Should the discharge facilities at Revelstoke be unable to pass all the necessary storage at any stage, the difference between the required storage release and actual release will be made up by increasing the storage release from Arrow Reservoir.

"The need to fill Revelstoke more rapidly than possible using streamflow alone means that some of the non-Treaty storage in Mica will be temporarily transferred to Revelstoke by releasing more water from Mica than required by the Treaty. This storage will be returned to Mica at the same rate as it is displaced from Revelstoke by stored streamflow."

Revelstoke Dam is essentially a run-of-river project used for power production, and the Revelstoke reservoir will contain 3.5 MAF of inactive storage (i.e., it will permanently impound 3.5 MAF of water), and only a relatively small amount of potentially active storage, 0.8 MAF. Filling the Revelstoke reservoir will cause a loss of water to downstream U.S. projects and, therefore, would adversely affect hydroelectric power benefits. If

Revelstoke were filled during a 12-month period, the amount of energy which could be generated by downstream U.S. dams with this water has been estimated as approximately 356 average megawatts (MW) at Federal dams, and 160 average MW at the mid-Columbia dams.

1.2.4 Short-Term Storage Agreement

BPA and B.C. Hydro entered into a short-term (until August 31, 1984) storage agreement in June 1983, in anticipation of the currently proposed long-term agreement. This agreement allowed the storage of up to 0.68 MAF (345 KSFD) in inactive storage space. A second agreement to allow additional storage is now in process. The short-term agreements were intended to enable storage of surplus water in the system to help fill the Revelstoke reservoir prior to any long-term agreement and reduce the risk of having to store at a later time when water was less abundant. Like the proposed long-term agreement, the short-term storage agreements were accompanied by an agreement with the mid-Columbia purchasers to compensate them for loss of energy they could market while flows were being reduced for storage.

BPA and B.C. Hydro stored approximately 0.430 MAF (or 215 ksfd) in B.C. Hydro reservoirs under the first short-term agreement. While the short-term storage agreements contain provisions to govern the disposition of the stored water in the event negotiations on a long-term agreement fail, the intent was and is that the stored water would be utilized in accordance with the long-term agreement now being proposed.

1.3 LIMITATIONS OF THE SCOPE OF THE ENVIRONMENTAL ASSESSMENT

Department of Energy guidelines relevant to proposals which have effects beyond the boundaries of the United States are discussed in Appendix B. Based on these guidelines, potential environmental impacts occurring in Canada as a result of the proposed agreement will not be evaluated.

Chapter 2.0

EXPLANATION OF ALTERNATIVES

This chapter will describe the alternatives, including the "no action" alternative. Each alternative addresses a series of operational aspects for which BPA and B.C. Hydro desire resolution. A description of each of the five aspects are described briefly below:

1. Initial Fill of Revelstoke Reservoir.

   B.C. Hydro has constructed Revelstoke Dam and desires to fill the reservoir. BPA seeks to protect itself from power-related impact due to the change in water flow assocciated with the fill.

2. Guaranteed Use of Active Storage Space.

   B.C. Hydro has non-Treaty storage space available in mainstem Columbia River reservoirs. BPA desires to use a portion of this space. B.C. Hydro has had insufficient incentive to allow BPA access to this space on a guaranteed basis.

3. Use of Mica Treaty Storage Space.

   Under some runoff conditions, Mica Reservoir has a lesser probability of refill than U.S. Coordinated System reservoirs. Mica also refills later in the year. These conditions result in the need to store in Mica at

times when other Coordinated System reservoirs have a 95 percent confidence of refilling and Mica does not. Refill of Mica Treaty space benefits both BPA and B.C. Hydro. Enhancement of Mica refill has occurred in the past on an as needed basis through short-term contractual arrangements between both parties.

4. Use of Additional Non-Treaty Space.

From time to time B.C. Hydro has non-Treaty storage space available in addition to that discussed in No. 2. above. BPA desires to use a portion of this space. In the past, BPA and B.C. Hydro have made short-term arrangements for use of a portion of this space.

5. Initial Fill of other Non-Treaty Space.

B.C. Hydro has constructed Seven Mile Dam and filled the reservoir to an elevation of 1715 feet. It intend to fill Seven Mile Reservoir to its maximum permitted operating elevation of 1730 feet. It also expects to construct Murphy Creek Dam and fill its reservoir. BPA seeks to protect itself from power-related impacts due to the change in water flow associated with future fill activities and desires redress for past actions.

2.1 ALTERNATIVE: NO ACTION

Under the no action alternative there would be no agreement between B.C. Hydro and BPA to resolve the issues related to the filling of the Revelstoke reservoir. If there was no agreement, BPA would seek to have the filling of

Revelstoke halted through legal means unless B.C. Hydro compensated downstream U.S. interests for their losses. If legal attempts failed to halt the filling, B.C. Hydro would proceed to fill Revelstoke in the manner presented in its August 10, 1982, letter to BPA (see section 1.2.3).

In this assessment, we have assumed that BPA would not continue to make short-term ad hoc agreements with B.C. Hydro for storage in Mica Treaty space or in non-Treaty storage space in other reservoirs. No agreement resolving past filling of Seven Mile Reservoir would be provided under the no action alternative. There would be no resolution of future reservoir filling issues.

2.2 ALTERNATIVE: FILL AGREEMENT

A possible alternative to the proposed agreement would be for B.C. Hydro and BPA to enter into an agreement whose scope would be limited to the filling of the reservoir behind the Revelstoke Dam. This "fill agreement" alternating would specify the terms and conditions under which Revelstoke would fill. Such an agreement would be structured to compensate BPA and mid-Columbia participants for the loss of energy. This would involve delivering to BPA electric energy generated by B.C. Hydro to mitigate the effects of a reduced flow during filling. Such an agreement would not provide BPA with long-term rights to store water in B.C. Hydro reservoirs, an essential feature that distinguishes the proposed agreement from the fill agreement alternative.

In this assessment we have assumed that, under the fill agreement alternative, BPA would continue to enter into ad hoc short-term agreements with B.C. Hydro for storage in Treaty space in Mica and for storage in other non-Treaty

space. BPA would also seek other agreements for filling new B.C. Hydro reservoirs. Compensation for past filling of Seven Mile Reservoir could be included or addressed independently.

2.3 ALTERNATIVE: PROPOSED AGREEMENT

The proposal is to enter into two related agreements. One, with B.C. Hydro, is the principal agreement addressed by this EA, and the one which results in changes in hydroelectric operations. The second agreement, with the mid-Columbia purchasers, provides protection for these purchasers from the potential operational consequences of the B.C. Hydro agreement. Without concurrence of the mid-Columbia purchasers, the agreement with B.C. Hydro could not be implemented.

2.3.1 Proposed BPA-B.C. Hydro Agreement

The following discussion summarizes the major provisions of the proposed agreement with B.C. Hydro. In general, the agreement would provide reciprocal, equal rights and obligations for BPA and B.C. Hydro. See Appendix C for a copy of the proposed agreement.

2.3.1.1 Initial Fill of Revelstoke Reservoir

The actual filling of the Revelstoke reservoir will occur with water presently stored in the Mica non-Treaty space. The refilling of the space then created in Mica is the subject of this provision. In the proposed agreement, BPA and B.C. Hydro share equally the obligation to fill the Revelstoke reservoir. The

space in Mica will be divided in two portions. Inactive storage of 2.3 MAF makes up the first portion. The second portion is 2.0 MAF of ACTIVE STORAGE. Each party has an obligation to fill one-half of each portion. Inactive storage must be filled by the October 1 which is at least 1-1/2 years after the inactive space has been declared available. Active storage may be filled at any time during the term of the agreement with surplus water.

Part of the 2.3 MAF obligation has already been fulfilled by the amount of water stored under the short-term storage agreement, Contract No. DE-MS79-83BP91290. This amounts to 0.43 MAF and reduces the remaining obligation to 1.87 MAF. BPA will fulfill its obligation to fill Revelstoke by requesting that B.C. Hydro reduce the flow out of Canada and store the water in Revelstoke. No energy will be scheduled in either direction. BPA will suffer any loss of energy production at U.S. projects and B.C. Hydro will suffer any loss of energy production at Canadian projects. B.C. Hydro will fulfill its obligation by reducing flow out of Canada and storing the water in Revelstoke and by delivering energy to BPA to compensate for the lost energy production at U.S. projects. BPA will then compensate each mid-Columbia purchaser based on their share of mid-Columbia generation.

This operation will fill the Revelstoke reservoir as desired by B.C. Hydro. BPA will be compensated for loss of energy associated with B.C. Hydro's obligation to fill Revelstoke. When B.C. Hydro commits stored water to inactive storage under this agreement, BPA will grant a release and discharge from any claims due to filling Revelstoke.

2.3.1.2 Guaranteed Use of Active Storage Space.

In return for BPA taking on the obligation to fill one-half of the Revelstoke reservoir, B.C. Hydro has made 2.0 MAF of storage available for use during the term of the agreement. BPA and B.C. Hydro will each have the right to store in 1.0 MAF. Either party may store more than 1.0 MAF if the space is not full, but the amount of water stored in excess of 1.0 MAF is subject to being forced out (if the other party wishes to store into that space) or purchased by the other party. It is intended that the parties leave the 2.0 MAF full at the end of the 10-year term of this agreement. However, in the event either party is unable to do this, those provisions of this agreement necessary to continue storing in this space will be extended for up to 7 years. At the end of the 7 years, BPA and B.C. Hydro must leave the 2.0 MAF full. During any extension, BPA will deliver energy to B.C. Hydro in amounts equal to B.C. Hydro's reduction in energy production at Mica due to reduced HEAD resulting from BPA's fill deficiency.

Active storage space will be initially filled in the same manner as inactive storage space. After a party has stored water in active space, that party may release the water and receive the generation produced at all projects (in both Canada and the U.S.) downstream from the storage reservoir. When that party refills that space it must compensate the other party for the loss of energy suffered by the other party.

The proposed agreement will give B.C. Hydro assurance that the inactive storage space created by the filling of Revelstoke will be full when the agreement expires. It will give BPA the assurance of use of 1.0 MAF for the term of the agreement.

2.3.1.3 Use of Treaty Storage Space.

Treaty space in Mica is available at any time that Mica Reservoir's Treaty space is below its maximum flood control elevation. Each party has the right to store in one-half of the available space. If the space is not full, a party may store in more than one-half of the space. That water above one-half of the available space is subject to being forced out by the other party if that party wishes to fill the storage space.

B.C. Hydro may also store in Treaty space in Arrow. BPA does not require a similar right because it can store in Treaty space in Arrow up to its maximum flood control elevation under provisions of the Treaty.

Treaty space is filled in the same manner as the refilling of active storage space. When a party stores water in Treaty space, it must compensate the other party for lost energy. When the water is released, the releasing party receives the energy generated at all generating projects (in both Canada and the U.S.) downstream from the storage reservoir.

This provision allows BPA and B.C. Hydro flexibility to fill Treaty space which they presently do not have. BPA will use this capability to (1) improve the probability of refilling Mica Reservoir in years that inability to refill Mica will impact the ability of the Coordinated System to adopt the first year FIRM ENERGY LOAD CARRYING CAPABILITY (FELCC) and (2) store unusable surplus water in the spring and summer.

Using the ability to store in Treaty space in Mica Reservoir will increase the probability of filling it (and other British Columbia reservoirs covered by the agreement) especially during average water years. (In low water years, there would be little energy to store, and in very good water years, the probability of refill is already high.)

2.3.1.4 Use of Additional Non-Treaty Space

B.C. Hydro may make additional non-Treaty storage space available from time to time. This space will be shared equally between the parties. Storage of water in more than one-half of the space is allowed but water in excess of one-half the space is subject to displacement or purchase by the other party.

Storage in this space will require that the storing party compensate the other party for the loss of energy. When a party releases water from this space, it will receive all of the energy generated at all projects (in both Canada and the U.S.) downstream from the storage reservoir.

This provision puts into a long-term agreement the mechanism for use of storage space that becomes available from time to time. These actions have been handled on an ad hoc basis in the past.

2.3.1.5 Initial Fill of Other Non-Treaty Space

The filling of the additional space in Seven Mile and Murphy Creek Reservoirs will be handled under this agreement if the space becomes available for filling within the term of the agreement. The parties will share the

obligation to fill these spaces equally. There will be a fixed period of time in which these spaces must be filled. This space will be filled in the manner described in the Initial Fill of Revelstoke Reservoir, section 2.3.1.6.

In addition, since Seven Mile has already been filled to an elevation of 1715 feet, B.C. Hydro will release an amount of water from non-Treaty storage space in Mica equal to that which was stored in Seven Mile to compensate for losses suffered at downstream U.S. projects. BPA will release and discharge B.C. Hydro from any claims on space filled under the terms of this agreement.

B.C. Hydro will benefit by securing rights to fill these reservoirs under this provision.

2.3.2 Proposed Agreement with Mid-Columbia Purchasers

The proposed agreement between BPA and the purchasers of power from the five non-Federal projects on the mid-Columbia (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) (see Figure 1) is a contract (see Appendix D) to account for the participation of each purchaser in the storage of water, return of water, payment of storage fees, and disbursement of generating fees. The purchasers are not permitted to store this water in Canada independently from BPA. However, when BPA chooses to store, each purchaser may elect to participate in such storage. Each participating purchaser is then credited for the amount stored. Those electing not to participate in such storage will receive energy to compensate for losses from the reduction in flow resulting from BPA's storing in Canada.

When the stored water is returned, those who elected to participate receive their share of the resulting energy and pay any associated fee. Those who elected not to participate must deliver to BPA all additional energy which can be produced at their project resulting from the return of stored water.

Chapter 3.0

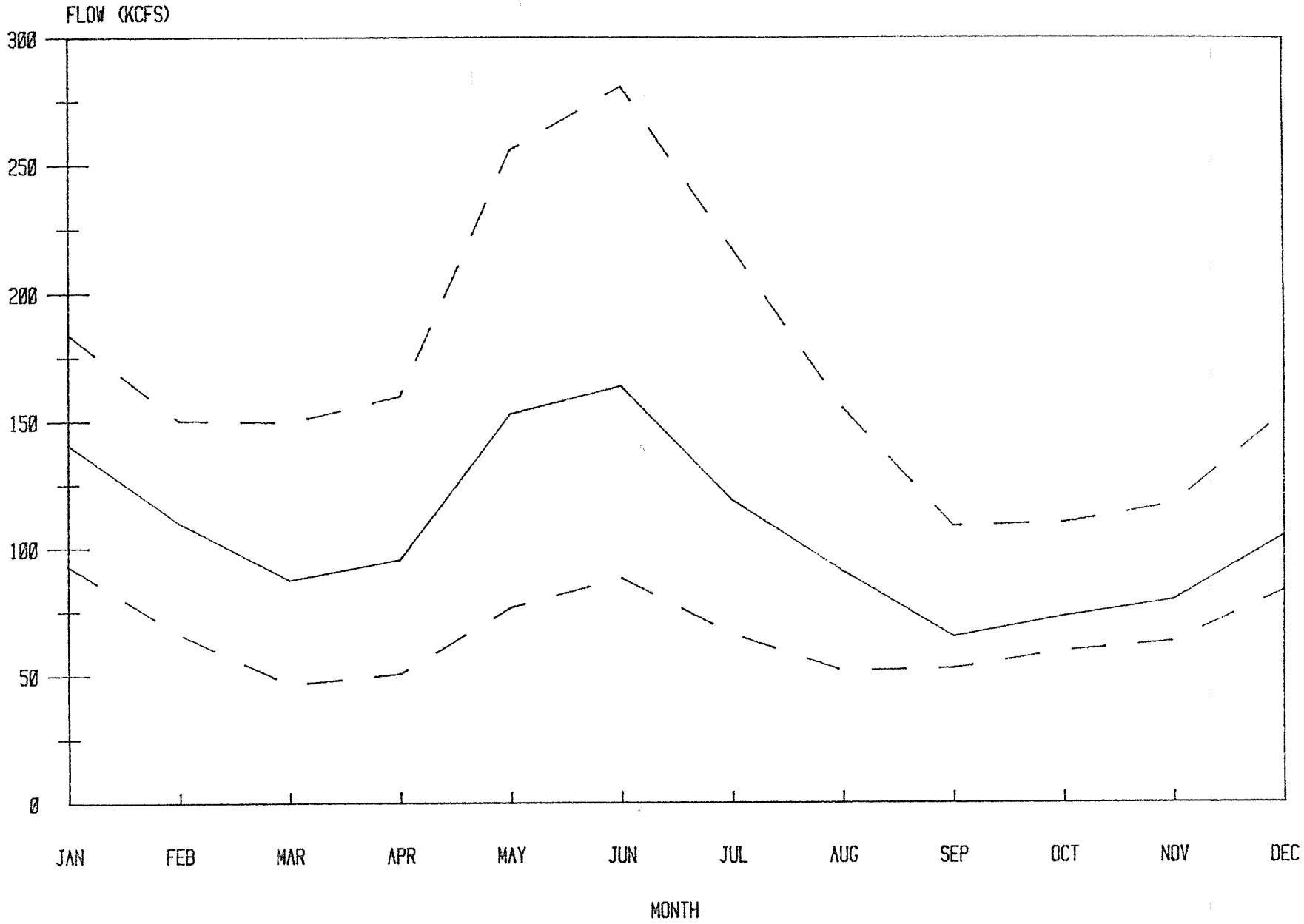
IMPACTS OF THE PROPOSAL AND ALTERNATIVES

This chapter will examine the physical changes caused by system operations and the resulting effects on power production and marketing as well as potential environmental impacts. This is done by using studies which contrast the proposed and no action alternatives against existing system conditions. For purposes of comparison, Figure 2 presents the mean and range of monthly inflow to Grand Coulee over 40 years of historical record. The physical changes resulting from the fill agreement alternative have not been evaluated in the same level of detail.

The decision not to evaluate the fill alternative in full detail results in large measure from a lack of sufficient detail concerning this alternative. While the general conditions surrounding the fill agreement alternative have been specified (section 2.2), the details have not been. These details could only have been developed through negotiation between BPA and B.C. Hydro, as has occurred under the proposed agreement. To make assumptions about the details of the fill agreement alternative and use these assumptions as the basis for system modeling studies would have resulted in extremely speculative definition of the location, magnitude, and timing of changes in system operations. For this reason, the studies have not been done. In place of studies of the fill agreement, a general assessment of the changes which would result from this agreement alternative has been made. The outcome of this assessment is used to describe the physical changes which would result from a fill agreement.

FIGURE 2: GRAND COULEE INFLOW

(MONTHLY FLOW; LOW, MEAN, HIGH)



The following sections identify physical changes resulting from examination of each activity occurring under the proposed agreement. The effects on power production and marketing, as well as the effects on the environment which result from these physical changes, are evaluated. The primary environmental concerns addressed are those related to fish and wildlife, although minor beneficial effects on water quality are occasionally mentioned. The reason for this concentration on fish and wildlife is related to the magnitude of potential physical changes. None of the alternatives result in changes which cause water flows or levels to exceed project-specific constraints. Most environmental impacts are closely tied to the absolute flow or water level. Examples of such impacts are dewatering of wetlands or inundation of historic sites. Since these impacts relate directly to absolute water levels or flow, they are adequately covered by environmental documents prepared by the project operators. These documents discuss establishment of these absolute constraints on flow and water level. Fish and wildlife populations differ substantially from this other category of environmental concerns since fish and wildlife often are impacted by rates of change or the amount of change over a period. An example of this occurs with small-mouth bass. These fish spawn in shallow water during the spring.

A significant impact to small-mouth bass populations can occur if water levels change by a certain amount, say 10 feet, over the period from spawning to hatching. In this example, absolute water levels mean very little. The amount of change during a fixed time period is the reason for concern. Project environmental documents do not thoroughly evaluate the potential for these types of impacts. For this reason, the focus of this EA is on impacts to fish and wildlife populations and not on those other environmental impacts

addressed by project-specific documents. However, the responsibility for remaining within constraints established to protect fish and wildlife lies with operators of specific projects. The following impact discussion analyzes each of the operational aspects explained in Chapter 2.

3.1 REVELSTOKE INITIAL FILL

The actual filling of the reservoir at Revelstoke will occur by moving water presently stored in the non-Treaty space of Mica Reservoir into the Revelstoke reservoir. The refilling of the space then created in Mica is the subject of this section.

3.1.1 Changes in System Operation

Refilling of Mica Reservoir will withhold 4.3 MAF of water from the volume which enters the United States from the mainstem Columbia River. Under the first short-term contract between BPA and B.C. Hydro, 0.43 MAF has already been stored in Mica and Arrow and additional water may be stored under the second short-term agreement. This reduces the volume withheld under the proposed agreement to 3.87 MAF. This volume can be stored over varying periods of time.

Under the no action alternative, the water would be withheld between October 1983 and June or July of 1984. The exact length of this period varies with streamflow conditions. Average daily flow over the period would be reduced by 6-7 KCFS. The reduction would be greatest during June when average daily flow would be reduced by 25 kcfs. Reduction during May would average 13.5 kcfs.

Flow reductions would not necessarily be passed through the mainstem Columbia River. In dry years, operators and regulators of U.S. reservoirs would need to draft their projects to meet firm requirements such as the WATER BUDGET. Analysis of the physical changes associated with this draft was not possible. The timing and location of such draft would vary greatly with flow conditions to such an extent as to make specific analysis meaningless. The possibility for such variation is further justification for not adopting the no action alternative.

Compared to the no action alternative, the proposed action would result in BPA obtaining greater flexibility in the timing and extent of flow reductions. Under the proposed agreement, the first 2.3 MAF of Mica refill storage would be removed between October 1, 1983, and October 1, 1985, assuming that all inactive space is declared available on October 1, 1984. Depending on conditions of load and streamflow, storage could occur in as little as 2 months or could be extended to as long as 18 months.

If very high fall streamflows, similar to that which occurred in 1933-34, were to occur in 1983, all storage could be withheld between October 1983 and December 1983. This would result in a daily average flow reduction of 12.6 kcfs.

Under average water conditions, similar to those which occurred in 1948-49, storage could occur in January 1984 and February 1984. This would reduce daily average flows by 19.3 kcfs.

Under very dry conditions, like those which occurred in 1928-29 through 1930-31, storage would be filled over an extended period of time. Storage

would begin in January 1985 and be complete by September 30, 1985. Water would be stored in every month excepting the last half of April and the month of May. Average flow during periods of storage would be reduced by 5.1 kcfs.

The remaining 2.0 MAF would be filled beginning as soon as the 2.3 MAF has been stored. The initial filling of this 2.0 MAF could take as little as 1 month or as long as 45 months.

The time period varies to this extent since the 2.0 MAF of space will only be filled with surplus water, that is, water which cannot be used to generate salable energy or to meet project constraints or firm nonpower commitments. After the initial filling of the space, it will be used as guaranteed active storage (see section 3.2.1). The physical changes of this filling will be very similar to those occurring under the refilling of guaranteed active storage (section 3.2.1).

Physical impacts to the hydrosystem under the fill agreement alternative would have been similar to the impacts created by the proposed agreement.

3.1.2 Effects on Power Production and Marketing

The filling of the Revelstoke reservoir under the no action alternative would have required Northwest utilities to reduce the FELCC of the Coordinated System by 4.5 billion kWh in the critical period which began September 1, 1983. The FELCC of the Fiscal Year (FY) 1984-1985 through FY 1986-1987 critical period for the Coordinated System is 551.9 billion kWh. BPA's loss of FELCC would amount to 3.1 billion kWh. This loss of FELCC would result in a reduction in the amount of firm surplus available for sale by BPA.

The initial filling of Revelstoke under the proposed agreement will reduce the FELCC of the Coordinated System by 1.0 billion kWh, of which 0.7 billion kWh is suffered by BPA. This will result in a reduction in the amount of firm surplus available for sale by BPA.

3.1.3 Environmental Effects

None of the flow reductions associated with any of the alternatives would significantly impact downstream migrant ANADROMOUS SALMONIDS. During the fall and winter, migratory activity is at a minimum. The Water Budget provides adequate protection for spring migrants from the effects of flow reductions (BPA, 1983). Preliminary results of current studies indicate that summer migrant juvenile salmonids are not affected by reductions in flow (Sims, 1982).

Reductions in flow may also reduce spill. At projects with inadequate bypass facilities, such spill is needed to prevent migrating juvenile salmonids from suffering significant turbine-related mortality. Each of the alternatives has the potential to substantially reduce spill. The Northwest Power Planning Council's (Council) Fish and Wildlife Program (Program) (Section 404(a) and (b)) requires operators of hydroelectric projects without effective bypass systems to provide spill which will achieve a level of smolt survival comparable to or better than that achievable by the best available bypass system. Under the proposed agreement, BPA will mitigate the potential for significant spill reductions by incorporating such spill programs into power planning and operations and will do nothing as a result of the proposed agreement which could hinder provision of fish passage spill provided for under the annual spill program developed in accordance with Section 404(a) and

(b) of the Council's Program. Therefore, no significant effects on juvenile downstream migrant anadromous salmonids should be caused by spill reduction resulting from the proposed alternative.

The information available in the literature has not shown a direct relationship between impacts to resident fish or wildlife populations of the mainstem Columbia River and changes in flow and spill.

Changes in reservoir elevations associated with the no action alternative have the potential to affect resident fish and wildlife populations. Without further legal definition of the types of changes which might be expected, analysis of these impacts is impossible.

No change in reservoir elevations will result from the proposed agreement in association with the initial fill of the reservoir at Revelstoke.

3.2 GUARANTEED USE OF ACTIVE STORAGE SPACE

Mica Reservoir's non-Treaty storage space is, at the present time, filled and essentially inactive. This space is kept full by B.C. Hydro and has not been made available to BPA. B.C. Hydro will use a portion of its Mica non-Treaty storage to fill the reservoir behind Revelstoke. This will leave Mica Reservoir 4.3 MAF below full of which 2.3 MAF will be filled permanently as described in section 3.1.1. Some of this storage has occurred as a result of the short-term agreements between the two entities. The consequent use of the remaining space is the topic to be discussed in this section.

3.2.1 Changes in System Operation

Under the no action alternative, B.C. Hydro will refill the space as discussed under Revelstoke Initial Fill (section 3.1.1). After this fill, the space would remain full and inaccessible to BPA. This would result in no physical changes other than those addressed under Revelstoke initial fill. Since the fill agreement does not provide for use of non-Treaty storage space, the impact of the fill agreement will look like the no action alternative.

Under the proposed agreement, 2.0 MAF of the vacated space will remain in use, 1.0 MAF by BPA and 1.0 MAF by B.C. Hydro. The other 2.3 MAF will be filled and become inactive. The physical changes asscciated with the filling of this 2.3 MAF have been addressed under Revelstoke Initial Fill (section 3.1.1).

The 2.0 MAF of storage which will remain in use over the life of the agreement has been termed active storage space. Active storage space will be filled at times when surplus water is available and used largely to generate NONFIRM ENERGY. In times of adverse water, this storage could also be used to generate firm energy or to meet firm nonpower obligations.

Analysis of how the storage space could be used by both parties indicates that storage may take place at any time of the year. Release of storage likewise may occur at any time. Flow reduction is most likely to occur between November and February and May through June. Flow reductions during times of storage on the mainstem Columbia at the U.S. border would average 11.6 kcfs for the November-February period and 10.8 kcfs for the May-June period. During June, the month when flow reductions are greatest, daily average flows

may be reduced by as much as 27.6 kcfs or as little as 1.7 kcfs depending on the water year. Releases of storage will primarily increase flows between July and September. Average flow increases during periods of release are 19.4 kcfs. During July, the month when releases are greatest, daily average flows may change, depending on the water year, by as much as 32.5 kcfs or as little as 1.6 kcfs.

3.2.2 Effects on Power Production and Marketing

The primary purpose of this contract provision is to improve the parties' ability to generate and market nonfirm energy. Under the terms of the proposed agreement, water will be stored when some portion of the 2.0 MAF is available, at times when it would otherwise be spilled. This reduces the amount of unmarketable energy. At a time when secondary markets become available, the previously stored water will be released and the resulting energy will be sold.

3.2.3 Environmental Effects

No significant adverse impacts associated with changes in flow have been identified. The discussion associated with Revelstoke Initial Fill (Section 3.1.1) is applicable to this topic as well. Two potential beneficial effects have been identified. The ability to reduce spring flows in years of high runoff could assist in reducing dissolved gas supersaturation on the mainstem Columbia River. Supersaturation often causes substantial mortality in both anadromous and resident fishes. The storage may also be of benefit in years when a wet fall is followed by a dry spring. In these cases, water

saved in the fall could be used to meet firm commitments, including nonpower commitments such as the Water Budget. Although the effects produced in these situations are positive, the magnitude of change is relatively minor owing to the volume of storage involved.

No alterations in reservoir elevations in the U.S. result from any of the alternatives.

3.3 USE OF TREATY STORAGE SPACE

Storage would be placed in Mica Reservoir's Treaty space in slightly submedian water years to enhance refill at Mica. These water conditions occur in approximately 10 percent of all water years.

3.3.1 Changes in System Operations

Under the no action alternative BPA would not seek agreements with B.C. Hydro in years when access to Mica Treaty storage would be beneficial. Therefore, there would be no effect on river operations.

Under the proposed agreement, storage would take place in Mica Treaty space. This would reduce flows on the mainstem Columbia River starting as early as February and continuing until as late as the end of July. In 1978, a year when BPA obtained agreement to use Mica Treaty space, flows were reduced between April 27 and July 14. The average flow reduction was 6.5 kcfs with a maximum hourly flow reduction during June of 25.0 kcfs. This water was released from July 17 to August 24 of that same year. The resultant average

flow increase was 13.1 kcfs with a maximum hourly flow increase during August of 30 kcfs. This use of Mica storage to enhance project refill is a typical example.

The other potential use of this storage would be to redistribute runoff within any given spring and summer. This operation would be used in high volume runoff years which occur about 1 year in every 4. Storage could begin as early as February and continue into July. This storage, unless removed, would be forced out by July 31 when Mica refilled. Due to the short period of availability of this storage, its primary use would be to provide for nonpower system considerations and short-term power marketing strategies. Storage and removal would likely occur within a short period, for example, 1 month. It is very difficult to estimate the potential for flow reduction or augmentation, since there has been no past use of storage in this manner. A best approximation of the flow reductions associated with this storage can be obtained from using the changes resulting from storage in Mica Treaty space for refill enhancement, a maximum reduction of 25 kcfs.

With regard to the use of Mica Treaty storage space, the fill agreement will produce the same physical changes as the proposed alternative in years when agreement is reached. In years when there is no agreement, there will be no change in river operations, as in the no action alternative.

3.3.2 Effects on Power Production and Marketing

The primary purpose for BPA's use of Treaty storage space is to assure the filling of Mica at times when other Coordinated System reservoirs are expected to fill. If Mica fails to fill when all other Coordinated System reservoirs

fill, the Coordinated System parties may not be able to adopt the first year FELCC. Adopting something other than the first year FELCC reduces each Coordinated System party's right to serve load.

Use of Mica Treaty storage space to enhance the filling of Mica will result in a redistribution of generation. During the period February 1 to July 31, generation and nonfirm sales will be reduced to aid in filling. After July 31 the storage will be released, resulting in an increase in generation and potentially, if the increased flows are not spilled, increasing nonfirm sales.

If Mica Treaty storage space is used to store surplus water, a portion of the surplus water will be stored through reduced flows. Another portion of the surplus water will be used to generate energy to deliver to B.C. Hydro. There is a chance that this stored energy will become usable for sales of nonfirm energy.

3.3.3 Environmental Effects

The discussion of flow-related impacts associated with Revelstoke Initial Fill (section 3.1.1) is applicable to this provision as well. Use of Mica Treaty space to provide for nonpower considerations can have a beneficial effect on resident and anadromous fish. Water can be stored during periods of high dissolved gas supersaturation, thus reducing those levels (see section 3.2.3.1).

No changes in reservoir elevations in the U.S. will result from any of the alternatives.

3.4 USE OF ADDITIONAL NON-TREATY SPACE

From time to time, B.C. Hydro has non-Treaty space available in addition to that provided for under guaranteed active storage.

3.4.1 Changes in System Operations

The no action alternative would not result in use of additional non-Treaty storage and therefore, would not change physical conditions.

The proposed agreement would result in use of storage when it is made available by B.C. Hydro. At the present time, there is no way to assess the exact amount, location, timing, or duration of such storage. Potential effects can, however, be assessed through evaluation of how this storage has occurred in the past. Examples of such storage occurred in 1980 and 1981 when access was obtained to .26 MAF of storage in Arrow reservoir. In 1981, storage space was filled in August when flow was reduced by an average of 22 kcfs over a 6-day period to fill the storage. The flow reduction ranged from 17 kcfs to 25 kcfs. Under the condition of that agreement, one-half the storage belonged to B.C. Hydro. They released their storage in September, raising flows by an average of 5 kcfs over a 14-day period. BPA released its half of the storage in December again raising flows by 5 kcfs over 14 days. Storage and release in 1980 was very similar to that which occurred in 1981.

Under the fill alternative, physical effects would be the same as under the no action alternative in years without an agreement, and the same as the proposed agreement in years when a short-term agreement was reached for use of additional space.

3.4.2 Effects on Power Production and Marketing

The impact of use of this additional non-Treaty storage space on power production and marketing will be like those discussed in Guaranteed Use of Active Storage Space (section 3.2) but of a lesser magnitude.

3.4.3 Environmental Effects

The discussion under section 3.2.3 covers all potential effects on fish and wildlife.

3.5 INITIAL FILL OF OTHER NON-TREATY SPACE

B.C. Hydro has constructed Seven Mile Dam and filled the reservoir to an elevation of 1715 feet. It intends to fill Seven Mile Reservoir to its maximum permitted operating elevation of 1730 feet. It also expects to construct Murphy Creek Dam and fill its reservoir.

3.5.1 Changes in System Operation

Under the no action alternative, the water which B.C. Hydro initially stored in Seven Mile would not be released; therefore, there would be no physical changes. The proposed agreement allows BPA to request the release of the 0.07 MAF any time between September 1, 1983, and March 31, 1985. The impact of this release will be an increase of flows of 2-3 kcfs if released over a 2-week period.

Filling Seven Mile from elevation 1715 feet to 1730 feet will require 0.02 MAF. The reduction in flows caused by this filling would be insignificant. Murphy Creek filling will require approximately 0.1 MAF. Filing this space over a 2-month period would result in a flow reduction of 0.8 kcfs. These impoundments are extremely small and as a result the physical changes resulting from fill will be insignificant regardless of which alternative is considered.

Under the fill agreement, physical effects would be the same as under the no action alternative in the absence of an agreement, and the same as the proposed agreement if there was an agreement.

3.5.2 Effects on Power Production and Marketing

Release of the water associated with the initial filling of Seven Mile will result in increased generation at U.S. projects on the mainstem Columbia River. This increase of approximately 70,000 MWh will be sold as nonfirm energy.

The effects of filling other non-Treaty reservoirs will be of the same type as those discussed in Revelstoke Initial Fill (section 3.1) but of a much smaller magnitude. The amount of storage which will be filled in Seven Mile and Murphy Creek is between 30 and 60 ksfd (0.06 MAF and 0.11 MAF).

Under the no action alternative, these reservoirs would be filled by B.C. Hydro with no compensation to downstream U.S. power interests. This would

result in a loss of FELCC of up to 125,000 MWh, 14.3 average MW over a 12-month period, for the Coordinated System. BPA's share of this loss would be 9.9 average MW over a 12-month period.

Under the proposed agreement, the impact of BPA sharing in the filling of these two reservoirs would be minimal.

3.5.3 Environmental Effects

Flow reductions and augmentation associated with the initial fill of other non-Treaty space are minimal. These changes in flow will be so minor as to have no likelihood of producing measurable impact to fish or wildlife populations.

3.6 Summary of Environmental Effects

As stated earlier in this chapter, the primary environmental concerns addressed in the EA are with potential effects on fish and wildlife. For purposes of comparison, Table 1 summarizes the environmental impacts for the five operational aspects discussed in Chapters 2 and 3 for each of the three alternatives.

No significant effects on fish and wildlife have been identified for any of the alternatives except under the no-action alternative where initial fill of the reservoir behind Revelstoke potentially may affect fish and wildlife. In this case, the impacts cannot be quantified because the location, timing, and extent of drawdown at U.S. reservoirs cannot be determined. Where the

potential for significant impact may exist for the other two alternatives, mitigation has been provided. This is true with regard to the effect of flow changes on downstream spring migrant anadromous salmonids, where adoption of the Water Budget provides mitigation. It is also true where reductions in spill for passage of downstream migrant juvenile salmonids provide mitigation, as described earlier in this chapter.

The proposed agreement alternative, and to a lesser extent, the fill agreement alternative may also result in minor beneficial impacts. Supersaturation of dissolved gasses may be reduced during periods of high flow. Storage may also be used during times of adverse water conditions to meet firm nonpower commitments such as the Water Budget.

TABLE 1

SUMMARY OF ENVIRONMENTAL IMPACTS FOR PROPOSAL AND ALTERNATIVES

ACTIVITY	ALTERNATIVES		
	No Action	Fill Agreement	Proposed Agreement
Revelstoke Initial Fill	1, 2, 3	2, 3	2, 3
Guaranteed Storage	2, 3	2, 3	2, 3, 4, 5
Treaty Storage	2, 3,	2, 3, 4, 5	2, 3, 4, 5
Additional Non-Treaty Storage	2, 3	2, 3	2, 3, 4, 5
Other Initial Fill	6	6	6

Potentially Significant Impact

1 - Changes in U.S. reservoir elevations may affect fish and wildlife.

Fully Mitigated Potential Impact

2 - Changes in Flow--potential impacts mitigated by Water Budget.
3 - Changes in Spill--Potential impacts mitigated by modification of power operations as necessary to meet Corps of Engineers Annual Spill Program.

Potential Beneficial Impact

4 - May reduce supersaturation of dissolved gasses thereby lessening incidence of gas bubble disease in fish.
5 - Storage may be used to meet firm nonpower commitments including Water Budget.

No Potential for Impact

6 - Physical changes restricted to flow alterations. Magnitude is too small to produce significant impact.

Chapter 4.0

OTHER CONSIDERATIONS

In addition to their responsibilities under the National Environmental Policy Act (NEPA), Federal agencies are required to carry out the provisions of other Federal environmental laws. Most of the Federal actions related to the proposed agreement discussed in this EA do not require any particular response with regard to the resources addressed in these other Federal laws because the requirements are more concerned with specific proposals for development, and not actions such as that proposed which will merely enable different operation of existing facilities on a discretionary basis. Also, part of the effect of the proposed action will occur in Canada where these laws are not applicable.

Other Federal laws and requirements which will not be affected by the proposed agreements with B.C. Hydro and the mid-Columbia purchasers but which were considered during preparation of the EA include:

1. OMB Circular No. A-95 Review - The proposed agreement does not involve any direct Federal development.

2. The Coastal Zone Management Act of 1972 - The alternatives discussed in this EA are not included in Washington's or Oregon's list of Federal activities affecting their coastal zone programs.

3. Endangered Species Act of 1973 - The proposed agreement provides only for discretionary changes in operation of existing power resources within existing operational constraints. None of the alternatives will affect any endangered species, listed or proposed, or its critical habitat.

4. Heritage Conservation requirements - The proposed agreement provides only for discretionary changes in operation of existing power resources within existing constraints.

5. Laws or requirements to protect farmlands - None of the alternatives will convert farmlands to other uses.

6. Recreation resources - BPA's anticipated action does not adversely affect any park, designated or proposed wild and scenic rivers, the National Trail System, wilderness areas or other recreation resources.

7. Permits for structures in navigable waters - The proposed action does not include: (a) a structure or work in, under, or over a navigable water of the United States; (b) a structure or work affecting a navigable water of the United States; or (c) the deposit of fill material or an excavation that in any manner alters or modifies the course, location, or capacity of any navigable water of the United States.

8. Permits for discharges into waters of the United States - The proposed actions and its alternatives do not involve discharge of dredge or fill material into waters of the U.S.

9. Permit for right-of-way or public land - The proposed actions do not include use of public lands in a way not in accordance with the primary objective of the management of those lands.

4.1 FISH AND WILDLIFE LAWS

There are several key Fish and Wildlife Laws that may relate to BPA actions:

- The Fish and Wildlife Coordination Act.

- The Fish and Wildlife Conservation Act of 1980.

- The fish and wildlife provisions of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act).

The Water Budget Managers for state and Federal agencies and for the Columbia Basin Tribes have been consulted informally during preparation of this EA. The Water Budget Managers for state and Federal agencies represent the U.S. Fish and Wildlife Service and National Marine Fisheries Service in matters relating to downstream migration of anadromous salmonids. To accomplish the consultation required by these laws, the Water Budget Managers, Pacific Northwest Power Planning Council, Federal and State fish and wildlife agencies and tribes will have the opportunity to comment on this EA, and BPA will take their concerns under consideration before a decision is made to implement the anticipated action. The proposed agreements with B.C. Hydro and the mid-Columbia purchasers were described at a March 22, 1983, Fish and Wildlife Consultation meeting at BPA.

The Fish and Wildlife Conservation Act of 1980, 16 U.S.C. 2901 et seq., provides for States to develop "approved conservation plans" for the conservation of fish and wildlife. The Act is primarily aimed at conservation

of non-game fish and wildlife, those not ordinarily taken for sport, fur, or food. It is BPA's obligation under the Act to share scientific information and any other appropriate information with States for the purpose of assisting States in developing and revising a conservation plan. By sending a copy of this EA to State fish and game agencies, BPA is meeting its obligation of sharing information it has with the State agencies. BPA askes that State agencies keep it informed of development of conservation plans so that information can be supplied if it is available.

4.2 FLOODPLAINS AND WETLANDS

Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands, establish a national policy to protect wetlands and floodplains and requires that Federal agencies avoid, to the extent possible, long- and short-term impacts associated with occupancy and modification of floodplains and destruction or modification of wetlands.

The proposed action is indirectly related to other entities' management of Federal and non-Federal dams and reservoirs in floodplains and that management may affect wetlands adjacent to and connected to the Columbia River and its tributaries. However, these impacts will not exceed the operational parameters (flood control, navigation, irrigation, etc.) established for each facility. Therefore, effects on floodplains and wetlands will not exceed those incurred during normal operation.

4.3 POLLUTION CONTROL AT FEDERAL FACILITIES

The proposal does not require procurement of goods, services, or materials, so the contract compliance provisions of the Clean Air Act, Clean Water Act, and other environmental laws do not apply. The proposed agreements with B.C. Hydro for storage will not alter the current status of any electrical generating resource with respect to compliance with environmental regulations governing air pollution, water pollution, solid waste transport and disposal, hazardous waste, drinking water standards, noise, pesticides, or polychlorinated biphenyls (PCB). Energy storage and energy recovery activities undertaken in accordance with the storage agreements may affect operations of certain resources at times, but resources would not be operated in such a manner as to violate currently applicable standards or permit conditions, nor would resources be operated to exceed a level of environmental impact that would not occur at least some time during normal operations in absence of the agreements.

4.4 ENERGY CONSERVATION AT FEDERAL FACILITIES

The proposal involves operation of Federal facilities in that at times of storage of energy in the Canadian reservoirs and recovery of such storage, operation of Federal power resources and the BPA transmission system will be altered accordingly. The agreement will result in transmission losses, head losses, and varying efficiencies of resources, but energy generation will be substantially increased as a consequence of storage of unusable water and subsequent release when it is salable.

Chapter 5.0

LIST OF AGENCIES AND PERSONS CONSULTED

The U.S. Army Corps of Engineers and the mid-Columbia purchasers have been involved in BPA's contract negotiations with B.C. Hydro. In addition, the Water Budget Managers for state and Federal agencies and for the Columbia Basin Tribes, have been consulted informally during preparation of this EA. The Water Budget Manager for state and Federal agencies represents the U.S. Fish and Wildlife Service and National Marine Fisheries Service in matters relating to downstream migration of anadromous salmonids.

A description of the proposed agreements with B.C. Hydro and the mid-Columbia purchasers was presented during a BPA Fish and Wildlife Consultation meeting on March 22, 1983. Representatives of many organizations listed below attended that meeting (an asterisk indicates those agencies which were represented). In addition, a summary of the meeting discussion was distributed on May 20, 1983.

This EA will be furnished to the following Federal, State, Tribal, public interest, environmental, and other types of organizations, and selected individuals for formal review and comment. In addition, others will be notified of the availability of this EA, and will be able to request copies for review and make comments if they want.

Federal Agencies

* Water Budget Manager for State and Federal Agencies
  Rural Electrification Administration, Washington, D.C.
* US Corps of Engineers, Portland, Oregon
  US Corps of Engineers, Seattle, Washington
  US Corps of Engineers, Walla Walla, Washington
* USDA, Forest Service, Portland, Oregon
  US National Park Service, Pacific NW Region, Seattle, Washington
* USDOC, National Marine Fisheries Service, Seattle, Washington
  USDOE, Federal Energy Regulatory Commission, San Francisco, California
  USDOE, Federal Energy Regulatory Commission, Washington, D.C.
  USDOI, Bureau of Indian Affairs, Nespelem, Washington
* USDOI, Bureau of Indian Affairs Regional Office, Portland, Oregon
  USDOI, Bureau of Indian Affairs, Toppenish, Washington
  USDOI, Bureau of Land Management, Portland, Oregon
* USDOI, Bureau of Reclamation, Boise, Idaho
* USDOI, Fish and Wildlife Service, Portland, Oregon
  USDOJ, US Attorneys Office, Portland, Oregon

State Agencies

  State of Idaho, Department of Fish and Game, Boise, Idaho
* State of Oregon, Department of Fish and Wildlife, Portland, Oregon
  State of Oregon, Intergovernmental Relations Division, Salem, Oregon
  State of Washington, Department of Ecology, Olympia, Washington
  State of Washington, Department of Fisheries, Olympia, Washington

* State of Washington, Department of Game, Olympia, Washington

State of Washington, Department of Game, Wenatchee, Washington

State of Washington, Energy Office, Olympia, Washington

State of Washington, Office of Archaeology & Historic Preservation Olympia, Washington

State of Washington, Office of Financial Management, Olympia, Washington

State of Washington, Parks and Recreation Commission, Olympia, Washington

State of Washington, Planning and Community Affairs, Olympia, Washington

Tribes

* Water Budget Manager for the Columbia Basin Tribes

Affiliated Tribes of Northwest Indians, Tacoma, Washington

* Columbia River Inter-Tribal Fish Commission, Portland, Oregon

Colville Business Council, Nespelem, Washington

* Kalispel Business Committee, Usk, Washington

Kootenai Tribal Council, Bonners Ferry, Idaho

* Spokane Business Council, Wellpinit, Washington

Interest Groups

* Columbia Basin Fish and Wildlife Council, Portland, Oregon

Columbia River Citizens Compact, Hillsboro, Oregon

Forelaws on Board, Boring, Oregon

Friends of the Earth, Seattle, Washington

Izaak Walton League, Portland, Oregon

National Audubon Society, Sacramento, California

National Wildlife Federation, Portland, Oregon

Natural Resources Defense Center, San Francisco, California

Northwest Environmental Defense Center, Portland, Oregon

Northwest Indian Fisheries Commission, Olympia, Washington

Northwest Steelhead and Salmon Council, Olympia, Washington

Oregon Environmental Council, Portland, Oregon

Oregon Wildlife Federation, Eugene, Oregon

Pacific Marine Fisheries Council, Portland, Oregon

Trout Unlimited, East Wenatchee, Washington

Washington Environmental Council, Seattle, Washington

Customers/Others

ASWSU, Environmental Task Force, Pullman, Washington

Benton-Franklin Governmental Conference, Richland, Washington

British Columbia Hydro and Power Authority, Vancouver, British Columbia, Canada

* Chelan County PUD #1, Wenatchee, Washington

Colockum Transmission Company, Inc., Wenatchee, Washington

Cowlitz County PUD #1, Longview, Washington

* Direct Service Industries, Portland, Oregon

Douglas County PUD #1, East Wenatchee, Washington

* Eugene Water and Electric Board, Eugene, Oregon

City of Forest Grove, Forest Grove, Oregon

* Grant County PUD #2, Ephrata, Washington

Kittitas County PUD #1, Ellensburg, Washington

City of McMinnville, McMinnville, Oregon

City of Milton-Freewater, Milton-Freewater, Oregon

Okanogan County PUD #1, Okanogan, Washington

Oregon State University, Corvallis, Oregon

* Pacific Northwest Utilities Conference Committee, Portland, Oregon

* Pacific Northwest Power Planning Council, Portland, Oregon

* Pacific Power and Light Co., Portland, Oregon

* Portland General Electric Co., Portland, Oregon

* Public Power Council, Vancouver, Washington

Puget Sound Power and Light Co., Bellevue, Washington

* Seattle City Light, Seattle, Washington

Spokane Regional Planning Conference, Spokane, Washington

* Tacoma City Light, Tacoma, Washington

Trico Economic Development District, Colville Washington

West Kootenay Power and Light Co., Trail, Canada, British Columbia

University of Washington, Seattle, Washington

Washington State University, Pullman, Washington

The Washington Water Power Co., Spokane, Washington

Chapter 6.0

CONCLUSIONS

BPA has reviewed all aspects of the proposed agreements to resolve Revelstoke Reservoir filling issues and access reservoir storage space in British Columbia with B.C. Hydro and with the mid-Columbia project participants for compliance with legislative and executive mandates adopted to safeguard the integrity of the human environment. BPA has consulted with the Water Budget managers, various fish and wildlife agencies, and, through the contract negotiation process, the Corps, the mid-Columbia project participants concerning the proposed agreements. These represent the principal interests affected by the agreements. Further consultation is being undertaken through distribution of this environmental assessment to agencies and the public for review and comment.

In review of the proposed agreements, BPA has not uncovered any unresolved conflicts over alternative uses of available resources. BPA has found that the nature and extent of the environmental consequences resulting from the agreements, which are primarily effects on river flows and fish, are not significant. No extraordinary, controversial, unique, or hazardous circumstances or conditions will be created or furthered by these agreements.

Unless public and agency review of this assessment reveals information that impacts may be more significant than BPA's analysis projected, an environmental impact statement does not appear to be needed for the proposed agreements. Preparation of a Finding of No Significant Impact (FONSI) is recommended.

APPENDIX A

REPRODUCTION OF BPA BROCHURE ON THE COLUMBIA RIVER TREATY

APPENDIX B

LIMITATIONS ON SCOPE OF ENVIRONMENTAL ASSESSMENT

The proposed agreements, the no action alternative, and the filling agreement alternative would each affect the environment in both Canada (particularly the Province of British Columbia) and the United States. The Department of Energy, pursuant to Executive Order 12114 of January 4, 1979, has issued guidelines (46 FR 1007-1011) for the scope of environmental analyses undertaken for proposals having effects abroad. Section 4 of these guidelines lists four categories of actions abroad for which environmental review is mandatory. These are as follows:

A. "4.1 Major Federal actions significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., the oceans or Antarctica)."

B. "4.2 Major Federal actions significantly affecting the environment of a foreign nation not participating with the United States and not otherwise involved in the action."

C. "4.3 Major Federal actions significantly affecting the environment of a foreign nation which provide to that nation:

(a) A product, or physical project producing a principal product or an emission or effluent, which is prohibited or strictly regulated by Federal law in the United States because its toxic

effects on the environment create a serious public health risk (see Appendix A): or

(b) A physical project which in the United States is prohibited or stricly regulated by Federal law to protect the environment against radioactive substances."

D. "4.4 Major Federal actions outside the United States, its territories and possessions which significantly affect natural or ecological resources of global importance designated for protection by the President pursuant to section 2-3(d) of Executive Order 12114 or, in the case of such a resource protected by international agreements binding on the United States, by the Secretary of State."

The proposed agreement with B.C. Hydro will not impact the global commons, or natural or ecological resources of global importance to any identifiable degree, and it does not result in any toxic products or emissions. Therefore, subsections 4.1, 4.3, and 4.4 are not applicable. With respect to subsection 4.2, B.C. Hydro is the "Entity," or appointed representative, of the Canadian Government for matters relating to the Columbia River Treaty, and is also a provincial Crown corporation with a Board of Directors appointed by the Lieutenant Governor in Council of British Columbia. The agreement is conditional upon B.C. Hydro's obtaining necessary licenses and approvals from the Province of British Columbia and the Canadian government. Therefore, the foreign nation is participating in the action, and subsection 4.2 also appears to be inapplicable. Thus, environmental review of impacts abroad is not required in this case.

APPENDIX C

PROPOSED AGREEMENT BETWEEN BPA AND B.C. HYDRO

APPENDIX E

GLOSSARY

Active Storage Space - Space is a reservoir which may be filled and lowered upon need of the user.

Anadromous - Species of fish (such as salmon) that are hatched in fresh water, mature in salt water, and return to fresh water to spawn.

Coordinated System - The Coordinated System consists of the Corps, Bureau, and BPA, and 14 of the areas generating utilities who signed the Pacific Northwest Coordination Agreement in August 1964. The object of the Coordinated System is to operate projects as if all were owned by a single entity to make optimun use fo the water and storage resources of the region.

Firm Energy - Electric energy which is intended to have assured availability to the customer to meet all or any agreed upon portion of his load requirements over a defined period. FIRM POWER is power which is guaranteed by the supplier to be available at all times except for reason of certain uncontrollable forces or continuity of service provisions.

Firm Energy Load Carrying Cability (FELCC) - the level of energy capable of being produced by the hydrogeneration system using all of the reservoir storage in combination with critical period streamflows.

Head - The vertical height of the water in a reservoir above the turbine. The difference between the elevations of the reservoir and the tailrace at the foot of the dam.

Inactive Storage Space - Space is a reservoir which is kept filled to produce head.

KCFS - THOUSAND CUBIC FEET PER SECOND - A measure of water flows or discharge equal to a thousand cubic foot of water passing a given point in one seconds time.

KSFD - THOUSAND SECOND FOOT DAYS - The volume of water produced by a flow of one thousand cubic feet per second over the period of 24 hours.

MAF - MILLION ACRE FEET - An acre foot is the volume of water needed to cover one acre of land one feet deep.

Nonfirm Energy - Energy supplied or avialable under an arrangement which does not have the guaranteed continous availability feature of firm power.

Salmonid - Member of the family SALMONIDAE.

Water Budget - Concept developed by the Regional Council in its F&W Program to provide certain volumes of water to achieve desired flows at Priest Rapids and Lower Granite control points during April 15 to June 15 to increase the flow velocities of the water between dams.

APPENDIX F
REFERENCES

Bonneville Power Administration (BPA), 1983, Environmental Assessment on Proposed Power System Changes to Implement the Water Budget, May.

Sims, C.W., 1982.

RSeiffert:db:jls (WP-PGE-1770K)

EQ 4-2-10

8-25-83

Addressees

John Piccininni

PGC

Attached is the latest version of the Revelstoke EA for your review. Due to the extensive revision of the first three chapters, we are several days behind our latest schedule.

Although we are aware of your own severe workloads, we request your review comments by COB Friday, August 26. Mark your changes on the document or relay them to me informally at extension 4240 or to Shirley Price at 4236.

We trust that this latest version addresses your previous concerns.

Attachment

Addressees:

O. Schmidt - AP	D. Harper - PJS	D. Faulkner - PS
P. Michie - APG	E. Bleifuss - PKI	A. Morrell - SJ
M. Knapp - PJS	L. Dean - PS	N. Stas - SA

JPiccininni:bw

cc:
R. Seiffert - PGC
S. Price - PGC
Official File - PGC

EQ 4-3-10

JO 8/18/83

August 18, 1983

PGC

Anthony R. Morrell, Environmental Manager
Office of Management Services - SJ

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Revised Schedule for Preparation and Approval of Revelstoke Environmental Assessment

Because of the need to edit the Revelstoke EA we have revised the preparation schedule as follows:

Tentative Schedule

Date	Activity
8-22	Finalize EA for DOE preliminary review and BPA internal review
8-22-24	Internal review
8-26	EA to SJ for 568 process
9-1	Mail final EA and draft FONSI to DOE
9-9	DOE review completed
9-14	Publish and distribute EA for 2-week external review
9-28	Close of comment period for EA
9-28	Finalize FONSI* and deliver to SJ for 568 process
9-30	Send to DOE for signature and, if necessary, publication in the Federal Register
10-5	Offer contracts; Distribute FONSI

* On hand in preliminary draft form. Needs to be reviewed in light of new proposal and modified accordingly.

If you have any problems with the revised schedule, please call me or John Piccininni at extension 4261.

JPiccininni:ay (WP-PGC-2211K)

cc:

P. Michie - APG	J. Palensky/S. Smith - PJ	L. Dean - PS
J. McLennan - PG	R. Harper - PJI	D. Faulkner - PS
R. Seiffert - PGC	E. Bleifuss - PKI	Official File - PGC

ENVIRONMENTAL ASSESSMENT

ON

PROPOSED AGREEMENTS TO RESOLVE REVELSTOKE RESERVOIR FILLING ISSUES AND ACCESS RESERVOIR STORAGE SPACE IN CANADA

August 1983

Office of Power and Resources Management

Bonneville Power Administration

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Chapter 1

INTRODUCTION

The British Columbia Hydro and Power Authority (B.C. Hydro) is constructing Revelstoke Dam on the Columbia River in Canada. It had proposed to fill the resulting reservoir beginning this September in a manner which the Bonneville Power Administration (BPA) believes is contrary to the Columbia River Treaty (Treaty) and which would have adversely affected BPA operations and revenues. Similar circumstances had occurred in the past with the filling of the reservoir created by Seven Mile Dam, and other such circumstances may yet occur. B.C. Hydro also controls storage space in these and other Canadian reservoirs. BPA's operational flexibility would be enhanced if it could secure rights to use some of this space. The two utilities chose to negotiate to resolve the conflict concerning the filling of Revelstoke and other reservoirs, and to enter into mutually beneficial arrangements regarding Canadian reservoir storage space. The negotiated agreement is the primary subject of this environmental assessment (EA). Any Canadian action which affects Columbia River flows at the U.S.-Canada border, such as filling a reservoir or storing water, also affects potential generation at Columbia River Dams (the mid-Columbia projects) owned and operated by non-Federal utilities. Therefore, a second negotiated agreement was needed with those affected utilities (the mid-Columbia purchasers) to compensate them for, or allow them to participate in, actions which would occur under the agreement with B.C. Hydro. This agreement with the mid-Columbia purchasers is also addressed in this EA.

1.1 PURPOSE AND NEED FOR PROPOSED ACTIONS

This section of the EA describes the purpose and need for the action; discusses legal, system operational, and power marketing issues related to the proposal; and sets forth the rationale for limitations in the EA's scope.

1.1.1 B.C. Hydro Contract

BPA's purposes in negotiating an agreement with B.C. Hydro are three-fold.

1.1.1.1 Resolve the Dispute over Filling of Inactive Storage Space

The first is to resolve a dispute over the filling of INACTIVE STORAGE SPACE at Revelstoke, Seven Mile, and, potentially, other Canadian reservoirs. On August 10, 1982, B.C. Hydro notified BPA by letter that the Revelstoke Project would be completed in early fall of 1983 (see Section 1.2.3). B.C. Hydro stated that inactive storage space at Revelstoke would be filled by reducing the outflow at Revelstoke to capture the natural inflow. Only that water released from Mica pursuant to the Columbia River Treaty operating plan would flow out of Revelstoke during filling. This would result in a reduction of flow at the U.S.-Canada border during the fall and winter of 1983-84.

A similar dispute had arisen over the filling of the Seven Mile Reservoir, a Canadian project much smaller than Revelstoke. It was anticipated that similar future disputes would arise were B.C. Hydro to fill the reservoir behind the proposed Murphy Creek Dam and to raise the pool elevation of Seven Mile, as B.C. Hydro may do during the term of the proposed agreement.

The two legal positions are described as follows. B.C. Hydro's position is that B.C. Hydro has the right to fill the inactive storage space in non-Treaty reservoirs in Canada without compensating those affected in the U.S. for reducing the flow of water in the Columbia River, and without being in breach of the Treaty. BPA's position is that BPA and other downstream U.S. power producers have a right pursuant to the Treaty to the flow of water at the U.S.-Canadian border which would occur as a result of natural flows being augmented by operation of Treaty storage in accordance with the Treaty operating plans, or compensation by B.C. Hydro for any losses of electric power caused by B.C. Hydro as a result of any reductions in flows below those levels.

Rather than pursue their respective legal positions, BPA and B.C. Hydro agreed to discuss ways of settling these initial filling disputes through negotiating a contract providing in a mutually acceptable manner for the filling of Revelstoke and Murphy Creek and the raising of the Seven Mile pool elevation.

1.1.1.2 Access to Treaty and Non-Treaty Storage Space

The second purpose is to provide both BPA and B.C. Hydro the ability to use storage space in reservoirs in Canada to produce more usable energy than is possible under existing arrangements. The proposed agreement will give each party (BPA and B.C. Hydro) the right to store up to 1.0 MAF of water in non-Treaty storage space in Mica and to release that stored water and use the energy it can generate in both Canada and the United States for the duration of the agreement. (The duration will presumably be for 10 years although there are provisions both for extension and early termination.) The proposed

agreement also will provide both parties the right to store equal amounts of water in and to obtain the resulting energy from additional non-Treaty storage space in reservoirs in Canada if, and to the extent that, B.C. Hydro makes such space available. Further, the proposed agreement gives both BPA and B.C. Hydro some additional flexibility which both desire to store water in Treaty space in Mica and Arrow.

1.1.1.3 Protection from Harm

Thirdly, the agreement is generally to protect both BPA and B.C. Hydro from harm as a consequence of each other's storage of water in the Canadian reservoirs. This will be accomplished by the storing party providing compensation for loss of energy which would have otherwise been generated on the nonstoring party's system by water held back for storage. Such compensation is made by delivery of energy from the storing party to the nonstoring party.

1.1.2 Mid-Columbia Contract

The purposes of the agreement with the mid-Columbia purchasers are:

1. To protect the mid-Columbia purchasers from adverse effects resulting from the initial filling of Revelstoke and other reservoirs in Canada.

2. To obtain from such purchasers a release and discharge from claims they might make as a result of the initial filling of Revelstoke and other reservoirs in Canada.

3. To provide for the participation of the mid-Columbia plants for B.C. Hydro's benefit when B.C. Hydro stores and releases water.

4. To provide for the participation of the mid-Columbia plants for the purchasers' benefit when BPA stores and releases water.

1.2 BACKGROUND

The circumstances which have lead to the proposed agreements relate to the fact that the United States and Canada have entered into the Treaty; and the fact that B.C. Hydro is constructing Revelstoke Dam and wishes to fill the resulting reservoir beginning this fall.

1.2.1 Columbia River Treaty

The Treaty between Canada and the U.S. became effective in September 1964. It increased storage capability and access to storage capacity resulting in increased operational flexibility and other benefits to the Regional power system. It is important to remember that the Treaty is and will continue to remain in effect and that it takes complete precedent over the proposed agreement between BPA and B.C. Hydro. A detailed discussion of the Treaty is contained in Appendix A.

1.2.2 Non-Treaty Storage

Two of the Canadian Treaty reservoirs, Mica and Arrow (the reservoir impounded by Keenleyside Dam), have storage capacity in excess of that designated under the Treaty. This storage capacity is termed non-Treaty storage and is

controlled by B.C. Hydro. The amounts of inactive storage, Treaty storage, and non-Treaty storage for each of the Canadian Treaty reservoirs is shown in Appendix A. In addition, non-Treaty storage capacity will exist in the Revelstoke reservoir when it is operational, and more non-Treaty storage may be available in other Canadian reservoirs controlled by B.C. Hydro. Under current conditions, B.C. Hydro may from time-to-time make non-Treaty storage available for use by BPA, but BPA has no long-term rights to use of this storage. A separate storage agreement must be negotiated on each occasion.

1.2.3 Filling of Non-Treaty Reservoirs

Other dams and reservoirs which may affect power production at downstream dams in the United States have been or are being constructed in Canada since the Treaty was ratified. The reservoir behind Seven Mile Dam was filled at a time when the impounded water could have been used by BPA and mid-Columbia purchasers to produce energy, and, therefore, the impoundment adversely affected hydroelectric power benefits. This problem may occur again as additional dams are constructed or as the amount of inactive storage space is increased in existing Canadian reservoirs, such as Seven Mile Reservoir. Other projects that will be covered by the proposed agreement include Murphy Creek, a dam planned for construction on the Columbia River in Canada nearest the border; and, of course, Revelstoke Dam on the Columbia River downstream of Mica Dam and about 5 kilometers north of Revelstoke, British Columbia.

B.C. Hydro has proposed in a letter dated August 10, 1982 to Mr. Charles E. Cancilla, Secretary of the United States Entity, to fill the Revelstoke Reservoir beginning September 26, 1983. Their plan for filling the reservoir

was "to store all local inflow above Revelstoke in the reservoir from the time of closure until the reservoir is full. During this period all requirements for storage releases from Mica will be passed through Revelstoke to the extent possible. Should the discharge facilities at Revelstoke be unable to pass all the necessary storage at any stage, the difference between the required storage release and actual release will be made up by increasing the storage release from Arrow Reservoir.

"The need to fill Revelstoke more rapidly than possible using streamflow alone means that some of the non-Treaty storage in Mica will be temporarily transferred to Revelstoke by releasing more water from Mica than required to by the Treaty. This storage will be returned to Mica at the same rate as it is displaced from Revelstoke by stored streamflow."

Revelstoke Dam is essentially a run-of-river project for power production, and the Revelstoke reservoir will contain 3.5 MAF of inactive storage (i.e., it will permanently impound 3.5 MAF of water), and only a relatively small amount of potentially active storage, 0.8 MAF. Filling the Revelstoke reservoir will cause a loss of water to downstream U.S. projects and, therefore, would adversely affect hydroelectric power benefits. If Revelstoke were filled during a 12-month period, the amount of energy which could be generated by downstream U.S. dams with this water has been estimated as approximately 356 average MEGAWATTS (MW) at Federal dams, and 160 at the mid-Columbia dams.

1.2.4 Short-Term Storage Agreement

BPA and B.C. Hydro entered into a short-term (until August 31, 1984) storage agreement in June 1983, in anticipation of the currently proposed long-term agreement. The short-term agreement was intended to enable storage of surplus water in the system this summer to help fill Revelstoke Reservoir and reduce the risk of having to store at a later time when water was less abundant. Like the proposed long-term agreement, the short-term storage agreement was accompanied by an agreement with the mid-Columbia purchasers to compensate them for loss of energy they could market while flows were being reduced for storage.

BPA has stored approximately 0.430 MAF (or 215 KSFD) in Canadian reservoirs under this short-term agreement. While the short-term storage agreement contained provisions to govern the disposition of the stored water in the event negotiations on a long-term agreement failed, the intent was and is that the stored water would be utilized in accordance with the long-term agreement now being proposed.

1.3 LIMITATIONS OF THE SCOPE OF THE ENVIRONMENTAL ASSESSMENT

Department of Energy guidelines relevant to proposals which have effects beyond the boundaries of the United States are discussed in Appendix B.

Chapter 2

EXPLANATION OF ALTERNATIVES

This chapter will describe the alternatives, including the "no action" alternative. Each alternative addresses a series of operational aspects for which BPA and B.C. Hydro desire resolution. The issues relating to each of the five aspects are described briefly below:

1. Initial Fill of Revelstoke Reservoir.

   B.C. Hydro has constructed Revelstoke Dam and desires to fill the reservoir. BPA seeks to protect itself from impact due to the change in water flow associated with the fill.

2. Guaranteed Use of Active Storage Space.

   B.C. Hydro has non-Treaty storage space available in mainstem Columbia River reservoirs. BPA desires to use a portion of this space. B.C. Hydro has had insufficient incentive to allow BPA access to this space on a guaranteed basis.

3. Use of Mica Treaty Storage Space.

   Under some runoff conditions, Mica Reservoir has a lesser probability of refill than U.S. Coordinated System reservoirs. Mica also refills later in the year. These conditions result in the need to store in Mica at

times when other Coordinated System reservoirs have a 95 percent confidence of refilling and Mica does not. Refill of Mica Treaty space benefits both BPA and B.C. Hydro. Enhancement of Mica refill has occurred in the past on an as needed basis through short-term contractual arrangements between both parties.

4. Use of Additional Non-Treaty Space.

From time to time B.C. Hydro has non-Treaty storage space available in addition to that discussed in 2. above. BPA desires to use a portion of this space. In the past BPA and B.C. Hydro have made short-term arrangements for use of a portion of this space.

5. Initial Fill of other Non-Treaty Space.

B.C. Hydro has constructed Seven Mile Dam and filled the reservoir to an elevation of 1715 feet. They intend to fill Seven Mile Reservoir to its maximum permitted operating elevation. They also expect to construct Murphy Creek Dam and fill its reservoir. BPA seeks to protect itself from impact due to the change in water flow associated with future fill activities and desires redress for past actions.

2.1 ALTERNATIVE: NO ACTION

Under the no action alternative there would be no agreement between B.C. Hydro and BPA to resolve the issues related to the filling of Revelstoke Reservoir. If there was no agreement, BPA would seek to have the filling of Revelstoke

halted through legal means unless B.C. Hydro compensated downstream U.S. interests for their losses. If legal attempts failed to halt the filling, B.C. Hydro would proceed to fill Revelstoke in the manner presented in their August 10, 1982, letter to BPA (see Section 1.2.3).

In this assessment, we have asumed that BPA would not continue to make short-term ad hoc agreements with B.C. Hydro for storage in Mica Treaty space or in non-Treaty storage space in other reservoirs. No agreement resolving past filling of Seven Mile Reservoir would be provided under the no action alternative. There would be no resolution of future reservoir filling issues.

2.2 ALTERNATIVE: FILL AGREEMENT

A possible alternative to the proposed agreement would be for B.C. Hydro and BPA to enter into an agreement whose scope would be limited to the filling of the Revelstoke Reservoir. This "fill agreement" would specify the terms and conditions under which Revelstoke would fill. Such an agreement would be structured to compensate BPA and Mid-Columbia participants for the loss of energy. This would involve delivering to BPA electric energy generated by B.C. Hydro to mitigate the effects of a reduced flow during filling. Such an agreement would not provide BPA with long-term rights to store water in Canadian reservoirs, an essential feature that distinguishes the proposed agreement from the fill agreement.

In this assessment we have assumed that, under the fill agreement alternative, BPA would continue to enter into ad hoc short-term agreements with B.C. Hydro for storage in Treaty space in Mica and for storage in other non-Treaty

space. BPA would also seek other agreements for filling new Canadian reservoirs. Compensation for past filling of Seven Mile Reservoir could be included or addressed independently.

2.3 ALTERNATIVE: PROPOSED AGREEMENT

The proposal is to enter into two related agreements. One, with B.C. Hydro, is the principal agreement addressed by this EA, and the one which results in changes in hydroelectric operations. The second agreement, with the Mid-Columbia purchasers, provides protection for these purchasers from the potential operational consequences of the B.C. Hydro agreement. Without concurrence of the Mid-Columbia purchasers, the agreement with B.C. Hydro could not be implemented.

2.3.1 Proposed BPA-B.C. Hydro Agreement

The following discussion summarizes the major provisions of the contract with B.C. Hydro. In general, the contract provides reciprocal, equal rights and obligations for BPA and B.C. Hydro. See Appendix C for a copy of the proposed agreement.

2.3.1.1 Initial Fill of Revelstoke Reservoir

The actual filling of Revelstoke Reservoir will occur with water presently stored in the Mica non-Treaty space. The refilling of the space then created in Mica is the subject of this provision. In the proposed agreement, BPA and B.C. Hydro share equally the obligation to fill Revelstoke Reservoir. The

initial filling will be divided in two portions. Inactive storage of 2.3 MAF makes up the first portion. The second portion is 2.0 MAF of active storage. Each party has an obligation to fill one-half of each portion. Inactive storage must be filled by the October 1 which is at least 1-1/2 years after the inactive space has been declared available. ACTIVE STORAGE may be filled at any time during the term of the agreement with surplus water.

Part of the 2.3 MAF obligation has already been fulfilled by the amount of water stored under the short-term storage agreement, Contract No. DE-MS79-83BP91290. This amounts to 0.43 MAF and reduces the remaining obligation to 1.87 MAF. BPA will fulfill its obligation to fill Revelstoke by requesting that B.C. Hydro reduce the flow out of Canada and storing the water in Revelstoke. No energy will be scheduled either direction. BPA will suffer the loss of energy production at all projects in the U.S. and B.C. Hydro will suffer the loss of energy production at all Canadian projects. B.C. Hydro will fulfill its obligation by reducing flow out of Canada and storing the water in Revelstoke and by delivering energy to BPA to compensate for the lost energy production at U.S. projects. BPA will then compensate each Mid-Columbia purchaser based on their share of Mid-Columbia generation.

This operation will fill Revelstoke Reservoir as desired by B.C. Hydro. BPA will be compensated for loss of energy associated with B.C. Hydro's obligation to fill Revelstoke. When B.C. Hydro commits stored water to inactive storage under this agreement, BPA will grant a release and discharge from any claims due to filling Revelstoke.

2.3.1.2 Guaranteed Use of Active Storage Space.

In return for BPA taking on the obligation to fill one-half of the Revelstoke Reservoir, B.C. Hydro has made 2.0 MAF of storage available for use during the term of the agreement. BPA and B.C. Hydro will each have the right to store in 1.0 MAF. Either party may store more than 1.0 MAF if the space is not full, but the amount of water stored in excess of 1.0 MAF is subject to being forced out (if the other party wishes to store into that space) or purchased by the other party. It is intended that the parties leave the 2.0 MAF full at the end of the ten-year term of this agreement. However, in the event either party is unable to do this, those provisions of this agreement necessary to continue storing in this space will be extended for up to 7 years. At the end of the 7 years, BPA and B.C. Hydro must leave the 2.0 MAF full. During any extension, BPA will deliver energy to B.C. Hydro in amounts equal to B.C. Hydro's reduction in energy production at Mica due to reduced head resulting from BPA's fill deficiency.

Active storage space will be initially filled in the same manner as inactive storage space. After a party has stored water in active space, that party may release the water and receive the generation produced at all projects (in both Canada and the U.S.) downstream from the storage reservoir. When that party refills that space they must compensate the other party for the loss of energy suffered by the other party.

The proposed agreement will give B.C. Hydro assurance that the inactive storage space created by the filling of Revelstoke will be full when the agreement expires. It will give BPA the assurance of use of 1.0 MAF for the term of the agreement.

2.3.1.3 Use of Treaty Storage Space.

Treaty space in Mica is available at any time the Mica reservoir is below its maximum flood control elevation. Each party has the right to store in one-half of the available space. If the space is not full, a party may store in more than one-half of the space. That water above one-half of the available space is subject to being forced out by the other party if that party wishes to fill the storage space.

B.C. Hydro may also store in Treaty space in Arrow. BPA does not require a similar right because it can store in Treaty space in Arrow up to its maximum flood control elevation under provisions cf the Treaty.

Treaty space is filled in the same manner as the refilling of active storage space. When a party stores water in Treaty space, it must compensate the other party for lost energy. When the water is released, the releasing party receives the energy generated at all generating projects (in both Canada and the U.S.) downstream from the storage reservoir.

This provision allows BPA and B.C. Hydro flexibility to fill Treaty space which they presently do not have. BPA will use this capability to (1) improve the probability of refilling Mica Reservoir in years that inability to refill Mica will impact the ability of the Coordinated System to adopt the first year FIRM ENERGY LOAD CARRYING CAPABILITY and (2) store unusable surplus water in the spring and summer.

Using the ability to store in Treaty space in Mica Reservoir will increase the probability of filling it (and other Canadian reservoirs covered by the agreement) especially during average water years. (In low water years, there would be little energy to store, and in very good water years, the probability of refill is already high.)

2.3.1.4 Use of Additional Non-Treaty Space

B.C. Hydro may make additional non-Treaty storage space available from time to time. This space will be shared equally between the parties. Storage of water in more than one-half of the space is allowed but water in excess of one-half the space is subject to displacement or purchase by the other party.

Storage in this space will require that the storing party compensate the other party for the loss of energy. When a party releases water from this space, it will receive all of the energy generated at all projects (in both Canada and the U.S.) downstream from the storage reservoir.

This provision puts into a long-term agreement the mechanism for use of storage space that becomes available from time to time. These actions have been handled on an ad hoc basis in the past.

2.3.1.5 Initial Fill of Other Non-Treaty Space

The filling of the additional space in Seven Mile and Murphy Creek Reservoirs will be handled under this agreement if the space becomes available for filling within the term of the agreement. The parties will share the

obligation to fill these spaces equally. There will be a fixed period of time in which these spaces must be filled. This space will be filled in the manner described in the Initial Fill of Revelstoke Reservoir, section 2.3.1.6.

In addition, since Seven Mile has already been filled to elevation 1715, B.C. Hydro will release an amount of water from non-Treaty storage space in Mica equal to that which was stored in Seven Mile to compensate for losses suffered at downstream U.S. projects. BPA will release and discharge B.C. Hydro from any claims on space filled under the terms of this agreement.

B.C. Hydro will benefit by securing rights to fill these reservoirs under this provision.

2.3.2 Proposed Agreement with Mid-Columbia Purchasers

The agreement between BPA and the purchasers of power from the five non-Federal projects on the mid-Columbia (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) is a contract (see Appendix D) to account for the participation of each purchaser in the storage of water, return of water, payment of storage fees, and disbursement of generating fees. The purchasers are not permitted to store this water in Canada independently from BPA. However, when BPA chooses to store, each purchaser may elect to participate in such storage. Each purchaser is then credited for the amount stored. Those electing not to participate in such storage will receive energy to compensate for losses from the reduction in flow resulting from BPA's storing in Canada.

When the stored water is returned, those who elected to participate receive their share of the resulting energy and pay any associated fee. Those who elected not to participate must deliver to BPA all additional energy which can be produced at their project resulting from the return of stored water.

Chapter 3

IMPACTS OF THE PROPOSAL AND ALTERNATIVES

This chapter will examine the physical changes caused by system operations changes which may result in changes in power production and marketing and changes in the environment. This is done by contrasting the proposed and no action alternatives against existing system conditions. The physical changes resulting from the fill agreement have not been evaluated. This results in large measure from a lack of sufficient detail concerning this alternative. While the general conditions surrounding the fill agreement have been specified (Section 2.2), the details have not been. As has occurred under the proposed agreement, the details of the fill agreement could only have been developed through negotiation between BPA and B.C. Hydro. To make assumptions about the details of the fill agreement and use these assumptions as the basis for system modeling studies would have resulted in extremely speculative definition of the location, magnitude, and timing of changes in system operations. For this reason the studies have not been done.

In place of the studies, a general assessment of the changes which would result from the fill agreement has been made. The outcome of this assessment will be contrasted with the proposed agreement in the following discussion. The physical changes which would result from implementation of a fill agreement will, in some cases, be like those occurring under the no action alternative. In the remaining cases, the physical changes of implementing the filling agreement are like those occurring under the proposed agreement.

The following sections identify physical changes resulting from examination of each activity occurring under the proposed agreement. The effects on power production and marketing as well as the effects on the environment which result from these physical changes are evaluated. The primary environmental concerns addressed are those related to fish and wildlife, although minor beneficial effects on water quality are occassionaly mentioned. The following impact discussion analyzes each of the operational aspects explained in Chapter 2.

3.1 REVELSTOKE INITIAL FILL

3.1.1 Changes in System Operation

The actual filling of Revelstoke Reservoir will occur by moving water presently stored in the non-Treaty space of Mica Reservoir into Revelstoke Reservoir. The refilling of the space then created in Mica is the subject of this section. Refilling of Mica Reservoir will withhold 4.3 MAF of water from the volume which enters the United States from the mainstem Columbia River. Under the short-term contract between BPA and B.C. Hydro, 0.43 MAF has already stored in Mica and Arrow. This reduces the volume withheld under the proposed agreement to 3.87 MAF. This volume can be stored over varying periods of time.

Under the no action alternative the water would be withheld between October 1983 and June or July of 1984. The exact length of this period varies with streamflow condition. Average daily flow over the period would be reduced by 6-7 kcfs. The reduction would be greatest during June when average daily flow would be reduced by 25 cfs. Reduction during May would average 13.5 kcfs.

Flow reductions would not necessarily be passed through the mainstem Columbia River. In dry years, operators and regulators of U.S. reservoirs would need to draft their project to meet firm requirements such as the WATER BUDGET. Analysis of the physical changes associated with this draft was not possible. The timing and location of such draft would vary greatly from year to year to such an extent as to make specific analysis meaningless.

As compared to the no action alternative, the proposed action would result in BPA obtaining greater flexibility in the timing and extent of flow reductions. Under the proposed agreement the first 2.3 MAF of Mica refill storage would be removed between October 1, 1983, and October 1, 1985, assuming that all inactive space is declared available on October 1, 1984. Depending on conditions of load and streamflow, storage could occur in as little as 2 months or could be extended to as much as 18 months.

If very high fall streamflows, similar to that which occurred in 1933-34, were to occur in 1983, all storage could be withheld between October and December. This would result in a daily average flow reduction of 12.6 kcfs.

Under average water conditions, similar to those which occurred in 1948-49, storage could occur in January and February. This would reduce daily average flows by 19.3 kcfs.

Under very dry conditions, like those which occurred in 1928-29 through 1930-31, storage would be filled over an extended period of time. Storage would begin in January 1985 and be complete by September 30, 1985. Water would be stored in every month excepting the last half of April and the month of May. Average flow during periods of storage would be reduced by 5.1 kcfs.

The remaining 2.0 MAF would be filled beginning as soon as the 2.3 MAF has been stored. The initial filling of this 2.0 MAF could take as little as 1 month or as long as 45 months.

The time period varies to this extent since the 2.0 MAF of space will only be filled with surplus water, that is water which cannot be used to generate salable energy or to meet project constraints or firm nonpower commitments. After the initial filling of the space it will be used as guaranteed active storage. (See section 3.2.1). The physical changes of this filling will be very similar to those occurring under the refilling of guaranteed active storage (Section 3.2.1).

Physical impacts to the hydro system under the fill agreement would have been similar to the impacts created by the proposed agreement.

3.1.2 Effects on Power Production and Marketing

The filling of Revelstoke Reservoir under the no action alternative would have required Northwest utilities to reduce the Firm Energy Load Carrying Capability of the Coordinated System by 4.5 billion kWh in the critical period which began September 1, 1983. BPA's loss of Firm Energy Load Carrying Capability would amount to 3.1 billion kWh. This loss of Firm Energy Load Carrying Capability would result in a reduction in the amount of firm surplus available for sale by BPA.

The initial filling of Revelstoke under the proposed agreement will reduce the Firm Energy Load Carrying Capability of the Coordinated System by 1.0 billion kWh, of which 0.7 billion kWh is suffered by BPA. This will result in a reduction in the amount of firm surplus available for sale by BPA.

3.1.3 Environmental Effects

None of the flow reductions asscciated with any of the alternatives would significantly impact downstream migrant anadromous salmonoids. During the fall and winter, migratory activity is at a minimum. The Water Budget provides adequate protection for spring migrants from the effects of flow reductions (BPA, 1983). Preliminary results of current studies indicate that summer migrant juvenile salmonoids are not affected by reductions in flow. (Sims, 1982)

Reductions in flow may also reduce spill. At projects with inadequate bypass facilities such spill is needed to prevent migrating juvenile salmonoids from suffering significant turbine-related mortality. Each of the alternatives has the potential to substantially reduce spill. The Northwest Power Planning Council's Fish and Wildlife Program (Section 404(a) and (b)) requires operators of hydroelectric projects without effective bypass systems to provide spill which will achieve a level of smolt survival comparable to or better than that achievable by the best available bypass system. Under the proposed agreement, BPA will mitigate the potential for significant spill reductions by incorporating such spill programs into power planning and operations and will do nothing as a result of the proposed agreement which could hinder provision of fish passage spill provided for under the annual

spill program developed in accord with Section 404(a) and (b) of the Council's Fish and Wildlife Program. Therefore, no significant effects on juvenile downstream migrant anadromous salmonoids should be caused by spill reduction resulting from the proposed alternative.

Changes in flow and spill have not been associated with impacts to resident fish or wildlife populations of the mainstem Columbia River.

Changes in reservoir elevations associated with the no action alternative have the potential to effect resident fish and wildlife populations. Without further definition, through court action, of the types of changes which might be expected, analysis of these impacts is impossible.

No change in reservoir elevations has been associated with the proposed agreement in association with the initial fill of Revelstoke Reservoir.

3.2 GUARANTEED USE OF ACTIVE STORAGE SPACE

3.2.1 Changes in System Operation

Mica Reservoir's non-Treaty storage space is, at the present time, filled and essentially inactive. This space is kept full by B.C. Hydro and has not been made available to BPA. B.C. Hydro will use a portion of its Mica non-Treaty storage to fill Revelstoke Reservoir. This will leave Mica Reservoir 4.3 MAF below full of which 2.3 MAf will be filled permanently as described in Section 3.1.1. The consequent use of the remaining space is the topic to be discussed in this section.

Under the no action alternative, B.C. Hydro will refill the space as discussed under Revelstoke Initial Fill (Section 3.1.1). After this fill the space would remain full and inaccessible to BPA. This would result in no physical changes other than those addressed under Revelstoke Initial fill. Since the fill agreement does not provide for use of non-Treaty storage space, the impact of the fill agreement will look like the no action alternative.

Under the proposed agreement, 2.0 MAF of the vacated space will remain in use, 1.0 MAF by BPA and 1.0 MAF by B.C. Hydro. The other 2.3 MAF will be filled and become inactive. The physical changes associated with the filling of this 2.3 MAF have been addressed under Revelstoke Initial Fill (Section 3.1.1).

The 2.0 MAF of storage which will remain in use over the life of the agreement has been termed active storage space. Active storage space will be filled at times when surplus water is available and used largely to generate nonfirm energy. In times of adverse water this storage could also be used to generate firm energy or to meet firm nonpower obligations.

Analysis of how the storage space could be used by both parties indicates that storage may take place at any time of the year. Release of storage likewise may occur at any time. Flow reduction is most likely to occur between November and February and May through June. Flow reductions during times of storage on the mainstem Columbia at the U.S. border average 11.6 kcfs for the November-February period and 10.8 kcfs for the May-June period. During June, the month when flow reductions are greatest, daily average flows may be reduced by as much as 27.6 kcfs or as little as 1.7 kcfs depending on the water year. Releases of storage will primarily increase flows between July

and September. Average flow increases during periods of release are 19.4 kcfs. During July, the month when releases are greatest, daily average flows may change, depending on the water year, by as much as 32.5 kcfs or as little as 1.6 kcfs.

3.2.2 Effects on Power Production and Marketing

The primary purpose of this contract provision is to improve the parties' ability to generate and market nonfirm energy. Under the terms of the proposed agreement, water will be stored when some portion of the 2.0 MAF is available, at times when it would otherwise be spilled. This reduces the amount of unmarketable energy. At a time when secondary markets become available, the previously stored water will be released and the resulting energy will be sold.

3.2.3 Environmental Effects

No significant adverse impacts associated with changes in flow have been identified. The discussion associated with Revelstoke Initial Fill (Section 3.1.3.1) is applicable to this topic as well. Two potential beneficial effects have been identified. The ability to reduce spring flows in years of high runoff could assist in reducing dissolved gas supersaturation on the mainstem Columbia River. Supersaturation often causes substantial mortality in both anadromous and resident fishes. The storage may also be of benefit in years when a wet fall is followed by a dry spring. In these cases, water

saved in the fall could be used to meet firm commitments, including nonpower commitments such as the Water Budget. Although the effects produced in these situations are positive, the magnitude of change is relatively minor owing to the volume of storage involved.

No alterations in reservoir levels in the U.S. are associated with any of the alternatives.

3.3 USE OF TREATY STORAGE SPACE

3.3.1 Changes in System Operations

Under the no action alternative BPA would not seek agreements with B.C. Hydro in years when access to Mica Treaty storage would be beneficial. Therefore, there would be no effect on river operations.

Under the proposed agreement, storage would be placed in Mica Reservoir in slightly submedian water years to enhance refill at Mica. These water conditions occur in approximately 10 percent of all water years. Under these conditions, flows on the mainstem Columbia River would be reduced starting as early as February and continuing until as late as the end of July. In 1978, a year when BPA obtained agreement to use Mica Treaty space, flows were reduced between April 27 and July 14. The average flow reduction was 6.5 kcfs with maximum hourly flow reductions during June of 25.0 kcfs. This water was then released from July 17 to August 24 of that same year. The resultant average flow increase was 13.1 kcfs with maximum hourly flow increases during August of 30 kcfs. This use of Mica storage to enhance project refill is a typical example.

The other potential use of this storage would be to redistribute runoff within any given spring and summer. This operation would be used in high volume runoff years which occur about 1 year in every 4. Storage could begin as early as February and continue into July. This storage, unless removed, would be forced out by July 31 when Mica refilled. Due to the short period of availability of this storage its primary use would be to provide for nonpower system considerations and short-term power marketing strategies. Storage and removal would likely occur within a short period, for example, 1 month. It is very difficult to estimate the potential for flow reduction or augmentation, since there has been no past use of storage in this manner. A best approximation of the flow reductions associated with this storage can be obtained from using the changes resulting from storage in Mica Traty space for refill enhancement; a maximum reduction of 25 kcfs.

With regard to the use of Mica Treaty storage space, the fill agreement will produce the same physical changes as the proposed alternative in years when agreement is reached. In years when there is no agreement, there will be no change in river operations, as in the no action alternative.

3.3.2 Effects on Power Production and Marketing

Use of Mica Treaty storage space to enhance the filling of Mica will result in a redistribution of generation. During the period February 1 to July 31 generation and nonfirm sales will be reduced to aid in filling. After July 31 the storage will be released resulting in an increase in generation and potentially if the increased flows are not spilled, increasing nonfirm sales.

If Mica Treaty storage space is used to store surplus water, a portion of the surplus water will be stored through reduced flows. Another portion of the surplus water will be used to generate energy to deliver to B.C. Hydro. There is a chance that this stored energy will become usable for sales of nonfirm energy.

3.3.3 Environmental Effects

The discussion of flow-related impacts associated with Revelstoke Initial Fill is applicable to this provision as well. Use of Mica Treaty space to provide for nonpower considerations can have a beneficial effect on resident and anadromous fish. Water can be stored during periods of high dissolved gas supersaturation, thus reducing those levels (See section 3.2.3.1).

No changes in reservoir levels in the U.S. are predicted for any of the alternatives.

3.4 USE OF ADDITIONAL NON-TREATY SPACE

3.4.1 Changes in System Operations

The no action alternative would not result in use of additional non-Treaty storage and therefore would not change physical conditions.

The proposed agreement would result in use of storage when it is made available by B.C. Hydro. At the present time there is no way to assess the exact amount, location, timing, or duration of such storage. Potential

effects can, however, be evaluated through evaluation of how this storage has occurred in the past. Examples of such storage occurred in 1980 and 1981 when access was obtained to .26 MAF of storage in Arrow reservoir. In 1981, storage was used in August when flow was reduced by an average of 22 kcfs over a 6-day period to fill the storage. The flow reduction ranged from 17 kcfs to 25 kcfs. Under the condition of that agreement one-half the storage belonged to B.C. Hydro. They released their storage in September, raising flows by an average of 5 kcfs over a 14-day period. BPA released its half of the storage in December again raising flows by 5 kcfs over 14 days. Storage and release in 1980 was very similar to that which occurred in 1981.

Under the fill alternative, physical effects would be the same as under the no action alternative in years without an agreement, and the same as the proposed agreement in years when a short-term agreement was reached for use of additional space.

3.4.2 Effects on Power Production and Marketing

The impact of this contract provision on power production and marketing for each of the three alternatives will be the same. The impacts will be the same as those discussed in section 3.2.2.

3.4.3 Environmental Effects

The discussion under section 3.2.3.1 covers all potential effects on fish and wildlife.

3.5 INITIAL FILL OF OTHER NON-TREATY SPACE

3.5.1 Changes in System Operation

Under the no action alternative the water which B.C. Hydro initially stored in Seven Mile would not be released; therefore, there would be no physical changes. The proposed agreement allows BPA tc request the release of the 0.07 MAF any time between September 1, 1983, and March 31, 1985. The impact of this release will be an increase of flows of 2-3 kcfs if released over a 2-week period.

Filling Seven Mile from elevation 1715 feet to 1730 feet will require 0.02 MAF. The reduction in flows caused by this filling would be insignificant. Murphy Creek filling will require approximately 0.1 MAF. Fillng this space over a 2-month period would result in a flow reduction of 0.8 kcfs. These impoundments are extremely small and as a result the physical changes resulting from fill will be insignificant regardless of which alternative is considered.

Under the fill agreement, physical effects would be the same as under the no action alternative in the absence of an agreement, and the same as the proposed agreement if there was an agreement.

3.5.2 Effects on Power Production and Marketing

Release of the water associated with the initial filling of Seven Mile will result in increased generation at U.S. projects on the mainstem Columbia River. This increase of approximately 70,000 MWh will be sold as nonfirm energy.

The effects of filling other non-Treaty reservoirs will be of the same type as those discussed in Initial Fill of Revelstoke Reservoir but of a much smaller magnitude. The amount of storage which will be filled in Seven Mile and Murphy Creek is between 30 and 60 ksfd (0.06 MAF and 0.11 MAF).

Under the no action alternative these reservoirs would be filled by B.C. Hydro with no compensation to downstream U.S. power interests. This would result in a loss of Firm Energy Load Carrying Capability of up to 125,000 MWh, 14.3 average MW over a 12-month period, for the Coordinated System. BPA's share of this loss would be 9.9 average MW over a 12-month period.

Under the proposed agreement, the impact of BPA sharing in the filling of these two reservoirs would be minimal.

3.5.3 Environmental Effects

Flow reductions and augmentation associated with the initial fill of other non-Treaty space are minimal. These changes in flow will be so minor as to have no likelihood of producing measurable impact to fish or wildlife populations.

Chapter 4

OTHER CONSIDERATIONS

In addition to their responsibilities under NEPA, Federal agencies are required to carry out the provisions of other Federal environmental laws. Most of the Federal actions related to the proposed agreement discussed in this EA do not require any particular response with regard to the resources addressed in these other Federal laws because the requirements are more concerned with specific proposals for development, and not actions such as that proposed which will merely enable different operation of existing facilities on a discretionary basis. Also, part of the effect of the proposed action will occur in Canada where these laws are not applicable.

Other Federal laws and requirements which will not be affected by the proposed agreements with B.C. Hydro and the Mid-Columbia purchasers but which were considered during preparation of the EA include OMB Circular No. A-95 Review, the Coastal Zone Management Act of 1972, the Endangered Species Act of 1973, Heritage Conservation requirements, laws or requirements to protect farmlands from conversion to other uses, permits for structures in navigable waters, permits for discharge into waters of the U.S., and permits for right-of-way on public land. Any changes due to BPA signing the proposed agreements would be minor and within the existing operational constraints for dams and reservoirs in the U.S. operation of the Columbia River basin.

4.1 FISH AND WILDLIFE LAWS

There are several key Fish and Wildlife Laws that may relate to BPA actions:

- The Fish and Wildlife Coordination Act.

- The Fish and Wildlife Conservation Act.

- The fish and wildlife provisions of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act).

- U.S. Fish and Wildlife Service Mitigation Policy.

The Water Budget Managers for state and Federal agencies and for the Columbia Basin Tribes have been consulted informally during preparation of this EA. The Water Budget Managers for state and Federal agencies represent the United States Fish and Wildlife Service and National Marine Fisheries Service in matters relating to downstream migration of anadromous salmonids. To accomplish the consultation required by these laws, the Water Budget Managers, Pacific Northwest Power Planning Council, Federal and State fish and wildlife agencies and tribes will have the opportunity to comment on this EA, and BPA will take their concerns under consideration before a decision is made to implement the anticipated action. A description of the proposed agreements with B.C. Hydro and the Mid-Columbia purchasers was given at a March 22, 1983, Fish and Wildlife Consultation meeting at BPA.

4.2 FLOODPLAINS AND WETLANDS

Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands, establishes a national policy to protect wetlands and floodplains and requires that Federal agencies avoid, to the extent possible, long- and short-term impacts associated with occupancy and modification of floodplains and destruction or modification of wetlands.

The proposed action in this EA is both a wetland and floodplain action since it related to management of Federal dams and reservoirs in floodplains and that management may affect wetlands adjacent to and connected to the Columbia River and its tributaries. Since operation of the rivers will continue within parameters set for flood control constraints, signing of the proposed agreement will not adversely affect floodplains. Wetlands adjacent to the Columbia River and its tributaries may be affected during moderate water years if downstream reservoirs are lowered in order to store energy in Mica and other Canadian reservoirs. However, such impacts will be within the limits of what may occur at times during normal operations of the reservoirs even in the absence of the agreement.

4.3 POLLUTION CONTROL AT FEDERAL FACILITIES

The proposal does not require procurement of goods, services, or materials, so the contract compliance provisions of the Clean Air Act, Clean Water Act, and other environmental laws do not apply. The proposed agreements with B.C. Hydro for storage will not alter the current status of any electrical generating resource with respect to compliance with environmental regulations

governing air pollution, water pollution, solid waste transport and disposal, hazardous waste, drinking water standards, noise, pesticides, or polychlorinated biphenyls (PCB). Energy storage and energy recovery activities undertaken in accordance with the storage agreements may affect operations of certain resources at times, but resources would not be operated in such a manner as to violate currently applicable standards or permit conditions, nor would resources be operated to exceed a level of enviromental impact that would not occur at least some time during normal operations in absence of the agreements.

4.4 ENERGY CONSERVATION AT FEDERAL FACILITIES

The proposal involves operation of Federal facilities in that at times of storage of energy in the Canadian reservoirs and recovery of such storage, operation of Federal power resources and the BPA transmission system will be altered accordingly. The agreement will result in transmission losses, head losses, and varying efficiencies of resources, but energy may actually be gained in an absolute sense as a consequence of storage of unusable water and subsequent realease when it is salable.

Chapter 5

LIST OF AGENCIES AND PERSONS CONSULTED

As Chapters 1 and 4 indicate, there was little consultation required to comply with environmental laws other than NEPA because of the nature of the proposal, the environment which would be affected by the proposal, and the degree and nature of environmental impacts within the United States projected. The U.S. Army Corps of Engineers and the Mid-Columbia purchasers were involved during contract negotiations. In addition, the Water Budget Managers for state and Federal agencies and for the Columbia Basin Tribes, have been consulted informally during preparation of this EA. The Water Budget Manager for state and Federal agencies represents the United States Fish and Wildlife Service and National Marine Fisheries Service in matters relating to downstream migration of anadromous salmonids.

A description of the proposed agreements with B.C. Hydro and the Mid-Columbia purchasers was presented during a Fish and Wildlife Consultation meeting on March 22, 1983. Representatives of many organizations listed below attended that meeting (an asterisk indicates those agencies which were represented). In addition, a summary of the meeting discussion was distributed on May 20, 1983.

This EA will be furnished to the following Federal, State, Tribal, public interest, environmental, and other types of organizations, and selected individuals for formal review and comment. In addition, others will be notified of the availability of this EA, and will be able to request copies for review and make comments if they want.

Federal Agencies

* Water Budget Manager for State and Federal Agencies
  Rural Electrification Administration, Washington, D.C.
* US Corps of Engineers, Portland, Oregon
  US Corps of Engineers, Seattle, Washington
  US Corps of Engineers, Walla Walla, Washington
* USDA, Forest Service, Portland, Oregon
  US National Park Service, Pacific NW Region, Seattle, Washington
* USDOC, National Marine Fisheries Service, Seattle, Washington
  USDOE, Federal Energy Regulatory Commission, San Francisco, California
  USDOE, Federal Energy Regulatory Commission, Washington, D.C.
  USDOI, Bureau of Indian Affairs, Nespelem, Washington
* USDOI, Bureau of Indian Affairs Regional Office, Portland, Oregon
  USDOI, Bureau of Indian Affairs, Toppenish, Washington
  USDOI, Bureau of Land Management, Portland, Oregon
* USDOI, Bureau of Reclamation, Boise, Idaho
* USDOI, Fish and Wildlife Service, Portland, Oregon
  USDOJ, US Attorneys Office, Portland, Oregon

State Agencies

  State of Idaho, Department of Fish and Game, Boise, Idaho
* State of Oregon, Department of Fish and Wildlife, Portland, Oregon
  State of Oregon, Intergovernmental Relations Division, Salem, Oregon
  State of Washington, Department of Ecology, Olympia, Washington
  State of Washington, Department of Fisheries, Olympia, Washington

* State of Washington, Department of Game, Olympia, Washington

State of Washington, Department of Game, Wenatchee, Washington

State of Washington, Energy Office, Olympia, Washington

State of Washington, Office of Archaeology & Historic Preservation Olympia, Washington

State of Washington, Office of Financial Management, Olympia, Washington

State of Washington, Parks and Recreation Commission, Olympia, Washington

State of Washington, Planning and Community Affairs, Olympia, Washington

Tribes

* Water Budget Manager for the Columbia Basin Tribes

Affiliated Tribes of Northwest Indians, Tacoma, Washington

* Columbia River Inter-Tribal Fish Commission, Portland, Oregon

Colville Business Council, Nespelem, Washington

* Kalispel Business Committee, Usk, Washington

Kootenai Tribal Council, Bonners Ferry, Idaho

* Spokane Business Council, Wellpinit, Washington

Interest Groups

* Columbia Basin Fish and Wildlife Council, Portland, Oregon

Columbia River Citizens Compact, Hillsboro, Oregon

Forelaws on Board, Boring, Oregon

Friends of the Earth, Seattle, Washington

Izaak Walton League, Portland, Oregon

National Audubon Society, Sacramento, California

National Wildlife Federation, Portland, Oregon

Natural Resources Defense Center, San Francisco, California

Northwest Environmental Defense Center, Portland, Oregon

Northwest Indian Fisheries Commission, Olympia, Washington

Northwest Steelhead and Salmon Council, Olympia, Washington

Oregon Environmental Council, Portland, Oregon

Oregon Wildlife Federation, Eugene, Oregon

Pacific Marine Fisheries Council, Portland, Oregon

Trout Unlimited, East Wenatchee, Washington

Washington Environmental Council, Seattle, Washington

Customers/Others

ASWSU, Environmental Task Force, Pullman, Washington

Benton-Franklin Governmental Conference, Richland, Washington

British Columbia Hydro and Power Authority, Vancouver, British Columbia, Canada

* Chelan County PUD #1, Wenatchee, Washington

Colockum Transmission Company, Inc., Wenatchee, Washington

Cowlitz County PUD #1, Longview, Washington

* Direct Service Industries, Portland, Oregon

Douglas County PUD #1, East Wenatchee, Washington

* Eugene Water and Electric Board, Eugene, Oregon

City of Forest Grove, Forest Grove, Oregon

* Grant County PUD #2, Ephrata, Washington

Kittitas County PUD #1, Ellensburg, Washington

City of McMinnville, McMinnville, Oregon

City of Milton-Freewater, Milton-Freewater, Oregon

Okanogan County PUD #1, Okanogan, Washington

Oregon State University, Corvallis, Oregon

* Pacific Northwest Utilities Conference Committee, Portland, Oregon

* Pacific Northwest Power Planning Council, Portland, Oregon

* Pacific Power and Light Co., Portland, Oregon

* Portland General Electric Co., Portland, Oregon

* Public Power Council, Vancouver, Washington

Puget Sound Power and Light Co., Bellevue, Washington

* Seattle City Light, Seattle, Washington

Spokane Regional Planning Conference, Spokane, Washington

* Tacoma City Light, Tacoma, Washington

Trico Economic Development District, Colville Washington

West Kootenay Power and Light Co., Trail, Canada, British Columbia

University of Washington, Seattle, Washington

Washington State University, Pullman, Washington

The Washington Water Power Co., Spokane, Washington

Chapter 6

CONCLUSIONS

BPA has reviewed all aspects of the proposed agreements to resolve Revelstoke Reservoir filling issues and access reservoir storage space in Canada with B.C. Hydro and with the mid-Columbia project participants for compliance with legislative and executive mandates adopted to safeguard the integrity of the human environment. BPA has consulted with the Water Budget managers, various fish and wildlife agencies, and, through the contract negotiation process, the Corps, the Mid-Columbia project participants concerning the proposed agreements. These represent the principal interests affected by the agreements. Further consultation is being undertaken through distribution of this environmental assessment to agencies and the public for review and comment.

In review of the proposed agreements, BPA has not uncovered any unresolved conflicts over alternative uses of available resources. BPA has found that the nature and extent of the environmental consequences resulting from the agreements, which are primarily affects on reservoir levels, flows, and fish, are not significant. No extraordinary, controversial, unique, or hazardous circumstances or conditions will be created or furthered by these agreements.

Unless public and agency review of this assessment reveals information that impacts may be more significant than BPA's analysis projected, an environmental impact statement does not appear to be needed for the proposed agreements. Preparation of a Finding of No Significant Impact (FONSI) is recommended.

APPENDIX A

(To be added later.)

APPENDIX B

LIMITATIONS ON SCOPE OF ENVIRONMENTAL ASSESSMENT

The proposed agreements, the no action alternative, and the filling agreement alternative would each affect the environment in both Canada (particularly the Province of British Columbia) and the United States. The Department of Energy (DOE), pursuant to Executive Order 12114 of January 4, 1979, has issued guidelines (46 FR 1007-1011) for the scope of environmental analyses undertaken for proposals having effects abroad. Section 4 of these guidelines lists four categories of actions abroad for which environmental review is mandatory. These are as follows:

A. "4.1 Major Federal actions significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., the oceans or Antarctica)."

B. "4.2 Major Federal actions significantly affecting the environment of a foreign nation not participating with the United States and not otherwise involved in the action."

C. "4.3 Major Federal actions significantly affecting the environment of a foreign nation which provide to that nation:

(a) A product, or physical project producing a principal product or an emission or effluent, which is prohibited or strictly regulated by Federal law in the United States because its toxic effects on the environment create a serious public health risk (see Appendix A): or

(b) A physical project which in the United States is prohibited or stricly regulated by Federal law to protect the environment against radioactive substances."

D. "4.4 Major Federal actions outside the United States, its territories and possessions which significantly affect natural or ecological resources of global importance designated for protection by the President pursuant to section 2-3(d) of Executive Order 12114 or, in the case of such a resource protected by international agreements binding on the United States, by the Secretary of State."

The proposed agreement with (B.C. Hydro) will not impact the global commons, or natural or ecological resources of global importance to any identifiable degree, and it does not result in any toxic products or emissions. Therefore, subsections 4.1, 4.3, and 4.4 are inapplicable. With respect to subsection 4.2, B.C. Hydro is the "Entity," or appointed representative, of the Canadian Government for matters relating to the Columbia River Treaty, and is also a provincial Crown corporation with a Board of Directors appointed by the government of British Columbia. The agreement is conditional upon B.C. Hydro's obtaining necessary licenses from the Province of British Columbia and the Canadian government. Therefore, the foreign nation is participating in the action, and subsection 4.2 also appears to be inapplicable. Thus, environmental review of impacts abroad is not required in this case.

APPENDIX C
(TO ADDED LATER)

APPENDIX D
(TO BE ADDED LATER)

APPENDIX E
GLOSSARY

(TO BE ADDED LATER)

APPENDIX F
REFERENCES

(TO BE ADDED LATER)

RSeiffert:db:jls (WP-PGE-1770K)

EQ 4-2-10

~~JUL 28 1983~~ JUL 28 1983

PGC

Anthony R. Morrell, Environmental Manager
Office of Management Services - SJ

(Sgd.) JOHN B. PYRCH

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Transmittal of Preliminary Draft Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues

Please find attached for your transmittal to DOE three copies of the preliminary draft EA for BPA's Proposed Agreements to Resolve Revelstroke Reservoir Filling Issues and Access Reservoir Storage Space in Canada. The EA has been preliminarily reviewed by contributing staff and will be circulated for BPA review concurrently with DOE's review. Upon receipt of DOE and internal comments, we will revise the document for formal DOE approval.

Since Mr. Kleinrock will be on vacation from August 1-12, we would appreciate it if you would ask DOE to see that review of the EA is not delayed until Kleinrock's return. To maintain our tight schedule we will need to formally transmit the EA to DOE for their approval by no later than August 15, 1983. Therefore, we would like to have DOE's comments by no later than August 10. If you have any questions, please contact me or Randy Seiffert at extension 4261.

Attachment

SPrice:ay (WP-PGC-2159K)

cc: (w/o attachment)
P. Michie - APG
J. McLennan - PG
R. Seiffert - PGC
J. Palensky - PJ
L. Dean - PS
D. Faulkner - PS
Official File - PGC

JUL 2 8 1983

PGC

Addressees

(Sgd.) JOHN B. PYRCH

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

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There may be extraneous material in this draft, but we were unsure of what material will be helpful to the lay reader in understanding the actions proposed, and what material is, indeed, excess. Therefore, in addition to your substantive comments, I request your suggestions on what material you believe should be omitted or condensed.

If you have any questions, please call me or Randy Seiffert at extension 4261.

Attachment

Addresses:
J. Luce/O. Schmidt - AP
P. Michie - APG
J. McLennan - PG
J. Piccininni - PGC
J. Palensky/S. Smith - PJ
M. Knapp - PJS
D. Harper - PJS
E. Bleifuss - PKI
G. Fuqua - PR
L. Dean - PS
D. Faulkner - PS
A. Morrell - SJ

SPrice:ay (WP-PGC-2159K)

cc: (w/attachment)
R. Seiffert - PGC
S. Price - PGC

cc: (w/o attachment)
T. Noguchi - PK
Official File - PGC

PY-10 J Piccinini 9/7/83

September 8, 1983

PGC

Anthony R. Morrell, Environmental Manager - SJ

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

Transmittal of Draft Environmental Assessment (EA) on Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in Canada

Attached is one copy of the EA on Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in Canada, prepared by the Office of Power and Resources Management, for your office to transmit to DOE for preliminary review. This EA will concurrently be reviewed internally.

Please expedite transmittal of this EA as we are faced with a contract offer deadline of October 5, 1983. Our previous EA preparation schedule has slipped a bit but we still plan on publishing and distributing the EA in mid-September.

Attachment

SPrice:sp (WP-PGE-2302K)

cc:
P. Michie - APP
J. McLennan - PG
J. Piccininni - PGC
D. Harper - PJI
T. Noguchi - PK
C. Combs - PKI
L. Dean/D. Faulkner - PS
Official File - PGC

Bonneville Power Administration
U.S. Department of Energy

EQ2 4 -510

BPA

DATE : SEP 0 8 1983

In reply refer to : PGC

UNITED STATES GOVERNMENT

Memorandum

TO : Addressees listed below

FROM : John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

SUBJECT: Draft Environmental Assessment (EA) on Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in Canada

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Attachment

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R. Seiffert - PGC
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D. Harper - PJI
E. Bleifuss - PKI
C. Combs - PKI
B. MacKay - PRCA
D. Faulkner - PS
N. Stas - SJ
Official File - PGC

EA: 7-2-10

SEP 0 8 1983

PGC

Addressees listed below

John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

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Official File - PGC

DOE F 1325.8
(7-79)

EQ4 2-10

U.S. DEPARTMENT OF ENERGY

memorandum

DATE September 8, 1983

REPLY TO ATTN OF BPA-SJ

SUBJECT Advance Review of Environmental Assessment on the Proposed Agreement to Resolve Revelstoke Reservoir Filling Issues and Access Reservoir Storage Space in Canada

TO Michael Kleinrock, Compliance Policy Division, EP-361
Stanley Echols, Office of General Counsel, GC-34

Copies of the subject document are attached for your review. Following your review, we will submit the document for official approval of the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness. We would appreciate receiving your comments as soon as possible. You may telephone your comments directly to Nick Stas of my staff at FTS 429-4721.

Anthony R. Morrell
Anthony R. Morrell
Environmental Manager
Bonneville Power Administration

Attachment

BPA:NStas:jh:633-8330:09/01/83 (WP-SJ-23330)

cc: (w/o attachments)
BPA-AC (2)
J. Picinnini - PGC
J. Pyrch - PGC
R. Seiffert - PGC
Official File - SJ

Bonneville Power Administration
U.S. Department of Energy

8 4-2-10

BPA

DATE : JUL 28 1983

In reply refer to : PGC

UNITED STATES GOVERNMENT

Memorandum

TO : Addressees

FROM : John B. Pyrch, Environmental Coordinator
Office of Power and Resources Management - PGC

SUBJECT: Review of Environmental Assessment (EA) on the Proposed Agreements to Resolve Revelstoke Reservoir Filling Issues

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SPrice:ay (WP-PGC-2159K)

cc: (w/attachment)
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S. Price - PGC

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T. Noguchi - PK
Official File - PGC

file
EA 8-2-4

Environmental Assessment
on
PROPOSED AGREEMENTS TO USE RESERVOIR
STORAGE SPACE IN CANADA

Outline

Summary

Chapter 1 - INTRODUCTION

1.1 Existing Situation (Base Case)

1.2 Purpose and Need for Proposed Actions

1.3 Additional Background Information

1.3.1 Legal Issues
1.3.2 System Operational Issues
1.3.3 Power Marketing Issues

Chapter 2 - EXPLANATION OF PROPOSAL AND THE NO ACTION ALTERNATIVE

2.1 Description of the No Action Alternative (i.e., not entering into agreement)

2.1.1 Potential Reasons for Not Signing Agreements
2.1.2 System Operational Impacts
2.1.3 Power Marketing Impacts

2.2 Description of the Proposed Actions (i.e., entering into agreements)

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2.2.2 Mid-Columbia Agreements
2.2.3 System Operational Impacts
2.2.3.1 Average Water Conditions
2.2.3.2 High Water Conditions
2.2.3.3 Low Water Conditions

2.2.4 Power Marketing Impacts
2.2.4.1 Average Water Conditions
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2.3 Comparative Evaluation and Summary

Chapter 3 - ENVIRONMENTAL IMPACTS OF PROPOSED AND NO ACTION ALTERNATIVE

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3.1.1.1 Effects on Fish Habitat
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3.1.1.3 Effects on Riparian Communities
3.1.1.4 Effects on Conditions during Migration Period of Anadromous Fish (including water budget effects)

3.1.2 Other Effects
3.1.2.1 Recreation
3.1.2.2 Irrigation
3.1.2.3 Navigation
3.1.2.4 Flood Control

3.2 Proposed Actions

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3.2.1.2 Effects on Wildlife Habitat
3.2.1.3 Effects on Riparian Communities
3.2.1.4 Effects on Conditions during Migration Period of Anadromous Fish (including water budget effects)

3.2.2 Other Effects
3.2.2.1 Recreation
3.2.2.2 Irrigation
3.2.2.3 Navigation
3.2.2.4 Flood Control

3.3 Comparative Evaluation and Summary

Chapter 4 - OTHER CONSIDERATIONS

Chapter 5 - LIST OF AGENCIES AND PERSONS CONSULTED

Chapter 6 - RECOMMENDATIONS

Appendices

A - Proposed Mid-Columbia Agreement
B - Proposed B.C. Hydro Agreement
C - References

JPyrch:ay (WP-PGE-1736K)

Environmental Assessment
on
PROPOSED AGREEMENTS TO USE NON-TREATY
STORAGE SPACE IN CANADA

Schedule

Date	Activity
3-28-83	Begin Preparing EA
4-8-83	Advance Copy of EA to DOE and for BPA Review
4-18-83	Final Copy of EA to DOE
4-29--83	Publish and Distribute EA for 2-Week Review
5-16-83	Close of Comment Period for EA
5-20-83	Finalize FONSI* and Send to DOE for Signature and Publication in Federal Register
6-1-83	Offer Contracts Distribute FONSI

* Preparation of a FONSI is contingent on the nature of public comments received and a confirmation of the finding of no significant environmental impact contained in the assessment.

JPyrch:db (WP-PGE-1736K)

BPA 16 Rev. Apr. 1965
U.S. DEPARTMENT OF ENERGY

Date 3/30

ROUTE TO

ADDRESS (Symbol, area or field location)

~~Bart~~

☐ Action

☐ Approval ☐ Per request or conversation ☐

☐ Comments ☐ Information ☐ Return ☐ File

REMARKS Please make copies and send to the following

Teresa Cunningham - APL

John Pyrch - PGE

John Piccinini - PGE

Preston Michie - APP

Bill Freeland - SJ Dick Harper - PJI

Fold here for return

and make an extra copy for me. Thanks!

FROM

Randy

ADDRESS

BONNEVILLE POWER ADMINISTRATION, PORTLAND, OREGON