Columbia River Treaty Summary

COLUMBIA RIVER - The Columbia River is the fourth largest river in North America as measured by average annual flow of 198 MAF (244 km3) at its mouth and about 134 million acre feet (MAF) (165 cubic kilometers (km3)) at The Dalles, Oregon, where it cuts through the Cascade Mountains. Surprisingly, the Columbia is the most powerful river in North America, as measured by flow times change in elevation, due to a large portion of the river flows coming from high mountain lakes and tributaries. Only about 15% of the 259,500 square miles (697,000 square km) of the Columbia River Basin is in Canada, but about 38 percent of the average annual flow and up to 50% of the peak flood flows at The Dalles come from Canada. Historical streamflows at the border varied from as low as 14,000 cfs (396 cubic meters per second (m3/s) to over 550,000 cfs (15,600 m3/s). The total system usable reservoir storage prior to the Treaty was only about 13 Maf (16 km3). These characteristics caused significant flood control and hydropower problems that were largely resolved by building storage dams. Today, the Columbia has about 55 Maf (68 km3) of storage, which is about 41% of the average annual flow at The Dalles. This allows only limited control of the Columbia compared to other major rivers, such as the Missouri and Colorado which have two to three times as much storage as average annual flow.

TREATY HISTORY - The Boundary Waters Treaty of 1909 established criteria for the joint use of boundary waters and created an International Joint Commission (IJC) to study and help resolve problems relating to the use of boundary waters. In 1944 the two governments requested that the IJC determine "whether a greater use than is now being made of the waters of the Columbia River System would be feasible and advantageous . . ". The IJC in turn established the Columbia River Engineering Board which concluded in 1945 that further development was "practicable and in the public interest from the point of view of both Canada and the United States(U.S.)," but considerable investigations and studies were needed to "formulate a comprehensive plan of development." In January 1959, the Board reported to the IJC on alternative plans for development. In December 1959, the IJC reported to the two governments the final study results and recommended principles for determining and apportioning benefits for the cooperative use of storage. Negotiations began one month later and led to the signing of the Columbia River Treaty on January 17, 1961. Ratification of the Treaty by the Canadian Parliament was delayed until 1964 when: 1) the B.C. and Canadian governments signed an agreement that allowed the sale of the Canadian share of the Treaty downstream power benefits and resolved issues of authority and responsibility between the two; and 2) Canada and the U.S. agreed to a Treaty Protocol that clarified methods for preparing operating plans and calculating power benefits.

TREATY PROJECTS - The Treaty required Canada to construct and operate 15.5 Maf of seasonal storage dams on the Columbia River and a tributary in Canada for optimum power generation and flood control downstream in Canada and the United States. The Treaty also allowed the U.S. to construct the Libby project on the Kootenai river in Montana for flood control and other benefits. The Canadian storage projects are Mica with 7 Maf of usable Treaty storage, Duncan with 1.4 Maf, and Keenleyside (Arrow Lakes) with 7.1 Maf. Libby has 4.98 Maf of usable storage. Duncan began operation in 1967, followed by Arrow in 1968, and Libby and Mica in 1973. The Canadians elected to build Mica Dam higher than required by the Treaty which enabled an additional 5 Maf of non-Treaty storage. The Treaty requires that non-Treaty storage be operated so as to not decrease the U.S. benefits of Treaty storage. Several Non-Treaty Storage Agreements between BPA and BC Hydro defined operating arrangements that shared the at-site and downstream power benefits of non-Treaty storage. Except for refill provisions, the last non-Treaty Storage Agreement expired in June 2004.

FLOOD CONTROL BENEFITS - The Treaty requires Canada to operate at least 8.45 Maf of storage for flood control in Canada and the U.S. In the event of a potential major flood, the U.S. has the option of requesting the evacuation of up to all remaining Canadian storage space for a payment of $1.875 million for each of the first four requests for this "on-call" additional storage. The U.S. must coordinate the operation of Libby for flood control in Canada. The U.S. made a lump-sum payment of $64.4 million for 1/2 of the present worth of the estimated future flood damages prevented by operation of the Canadian Treaty projects. The Army Corps of Engineers has estimated that the operation of Treaty storage reduced actual flood damages in the U.S. by over $200 million in each of the 1972 and 1974 floods. The flood damages prevented in the 1996 and 1997 floods by Canadian storage have not yet been estimated, but were probably very large in 1997.

POWER BENEFITS - The operation of Canadian Treaty storage creates hydropower benefits in both Canada and the U.S. through at-site generation, reducing spill and enabling higher reservoir elevations at downstream projects, converting nonfirm energy to firm energy, and supplementing low inflows with up to 15.5 Maf of storage releases. The Treaty requires that the downstream U.S. power benefits (DPB) are to be shared equally between the two countries. Because the actual power benefits vary a great deal from year, depending on runoff amounts, reservoir elevations, and market conditions, the Treaty reduces the uncertainty of Canada's share (Canadian Entitlement) by estimating the benefits six years in advance, using special procedures explained below. Delivery of the Canadian Entitlement is a firm obligation of the US government, with the amount fixed by the Treaty studies, regardless of the real benefits during actual operations. The Canadian Entitlement to one-half of the Treaty DBPs computed for the 2004-05 operating year is 1176.4 MW dependable capacity and 537.3 MW average annual energy. The energy Entitlement will gradually decrease in the future as new U.S. thermal resources increase the usability of U.S. nonfirm energy (to displace thermal generation). All of the Canadian and U.S. downstream power and flood control benefits from the operation of Libby belong to the country in which they occur.

ASSURED OPERATING PLANS - The Treaty requires the Entities prepare annually for the sixth succeeding operating year an Assured Operating Plan (AOP) and Determination of Downstream Power Benefits (DDPB). The AOP's are designed to achieve optimum power and flood control operation in Canada and the U.S. Entity Agreements in 1988 and 1996 resolved disputes over AOP and DSB computation methods and allowed the U.S. to shift and shape firm loads to increase U.S. power benefits and match expected imports and exports. The 1992-93 AOP was the first to include shaped loads similar to exports caused by Water Budget minimum flows, and beginning with the 1997-98 AOP additional loads were included in June to reflect higher exports caused by U.S. flow augmentation requirements. The DDPB calculates the Canadian Entitlement and determines the year-to-year limit of allowable decrease in Entitlement due to reoperation of Canadian storage for optimum power in Canada.

DETAILED OPERATING PLANS - Each year a Detailed Operating Plan (DOP) is prepared for the upcoming operating year that implements the AOP and the 2003 Flood Control Operating Plan. If the Entities agree, the Treaty allows mutually advantageous changes (for power or nonpower objectives) from the AOP. Generally, the Canadians allow only minor changes in the DOP. Beginning in 1993, the Canadian Entity ended the practice of allowing the U.S. Entity operating flexibility for storage above DOP levels to optimize Treaty storage operation for changes in loads, streamflows, and market conditions different than assumed in the AOP. Since then the Entities have agreed only to mutually beneficial deviations from the DOP, through supplemental operating agreements that meet U.S. power and/or fishery/recreation needs, such as 1 MAF Flow

Augmentation and Vernita Bar minimum flows, in return for meeting Canadian power and nonpower objectives, e.g. trout and white fish spawning and dust storm avoidance.

CANADIAN ENTITLEMENT – The Canadian Entitlement to the downstream power benefits is one-half of the estimated increase in U.S. dependable capacity and average annual usable energy. The Entitlement calculations are based on an AOP operation of a theoretical U.S. Pacific Northwest Area (PNWA) hydro-thermal power system with Columbia basin reservoirs that existed when the Treaty was signed in 1961 (US Base System), plus today's thermal installations and load shape, and evaluated with and without the operation of Treaty storage using the 1929 to 1958 stream flow record. The Capacity Entitlement is one-half the increase in average critical period (CP) energy divided by the average CP monthly load factor. The Energy Entitlement is one-half the increase in the 30-year average sum of firm hydro energy (from the CP), plus nonfirm hydro energy that can be used to displace thermal installations that meet load in the PNWA (thermal displacement market or TDM), plus 40% of the remaining nonfirm energy. Among parameters affecting the Entitlement, the most significant are: Size, annual shape, and monthly load factor of PNWA firm load; Size, annual shape, and minimum generation for the thermal installations and TDM; Flood control and other established nonpower hydro operating constraints; and Size and annual shape of the irrigation depletions. Use of the Base System puts Canada in the "first added" position by not counting US reservoirs added since 1961. As the TDM increases, more of the nonfirm energy becomes usable, making Treaty storage less valuable and decreasing the Energy Entitlement.

PURCHASE AGREEMENT AND RETURN TO CANADA - Concurrent with Treaty ratification, Canada sold its right to the Canadian Entitlement for a 30-year period beginning after the completion of each of Canadian projects for $254 million (actual proceeds were $263 million) to Columbia Storage Power Exchange (CSPE), a consortium of Pacific Northwest utilities. CSPE exchanged the Entitlement with BPA for a fixed amount of power for 30 years, which was designed to be equivalent to the 1963 forecast of future Entitlement calculations. CSPE resold the power to California utilities, on a [withdrawable] recallable basis, providing one of the major benefits that justified the Pacific Northwest-Southwest intertie. Because of slower load growth and much less thermal plant construction in the Pacific Northwest than forecast in 1963, the downstream power benefits computed each year have not decreased as much as originally expected, making the purchase by CSPE and exchange with BPA a better deal than expected for BPA. A total of 38.8 million MWH of CSPE energy was delivered to California from April 1968 to March 1983, and CSPE power was used to meet PNW loads from 1983 to 2003. Beginning in April 1998, and ramping up to the full amount in April 2003, the CSPE agreement expired and the Canadian Entitlement reverted to Canada with the obligation for the United States government to deliver the computed capacity and energy benefits to the Canadian border. A March 1999 Entity Agreement (supercedes similar 1996 agreement) defines transmission losses and scheduling guidelines and allows power returns to Canada using existing transmission interconnections at Blaine and Nelway/Selkirk instead of the Treaty-defined point at Oliver, BC. A separate March 1999 Agreement allows disposal of the Canadian Entitlement directly in the U.S., thus reducing transmission losses for the Canadians and transmission costs for the U.S., if they elect to do so. April 1997 agreements between BPA and the public utilities owning mid-Columbia (Mid-C) projects allows those PUD's to deliver their share of the Entitlement obligation to BPA on a fixed schedule, shaped flat on heavy load hours, instead of varying as a portion of Entitlement power scheduled by Canada. The Mid-C Entitlement obligation was defined as 27.5% of the estimated Entitlement based on a function of the AOP loads, instead of the actual Entitlement calculation.

ENTITIES AND PEB - The Treaty established the U.S. and Canadian Entities as the implementing agencies for each government. The Canadian Entity is B.C. Hydro & Power

Authority (the Provincial electric utility) and the U.S. Entity is the Administrator of BPA and the Division Engineer of the Corps of Engineers North Pacific Division. The Entities have established an Operating Committee and a Hydrometeorological Committee to perform most of the Treaty activities. The Treaty also established a Permanent Engineering Board (PEB) to review Entity actions for consistency with Treaty objectives, to assist the Entities in resolving technical and operational disputes, and to report annually to the governments on the results being achieved under the Treaty and whether there were any deviations from the operating plans The two PEB members for the U.S. are appointed by the Secretaries of Army and Energy. The governments of Canada and British Columbia each appoint a Canadian member. A PEB Engineering Committee (PEBCOM) assists the Board in reviewing Entity actions. Disputes between the Entities may be referred to the International Joint Commission for decision or an Arbitration Tribunal if the IJC does not respond within three months.

DIVERSIONS - During the life of the Treaty, both Canada and the U.S. may not divert any water that would alter the flow across the border, except for consumptive use or special Kootenay River diversion rights listed in the Treaty. Consumptive use includes domestic, irrigation, and industrial uses. Kootenay River diversion rights include a post September 1984 Canadian option to begin diverting 1.5 Maf annually from the Kootenay River, across Canal Flats, into the Columbia River. This would result in about a 40 MW energy loss at Libby, and about a 90 MW net energy gain for B.C. Hydro since the developed head on the Columbia at Mica, Revelstoke, Keenleyside, and potentially at Murphy Creek, exceeds the loss on the Kootenay river projects in Canada. Environmental problems and less expensive alternatives, have delayed and will probably preclude any action on this option in the foreseeable future. After 2024, Canada has an additional right to begin diverting all Kootenay River flows exceeding a Canada/U.S. border minimum flow of 2500 cfs, and after 2044, all flows exceeding a border minimum of 1000 cfs. Both of the latter diversion rights could severely impact Libby generation and reservoir operation.

TERMINATION - Both governments have the option to terminate the Treaty after September 2024 (60 years from ratification) with 10 years' advance notice. However, Kootenay River diversion rights continue, and the right to operate Libby, Mica, Duncan, and Arrow continues, and the U.S. continues to have the right to request and pay for flood storage in Canadian Treaty projects as long as the projects exist.