IN THE MATTER OF

# West Kootenay Power Ltd.

## CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

## Kootenay 230 kV System Development Project

# DECISION

**June 5, 2000**

**Before:**

**Peter Ostergaard, Chair**
**Kenneth L. Hall, P.Eng., Commissioner**
**Paul G. Bradley, Commissioner**
**Barbara L. Clemenhagen, Commissioner**

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## EXECUTIVE SUMMARY

West Kootenay Power Ltd. is an investor-owned electric utility providing wholesale and retail service in the west Kootenay and south Okanagan regions of British Columbia. It is a public utility regulated by the British Columbia Utilities Commission in accordance with the Utilities Commission Act. Annual peak loads on the WKP system are in the order of 600 to 650 MW. The Utility owns four small hydroelectric plants on the Kootenay River with a combined rated capacity of 214 MW. Remaining needs are met through power purchase contracts.

The WKP transmission system in the Kootenay and Columbia valleys consists of a series of 63 kV lines mounted on wooden poles. Much of the system was built in the 1930's and has deteriorated to the point where safety, reliability and quality of service are compromised. Also, the system is somewhat isolated from 230 kV systems developed more recently in the area. This isolation can cause outages and related difficulties. In April 1999, following a series of studies, WKP filed with the Commission a 20-year Transmission and Distribution Master Plan. In November 1999, WKP applied to the Commission for a Certificate of Public Convenience and Necessity to develop a fully-integrated, 230 kV system to upgrade its transmission and substation system in the Kootenay region.

The generation and transmission infrastructure in the Kootenay/Lower Columbia region is unusually complex. Four companies own electrical generation and transmission facilities in the area. Generation totals 2,100 MW and is likely to increase to 2,500 MW or more in the near future. In contrast, the maximum Kootenay area load is only 450 MW, comprised of WKP's customer load of 200 MW and Cominco's 250 MW industrial load. Cominco has its own aging generation and transmission system, which it views as a strategic asset to ensure its regional economic viability. In the 1960's and 1970's, B.C. Hydro superimposed a new 230 and 500 kV system to connect its large generation plants with loads outside the region, and to meet Columbia River Treaty obligations. More recently, the Columbia Basin Trust was established with a mandate to invest in and develop power projects, using some of the Province's proceeds from the sale of the Columbia River downstream benefits. In 1996, a joint venture of the Columbia Power Corporation and the CBT Power Corporation ("CPC/CBT") purchased from Cominco the Brilliant Dam and Powerhouse and expansion rights to Cominco's Waneta plant.

WKP's Application for a 230 kV system development describes proposed new transmission lines, and new or rehabilitated substations and switchyards, that WKP states it needs to upgrade and expand its transmission system in the Kootenay region. It includes proposed additional connections to adjoining 230 kV systems for additional reliability and system security. There has been a long history of mutual support and co-operation between WKP and Cominco in the joint use of facilities. The WKP proposal depends upon agreements with Cominco at the Warfield and Waneta facilities, with CPC/CBT at Brilliant and with B.C. Hydro for connections at the Kootenay Canal plant and at the Nelway substation.

There are a number of agreements among the four owners of generation and transmission facilities in the Kootenay region. All parties were involved in the preliminary studies and negotiations were undertaken to seek amendments to agreements where necessary to accommodate the WKP system development proposal. In its Application, WKP stated that it expected to have all the agreements in place prior to the opening of the public hearing; however, the negotiations were not completed successfully. As a result, WKP requested that the Commission issue directions to the other parties to meet WKP's requirements. This, as explained in the Reasons for Decision, the Commission declined to do. In its Decision the Commission directed WKP to resume negotiations and urged all parties to work together to find solutions for their mutual benefit.

By Order No. G-125-99, the Commission established the Regulatory Agenda and Timetable to review the Application. A public workshop and pre-hearing conference was held in Castlegar on January 14, 2000. A public hearing was held in Castlegar and Brilliant from February 21 to 24, and from March 13 to 16, 2000. Evening sessions were held on February 22 and 23 and on March 13 to ensure that concerned residents could participate in the hearing. The Application, as amended, requested approval of option K3 of the Feasibility Study Report.

The Application requested approval for construction of the following facilities:

- South Slocan switchyard modifications and an additional 63 kV tie to the B.C. Hydro Kootenay Canal plant, and Kootenay Canal substation modifications
- Kootenay Canal to Brilliant 230 kV line via the East High Elevation route
- New Brilliant substation
- Brilliant to Warfield 230 kV line via existing river line route
- Warfield substation replacement
- Warfield to Waneta 230 kV line along existing route
- Waneta switchyard expansion
- Connection from Cominco's 230 kV Line No. 71 to B.C. Hydro's Nelway substation
- Breakers and improved protection at WKP generation stations
- Communications system

The transmission assets in the region are identified on Figure 1, attached.

Participants in the hearing generally agreed that WKP's transmission assets in the Kootenay region were reaching the end of their physical life and that a major refurbishment was required. However, several participant groups opposed specific routings or the sizing and ownership of specific assets.

Residents of Glade and nearby settlements expressed their opposition to routing the transmission line between South Slocan and Brilliant nearby their communities. This group supported a new route east of the present B.C. Hydro right-of-way, and WKP adopted this "East High Elevation" route as its preferred option during the hearing.

Atco Lumber Ltd. and others concerned about forest, wildlife and wilderness values, opposed the routing of new transmission corridors through forest and unroaded lands.

CPC/CBT expressed numerous concerns about the Project, primarily with respect to the ownership, cost sharing and implications for regulation of the proposed new Brilliant substation. CPC/CBT was also concerned that the proposed new transmission line between Warfield and Waneta could jeopardize their rights in future to the use of Cominco's Line No. 71.

Cominco's concerns related to maintaining the viability of its operations at Trail and minimizing its transmission and substation costs, along with maintaining low cost access to export its surplus power to the United States. If Cominco is able to renegotiate the delivery point of its power under the Canal Plant Agreement, it would not require capacity on the proposed Kootenay Canal to Warfield 230 kV line. Cominco proposed a more modest 230 kV upgrading and opposed WKP's planned expansions at Warfield along with the proposed cost sharing. Cominco also opposed the construction of the new 230 kV line from Warfield to Waneta and any proposed changes to the Waneta switchyard or firm access by WKP to Cominco's Line No. 71.

B.C. Hydro asked that the new WKP facilities not be energized until Line No. 71 was connected to the Nelway substation, to avoid worsening loop flows on its system. B.C. Hydro also took the position that any discussion of a modified rate under its Wholesale Transmission Service should not be determined in this Decision.

The Regional Districts of Kootenay Boundary and Central Kootenay supported the construction of a transmission link between Keenleyside and Warfield so as to allow removal of most of the eight transmission lines in the corridor between Brilliant and Trail.

WKP applied for approval of Rate Schedule 110 – Long-Term Alternate Path Transmission Service ("APTS"). WKP indicated that if it were unable to reach an agreement for facilities sharing with any of the third parties, the third parties would take service under the APTS. Cominco stated that the APTS tariff was not required at this time and that it would not take service under that tariff. The Commission has determined that approval of the APTS tariff is premature, since agreement on cost sharing with Cominco is still likely.

In this Decision, the Commission has determined that a major rebuilding of the Kootenay transmission system is required to maintain reliable and safe electricity service to ratepayers. The cost of these upgrades is substantial, but the Commission finds that reliable, safe, high quality service to customers cannot be provided without them. The Commission's determinations with respect to the major segments of the new transmission line and the substations are as follows:

## 1.0 Transmission Lines

### 1.1 South Slocan to Brilliant

Construction of a 230 kV transmission line is required between South Slocan and Brilliant along the East High Elevation route, subject to filing of final line alignment, right-of-way acquisition plans and updated cost estimates. WKP is to pursue mitigation measures such as consolidating its routing with that of the CPC/CBT line, the use of large spans to reduce clearing and coordination of the timing and sequencing of logging.

### 1.2 Brilliant to Warfield

Construction of a 230 kV transmission line is required between Brilliant and Warfield along the general routing of the existing lines (K3), subject to the filing of final line alignment, right-of-way acquisition plans and updated cost estimate. The K3 routing not only has the lowest cost for all ratepayers but also the proposed line, with diversions around most populated areas, will greatly reduce the impact on the public compared to the existing lines. This route also minimizes the impact on wildlife and forest resources.

### 1.3 Warfield to Waneta

The Application to build a 230 kV transmission line from Warfield to Waneta is denied, at this time. WKP has historically been able to obtain access to Line No. 71 by agreement with Cominco. Cominco and WKP have acted pragmatically and cooperatively in the past and the Commission encourages them to assist each other. If the transmission owners in the Kootenays cannot cooperate then a Regional Transmission Organization will be required, as soon as possible.

## 2.0 Substations and Interconnections

### 2.1 South Slocan to Kootenay Canal Plant

Construction of a second 63 kV intertie with the Kootenay Canal Plant and a second transformer at the Kootenay Canal Plant is required, subject to the filing of an updated cost estimate. The Commission also finds that the rebuild of the South Slocan switchyard and the Breaker Upgrades at the Kootenay River generating plants and at Rosemont substation are required.

### 2.2 Connection at Brilliant

The need to deliver power generated at Brilliant to the WKP system and the construction of a 230 kV transmission line to Warfield will require a substation at Brilliant. There appear to be considerable advantages to the construction of one common substation, and benefits to all parties from interconnection of the WKP and CPC/CBT systems. To date, WKP has not been able to negotiate an agreement for the connection, and for sharing the costs of the connection.

The Commission considers that at this time it does not have authority to direct CPC/CBT to connect its Keenleyside to Selkirk line to the WKP system at the Brilliant substation or at Keenleyside, even though interconnection could be beneficial to both parties. Without integration WKP ratepayers may face higher utility rates. In the absence of an agreement with CPC/CBT, which benefits WKP ratepayers, it seems appropriate for WKP to construct and own the substation. As the substation will be a critical part of the Kootenay transmission system, the public interest is likely to require Commission oversight of the facility.

The Commission directs WKP to resume negotiations with CPC/CBT to determine the design and the ownership arrangements of a larger Brilliant substation to accommodate the needs of both parties at a reasonable cost to WKP ratepayers. If a negotiated settlement cannot be reached by September 15, 2000, the Commission authorizes WKP to construct and own a substation at Brilliant that is designed to meet the requirements of WKP and its ratepayers.

### 2.3 Warfield Substation

The proposed Warfield substation is an integral part of the WKP transmission system. Interconnection of the WKP and Cominco systems at the Warfield substation is essential so that the systems can be operated together, as required by the Cominco Exemption Order. Construction of a new 230 kV and 63 kV substation at Warfield is required. WKP is directed to resume negotiations with Cominco on the design, construction and cost sharing of a new substation at Warfield. The Commission declines to issue specific

directions to Cominco, since the Commission believes that Cominco and WKP will be able to design and cost-share the mutually dependent facilities.

### 2.4 Waneta Substation

The Commission declines to approve construction of the requested works at Waneta, and declines to make directions to Cominco regarding the requested works. However, the Commission recognizes that with its denial of the 230 kV line from Warfield to Waneta a system constraint is again an issue. WKP needs to find an alternative solution: a preferred solution would include interconnection with CPC/CBT's Keenleyside to Selkirk line.

### 2.5 Connection of Line No. 71 to Nelway

The Commission accepts that connection of Line No. 71 to Nelway is necessary and in the public interest. Due to the lack of direct WKP involvement in the intertie facilities, it is not appropriate to include such facilities in a CPCN to WKP. Moreover, the Commission believes that the connection between Line No. 71 and Nelway will proceed under the guidance of B.C. Hydro and Cominco without the need for Commission intervention.

## 3.0 Capital Costs and Impact on Rates

The capital cost estimates of the Project varied significantly during the course of the hearing and the potential for cost sharing with other parties was not resolved. The Commission estimates that the capital costs of the facilities approved in this Decision are likely to range between $93 and $100 million with WKP's share of the capital costs likely to be between $73 and $80 million. The Commission determines that the Project should be financed with traditional utility equity and debt financing. In keeping with the debate during the hearing on alternative financing methods, the Commission expects WKP to secure the least cost debt funding possible, which may be from local governments or a Crown Corporation.

Over the next six years, the cumulative impact on customer rates is expected to range between 5.6% and 6.4%. The revenue requirement impact will be influenced by sharing arrangements with CPC/CBT and Cominco.

# 1.0 INTRODUCTION

## 1.1 Background

West Kootenay Power Ltd. ("WKP", "the Company", "the Utility") is an investor-owned electric utility providing wholesale and retail service in the west Kootenay and south Okanagan regions of British Columbia. It is a public utility regulated by the British Columbia Utilities Commission ("the Commission", "the BCUC") in accordance with the Utilities Commission Act ("the Act").

WKP forecasts its system peak load for 2000 at 628 MW. The Utility owns four small hydro-electric plants on the Kootenay River with a combined rated capacity of 214 MW, which is expected to increase to 236 MW by 2009. Remaining energy and capacity needs are met through contracts with the British Columbia Hydro and Power Authority ("B.C. Hydro"), a contract with a joint venture of the Columbia Power Corporation ("CPC") and the CBT Power Corporation (collectively "CPC/CBT"), and other market purchases.

On November 12, 1999, WKP applied to the BCUC for a Certificate of Public Convenience and Necessity ("CPCN"), pursuant to Section 45(1) of the Act ("the Application"). The Application describes the proposed new transmission lines, and new or rehabilitated substations that WKP states it needs to upgrade and expand in the west Kootenay region ("the Kootenay 230 kV Project"). Commission Order No. G-125-99, dated December 2, 1999, established the Regulatory Agenda and Timetable to review the Application.

WKP filed amendments to its Application on January 10, 2000, which included changes to its preferred route. The filing also included an application under Section 61 of the Act for approval of a new Rate Schedule 110 - Long-Term Alternate Path Transmission Service ("APTS").

Order No. G-125-99 set February 21, 2000 as the commencement date for a public hearing in Castlegar. Two subsequent procedural Orders were issued:

1. No. G-17-00 (February 10, 2000), declining a request by counsel for the Regional District of Central Kootenay ("RDCK") and the Regional District of Kootenay Boundary ("RDKB") for a postponement of the hearing; and

2. No. G-21-00 (February 24, 2000), establishing March 13, 2000 as the date for recommencement of the hearing at Brilliant, B.C.

The evidentiary portion of the public hearing lasted eight days, from February 21 to 24 and March 13 to 16, 2000. Evening sessions were held on February 22 and 23 and March 13 to give the public – and particularly residents concerned about routing – an opportunity to ask questions and state their views. Written argument followed, with WKP's Submission filed on March 27, Intervenor Submissions on April 7, and WKP's Reply Submission on April 14, 2000.

### 1.2 Related Reports, Meetings and Workshops

Public utilities have an ongoing responsibility to monitor the costs, issues, and options associated with maintaining and upgrading their systems. The public hearing into WKP's CPCN Application was the product of a two-year process of meetings and workshops to review reports, described in more detail in Chapter 2 of this Decision. The first report, the 20 Year Transmission and Distribution Master Plan (Exhibit 5), was filed with the BCUC in April 1999 and was the subject of a public workshop in Penticton on May 27, 1999.

The Commission's Letter No. L-28-99 of June 15, 1999 noted that Workshop participants favoured at least the replacement of the Columbia "river lines" with a 230 kV system between Brilliant and Warfield, plus two new substations. At the Workshop it was also agreed that WKP would proceed expeditiously with a CPCN Application, and would consider the benefits and costs of pursuing an option to extend a 230 kV line north from Brilliant to Kootenay Canal. Workshop participants expressed concern that action to refurbish the WKP transmission system must proceed quickly to maintain adequate system reliability.

In mid-1999, WKP prepared a joint system impact study with B.C. Hydro, which was followed by a transmission system expansion feasibility study. Both studies form part of the Application, which was made available to participants involved in WKP's revenue requirements review in Kelowna on November 15, 1999.

A Workshop and Pre-hearing Conference was held in Castlegar on January 14, 2000. Representatives for all active Intervenors were present, except the Concerned Citizens of South Slocan, Shoreacres, Glade, Tarrys and Thrums ("the Concerned Citizens"). WKP presented its justification for the Kootenay 230 kV Project and system options. It was noted that negotiations with B.C. Hydro, CPC/CBT, and Cominco Ltd. ("Cominco") were not complete, and WKP agreed to file a report on the status of negotiations by February 7, 2000 (Exhibit 6). B.C. Hydro, CPC/CBT, and Cominco articulated their positions at that juncture in letters dated February 10, February 10, and February 18 respectively.

As part of the December 16, 1999 Revenue Requirements Decision, the Commission required WKP to file a report to advise on measures being taken to address near-term power quality and reliability issues in the Slocan Valley region. The March 10, 2000 System Risk Management Report was not filed as an exhibit at the hearing. In making copies available to participants of both the revenue requirements and CPCN proceedings on March 24, 2000, the Commission noted that the System Risk Management Report may be relevant to CPCN hearing issues. Peripheral reference was made to this Report in submissions. The Commission has not considered the System Risk Management Report in this Decision.

In its March 27, 2000 Submission, WKP asserted it had expended substantial efforts on its system upgrade process, providing ample opportunity for input at both a technical and a strategic level (Argument, 4.14, p. 14). WKP further argued that the comprehensive process to date "underscores the need for the Commission to decide these issues and make clear that further discussion and analysis of these issues is not likely to result in a negotiated resolution" (Argument, 4.15, p. 14).

### 1.3 Generation and Transmission Providers

Four companies own electrical generation and transmission facilities in the Kootenay area. Generation currently totals 2,100 MW, and is likely to increase to 2,500 MW or more (Exhibit 83, p. 4). However, the maximum Kootenay area load is only 450 MW, comprised of Cominco's 250 MW load plus WKP's customer load of up to 200 MW. This section describes the four companies and the agreements that are currently in place to coordinate the operation of their facilities, to provide a context for reviewing WKP's Kootenay 230 kV Project within the overall electrical system configuration.

The generation and transmission infrastructure and ownership structure in the Kootenay/lower Columbia region is unusually complex. The WKP transmission system in the region is reaching the end of its physical life. Cominco has its own aging generation and transmission system, which it views as a strategic asset to ensure its regional economic viability. B.C. Hydro superimposed a new 230 and 500 kV system to connect its large generation plants with loads outside the region, and to meet Columbia River Treaty obligations. More recently, the Columbia Basin Trust was established with a mandate to invest in and develop power projects, using some of the Province's proceeds from the sale of the Columbia River Treaty downstream benefits.

Figure 1.1 shows the region's electrical system. B.C. Hydro has 500 kV lines looping around WKP's service area, running from Selkirk substation southeast of Trail to Ashton Creek substation north of Vernon, to Nicola substation near Merritt and back to Selkirk. The regional transmission system is interconnected with the U.S. Pacific Northwest and with Alberta. One connection is a B.C. Hydro 230 kV line from Selkirk to Nelway to the Bonneville Power Administration ("BPA") substation at the Seattle

City Light's Boundary generating plant on the Pend d'Oreille River, just south of the international boundary. Another is Cominco's 230 kV Line No. 71 from Waneta directly to BPA's Boundary substation.

### 1.3.1 West Kootenay Power Ltd.

Generation Resources and Load

As shown in Figure 1.2, WKP has four hydroelectric plants on the Kootenay River:

| | |
|---|---|
| Corra Linn (Plant 4) | 45.0 MW capacity |
| Upper Bonnington (Plant 2) | 64.0 MW capacity |
| Lower Bonnington (Plant 1) | 52.5 MW capacity |
| South Slocan (Plant 3) | 52.5 MW capacity |
| | 214.0 MW |

Generator upgrades are expected to add 22 MW of capacity over the next ten years. Power output varies from 80 MW in the winter to 200 MW during the spring and summer (Exhibit 1, Appendix D, p. 15).

WKP forecasts its peak load for 2000 at 628 MW, of which about 200 MW is in the Kootenay area and the remainder is in the south Okanagan (Exhibit 1, Appendix D, p. 24). WKP's peak load is forecast to increase to 734 MW by 2010, with most of the growth occurring in the Okanagan.

Under the Brilliant Power Purchase Agreement with CPC/CBT, WKP buys the power produced at, or resulting from entitlements related to the Brilliant plant. The Agreement runs to 2056. The Brilliant plant has a generating capacity of 128 MW. The Brilliant Upgrade is expected to add 20 MW by 2003, and the Brilliant Expansion another 100 MW by 2006.

WKP buys up to 160 MW of power from B.C. Hydro that is delivered in the Okanagan and Princeton areas. WKP also purchases about 120 MW of additional power from the market.

Transmission Facilities

WKP operates the transmission facilities that WKP and Cominco own. The principal transmission lines in the Kootenay area are known as the river lines: six 63 kV lines between South Slocan and Brilliant near Castlegar; eight 63 kV lines between Brilliant and Warfield near Trail; and four 63 kV lines between Warfield and Waneta.

WKP also has a 63 kV line that runs from its Kootenay River generating plants to Nelson, Salmo and Trail, and which connects to the Waneta generating plant. As well, WKP owns Line No. 30 from South Slocan to Crawford Bay, and Cominco owns the portion of this line that extends to Kimberley. Other 63 kV lines serve communities in the Slocan Valley, Kaslo, Creston, and Grand Forks.

The principal connections between WKP's Kootenay transmission system and neighbouring systems are at Waneta (Cominco's 230 kV Line No. 71 from Waneta to the BPA Boundary substation with a capacity of 450-500 MW but limited to 360 MW by the transformer capacity at Waneta) and at South Slocan (the short 63 kV Line No. 13 to B.C. Hydro at Kootenay Canal with a capacity of 160 MW). WKP's Line No. 11 to the Okanagan is a 161 kV line from WKP's Mawdsley substation in Warfield, and has a capacity of about 140 MW (Exhibit 1, Appendix D, p. 27).

WKP uses its Line No. 11 and wholesale transmission over the B.C. Hydro system to move power from the Kootenay area to the Okanagan. WKP expects later in 2000 to file a CPCN application to improve delivery to the Okanagan. The Feasibility Study for the Transmission System Expansion Report considered two alternatives: a substation in the south Okanagan connected to B.C. Hydro's 500 kV system (Option O1) or a 230 kV transmission line from Trail to Penticton (Option O3). The optimal solution from a WKP ratepayer perspective will depend on the rate that WKP would pay to wheel power over the B.C. Hydro system.

WKP stated that its Kootenay 230 kV Project is independent of the option that is selected to reinforce deliveries to the Okanagan. The proposed Warfield switch station is sized to accommodate an additional line termination, but no components are included for the Okanagan 230 kV line option (Exhibit 4, Tab 1, p. 21). WKP stated that the option ultimately selected to reinforce the Okanagan does not affect, and would not be affected by, the conductor size selected by WKP for the Kootenay 230 kV Project (T6: 1034 and 1035).

### 1.3.2 Cominco Ltd.

In British Columbia, Cominco is engaged primarily in mining, and lead and zinc smelting. Cominco's industrial operations at Trail employ approximately 2000 people, and form an important part of the economic base of the region (Exhibit 83, p. 1).

Generation Facilities and Load

Cominco owns the Waneta generating plant on the Pend d'Oreille River, which has a capacity of 370 MW. The plant is being upgraded, and an increase in capacity of 94 MW is expected by 2005 (Exhibit 1, Appendix D, p. 15).

Cominco's load in the Trail area is up to 250 MW (Exhibit 83, p. 4). About 120 MW of this load can be shut off instantaneously for a number of hours without having much impact on production over a month (T8: 1371 and 1405). Cominco's load at Kimberley of 30 MW will end when the Sullivan Mine shuts down in 2002.

Transmission Facilities, Including Line No. 71

Cominco owns three of the 63 kV transmission lines between South Slocan and Warfield, and all four 63 kV lines between Warfield and Waneta. These transmission lines connect at the Warfield and Tadanac switching stations to Cominco's industrial operations at Trail and to WKP transmission facilities. Cominco and WKP are negotiating to replace both stations at Warfield and Tadanac (T7: 1322).

Cominco also owns the 230 kV Line No. 71 between Waneta and the BPA Boundary substation. The line was built in 1964 to deal with varying levels of generation at the Waneta plant (T8: 1390-1393). Cominco uses Line No. 71 mainly to export surplus power at low cost. The line can also be used to import power during periods of low water flow or when the Waneta plant is out of service. WKP uses Line No. 71 to import power and to export small amounts of its own electricity (Exhibit 1, Appendix D, p. 18; T7: 1316). WKP has an arrangement with Cominco for the use of the line on an interruptible basis for a fee of 0.2 mills per kW.h (Exhibit 26). Cominco is no longer prepared to allow WKP firm access to Line No. 71 if this access would lead to open access precedents (Cominco Argument, p. 6, and Exhibit 83, p. 7).

Both Line No. 71 and a B.C. Hydro 230 kV transmission line connect to the BPA Boundary substation. To prevent loop flows, B.C. Hydro and Cominco have agreed to connect Line No. 71 to the phase-shifter at the Nelway station on B.C. Hydro's 230 kV line (Exhibit 9G, p. 1).

Cominco As Power Supplier To Wkp, And Cominco Exemption

Cominco historically was an electricity supplier to WKP. In 1994, Cominco entered into the Power Asset Sale Agreement which provided for the sale to the Province of British Columbia of the right to construct expansions at the Brilliant and Waneta generating plants, and the extension of benefits received by Cominco under the Canal Plant Agreement to the earlier of the date of termination of the Columbia River Treaty or December 31, 2035. The province assigned the expansion rights to CPC.

In 1996, CPC/CBT bought the existing Brilliant plant from Cominco and, by the Brilliant Power Purchase Agreement, agreed to sell to WKP the power from the plant. Commission Order No. E-7-96 approved the Brilliant Power Purchase Agreement and several related agreements. One of these was the Residual Power Supply Agreement between Cominco and WKP, which expired at the end of 1999. Currently Cominco does not sell power to WKP (T5: 876; Exhibit 71; Exhibit 79).

Starting in 1982, Cominco was exempted from provisions of Part 3 of the Act under exemption orders issued by the Minister responsible for the Act. The most recent exemption order issued in 1996 (the "Cominco Exemption Order") replaces earlier orders (Exhibit 47A).

### 1.3.3 CPC/CBT

The Mandate

The mandate of CPC and the Columbia Basin Trust was legislated by the Columbia Basin Trust Act in 1995. It includes investing and developing power projects in the Columbia Basin using some of the revenues from British Columbia's sale of the Columbia River Treaty Downstream Benefits. The CBT Power Corporation ("CBT") is a subsidiary of the Columbia Basin Trust. CPC is a Crown Corporation wholly-owned by the Province of British Columbia and is in a joint venture partnership with Columbia Basin Trust to develop and run various power projects. All the outstanding shares of CPC and the Columbia Basin Trust are owned by the Province (Exhibits 47B and 94). Their core projects are the Keenleyside Power Plant, the Brilliant Redevelopment Project and the Waneta Expansion.

Current and Proposed Facilities

CPC/CBT are constructing a 170 MW power plant at the Keenleyside Dam and a 49 km, 230 kV transmission line to B.C. Hydro's Selkirk substation.

CPC/CBT purchased from Cominco the Brilliant Dam and Powerhouse, and expansion rights to Cominco's Waneta plant. The two-stage Brilliant Redevelopment Project consists of a 20 MW upgrade, which is expected to be completed in 2003, and a 100 MW Expansion scheduled for completion in 2006. CPC/CBT own a switching station at Brilliant that connects the Brilliant plant to WKP's transmission lines. CPC/CBT had intended to tie the Brilliant Expansion project through a small, dedicated substation into the new 230 kV line from Keenleyside to Selkirk.

An upgrade (94 MW) and an expansion (250 MW) are also planned for Waneta. CPC/CBT is seeking to participate in the upgrade. The Expansion is planned for a time frame after 2006. Purchase of the Waneta Expansion Rights included certain transmission rights to Cominco's Line No. 71, which CPC/CBT would use to deliver Waneta Expansion electricity.

CPC/CBT is concerned that WKP's Kootenay 230 kV Project may interfere with its Keenleyside-Selkirk line and its rights on Line No. 71. WKP has proposed a larger Brilliant substation, which would preclude CPC/CBT's planned smaller one. Both WKP and CPC/CBT proposed to finance and own this larger substation. Ownership and sizing of combined or separate substations at Brilliant were not resolved prior to the hearing.

The Waneta Upgrade, the Keenleyside Project, and the Brilliant Project acquired from Cominco in 1996 are among the projects subject to a Minister's Exemption Order (Exhibits 47B and 91) (the "CPC/CBT Exemption Order"). While open to differing interpretations, the intent of the CPC/CBT Exemption Order is to exempt CPC/CBT from utility regulation with respect to Commission approval for the named projects and their associated electricity supply contracts.

#### 1.3.4 1996 Facilities Sharing Agreement

CPC/CBT, WKP, and Cominco are parties to the 1996 Facilities Sharing Agreement ("FSA") (Exhibit 48). The FSA replaced a similar agreement signed in 1987 by adding CPC/CBT and incorporating changes to facilities and their ownership. Its purpose is to optimize the benefits of each party's facilities by making portions that are surplus to the owning party's requirements available to the other parties.

The FSA defines two types of facilities. "Shared Facilities" as set out in Appendix I to the FSA are lines, substations and switches where nominated uses are specified and an annual rent is paid based on capital and operating costs. Appendix I is reviewed each year for the next four-year period beginning the following January 1: a new Appendix I is prepared with revisions to the facilities list, their nominated uses, and their capital, operating, and financing costs. "Common Facilities", set out in Appendix II, are generally the river lines and switches at associated switching stations. No charges apply to Cominco or WKP for their use of Common Facilities.

WKP confirmed in testimony that Line No. 71 was not included as a Shared Facility under the 1987 Facilities Sharing Agreement (T3: 568). The FSA provides that Line No. 71 will become a Shared Facility under the FSA when CPC/CBT fulfills certain conditions related to the Waneta Upgrade Project. CPC/CBT hoped that it would reach agreement with Cominco on these matters in 2000 (T7: 1279). CPC/CBT also stated that it holds transmission rights on Line No. 71 that the Province of British

Columbia acquired when it purchased the expansion rights at Waneta from Cominco in 1994. CPC/CBT intends to use the transmission rights for the Waneta Expansion Project. Use of Line No. 71 "shall be subject to Cominco's requirements for use of Line No. 71, as determined by Cominco acting reasonably" (Exhibit 48, paragraph 6.2).

The use of Shared Facilities by CPC/CBT is for the sole purpose of transferring electricity to the Perimeter of the Shared Facilities. The Perimeter is defined currently as three points of interconnection – at Crawford Bay, at Kootenay Canal, and at Waneta. Once Line No. 71 is available as a Shared Facility, BPA's Boundary substation becomes an interconnection point for the purpose of defining "Perimeter".

The Kootenay 230kV Project would likely trigger the need for amendments to the FSA. WKP has proposed revisions to Appendix I of the FSA, as described in Exhibit 16, to which the other parties have not consented. In its Submission, WKP seeks the BCUC's approval for its proposed amendments to Appendix 1 of the FSA.

#### 1.3.5 British Columbia Hydro and Power Authority

B.C. Hydro is a Crown-owned electric utility regulated by the BCUC under the Act. WKP buys energy and capacity under B.C. Hydro's Rate Schedule 3808. As a wholesale transmission customer, WKP also transfers electricity from the Kootenays to the Okanagan/Similkameen using B.C. Hydro's 500 kV transmission system.

Generation Resources and The Canal Plant Agreement

B.C. Hydro has two large generating stations in the region: the 530 MW Kootenay Canal plant on the Kootenay River and the 607 MW Seven Mile plant on the Pend d'Orielle River between Boundary and Waneta (Figure 1.2).

Under the Columbia River Treaty, B.C. Hydro built and operates the Keenleyside storage dam on the Columbia River, to which CPC/CBT is adding generation. By 2003, up to 290 MW of capacity from the Treaty's downstream benefits can be returned to British Columbia using the 230 kV Boundary-Nelway intertie.

Under the 1972 Canal Plant Agreement, B.C. Hydro granted average peak capacity and average energy entitlements to Cominco and WKP in exchange for additional water rights on the Kootenay River. This Agreement expires in 2005. If it is not extended or renewed, WKP may resume independent operation of its four plants under its existing water license.

In 1974, B.C. Hydro built a canal bypassing the four WKP generating stations and installed the Kootenay Canal plant, with its tailrace just downstream of the South Slocan plant. In 1991, Cominco and WKP executed the Canal Plant Sub-Agreement, which divides capacity and energy entitlements between them. This Sub-Agreement was replaced by the 1996 Canal Plant Sub-Agreement when CPC/CBT bought the Brilliant plant.

The Canal Plant agreements integrate the WKP, Cominco, and CPC/CBT facilities with the B.C. Hydro system. Effective control of Kootenay River flows and of plants on the Kootenay and Pend d'Oreille River rests with B.C. Hydro. The electricity available at any given time to WKP, Cominco, and CPC/CBT is seldom the actual production at their plants; rather, these agreements determine monthly capacity and energy entitlements.

B.C. Hydro is required to provide 150 MW of capacity between the Kootenay Canal plant and the South Slocan substation in order to supply the entitlements. The Feasibility Study Report states that the 63 kV interconnection between WKP and B.C. Hydro at South Slocan/Kootenay Canal is the contractual point of delivery for these entitlements (Exhibit 1, Appendix D, p. 19). However, Cominco is of the view that the present Canal Plant Agreement does not specify a point of delivery (T7: 1325). The entitlements are accounted for at the Waneta bus (T8: 1402). An extension to the Agreement is under negotiation, and Cominco is seeking to have its entitlement delivered at Selkirk or Nelway. If Cominco receives its entitlements at South Slocan, it would prefer to use WKP's Kootenay 230 kV Project to transmit the electricity to Warfield, but it is also considering other options (T8: 1368).

Transmission Facilities

B.C. Hydro's regional transmission system is shown on Figure 1.2. The Selkirk substation serves as a collection point for generation from Seven Mile and Kootenay Canal, each delivered by two 230 kV lines. A fifth 230 kV line connects with Nelway. The two 230/500 kV transformers at Selkirk have been operating close to thermal capacity limits, and a third transformer is to be completed in 2001 (Exhibit 1, Appendix C, p. 7). Three 500 kV lines radiate from Selkirk, east to Cranbrook, northwest to Ashton Creek and west to Nicola.

## 2.0 WKP APPLICATION FOR SYSTEM DEVELOPMENT

### 2.1 The 20 Year Transmission and Distribution Master Plan

The purpose of the 20 Year Transmission and Distribution Master Plan was to establish capital spending priorities for WKP's transmission and distribution networks over a 20-year planning horizon and a five-year action period. For Kootenay transmission facilities, the March 1999 report entitled "20 Year System Plan for the Period 1999-2018" focussed on the condition of the river lines from South Slocan, and the condition and capacity of the substations. This report also addressed interconnections with B.C. Hydro, Cominco, and CPC/CBT; these companies were represented on a review panel.

Three transmission options were identified for the Kootenay/Columbia Valleys:

K1: A Rehabilitation of the Existing 63 kV river line system;
K2: A new "Small Scale" 230kV line between Brilliant and Waneta; and
K3: A new "Large Scale" 230kV line between Kootenay Canal and Waneta (i.e., K2 plus a new line between Brilliant and Kootenay Canal).

That report recommended that option K2 be undertaken in conjunction with a new east-west line to the Okanagan (option O3). Compared to option K1, the small scale 230 kV project provided enhanced security and reliability, as well as reduced line losses and aesthetic improvements associated with the removal of the old poles and lines. K3 would provide improved generation security for the Kootenay Canal plant, but was considered too costly.

### 2.2 System Impact Studies for Transmission System Expansion

To translate the recommendations of the 20-year plan into a business case suitable for financing and regulatory review, WKP initiated additional project feasibility studies in 1999 for the major new Kootenay and Okanagan proposals. A Draft Executive Summary of the "System Impact Studies for Transmission System Expansion" is included as Appendix C of the Application. Its purposes were to verify or refine cost estimates, to quantify operational performance impacts, and to assess financial impacts of the various planning options. A Technical Oversight Committee and a Strategic Oversight Committee were formed.

The main conclusions of this summary were:

1. Definitive rejection of the concept of the life extension of the 63 kV river lines in favour of a new 230 kV "backbone";

2. The addition of two new options: K4, a new 230 kV line from Keenleyside to Trail, and K5, a new 230 kV line from Kootenay Canal to Brilliant and from Keenleyside to Trail; and

3. A recommendation for an aggressive 230 kV development (K3 or K5) over the modest 230 kV options (K2 or K4).

Justification for the 230 kV development north of Brilliant included improvements in generation security to B.C. Hydro, added security to WKP loads and generation, and security for CPC/CBT generation at Keenleyside under multiple outage conditions. "The risk management issue used to reject large scale 63 kV life extension can also be applied to life extension for the Brilliant-South Slocan 63 kV circuits, although these circuits are generally found to be in better condition than the Brilliant-Trail circuits" (p. 18 of Appendix C of the Application). With regard to the choice between K3 or K5, this summary noted the decision becomes one of tradeoffs between impacts on people and impacts on the environment. It recommended K5 – Keenleyside termination and backcountry routing to Trail – conditional upon recognition by all parties of the benefits realized.

### 2.3 Feasibility Study for Transmission System Expansion

A third report was prepared by Acres International for WKP in November 1999. The "Feasibility Study for Transmission System Expansion: Feasibility Study Report" appears as Appendix D of the Application. It evaluates the impacts of the two Okanagan and five Kootenay (K1 through K5) supply options on the B.C. Hydro and WKP systems, covering four test years, seasonal load and generation simulations, and contingencies.

The preferred development strategy recommended in this Report is O3 and K5: a new east-west line to the Okanagan, coupled with new 230 kV lines from Kootenay Canal to Brilliant, and from Keenleyside to Trail. Despite a $5 million added cost, K5 was preferred over K3 on the strength of improved aesthetics in the Columbia Valley, and the reduced safety risks and operational problems associated with building a new line in an energized corridor. The Report suggests the benefits to CPC/CBT associated with improved security for its generation at Keenleyside and Brilliant could be used to reduce rate impacts on WKP customers, in spite of a lack of persuasive incremental benefits to those customers associated with K5.

### 2.4 Public Consultation

As stated in the Application, WKP's public consultation objective was to enable input from concerned citizens and communities while building consensus for a solution for improving the reliability and security of power transmission in the region. Consultation involved:

- three BCUC staff-initiated Workshops in May 1999, September 1999 and January 2000;
- meetings with elected and appointed local government officials;
- media briefings;

- meetings of WKP customer advisory panels in December 1999; and
- seven community open houses.

Exhibit 19 reports results from the community open houses and customer advisory panels.

WKP's approach was premised on its view that the overall impact of the Project would be positive with respect to aesthetics and public safety, and any negative impacts would be confined to local property matters which would be mitigated where feasible.

As the hearing date approached, it became apparent that some intervenors and residents considered the public consultation process to be inadequate. There was confusion and mistrust over the January 10, 2000 Application amendment that changed WKP's preferred route option between Brilliant and Warfield from K5 to K3. Residents of rural communities along the Kootenay River north of Brilliant, affected by transmission line changes and dissatisfied with WKP's routing proposal and its consultation process, formed the Concerned Citizens, who intervened actively in the public hearing.

The RDCK and RDKB were concerned with what they considered to be the short time frame allotted to local government and general public input. In particular, the Regional Districts felt that local Advisory Planning Commissions had not been provided with enough time to become informed and comment knowledgeably on the routing options.

In response to these concerns, the BCUC held three well attended evening sessions as part of the public hearing, and attempted to ensure they were well publicized in advance.

In the two weeks between the two segments of the public hearing, WKP retained a communications consultant and a noise consultant, and met with community representatives. When the hearing resumed on March 13, 2000, WKP announced it had reviewed the line routing options between South Slocan/Kootenay Canal and Brilliant in response to concerns raised by residents in the area, and had changed its preferred transmission line route to avoid the concerned communities.

### 2.5 The Application

The Application, as amended, requested approval of option K3. From north to south, this is comprised of:

| | | |
|---|---|---|
| 1. | South Slocan substation rehabilitation | ($9,716,000) |
| 2. | 63 kV tie to Kootenay Canal | ($229,000) |
| 3. | Kootenay Canal substation modification | ($6,934,000) |
| 4. | Kootenay Canal to Brilliant 230 kV line via the "East High" route | ($9,828,000) |

| | | |
|---|---|---|
| 5. | New 63 kV/230 kV Brilliant substation | ($16,463,000) |
| 6. | Brilliant to Warfield 230 kV line via existing river lines corridor | ($13,603,000) |
| 7. | Warfield 63 kV substation expansion | ($12,596,000) |
| 8. | Warfield 230 kV substation addition | ($13,140,000) |
| 9. | Warfield line diversions | ($540,000) |
| 10. | Warfield to Waneta 230 kV line via existing river lines corridor | ($4,835,000) |
| 11. | Waneta 230 kV substation expansion | ($6,714,000) |
| 12. | New 230 kV transmission line from Cominco's Line No. 71 to B.C. Hydro's Nelway substation | ($636,000) |
| 13. | Nelway substation modifications | ($1,748,000) |
| 14. | Breakers and improved protection at WKP generating stations and Rosemont Switching Station | ($8,480,000) |
| 15. | Communications system for Option K3 | ($4,097,000) |
| 16. | Feasibility Study | ($431,000) |

WKP sought approval for a total Project cost of $109,990,000. After cost sharing and rental payments, WKP expected to be responsible for $79,954,356 of the cost (Exhibit 27D). WKP had expected that proposed Project cost sharing arrangements with Cominco, CPC/CBT, and B.C. Hydro would be completed by the time of the hearing.

In the Application, WKP also sought approval of a 10% cost collar for the purposes of cost containment and to protect ratepayers from being exposed to cost overruns exceeding 110% of WKP's share of the total Project costs. WKP would be motivated to minimize costs by the opportunity to keep savings below 90% of target cost.

WKP also sought approval for a new tariff, Rate Schedule 110, for APTS, namely a monthly rate of $0.67 per kVA of reserved capacity (Exhibit 1, Appendix G as amended in Exhibit 13, p. 2). WKP proposed that APTS would be available to provide full service to Cominco's operations at Trail through the use of the new 230 kV lines between Kootenay Canal and Warfield, in the absence of changes to the FSA. Cominco's position was that it would not use the APTS (Exhibit 83, p. 6).

The Project schedule in the Application was premised on receipt of a final unconditional CPCN by July 2000. Construction would be completed by October 2002, and river line decommissioning and salvage would finish in April 2003.

### 2.6 WKP Requests for Commission Directions

During the hearing and in Argument, WKP requested Commission directions or orders related to facilities, agreements, and tariffs involving Cominco, CPC/CBT and B.C. Hydro. These included:

1. approval of WKP's proposed changes to the FSA;
2. a direction to Cominco to make Line No. 71 available to WKP;
3. a direction to Cominco to permit construction of the Warfield and Waneta substations;
4. an order to Cominco to connect its Line No. 71 to B.C. Hydro's Nelway substation;
5. a direction to CPC/CBT to interconnect its Keenleyside-Selkirk 230kV line with WKP at Brilliant, to file a report on the benefits of interconnection, and to cooperate in the construction of the Brilliant substation;
6. a direction to WKP and CPC/CBT to negotiate cost sharing for the Brilliant substation, and failing agreement on ownership and cost sharing, a determination by the Commission; and
7. a direction to B.C. Hydro to either confirm that the WTS tariff will not apply to the short Boundary-Nelway intertie or, alternatively, that B.C. Hydro file a new, lower WTS tariff specific to this line. WKP later clarified that it was seeking a direction for the parties to enter into negotiations on the appropriate tariff.

The statutory authority of the Commission to make these requested directions and orders was the subject of considerable discussion.

## 3.0 WKP PLAN AND INTEGRATION OF SYSTEM

### 3.1 Evaluation of Present WKP / Cominco System

#### 3.1.1 Physical Condition and Safety

The eight 63 kV lines between Brilliant and Warfield and six similar transmission lines between Brilliant and South Slocan (the "river lines") were originally constructed in the 1930s, and WKP is concerned that the safety risks inherent with the aging plant are not being adequately managed by the standard eight-year inspection cycle and current maintenance levels. The wooden poles and crossarms are visibly deteriorated, and the structural steel elements are badly rusted. The insulators have lost almost their entire original glazing, and the copper line conductor has lost some strength and has experienced localized corrosion. WKP is concerned about its recent experiences with pole fires, and with the potential for structural failure to endanger workers and the public. WKP also considers that the degraded insulation on the lines may have contributed to recent system islanding events (Exhibit 3, Tab 1, pp. 4 and 5; T3: 604).

WKP anticipates that property damage incidents will occur at a frequency of once in five years, and that incidents that threaten worker or public safety will occur once in ten years (Exhibit 1, Tab 4, p. 20). WKP and Cominco spent almost $1 million in 1999 on a short-term program to rehabilitate the river lines for two years, and may need to repeat the expenditure if the lines are still in service in 2003 (T3: 623). Cominco agrees that there are public liability and safety issues with the lines (T7: 1180). However, Cominco is of the view that the three river lines that it owns could be kept in service for a very long time with adequate maintenance. Cominco acknowledged pole and conductor replacements will be necessary, and expected that maintenance costs would average about $500,000 per year (T8: 1411).

WKP also has concerns about the condition of substations in the system. The Warfield substation and the nearby Tadanac substation cannot be properly maintained and are inflexible in operation. There is also concern about the adequacy of fault-current interrupting capacity at both stations and inadequate grounding (Exhibit 1, Tab 4, p. 4). WKP has adopted lengthy defensive work routines to protect staff working in the stations (T1: 73). Cominco also is concerned, and the parties are negotiating to replace both stations with a new substation at Warfield (Exhibit 9G, p. 1) or two independent, but connected, substations (Exhibit 14).

WKP has also identified similar problems at the substations at South Slocan, Lower Bonnington, Upper Bonnington, Cora Linn and the Rosemont Station near Nelson. Initiatives to address islanding problems and to upgrade the generating units will increase short-circuit currents to levels above the normal operating levels of the breakers. At South Slocan there are additional concerns about the condition of the structural supports and the substation grounding, and the suitability of the bus configuration (Exhibit 3, Tab 1, pp. 6 and 7; Exhibit 1, Tab 4, p. 4).

#### 3.1.2 System Stability, Reliability and Power Quality

WKP's system is vulnerable to power quality and stability problems when WKP is unable to maintain sufficient capacity on its interconnections to other systems. System stability and load flow studies were performed under various system configurations to predict deficiencies on the system.

In the System Impact Studies, WKP conducted system load flow studies with B.C. Hydro under certain assumed loading and generation conditions (Exhibit 1, Appendix C). The studies have demonstrated that insufficient intertie capacity from the WKP/Cominco Kootenay region to the B.C. Hydro or BPA systems can cause islanding of various segments of load and generation on the WKP system. The formation of islands with an excess of generation will cause high voltages and over-frequency conditions until the generation is tripped off. The formation of islands with a deficiency of generation will cause frequency and voltage sags until load is tripped off. WKP has experienced both situations upon the loss of a key system element or number of elements. These conditions lead to power quality and reliability problems for WKP's

customers. The studies have also demonstrated that under certain conditions WKP is also at risk from system collapse which would affect major portions of its load in the Okanagan as well as the Kootenays.

### 3.2 Minimum System Planning Criteria

As discussed in Section 2.1 WKP's 20 Year Transmission and Distribution Master Plan reviewed the present condition of the Kootenay and Okanagan transmission systems. Objectives of the Plan included safety risk management, reliability improvements, power quality improvements and the avoidance of redundant facilities from a single system operator viewpoint.

To meet these objectives, WKP applied a number of planning criteria. WKP applied these criteria to the present system without considering ownership of the system components, in order to achieve overall objectives from a system perspective. The most important criterion has been the adoption of a single contingency outage for the bulk transmission system, which requires that after the failure of any single major system element the system can be quickly reconfigured to pick up all the load. This is referred to as N-1 criteria.

The predominant criterion of all utilities in North America is N-1. It is required by the Reliability Management Agreement between WKP and the Western Systems Coordinating Council ("WSCC"). Exhibit 76, entitled "General Instructions for WSCC Compliance with North American Electric Reliability Council ("NERC") Planning Standards" requires that in the event of a single contingency, that there be no loss of demand and the system remain stable. It also notes that for single contingencies a planned or controlled interruption of generators to radial customers, or some local network customers, may occur in certain areas without impacting the overall system stability. WKP's loads and generation in the Kootenay region are interspersed on the transmission system and, therefore, would be impacted by generation and load remedial action schemes. Such Remedial Action Schemes[1] ("RAS") for interspersed loads would be less desirable under the NERC guidelines but may be necessary in less developed areas.

Other minimum system planning criteria included thermal loading to 100% of emergency rating and voltage limits to +/– 10% of nominal. Systems are frequently planned to meet higher criteria. Higher level criteria would include N-2 and N-3 outage criteria, reduced line loss levels, increased system stability and increased reliability. Planning criteria to deal with power quality included the requirement to avoid system conditions such as generation islanding and avoidance of the use of remedial action schemes.

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[1] A Remedial Action Scheme is a protection scheme which will trip off generation or load when voltage, current or frequency levels meet certain, pre-defined conditions.

### 3.3 Voltage of Transmission System

WKP has studied two voltage levels to address the needs of the transmission system. The 63 kV level would involve either the rebuild of the present system (K1) or a possible rebuild with fewer but heavier lines (KlA) referred to in the WKP 20 Year Transmission System Plan. The present capacity of the river lines is approximately 50 MW/line for a total capacity of 400 MW between Brilliant and Warfield. The proposed 230 kV line will have a rating of 550 MW. This higher capacity is required to accommodate increased flows caused by the lower resistance 230 kV interconnections. A 230 kV system provides several advantages: it creates a stronger path for the bulk transfer of power; a more compact structure configuration is possible; and it is more readily integrated into the present 230 kV transmission system of B.C. Hydro, CPC/CBT and Cominco. Lower voltages would require additional transformation to integrate them and would have higher resistances to power flow.

### 3.4 System Configurations to Address System Deficiencies

To attempt to meet the foregoing planning criteria WKP selected five options labeled as Kl, K2, K3, K4, and K5. Other options were studied and rejected.

The K1 system option consists of the following basic elements:

1. The construction of an additional 63 kV line from South Slocan to B.C. Hydro's Kootenay Canal plant and a 63/230 kV transformer at Kootenay Canal. This element is needed to strengthen the interconnection capacity of the region in order to satisfy system stability and power quality problems associated with generation islanding events. It corrects the present lack of capacity on the Line No. 13. It is required for all options.

2. The extensive refurbishment of all present 63 kV river lines between South Slocan and Trail to satisfy safety and system reliability deficiencies.

3. The replacement of aging circuit breakers at the Brilliant and South Slocan generating stations in order to satisfy safety and reliability concerns.

4. A reconstruction of the Tadanac and Warfield substations to satisfy safety and reliability concerns. Present deficiencies consist of inadequate grounding, breakers and other equipment which are suspect and which may not perform properly, and circuit and bus arrangements which do not adequately clear and protect against N-1 contingencies.

5. The addition of a third transformer at Waneta Generating station. This is required to export excess generation in the Kootenays caused by spring freshet conditions at the Kootenay River, Brilliant and Waneta Generating stations and light loads in the Kootenays. The total amount of possible excess generation under these conditions is 400 MW and the present transformers are limited to 350 MW.

6. The construction of a 230 kV line diversion from Cominco's Line No. 71 (Waneta to BPA's Boundary substation) to the B.C. Hydro Nelway substation. Although this may not be strictly required to satisfy the above planning criteria, before any further interconnections with B.C. Hydro's system would be allowed, B.C. Hydro requires the construct of this line diversion to mitigate the impact of exacerbated loop flows caused by the strengthened interconnection. This component element is required for all options.

This option satisfies the planning concerns for safety and reliability and satisfies present N-1 criteria for WKP load. However, the extensive refurbishment of equipment has been calculated to take from 8 to 15 years and during this time WKP may be exposed to the multiple outage situations similar to those which occurred during the summer of 1999. This would require WKP to install remedial action schemes for the generation at South Slocan and the load at Cominco.

The K2 system option consists of the following basic elements:

1. A second South Slocan to Kootenay Canal connection (same as K1).

2. The retermination of the six 63 kV lines from South Slocan into a new Brilliant substation in order to facilitate the replacement of the remaining portions of 63 kV lines to Trail, and to connect to the 230 kV line that CPC/CBT is building from Keenleyside to Selkirk.

3. The extensive structural rehabilitation of the South Slocan to Brilliant lines in order to satisfy safety and reliability concerns.

4. The demolition of the existing eight 63 kV lines from Brilliant to Trail.

5. A 230 kV line from the new Brilliant substation to Warfield to replace the present 63 kV lines for safety and reliability concerns and to provide additional capacity on an alternate path for increased generation from the South Slocan (all plants) and the Brilliant generation stations.

6. An additional 230 kV line from Warfield substation to Waneta substation. This is needed to provide additional capacity to the present 63 kV lines which are inadequate to serve the load in Trail in the event of an outage to one of the lines.

7. The addition of two 230/63 kV transformers at Brilliant to transform the output of the Brilliant plant to 230 kV for transmission on the 230 kV lines.

8. The addition of two 230/63 kV transformers at Warfield to supply local distribution substations and the Cominco load.

9. A reconstruction of the Tadanac and Warfield substations (same as K1).

10. Replacement of circuit breakers at Brilliant and South Slocan (similar to K1).

11. Line No. 71 diversion to Nelway (same as K1).

The major differences between K1 and K2 are: the change in voltage from 63 kV to 230 kV between Brilliant and Waneta; the interconnection with CPC/CBT at Brilliant; and the addition of a 230 kV line from Warfield to Waneta. The addition of this line eliminates the need for remedial action schemes for

Cominco load and for Waneta generation, and for additional transformer capacity at Waneta. Remedial action schemes are still required for generation at South Slocan.

The K3 system option is similar to K2 except for the demolition of six 63 kV river lines between South Slocan and Brilliant and their replacement with one 230 kV line from Kootenay Canal to Brilliant.

The K4 and K5 system options are similar to the K2 and K3 options respectively except that in each case the 230 kV line from Brilliant to Warfield is replaced by a 230 kV line from Keenleyside to Warfield.

## 3.5 Comparison of System Planning Options

### 3.5.1 Qualitative Comparisons

Each of the options was developed from the perspective of a single system operator. Option K1 satisfied the minimum system planning criteria, however, all options provided varying degrees of benefits to the various participants (Exhibit 1, Appendix D, pp. 49-54).

The benefits that option K1 would provide to WKP include: elimination of system collapse exposure for N-1 events; mitigation of safety hazards on WKP owned river lines; mitigation of worker safety hazards on Cominco owned river lines; necessary safety and reliability improvements at the Tadanac and Warfield Switching Stations; and, some resilience against system islanding events.

The additional benefits to WKP for option K2 over option Kl include: elimination of safety hazards on the Cominco and WKP river lines from Brilliant to Trail (Kl only mitigates these hazards); elimination of worker safety hazards in the Cominco Tadanac and Warfield substations; elimination of system collapse and loss of load for N-2 events; elimination of system collapse exposure for common mode N-3 or N-4 events (e.g. loss of all four Waneta to Trail 63 kV lines); reduced line losses; avoided cost of transformation at Mawdsley substation near Warfield; greater resiliency against system islanding events; reduced pole replacement costs on WKP owned river lines between Brilliant and Trail; and, improved aesthetics.

The additional benefits to WKP of K3 over K2 include: elimination of public/worker safety hazards on WKP and Cominco lines from Brilliant to South Slocan; elimination of system collapse; and, load loss exposure for N-2 events and improved resiliency against system islanding.

Option K5 has reduced line losses over K3 and improved aesthetics.

The benefits to Cominco of option Kl are similar to those of WKP. The additional benefits to Cominco of K2 over Kl are also similar to those of WKP, plus: reduced cost of 63 kV reconstruction at Tadanac and Warfield; avoided cost of additional transformation at Waneta; and, land redevelopment potential of the Brilliant to Trail corridor. The additional benefits of Option K3 are similar to those of WKP plus land redevelopment potential of the South Slocan to Brilliant corridor. Option K4 and K5 benefits are identical to K2 and K3.

There are no benefits to CPC/CBT of option K1. However the benefits of K2 and K3 include: reduced losses on the Brilliant to Selkirk transmission line; improved generation security; avoided costs of single phase reclosing on the Keenleyside to Selkirk line; and, aesthetic and environmental improvements. The additional benefits of K5 and K4 include: reduced line losses compared to K2 or K3; increased generation security; and, improved aesthetics.

The benefits to B.C. Hydro for all options include avoided loop flows and for higher level options some reduced losses and generation security improvements.

### 3.5.2 Economic Comparisons

The following is a comparison of costs and rate impacts of the options and amended Application (Exhibit 4, Tab 1, p. 3, Table 2). The revenue requirements analysis assumes certain cost sharing assumptions based on a partial WKP quantification of the benefits listed above.

Table 3.1

**Estimated Project Costs and Rate Impacts**

| Planning Option | Capital Cost ($ million) | WKP Share | Rate Impact Cumulative - 6 year |
|---|---|---|---|
| K1 (63 kV life extension) | 75.0 | 49.7 | 3.78 %[2] |
| K1A (15 year line replacement) | 111.2 | 70.6 | 3.78 % |
| K1B (8 year line replacement) | 110.4 | 69.8 | 3.78 % |
| K2 (Waneta-Brilliant) | 104.5 | 69.8 | 5.15 % |
| K3 (Waneta-Kootenay Canal) | 106.5 | 74.3 | 5.04 % |
| K4 (Waneta-Keenleyside) | 110.0 | 70.2 | 5.88 % |
| K5 (Waneta-Kootenay Canal) | 112.3 | 74.6 | 5.68 % |
| K3 Application (as amended) | 110.0 | 80.0 | 6.20 % |

[2] Although the K1 option has a lower capital cost and WKP share than the K1A and K1B options, the rate impact is the same because of higher facilities maintenance costs for the K1 option vs. higher capital costs for the other two options. Both of these impacts are spread over later years.

Cominco, CPC/CBT and B.C. Hydro have disputed the cost sharing assumptions of WKP based on their evaluation of the benefits WKP has assigned to each party, however, no parties have argued that the benefits described by WKP are non-existent. Safety benefits, aesthetic improvements, and some reliability benefits are not quantified.

WKP provided information about the effect of deferring the 230 kV transmission line north of Brilliant (Exhibit 4, Tab 1, pp. 2 and 3). To avoid negatively affecting reliability and power quality in the Slocan-Nelson area, certain additional capital expenditures would be required. WKP stated that development of the northern part of the 230 kV system could be deferred to 2007 and the capital expenditure reduced by $11 million, however, approximately $4 million of stranded investment would result. WKP felt that a deferral would not be prudent, as it would increase the 20-year net present value ("NPV") revenue requirements by $2.2 million (Exhibit 4, Tab 1, Tables 1 and 2.3). WKP considered that a transmission line from Kootenay Canal to Brilliant would provide an alternative path for generation, and would make the system more robust against voltage and frequency excursions that comprimised power quality standards.

## 3.6 Other Planning Options from a Single System Viewpoint

### 3.6.1 The Current Status of System Integration

Pursuant to the Commission's Decision on WKP's Transmission Access Application, WKP is required to provide a report by June 2000 to the Commission detailing the status of a single-system operator proposal. During the hearing WKP stated that, based on its discussions with B.C. Hydro, it sees significant advantages to a Regional Transmission Organization ("RTO"). WKP anticipates that a RTO could be present sometime in the next five to seven years (T1: 23 and 100). Intervenors expressed support for cooperation of various forms.

CPC/CBT indicated that it supported integrated planning as demonstrated by their participation in WKP's system development planning process. CPC/CBT contemplated that in the future that it could play a similar role to ensure that duplicate lines would not be constructed (T7: 1294). CPC/CBT felt, however, that any integrated solution must be one that accommodated its strategic business interests and that it was prepared to consider construction and interconnection of certain facilities, upon acceptable commercial, financial and regulatory conditions (Exhibit 1, Appendix A). CPC/CBT also indicated that there may be a public interest related to interconnection with WKP but maintained it was WKP's responsibility to meet this interest (T7: 1220).

Despite CPC/CBT support for integrated planning, the transmission grid in the Kootenays has evolved in a disjointed fashion. CPC/CBT indicated that its own needs for transmission for its generation projects were decided three to five years ago, before WKP determined its transmission requirements (T7: 1294). As a result it expressed reservations about interconnecting with WKP, and required assurances that interconnection would not disrupt its other projects.

Cominco agreed that there would be merit in attempting to plan the system taking into account all stakeholders in the region. It felt that the interests of the public and users of the system could not be met if other parties' interests were not considered in planning the facilities (T6: 1089). Cominco characterized its own involvement in the planning process for the 230 kV facilities as "not intensive involvement or close supervision but rather as representation" (T6: 1108). Cominco recognized the need for a unified strategy to coordinate the replacement or modification of transmission facilities in the Kootenays. However, it expressed the need for negotiations to align project benefits with Cominco's strategic interests (Exhibit 1, Appendix A).

With respect to construction of interconnecting facilities, Cominco indicated that its system and WKP's system are more separate than in the past and each should construct the facilities it needs (T7: 1176). Cominco suggested that WKP should construct facilities as if Cominco were not necessarily connected to WKP's system. If it was beneficial to Cominco to interconnect with the WKP system, then Cominco would pay for those facilities. In Cominco's view, WKP should not construct specific facilities for Cominco unless requested by it (T7: 1176).

### 3.6.2 Alternative System Configurations and Possible Redundancies

Cominco, in its opening statement, cautioned against the risk of WKP building transmission facilities that might become redundant in a short time. Cominco outlined the essential components that it considered necessary to improve reliability in the Kootenay area. Cominco cited two key unresolved issues related to future development of an integrated system. They were: (a) the desirability of a 230 kV connection to the South Okanagan; and, (b) renegotiation of the Canal Plant Agreement.

Cominco argued that the primary purpose of the 230 kV connection from the Canal plant to Warfield is to move generation out of the Kootenays to the Okanagan via a proposed 230 kV line from Warfield to the Okanagan. In these circumstances, Cominco queried the need for 230 kV transmission between the Canal plant and Warfield. Instead, Cominco suggested that south Okanagan supply could be reinforced by a tap off B.C. Hydro's 500 kV transmission system near Oliver (Exhibit 83, p. 3), eliminating the need for a 230 kV line from Warfield to the Okanagan. This, in turn, would reduce the need for capacity between the Canal plant and Warfield (Final Argument, p. 3). Cominco also questioned whether WKP's 230 kV plan

was intended to ensure that it had adequate facilities to move power into the Okanagan upon the expiry of a transmission wheeling agreement between WKP and B.C. Hydro.

Cominco further stated that the need for capacity from the Canal plant to Warfield would be lessened if, as a result of the Canal Plant Agreement negotiations, Cominco elected to curtail its deliveries over WKP facilities to Warfield. In short, under these scenarios, WKP's proposed facilities might not be required now or in the future (Argument, p. 4).

Cominco suggested that a single-system operator (such as under an RTO) might rationalize the system differently than proposed by WKP. To illustrate, it provided Exhibits 30 and 95 and suggested that this represented a system conforming to the single owner concept. Exhibit 30 proposed a transmission line (63 kV or 230 kV) from Brilliant to Warfield, an additional 63 kV line from South Slocan to the Kootenay Canal plant and the elimination of the 63 kV lines from South Slocan to Brilliant. This proposal envisions that the generation from the four Kootenay River plants and from the Kootenay Canal plant would be transmitted out of the area via B.C. Hydro's 230 kV transmission lines from Kootenay Canal to the Selkirk substation. The generation from Keenleyside and Brilliant would be transmitted out of the area via CPC/CBT's 230 kV transmission line from Keenleyside/Brilliant to Selkirk and local load would be supplied via a transmission line from Brilliant to Warfield. There was considerable debate regarding the limitations of the B.C. Hydro system and what was required to correct these limitations. However, Cominco's engineering consultant considered that such a system with the appropriate remedial action schemes met the N-1 criterion (T6: 1073, T7: 1146). Cominco, therefore, argued that WKP's proposal should be dismissed given insufficient confidence that the facilities proposed by WKP would be required in a new transmission world.

Cominco characterized Exhibit 30 as an initial model which could provide the base for implementation while recognizing that there are many business aspects still to be resolved (T6: 1073). Cominco acknowledged that its alternative had only been given a preliminary engineering review and required more study. Furthermore, it indicated that the primary motivation behind Exhibit 30 was to support the continued viability of its Trail operations (T6: 1087). Cominco agreed that WKP's proposal seemed to solve the electrical problems, but added that it seemed wasteful and that other solutions should be aggressively explored (T6: 1085). Cominco stated that it was not designing the system but was looking at its interests and the impact of WKP's proposed system on its own operations (T7: 1144).

In reply, WKP indicated that whether or not there was a RTO to be in place, the river lines needed to be replaced and that the Project was necessary (T1: 25 and 124). WKP also indicated that planning of the 230 kV facilities was done from the perspective of a single operator (T2: 317). In terms of the Kootenay supply system, there was no consideration given to factors that went outside the bounds of the owners

already in existence and the system was treated as one system covering all owners in this area. The studies that formed the basis of a feasibility planning study were jointly undertaken by WKP and B.C. Hydro from a single system perspective (T6: 999).

With respect to a future line from the Kootenays to the Okanagan, WKP stated that there had not been a decision on whether the line should be built (T1: 22). WKP stated the two projects were independent and there were no designated facilities in the 230 kV application designed to accommodate any future Okanagan upgrade (T2: 22).

At the suggestion of Atco Lumber Ltd. ("Atco"), WKP filed an alternative system configuration diagram that showed a connection to B.C. Hydro's 500 kV system near the Kootenay Canal plant and connection of the CPC/CBT Keenleyside line to one of the B.C. Hydro 230 kV lines from Kootenay Canal (Exhibit 53). This configuration had no WKP 230 kV transmission lines between Kootenay Canal and Waneta, but required a 230 kV connection from Warfield to Selkirk. WKP suggested that this configuration would have a $13 million higher cost, and would be of lower quality and less robust than its preferred option (T4: 733). Atco also filed a "Facility Rationalization" diagram, which was similar in concept to Exhibit 53, but excluded some facilities between Kootenay Canal and Selkirk (Exhibit 57). WKP considered this configuration to be technically inadequate (T4: 736).

The Consumers' Association of Canada (B.C. Branch) et. al. ("CAC (B.C.) et al.") submitted that there was no compelling reason for issuing a CPCN since there is no clear agreement on the nature and the extent of the required upgrade. It stated that in hindsight WKP should first have proceeded with a CPCN application for the Kootenay-Okanagan connection project. The CAC (B.C.) et al. reasoned that all of the uncertainties concerning WKP's application would be the basis for buying some time before approving final transmission facilities in the Kootenay region (Argument, p. 19).

### 3.7 Commission Findings

WKP's initial preference, developed during the planning process described in Chapter 2 and contained in the Application submitted November 12, 1999, was option K5. However, in its January 10, 2000 filing, WKP proposed option K3. This was modified during the hearing process with respect to routing. The K3 and K5 options provide superior safety and reliability benefits compared to Kl, K2, and K4 by removing all of the 63 kV river lines. They also offer significant aesthetic benefits compared to K1 and K2.

**The Commission determines that the added benefits of the K3 and K5 options make them preferable to the other options. The Cominco and Atco variations are found to be inferior to the K3 or the K5.**

**The Commission determines that the substantial risk to public and worker safety of the status quo dictates that the river lines, and some substations, must be replaced. The K3 and K5 options would accomplish this. The Commission considers that K3 and K5 options are compatible with future Okanagan reinforcement either by the South Okanagan substation or a new 230 kV transmission line from the Kootenays.**

K3, as modified at the hearing, is less costly than K5, with correspondingly reduced impacts on WKP ratepayers. The Commission cannot turn back the clock to reconfigure existing transmission facilities as if they had been planned and were operated as an integrated system. Both options are analyzed in more detail in subsequent chapters.

K5 is not viable at this time owing to the failure of WKP and CPC/CBT to negotiate satisfactory interconnection arrangements, a point discussed further in Chapter 4. Nevertheless, further consideration is given to K5 because of its alternative routing remote from existing communities. A variant of WKP's K3 option that was suggested during the hearing – the so-called cross-over diversion – will also be discussed in connection with routing. Finally, the Commission will evaluate other possible modifications of the K3 option.

## 4.0 TRANSMISSION LINES

As noted in Section 2.5, WKP proposes to replace the six 63 kV transmission lines between South Slocan and Brilliant with one 230 kV line. WKP also proposes to replace the eight 63 kV lines between Brilliant and Trail (Warfield) with a 230 kV line, and to build another 230 kV line between Warfield and Waneta. In the Kootenay area a 230 kV system provides the optimum design for major new components. One or two of the 63 kV lines would remain in some areas to supply local loads. In addition, WKP plans to add a second 63 kV intertie built from South Slocan to the Kootenay Canal plant in parallel to Line No. 13, and to upgrade several substations.

In each of the proposed line sections, South Slocan to Brilliant, Brilliant to Warfield and Warfield to Waneta, several routing alternatives were explored by WKP before selecting a preferred route option.

### 4.1 South Slocan to Brilliant

Three options were examined for this section of the proposed line:

- West Route
- Low Elevation Route
- High Elevation Route

### 4.1.1 West Route

The West route option follows the existing 63 kV transmission corridor along the west side of the Kootenay River, from South Slocan to Brilliant, as shown on Figure 4.1. Replacement of the 63 kV lines with one 230 kV line on single pole structures and reducing the width of the corridor would reduce the visual impact and enhance aesthetics in the area. However, the corridor would continue to affect landowners and community values in Shoreacres, Tarrys and Thrums (Exhibit 3, Tab 2, p. 2). Two of the 63 kV lines would be retained from South Slocan to Tarrys to supply local loads. Figure 4.2 is a sketch to scale showing the cross-section of the existing corridor north of Glade/Tarrys, under the different routing alternatives (Exhibit 65, p. 14, drawing BCUC6).

The Kootenay River Valley between South Slocan and Brilliant is fairly heavily developed, and the existing right-of-way is covered by over 70 agreements with private landowners. Most of the old agreements would need to be renegotiated, as they contain restrictions on voltage level and pole height that would not currently permit a 230 kV line (T5: 901-903). WKP has not made a detailed assessment of the restrictions, but expects that acquisition of a right-of-way across Crown land would be much simpler.

Wildlife and wildlife habitat would not be directly impacted by the West option, and may benefit to the extent the right-of-way width is reduced with a 230 kV line (Exhibit 3, Tab 2, p. 7). Other land uses, including agriculture and recreation, would show a similar beneficial impact to the extent the right-of-way is reduced. The impact on stream crossings is expected to be minimal.

A West High Elevation route on the west side of the Kootenay River was considered briefly in the hearing. The route would require three river crossings and the cutting of a new transmission corridor through forest land. The sections near Brilliant and South Slocan would be highly visible. At the north end, locating a new 230 kV transmission corridor through the relatively heavily populated South Slocan area would be a challenge. WKP concluded that the route was feasible but highly unattractive (Exhibit 65, pp. 1-3).

### 4.1.2 Low Elevation Route

The Low Elevation route was WKP's preferred option when it applied for the project. A new 230 kV line on H-frame structures would follow the B.C. Hydro right-of-way from the Kootenay Canal plant on the east side of the Kootenay River, and then run in a south-west direction along a new corridor to join with the CPC/CBT corridor to Brilliant.

The existing B.C. Hydro right-of-way is very visible from the valley and WKP expects that the additional line would have a similar high visual impact. The southern portion where the line approaches Brilliant would be visible from Castlegar. WKP expects that the affect on residential areas would be slight. However, residents of Glade, who live near the B.C. Hydro right-of-way, consider any further development that expands the transmission line corridor towards their properties would be highly undesirable (TC1: CH15 and CH22; TC2: CH136).[3] Figure 4.3 is a sketch to scale showing the cross-section of the Glade Hill section of the B.C. Hydro transmission corridor, under several routing options.

The Low Elevation route would have a moderate impact on wildlife and wildlife habitat. The impact on aquatic resources would be low, and could be mitigated through proper construction and maintenance procedures for stream crossings. However, residents of Glade rely on several of the streams for domestic water supply and were concerned about short and long term impacts on their water supply (TC1: CH21, CH29 and CH97; TC2: CH127).

WKP expected the route to have a low level impact on forest resources and forestry operations. About 60 hectares of forest land would need to be cleared (Exhibit 2, p. 59). The new line would traverse about 4.4 km of land that Atco holds in fee simple (T4: 756). Atco holds approximately 20,000 acres of fee simple land, and is concerned about the ongoing alienation of forest land for utility corridors (T4: 763 and 764). Atco is also concerned that the need to carry out its forest management and harvesting activities in the vicinity of a transmission line would add costs and interfere with sound forest management (Exhibit 9A, pp. 10 and 11). Atco expects to be compensated by WKP for any financial impact resulting if lands are removed from the Forest Land Reserve (T4: 782). Atco recently completed a land swap with CPC/CBT in exchange for a transmission line right-of-way (T4: 785).

The Low Elevation route would also cross a parcel of forest land held by Selkirk College. The College suggested the use of double circuiting where the WKP and CPC/CBT lines share a common corridor, and expressed a desire to coordinate access road construction and clearing activities (Exhibit 10G, p. 1). WKP has written to CPC/CBT to inquire about double circuiting through the Selkirk College block, but has not received a reply (T5: 907). This would require CPC/CBT to interrupt the purchase of materials for their line and to implement a changed design.

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[3] TC1: CH15 refers to Transcripts, Community Hearing, Vol. 1: page 15 of Community Hearing.

### 4.1.3 High Elevation Route

The High Elevation route was adopted by WKP as its preferred route option during the hearing. The route runs on the east side of the Kootenay River, in a new corridor east of the existing B.C. Hydro right-of-way, before turning west to Brilliant. This route would have the least visual impact, and would only be visible from the Valley near Kootenay Canal plant and Brilliant (Exhibit 4, Tab 1, pp. 29 and 30).

The High Elevation route crosses the same streams as the Low Elevation route, and WKP expects that the impact on aquatic resources will be low. Residents of Glade did not express concern about the impact of the High Elevation route on their water supplies.

The route would have a moderate impact on wildlife and wildlife habitat. WKP stated that the route does not traverse much ungulate winter range, but traverses an area with a moderate rating for grizzly bears. Additional access roads would be required which could increase human access and habitat fragmentation in the absence of access controls.

The High Elevation route is expected to traverse more old growth and mature forests than the Low Elevation option, and clearing of 80 to 120 hectares of forest land would be required. Atco estimates that the route would cross 5.3 km of its fee simple land (T4: 756). The High and Low Elevation options would have similar impacts on Selkirk College's parcel of forest land (T5: 904 and 905).

### 4.1.4 Economic Impacts

WKP filed a cost estimate for each route option, including right-of-way acquisition and compensation, environmental mitigation and line termination costs (Exhibit 65, p. 7).

During the hearing, in response to the concerns raised by area residents, WKP evaluated the cost of mitigating the impact of the Low Elevation route by constructing its 230 kV line on the uphill side of the B.C. Hydro corridor through the Glade area and building the Glade Hill portion of the line as a double circuit on one of the B.C. Hydro 230 kV lines. WKP estimated the up hill location would increase the cost of the Low Elevation alternative from $8.428 million to $9.528 million (T5: 811). Also, WKP identified that the need to coordinate the construction project with B.C. Hydro would impose severe logistical constraints. As the revised difference in cost between the Low (Uphill Side) and the High Elevation options was only $300,000, WKP adopted the High Elevation option as its preferred route.

The cost comparison for the route options is shown in Table 4.1.

Table 4.1
**Cost Comparison of Route Options**

| Route Option | Capital Cost Total ($ million) |
|---|---|
| West (Existing Right-of-Way) | 10.132 |
| Low Elevation (Downhill Side) | 8.428 |
| Low Elevation (Uphill Side) | 9.528 |
| High Elevation | 9.828 |

WKP did not prepare a comparative cost-benefit analysis of the economic and social impacts of the Project. Compared to the environmental and cost impacts described in the Application, other economic and social impacts were considered to be of a lower order of magnitude (Exhibit 4, Tab 2, p. 1).

WKP argued that the High Elevation route reasonably balances all the competing interests. However, selection of the High Elevation option may delay finalization of permitting and final cost estimates for this part of the Project by one to two months. WKP considered that the primary impact from the route will be to forestry operations, and proposed the following mitigation measures where possible:

- consolidate the routing out of Brilliant with the CPC/CBT transmission line;
- use land swaps for compensation;
- coordinate the timing and sequence of logging; and
- use large spans near McPhee Creek to reduce clearing of forest land.

The Concerned Citizens and other local residents supported the High Elevation option, as it would remove the transmission line from the valley and reduce the impact on communities. The Regional Districts took a similar position.

Atco argued in support of the West option as it would be in an existing transmission corridor which is wider than would be needed, and would not require cutting another new right-of-way through productive forest land. The City of Nelson expressed concern that the High Elevation option would burden ratepayers with higher capital and operating costs.

#### 4.1.5 Commission Findings

The West route has the highest capital cost of the options, and is the most intrusive on residents in the area. The Low Elevation route impacts overall are more negative than those of the High Elevation route. The estimated costs for the Low and High alternatives are not significantly different, particularly if the Low Elevation route is to be placed on the Uphill Side of the B.C. Hydro corridor. The impact of the High Elevation option on forestry activities can be mitigated to some extent, and WKP will need to compensate

owners or tenure holders for the right-of-way that it requires. This compensation may take the form of land swaps.

**The Commission determines that construction of a 230 kV transmission line is required between South Slocan and Brilliant along the East High Elevation route, subject to the filing of final line alignment, right-of-way acquisition plans and an updated cost estimate. WKP is directed to implement the mitigation measures that it identified, where possible. These include consolidating its routing with that of the CPC/CBT line, the use of large spans to reduce clearing and coordination of the timing and sequence of logging.**

## 4.2 Brilliant to Warfield

The Application as originally filed on November 12, 1999, proposed a 230 kV transmission line in option K5 route from the Keenleyside plant to Warfield. WKP's January 10, 2000 filing amended the Application to adopt the K3 route from Brilliant to Warfield as the preferred option for the 230 kV line.

Three route options were examined for this section of line:

- the K3 route;
- the K5 route; and
- the Cross-over route.

### 4.2.1 The K3 Route

Option K3 transmission line would generally follow the existing 63 kV transmission corridor, as shown on Figures 4.4 and 4.5. WKP proposed to replace the eight 63 kV lines with one 230 kV line. Two of the 63 kV lines would be retained from Brilliant to Blueberry and from Warfield to Stoney Creek to supply local loads. Short diversions are proposed to bypass the communities of Blueberry, Fairview, Genelle and Rivervale, and for the approach to Warfield (Exhibit 1, Tab 3, p. 1). Figure 4.6 is a sketch to scale showing the cross-section of the existing corridor in south Ootischenia, compared to the situation with a 230 kV transmission line in the corridor and with a 230 kV transmission line routed from Keenleyside to Warfield. Figure 4.7 shows a similar comparison for the section of the existing corridor between Blueberry and Stoney Creek.

The new 230 kV transmission line would have a significant beneficial impact relative to the existing eight 63 kV lines. WKP proposed to use single-pole structures with longer 100 to 150 metre intervals between poles to minimize the impact on local communities (Exhibit 3, Tab 2, p. 4). Adjacent residents, agriculture and aesthetics would all benefit. Wildlife and wildlife habitat have been affected by the existing

development in the area, and would be expected to benefit from a narrower right-of-way and fewer poles. Very few new access roads or stream crossings would be needed.

The divergences around residential communities, plus a change in the approach to Warfield, would require short sections of new right-of-way, which would have some local impacts. WKP estimated the diversions would cost $291,000, and would have significant positive economic and social impacts on the communities involved. WKP was compiling individual property ownership information as part of the environmental management plan process, but did not intend to contact individual property owners until the route selection process was complete (Exhibit 4, Tab 1; p. 32).

#### 4.2.2 The K5 Route

The K5 route would entail a new 230 kV transmission line from the Keenleyside generating plant to Warfield. The K5 configuration relies on the use of CPC/CBT's line from Keenleyside to Brilliant to complete the 230 kV circuit from the Kootenay Canal plant to Warfield.

The K5 route would be a new transmission corridor that would avoid developed areas. WKP expects that existing access would provide much of the required access (Exhibit 3, Tab 2, p. 4). This route would reduce, and in some sections eliminate, the existing right-of-way along the valley bottom between Castlegar and Trail. This could encourage commercial and residential development and tourism opportunities, increasing land values and assessments for taxation purposes. The reduced visual impact would have aesthetic benefits for residents and travelers. The new 230 kV line would not be visible from the valley, except for the portions near Keenleyside and Trail. WKP expected that the need to clear a new right-of-way would have a moderate negative impact on wildlife and wildlife habitat. The new right-of-way would also increase human access, which could negatively impact wildlife resources.

For the new right-of-way, WKP would need to clear 60 to 120 hectares of mainly mature forest. The elimination of this land from forest production would be expected to reduce the amount of wood that Atco could cut in its Arrow timber supply area licence. Selkirk College owns a block of forest land along this route which WKP might be able to avoid (T6: 978).

Stream crossing impacts would be generally expected to be low, although steep terrain may require more extensive mitigation measures. The Environmental Screening Report stated that access road construction and transmission line installation near the drainage divide between Blueberry and China Creeks has the potential to increase erosion and destabilize the steep slopes (Exhibit 2, p. 9). Allowance was made in the capital cost estimate for measures to address these concerns, but the impact on future maintenance costs has not been explicitly reflected.

### 4.2.3 The Crossover Route

During the hearing, WKP identified a Crossover route option, which would go east from Brilliant along the CPC/CBT line that runs to Selkirk, cross over the Columbia River near Blueberry and then follow the southern portion of the K5 route to Warfield.

The Crossover route was generally expected to have similar impacts as the Keenleyside to Brilliant route, except for somewhat greater (but still relatively small) residential, visual and recreational impacts. This route option would also cross some Atco fee simple land (T4: 756, and Exhibit 60).

### 4.2.4 Economic Impacts

WKP considered that option K5 has the greatest electrical and economic benefits if planning is done from a single owner perspective. However, WKP was unable to obtain agreement from the other parties about how to share the incremental costs associated with option K5 (T2: 363). WKP's evidence indicated that option K5 would increase the deemed WKP share of the cost of the Project by $6.9 million (Exhibits 27C and 27D).

WKP filed a cost estimate for each of the three options, including right-of-way acquisition and compensation, environmental mitigation and line termination costs. To provide a proper comparison of the options, the capital costs included the 230 kV transmission line and Brilliant substation for each option, plus a substation at Keenleyside for option K5. The cost comparison for the route options is shown in Table 4.2.

Table 4.2
**Cost Comparison of Route Options**

| Route Option | Capital Cost Total ($ million) |
|---|---|
| K3 (Brilliant – Warfield) | 30.1 |
| K5 (Keenleyside – Warfield) | 35.4 |
| Crossover | 33.7 |

WKP did not prepare a comparative cost-benefit analysis of the economic and social impacts of the options. Compared to the environmental and cost impacts set out in the Application, WKP considered other economic and social impacts to be of a lower order of magnitude.

WKP filed an Environmental Screening Report, and will prepare an Environmental Management Plan, an Access Management Plan, a Visual Impact Management Plan and a Vegetation Management Plan for the Project (Exhibit 1, Tab 3, p. 7). WKP stated that it would continue to consult with the appropriate agencies, stakeholders and the public through the next stages of project planning and development regarding corridor and alignment decisions, in order to mitigate potential impacts.

WKP argued that the proposed K3 Brilliant to Warfield route eliminates the need for new clearing, that the diversions would minimize the impact on most residential areas and that much of the right-of-way would be on land owned by Cominco.

Opponents to the K5 and Crossover routes included Atco, who generally opposed cutting new rights-of-way through productive forest land. Mr. Wood, a retired biologist, noted that the region has a population of grizzly bear, elk and other large animals which are under threat from human encroachment. Transmission corridors and other development have compromised the valley as wildlife habitat. Mr. Wood, therefore, submitted that the new transmission lines should be built in the existing corridors (T7: 1248 to 1252).

The Regional Districts supported the K5 Keenleyside to Warfield route, on the basis that any line in the existing corridor would be a barrier to staged development and would have a significant visual impact. The lines are expected to remain in place for 50 to 70 years, and the Regional Districts felt that efforts should be made to consider what will be appropriate throughout that extended period.

Residents in the area presented views that were generally similar to those of the Regional Districts. Residents who made submissions at the evening hearing sessions and who filed written submissions generally supported removal of transmission lines from the river valleys.

Mr. Karow, on behalf of the Coalition to Reduce Electropollution ("CORE") supported the remote routes, to keep the lines out of the present corridor in the valley. In that way, the lines would be removed from populated areas, and possible health concerns related to the transmission lines would be avoided.

#### 4.2.5 Commission Findings

The Commission recognizes that the K3 routing not only has the lowest cost for all ratepayers but also that the proposed line with the diversions around most populated areas will greatly reduce the impact on the public compared to the existing lines. This route also minimizes the impact on wildlife and forest resources.

The Commission is of the view that the K5 route and the Crossover route, together with being more costly, provide little in the way of additional benefits to the public interest. The increased alienation of timber reserves and the additional access to wilderness areas offset the marginal benefits of not using a major portion of the existing right-of-way between Brilliant and Warfield. Unlike the linear residential settlement pattern that has emerged along the transmission line corridor between South Slocan and Brilliant, the corridor between Brilliant and Waneta is less continuously inhabited. Mitigation of the impact of the new 230 kV line on the communities and the highway can be achieved with little additional cost by the diversions that WKP has proposed. Where there are no diversions, the present wide right-of-way required for the present lines offers latitude in the alignment of the new single line, as well as the potential for new land uses and public amenities that are compatible with the new line. WKP will be expected to take the interests of residents and landowners into consideration when it is determining the alignment and pole placements for the line.

The K5 route would require connection to the CPC/CBT line from Keenleyside to Selkirk. WKP has not been able to negotiate an agreement for the connection and for sharing the cost of the connection. As discussed in Section 5.2, the Commission considers that it does not have jurisdiction at this time to direct CPC/CBT to connect its transmission system with that of WKP. In this circumstance, the K5 route may not be a viable alternative.

**The Commission determines that construction of a 230 kV transmission line is required between Brilliant and Warfield along the K3 route, subject to the filing of final line alignment, right-of-way acquisition plans and updated cost estimates. WKP is directed to proceed with project planning and development for the line.**

## 4.3 Warfield to Waneta

### 4.3.1 Connection to Waneta

Cominco owns the generation facilities at the Waneta dam and four 63 kV transmission lines connecting Waneta to Warfield. The lines have a rated capacity of 130 MW per line (Exhibit 4, Tab 7, p. 1). The lines are about 50 years old but recent pole tests and visual inspections have indicated that they are in reasonably good condition.

Under an historical arrangement with Cominco, WKP has had limited use of the Cominco 63 kV lines and Cominco's Line No. 71 for the import of contracted energy.

To complete the 230 kV configuration, WKP proposed to build a new 230 kV line in parallel with the four 63 kV lines at a cost of $4.8 million (Exhibit 27D). The Waneta 230 kV substation would be modified to include relocation of the two 150 MW transformers and terminations for the line to Warfield and Line No. 71, at a cost of $6.7 million. WKP assumed that Cominco would pay one half of the cost of the Waneta substation upgrade (Exhibit 27D).

WKP is concerned that flows now approach the capacity ratings of the two transformers at Waneta during spring freshet periods of high generation and light load (Exhibit 3, Tab 1, p. 7). The generator upgrade of 94 MW scheduled for Waneta, plus generator upgrades at Brilliant and the Kootenay River plants, would require an increase in transformer capacity, or the redirection of power along different transmission routes, by 2002.

In Argument, WKP asked the Commission for a direction to Cominco to permit construction of the proposed Waneta substation with modifications to allow connection of the proposed 230 kV line from Warfield to Waneta. WKP also asked the Commission to direct WKP and Cominco to negotiate an agreement on the nature and extent of firm access to Line No. 71 by WKP within a specified time period.

#### 4.3.2 Selkirk and Nelway Alternatives

A 230 kV line from Warfield to B.C. Hydro's Selkirk station or Nelway station was considered as an alternative to the proposed 230 kV line from Warfield to Waneta. Based on a preliminary review, WKP considered that the system configuration with a connection to Selkirk would be identical to option K3 in terms of electrical performance and system reliability (Exhibit 4, Tab 7, p. 3).

WKP estimated this alternative would avoid the Waneta substation costs of $6.7 million, but would require a $1.5 million termination at the B.C. Hydro station plus $6.0 million for the additional line length from Warfield to Selkirk. An overall cost increase of about $0.8 million would result (Exhibit 4, Tab 7, p. 3). WKP subsequently filed information that a line from Waneta to Selkirk would cost $3.2 million, so that this alternative would have a lower overall cost (Exhibit 20B). However, WKP was concerned that a connection to Selkirk would expose it to payment of B.C. Hydro's WTS tariff for power imports (T2: 300).

Under a separate alternative, WKP estimated that the additional line length from Waneta to Nelway would cost $7.7 million. This would also avoid the Waneta substation costs of $6.7 million but require an additional termination cost of $1.5 million. Therefore, the line from Warfield to Nelway would cause an overall cost increase of about $2.5 million relative to the proposed system (Exhibit 20B).

WKP argued that a line to Selkirk would be a duplication of facilities, which would be contrary to the trend toward formation of RTOs. Also, WKP felt that while the cost of a 230 kV connection to Waneta may be shared, WKP ratepayers would pay all of the cost of a line to Selkirk.

#### 4.3.3 Warfield to Waneta Alternatives

If the proposed 230 kV line to Waneta is not approved, WKP must otherwise reinforce its Kootenay transmission system under N-1 contingencies. The options for system reinforcement will depend on whether WKP interconnects with CPC/CBT at Brilliant.

Scenario 1 Interconnection with CPC/CBT at Brilliant with Keenleyside to Selkirk line occurs

Under this scenario if the Warfield to Waneta line was deferred indefinitely WKP has testified that under spring freshet conditions and a loss of the Brilliant to Selkirk line, power flows would overload B.C. Hydro lines and generation rejection would be necessary at one of the Kootenay generation stations. Under winter low generation conditions, loss of the Brilliant to Warfield circuit would result in overload of the Waneta generating station and load rejection would be required (at Cominco's Trail operation) to avoid transformer damage (Exhibit 4, Tab 7, p. 1). In addition, the loss of Line No. 71 under winter low generation conditions, would cause an overload of the proposed Warfield transformers. The overload of the Waneta transformers could also be accommodated by increased transformer capacity at Waneta. (T2: 292).

Under this scenario with the load rejection scheme, the cost reductions to the project would consist of:

| | |
|---|---|
| 230 kV line from Warfield to Waneta | $ 4.8 million |
| Waneta switchyard upgrade | 6.7 million |
| One 230 kV line position at Warfield | 1.6 million |

Additional costs would be required for Remedial Action Schemes and additional transmission capacity at Warfield:

| | |
|---|---|
| Additional transformer capacity at Warfield | $ 0.5 million |
| Kootenay generation rejection | 1.0 million |
| Trail load rejection | 1.0 million |

This would result in a savings of $10.6 million. However, the overall project would lose some system benefits and the exposure to possible islanding problems in the South Slocan area would increase compared to K3.

Scenario 2 If WKP fails to secure an interconnection with CPC/CBT at Brilliant

Under this scenario, a 230 kV line deferral from Warfield to Waneta would require additional transformer capacity at Waneta to handle the spring freshet generation in the Kootenays. With the additional transformer capacity an interruption in the Brilliant to Warfield circuit would not cause an overload on the Waneta transformers and therefore no load rejection would be required at Trail (K1 option).

The cost reductions to the project would consist of:

| | |
|---|---|
| 230 kV line from Warfield to Waneta | $ 4.8 million |
| Waneta substation upgrade | 6.7 million |
| One 230 kV line position at Warfield | 1.6 million |

Additional costs would include:

| | |
|---|---|
| Additional transformer capacity at Warfield | $ 0.5 million |
| Kootenay generation rejection | 1.0 million |
| Additional transformer and substation at Waneta | 10.3 million |

The cost reductions under this scenario are $1.3 million.

Under this scenario, if WKP is unable to build either a transmission line to Waneta or add an additional transformer, generation in the region would be restricted and an alternate solution to its export would be required. This could require a transmission line from Warfield to Selkirk and/or the upgrade of Selkirk substation to increase the capacity of the B.C. Hydro lines from the Kootenay Canal.

#### 4.3.4 Cominco Exemption Order Considerations

The Cominco Exemption Order dated March 29, 1996 was issued pursuant to Section 27 (now Section 22) of the Act, and in it the Minister:

> "exempts Cominco from the provisions of Part 3 of the Act, except sections 51 and 53, and notwithstanding the generality of this clause, in particular exempts Cominco from the provisions of Part 3 of the Act (except section 51 and 53) for: [list of specific items]
>
> subject to the following Conditions:
>
> CONDITIONS
>
> 1. Cominco and West Kootenay shall maintain in force the Facilities Sharing Agreements, as they may be amended from time to time, for the common use of transmission and switching facilities, so that the electrical systems owned by Cominco, West Kootenay, and CPC and the Trust can be operated together as one integrated system;"

Sections 51 and 53 are now Sections 45 and 46, which relate to CPCNs.

WKP argued that Cominco is a public utility under the Act, and that Cominco has an exemption only from the items that are set out in the Cominco Exemption Order. WKP considered that it is a condition of the exemption that Cominco allow its transmission and switching facilities to be used in an integrated manner with the other regional transmission system owners, WKP and CPC/CBT. WKP stated that the FSA requires a party to the Agreement to make available the use of facilities that are surplus to its requirements, and argued that Cominco must act reasonably and in good faith when assessing its surplus capacity on Line No. 71. WKP considers that Section 72 of the Act gives the Commission authority to enforce the terms of the Cominco Exemption Order.

Cominco Position

Cominco stated that it is not prepared to allow WKP firm access to Line No. 71, and objected to the construction of a 230 kV line to Waneta on the basis that it would provide access to Line No. 71 (T7: 1314). The foundation of its operations at Trail has been its generation and transmission lines, which provide low cost power for industrial operations and revenue from surplus sales. Line No. 71 provides Cominco with direct access at low cost to markets for its surplus power (Exhibit 83, p. 7). Cominco was concerned that further integration with the new WKP system could expose it to regulated control of its own 63 kV lines and Line No. 71, and to the application of tariff rates to the movement of its own power over these lines.

Cominco stated that an arrangement is being put in place currently whereby 120 MW of its load could be dropped to keep the system in balance (T6: 1054). Cominco gave evidence that high loads on the Waneta transformers occur in the winter, when ambient temperatures are low, and that the units can operate at 20 to 30% above rated capacity (T6: 1076).

Cominco suggested that WKP connect directly from Warfield to the B.C. Hydro system at either Selkirk or Nelway, and argued that a direct connection between Warfield and Selkirk is less costly and would be superior in terms of electrical capacity and stability of supply.

Cominco argued that WKP's request for directions is not properly before the Commission, and that the Commission does not have the jurisdiction to grant the directions. Cominco stated that WKP does not require access to Line No. 71 for an operational reason, but rather seeks to avoid the payment of B.C. Hydro tolls. Cominco also stated that it does not contemplate that common facilities will be constructed at Waneta, and that there is no evidence Line No. 71 has excess capacity.

Cominco stated that it is not a public utility, and that it is exempt from all of Part 3 except for Sections 45 and 46. Cominco considered that it does not provide a "public utility service", and that consequently Section 72 of the Act does not apply to it. Cominco further argued that it intends to maintain the FSA in effect, that it has not breached its Exemption Order, and that it is the Minister rather than the Commission that can properly enforce the Cominco Exemption Order.

Cominco argued that WKP's remedy for any alleged breach of the FSA is with the courts rather than the Commission. This would include disputes about modifications to Appendix I of the FSA. Cominco stated that, although the Commission approved the FSA as part of the arrangements associated with the Brilliant Power Purchase Agreement, this does not empower it to amend the FSA without the consent of the other parties.

Cominco also stated that Line No. 71 is an international power line, parts of which are regulated by the National Energy Board in Canada and by the Federal Energy Regulatory Commission in the United States. WKP responded that Line No. 71 is under provincial jurisdiction, or will be after it is connected to Nelway.

Views of Other Parties

CAC (B.C.) et al. argued that the Commission does not have jurisdiction to order Cominco to interconnect with WKP, or to order Cominco to allow WKP use of its Line No. 71. CAC (B.C.) et al. considered that Cominco is exempt from Part 3 of the Act except for Sections 45 and 46, and that Sections 70 and 72 do not give the Commission jurisdiction to make the orders requested by WKP. CAC (B.C.) et al. felt that granting WKP's request would likely result in a legal challenge, and preferred giving the parties an opportunity to negotiate a settlement of the issues.

CPC/CBT argued that any rights with respect to Line No. 71 that the Commission grants to WKP should be subordinate to CPC/CBT's existing contractual rights regarding the line.

#### 4.3.5 Commission Findings

The Commission notes that the existing 63 kV lines from Warfield to Waneta and the 71 line are reported to be in reasonably good condition. Not building a 230 kV line from Warfield to Waneta is expected to reduce the cost of the Project by up to $10.6 million.

Use of the lines between Warfield and Waneta and of Line No. 71 by WKP has historically been by agreement between Cominco and WKP. The Commission does not want to abrogate contracts, or to jeopardize corporate options and assets that may have significant economic benefit. A RTO is expected to

be in place in the not distant future, and this may resolve many of the questions about rights of access and many of Cominco's concerns about tariffs. Moreover, Cominco and WKP have acted pragmatically and cooperatively to date, and the Commission encourages them to continue in this spirit. The Commission prefers to give the parties an opportunity to negotiate. **The Commission is not prepared, at this time, to make the directions to Cominco requested by WKP.**

In the event that WKP believes the FSA provides WKP with the right to use Line No. 71, the Commission has concluded that WKP should apply to the courts to enforce such rights.

**The Application by WKP for approval to build a 230 kV transmission line from Warfield to Waneta is denied. WKP is directed to continue to negotiate with all area transmission owners to further develop a safe and reliable 230 kV integrated system that is both cost-efficient and acceptable to all parties.**

The Commission believes that a system reinforcement through interconnection with CPC/CBT is the preferred alternative. Such an interconnection would bring benefits to both CPC/CBT and WKP and would be both pragmatic and supportive of regional system planning for the benefit of all users. The Commission believes that such an interconnection can be negotiated without jeopardizing CPC/CBT's concerns about regulation.

If an agreement beneficial to WKP customers cannot be negotiated with CPC/CBT, WKP is to consider options to connect to Selkirk or negotiate with Cominco for the 230 kV line to Waneta or a new transformer at Waneta. The Commission believes that the 230 kV line would offer improved system reliability compared to the transformer option, at a similar cost.

The Commission concludes that if the parties are not willing to negotiate system development in a reasonable way to recognize the broad interest of the region and development of a least cost and most reliable system, then development of an RTO is required as soon as possible.

### 4.4 Communication System

The Project as proposed by WKP includes a communications system estimated to cost $4.1 million. The initial design of the system assumed a fiber optic system along most lines. A fiber optic system would have a large capacity compared to the alternatives of a power line carrier option or a microwave option. It was considered the most reliable of the options but was also expected to have the highest cost (Exhibit 4, Tab 1, pp. 34 and 35; T5: 831).

WKP indicated that a design review was ongoing which included examining the other alternatives. WKP stated that it would only depart from its initial estimates and design in order to achieve the least expensive system overall. Of the $4.1 million estimated cost, WKP expected that others would absorb $1.4 million.

No party took issue with the communications system proposed by WKP.

**The Commission determines that construction of a communications system is required, subject to the filing of an updated cost estimate demonstrating that the most cost effective design has been chosen.**

### 4.5 Electric and Magnetic Fields, Radio Interference and Noise Levels

In 1989 the Commission reviewed a 230 kV transmission line CPCN on Vancouver Island, during which the Commission heard detailed evidence about the health effects of electric and magnetic fields ("EMF"). In that Decision, the Commission concluded that there was insufficient scientific evidence to link health impacts to EMF. Since that time this issue has been raised by concerned individuals at the transmission line hearings that the Commission has conducted, and there have been many new research projects conducted by the scientific community.

At a hearing in June 1998 regarding the replacement of WKP's transmission line between Oliver and Osoyoos the subject was again dealt with in some detail. In response to public concern, the Commission retained an expert to give testimony with regard to the latest scientific findings on the subject. In its Decision on the Oliver to Osoyoos line, the Commission concluded:

> "The Commission has been keeping itself apprised of EMF research since 1989, and has taken the position that evidence that EMF causes adverse health effects is, to date, inconclusive and inconsistent. Even if one holds the view that magnetic fields from power lines do cause cancer, the fact that the connection has been so hard to prove means that the risk cannot be large."

Prior to the hearing, the Commission determined it would not revisit the scientific research previously reviewed but was willing to hear evidence on new issues related to EMF (Commission letter dated February 4, 2000; T1: 187).

A number of participants presented opinions on the effects of EMF, and stated that the perception of health risks associated with transmission lines has a negative impact on property values. Several people who spoke at the Community hearings expressed concern that EMF might pose health hazards even though they acknowledged that any effects might not yet be proven.

Additional presentations on the possible health effects of transmission lines were submitted by Dr. Marjorie Lundquist and Mr. Hans Karow (Exhibits 9B, 9C, 9D, 9E, 9F, 41, 66 and 73). Dr. Lundquist submitted a paper which proposed that cancer could be caused by a power line carrier system used for the transmission of data on the high voltage lines. Mr. Karow claims that there are multiple health hazards associated with transmission lines and requested that the Commission acknowledge these effects and require that transmission lines be kept away from human habitation.

WKP presented evidence of magnetic and electric field levels which would be present with the new proposed lines compared to the existing lines (Exhibit 4, Tab 5, p. 1). The Kootenay 230 kV Project would reduce the level of magnetic fields to which the public may be exposed. This results from the triangular configuration of the phase conductors on the single-pole structures, and the lower current levels as a result of increasing the operating voltage. Also, the transmission line would be relocated away from or diverted around most residential communities (Exhibit 3, Tab 4, pp. 7 and 8).

The maximum radio interference that WKP calculated for the 230 kV line between Brilliant and Warfield is within the maximum allowable level of the Canadian Standards Association (Exhibit 65, pp. 16 and 17). The noise level at a standard distance of 100 feet in fair weather was calculated to be only 14.6 dbA. However, a resident of Glade indicated that noise from transmission lines in his area is a problem when there is moisture in the air (TC1: CH16). WKP retained a consultant to measure noise levels but was unable to obtain useful information when the readings were taken.

#### 4.5.1 Commission Findings

The Commission recognizes that there are a large number of conflicting scientific papers and scientific opinions with regard to the interpretation of highly complex physical and physiological phenomena related to EMF. The body of scientific evidence continues to grow. To date the advice from scientific forums, such as the National Academy of Sciences, is that there is no conclusive evidence to support the theories that EMF from power lines is a health hazard. Given the large number of studies completed without demonstrating a clear relationship, the Commission is less concerned that EMF is a significant health risk compared to its view in 1989. In the case of this project, the levels of EMF will be substantially reduced from those which currently exist.

## 5.0 SUBSTATIONS AND INTERCONNECTIONS

It is in the public interest that the WKP system be connected with other transmission facilities in the area to provide the safety, stability and reliability that results from a looped and intermeshed system. The substations and interconnections that are either essential, desirable or possible include:

- South Slocan to Kootenay Canal plant intertie;
- Interconnection at Brilliant;
- Substations at Warfield and Waneta; and
- Line No. 71 to Nelway.

### 5.1 South Slocan to Kootenay Canal Plant

A 63 kV intertie between the South Slocan plant and Kootenay Canal plant now exists as Line No. 13. The capacity of this line is limited to 160 MW. WKP proposes to install a second 63 kV line in parallel to Line No. 13 and a second 230/63 kV, 150 MW transformer at the Kootenay Canal plant (Exhibit 3, Tab 1, p. 31). B.C. Hydro agrees with the need for this second connection and is prepared to proceed providing WKP bears the cost.

WKP is also concerned about the conditions in the substations at South Slocan, Lower Bonnington, Upper Bonnington, Cora Linn and the Rosemont substation near Nelson, as discussed in Section 3.1. Initiatives to address islanding problems and to upgrade the generating units will increase short-circuit currents to levels above the normal operating levels of the breakers. At South Slocan there are additional concerns about the condition of the structural supports and the substation grounding, along with the suitability of the bus configuration.

WKP plans to rebuild the South Slocan substation. Breakers will be upgraded at the Kootenay River generating plants and at Rosemont.

The Commission considers it essential that these upgrades be carried out to maintain safe, reliable and secure service to the public.

**The Commission determines that construction of the second 63 kV intertie with the Kootenay Canal plant and a second transformer at the Kootenay Canal plant are required, subject to the filing of an updated cost estimate. WKP is directed to finalize arrangements with B.C. Hydro.**

**The Commission approves the rebuild of the South Slocan substation and the breaker upgrades at the Kootenay River generating plants and at Rosemont substation.**

### 5.2 Connection at Brilliant

WKP buys power from CPC/CBT that is produced at the Brilliant generating station, under the terms of the Brilliant Power Purchase Agreement. This purchase includes the additional power that will result from the Brilliant Upgrade Project. WKP proposes to construct a substation at Brilliant to include connection to

the Brilliant plant 63 kV substation and two 63/230 kV transformers, along with terminations for 230 kV lines to Warfield, Kootenay Canal, Keenleyside and Selkirk, and to the Brilliant Expansion Project. The estimated cost of this substation is $16.5 million. WKP assumed that CPC/CBT would rent line terminations to Keenleyside and Selkirk when the Brilliant Expansion is completed (Exhibit 16, p. 1).

In the hearing, WKP provided summary matrices showing the environmental and sociocommunity impacts associated with the substation developments (Exhibits 20A and 20B). WKP expected that the new Brilliant substation would have impacts at a relatively low level on vegetation, wildlife and aquatic resources.

CPC/CBT is constructing the Keenleyside generating plant and a 230 kV line to Selkirk, and expects them to be in service by late 2001 (T7: 1240). CPC/CBT is also planning a 100 MW Expansion project at Brilliant to be in service by 2006, which would connect to the Keenleyside to Selkirk line through a new, small substation at Brilliant (T7: 1197 and 1198). CPC/CBT expects the small substation will cost about $6 million (T7: 1236).

#### 5.2.1 CPC/CBT Exemption Order

The CPC/CBT Exemption Order dated November 25, 1998 was issued pursuant to Section 22 of the Act, and, in one provision of it, the Minister exempts from:

> *" … all the provisions of Part 3 of the Act, CPC, CPC Subsidiaries and CBT and CBT Subsidiaries when acting jointly with CPC or CPC Subsidiaries, and their respective successors and assigns, in respect only of the production and sale of a power service produced by the Keenleyside Project and their respective equipment, facility, plant, project or system that is used solely for the production or sale of that power service;"*

The Keenleyside Project is defined as "a hydro-electric generation facility at the Keenleyside Dam".

WKP considered CPC/CBT to be a public utility, and argued that the Commission has a general authority to make orders respecting the construction, operations and sharing of facilities of public utilities. WKP argued that the CPC/CBT Exemption Order does not exempt CPC/CBT generally from the application of the Act. It exempts specific projects from Part 3, including the Keenleyside Project and facilities that are used solely for the sale of power from Keenleyside. WKP noted that the exemption does not include Part 5, or the Brilliant substation.

#### 5.2.2 CPC/CBT Position

CPC/CBT stated it would be willing to participate in a larger, common Brilliant substation, provided it can negotiate a satisfactory arrangement with WKP covering the following:

1. The substation would be financed and owned by CPC/CBT, with cost recovery according to a formula similar to that in the Brilliant Power Purchase Agreement and assured by a long-term commitment from the users of the substation, principally WKP (T7: 1203);

2. There would be no interference with current and planned power projects, including the Keenleyside line and CPC/CBT's rights on Line No. 71. Also, extra non-compensatable costs would not be imposed (T7: 1204);

3. The Facilities Sharing Agreement would be amended to remove certain restrictions on CPC/CBT, and to make the agreement ready for a RTO environment (T7: 1225-1229); and

4. Regulatory issues would be "appropriately dealt with". CPC/CBT stated that it would seek an exemption for its own smaller substation, but it was not clear whether CPC/CBT would require that the larger substation be exempt from Part 3 of the Act (T7: 1271 and 1272).

If CPC/CBT owned the Brilliant substation, it would expect to have control over modifications to it. CPC/CBT anticipates an arrangement similar to that for the Brilliant generating plant, where WKP operates and maintains the equipment and a committee manages modifications and upgrades to the facility (T7: 1283).

CPC/CBT felt that the CPC/CBT Exemption Order includes the line to Selkirk (Exhibit 47B; T7: 1269). CPC/CBT has a similar exemption for the Brilliant plant, including the upgrades (Exhibit 91; T7: 1269). Although CPC/CBT does not have an exemption for a Brilliant substation to connect the Brilliant expansion project to the Keenleyside to Selkirk line, CPC/CBT stated that it intended to request one from the Minister (T7: 1272).

CPC/CBT argued that the Commission does not have jurisdiction to direct CPC/CBT to interconnect their Keenleyside to Selkirk line with the WKP system. CPC/CBT argued that the Keenleyside to Selkirk line is included under the exemption for the Keenleyside Project, and that Part 5 and Section 72 do not give the Commission broad powers to make directions respecting CPC/CBT as they have been exempted from Part 3 by Ministerial Order. CPC/CBT argued that when the Minister makes an exemption order under Section 22(2), the Minister assumes responsibility for protection of the public interest.

CAC (B.C.) et al. supported CPC/CBT's position that the Commission does not have jurisdiction to order CPC/CBT to interconnect with WKP. CAC (B.C.) et al. considered that the exemption for the Keenleyside Project is broad enough to preclude a direction to interconnect with WKP at either Brilliant or Keenleyside.

#### 5.2.3 Commission Findings

The need to deliver power generated at Brilliant to the WKP system and the construction of a 230 kV transmission line to Warfield will require a substation at Brilliant. There appear to be considerable advantages to construction of one common substation, and benefits to all parties from interconnection of

the WKP and CPC/CBT systems. However, to date, WKP has not been able to negotiate an agreement for the connection, and for fairly and reasonably sharing the cost of the connection.

The Commission considers that at this time it does not have authority to direct CPC/CBT to connect its Keenleyside to Selkirk line to the WKP system at the Brilliant substation or at Keenleyside. The current lack of uniform regulatory oversight regarding electrical system reliability, quality, and potential for facility duplication is not desirable, but the situation may change in the future, depending on future actions of CPC/CBT and actions by the Minister related to the exemption. **At this time the Commission declines to direct CPC/CBT to connect its Keenleyside to Selkirk line to the WKP system, and declines to make the other directions to CPC/CBT requested by WKP.**

In the absence of an agreement with CPC/CBT which benefits WKP ratepayers, it seems appropriate for WKP to construct and own the substation. As the substation will be a critical part of the Kootenay transmission system, the public interest is likely to require Commission oversight of the facility.

It may be possible for the Commission to support an exemption for a common substation provided that the terms of access to it by WKP and others are set out in a long-term agreement. However, any such exemption should be granted under Section 88(3) of the Act.

**The Commission directs WKP to resume negotiations with CPC/CBT to determine the design and ownership arrangements of a larger Brilliant substation to accommodate the needs of all parties at reasonable cost to WKP ratepayers.**

**If a negotiated settlement cannot be reached by September 15, 2000, the Commission authorizes WKP to construct and own a substation at Brilliant that is designed to meet the requirements of WKP and its ratepayers.**

### 5.3 Warfield Substation

Substations are currently located at Warfield and at nearby Tadanac which serve the local WKP load, provide a termination for Line No. 11 to the Okanagan and serve the Cominco smelter load. As discussed in Chapter 3, WKP has concerns about the condition of the substations, which are difficult to maintain and are inflexible in operation. There is also concern about the adequacy of fault-current interrupting capacity at both substations. Cominco shares these concerns and the parties have agreed to replace both substations with a new substation at Warfield.

WKP originally estimated that the modifications to the 63 kV portion of the Warfield substation would cost $10.5 million. At the start of the hearing, WKP filed a revised cost estimate for the Warfield 63 kV substation of $12.6 million, and assumed WKP would be responsible for $5.2 million. This estimate anticipated that separate WKP and Cominco facilities would be built at Warfield (Exhibit 14, p. 2). The Kootenay 230 kV Project also included a WKP 230 kV substation at Warfield with two 63-230 kV 150 MW transformers, costing $13.1 million (Exhibit 27D).

In argument, WKP asked for a direction to Cominco for construction of the 230 kV substation at Warfield in a manner to facilitate the 230 kV tie-in.

#### 5.3.1 Cominco Position

Cominco stated that it would make land available to WKP for the latter's portion of the new substation. Cominco disputed the cost sharing proposal of WKP and suggested that each party could pay for its own facilities (Exhibit 9G, p. 1).

At Warfield, Cominco distinguished between firm transmission service provided to and by WKP, and interconnection support. Cominco considered interconnection support to mean that it would connect with WKP at Warfield, and the parties would provide each other with increased system reliability and stability, but no firm transmission service. Power would be transferred as available to meet operational or emergency conditions (Exhibit 83, p. 5). Cominco also stated that it would consider disconnecting from WKP at Warfield if WKP required Cominco to pay for interconnection support.

#### 5.3.2 Commission Findings

It is the Commission's view that the interests of safety and quality of service necessitate the reconstruction of the Warfield and Tadanac substations.

The proposed Warfield substation is an integral part of the WKP transmission system. Interconnection of the WKP and Cominco systems at the Warfield substation is essential so that the systems can be operated as one system under the FSA, as required by the Cominco Exemption Order.

Certain matters about the design of the 230 kV substation and the related 63 kV facilities, and the sharing of costs for these new facilities, need to be resolved. The Commission declines to issue specific directions to Cominco but encourages the two parties to work together on mutually dependent facilities in the spirit of support and cooperation that has historically characterized their relationship. Amendments to the FSA may be required and Cominco is reminded of the Conditions attached to its Exemption Order.

**The Commission determines that construction of a new 230 kV and 63 kV substation at Warfield is required, subject to the filing of an updated facility design and an updated estimate of costs and cost-sharing. WKP is directed to resume negotiations with Cominco on the design, construction and cost-sharing of a new substation at Warfield that meets their needs.**

### 5.4 Waneta Substation

WKP proposed to modify Cominco's Waneta 230 kV substation, relocating the two transformers and providing terminations for the proposed 230 kV line to Warfield. WKP estimated the modifications would cost $6.7 million. The substation modifications, the 230 kV connection to Warfield and concerns related to the existing transformer capacity at the Waneta substation are discussed in Section 4.3.

Work is proceeding to split the bus at the Waneta plant so that a bus fault problem will take only one-half of the plant off line at a time rather than the whole plant, so as to prevent a total system collapse if a fault were to occur at the Waneta bus. This change is expected to be fully commissioned by May 2000 (T6: 1054).

In argument, WKP asked for a direction to Cominco for construction of the proposed Waneta substation with modifications to allow connection of the proposed 230 kV line from Warfield to Waneta.

#### 5.4.1 Commission Findings

In Section 4.3.5, WKP's requests for a CPCN for a 230 kV line from Warfield to Waneta and for a direction to Cominco related to connection of the 230 kV line are denied. The remedial work on the Waneta bus as described above is now underway. Therefore, the relocation of the two transformers to allow the 230 kV line connection described by WKP as being required at the Waneta substation for the K3 option is not applicable at this time.

Remedies to the system constraints resulting from a denial of the 230 kV line from Warfield to Waneta are discussed in section 4.3. One remedy could include a third transformer at Waneta. WKP is to negotiate the most cost effective alleviation of the potential system constraints with CPC/CBT, Cominco and/or B.C. Hydro and report back to the Commission.

**The Commission declines to approve construction of the requested works at Waneta, and declines to make directions to Cominco regarding the requested works.** All parties must realize that the evolution of electricity markets will likely require changes to historic rights in the not too distant future.

The Commission remains optimistic that the positive working relations between WKP and Cominco will result in a voluntary agreement which will meet the needs of both parties.

### 5.5 Connection of Line No. 71 to Nelway

Nelway is a B.C. Hydro 230 kV substation that is connected to Selkirk and to the BPA Boundary substation. The phase-shifter transformer at Nelway was put in place to control loop flows from northeastern Washington through the B.C. Hydro system to Northwestern Washington (Exhibit 1, Tab 4, p. 24) Cominco's Line No. 71 also connects to Boundary substation.

Heavy flows of current can now bypass the phase-shifter by following a circuit from Boundary to Waneta to Warfield to Kootenay Canal and back to Selkirk. Unless Line No. 71 is connected to Nelway, strengthening of the transmission system and interties in the Kootenay Region threatens to impair the effectiveness of the phase-shifter. To prevent loop flows, B.C. Hydro and Cominco are negotiating to connect Line No. 71 to the phase-shifter at Nelway (Exhibit 9G, p. 1).

The section of new line from Line No. 71 to Nelway will be approximately one kilometre long. WKP expected that it will have a minimal impact on mineral and forest resources, and on wildlife and wildlife habitat. It would not impact residential areas, or other resources (Exhibit 20D).

WKP included the intertie to Nelway in the Application for the 230 kV Project even though it did not anticipate playing any role in the construction or ownership of the intertie (T2: 247).

In argument, WKP asked the Commission to direct Cominco to connect Line No. 71 to Nelway. WKP also asked for a Commission direction to B.C. Hydro to confirm that the Wholesale Transmission Service ("WTS") tariff does not apply to the intertie at Nelway and to direct that B.C. Hydro and WKP negotiate an appropriate tariff. WKP argued that the B.C. Hydro WTS should not apply to the connection at Nelway, as WKP power will flow on B.C. Hydro facilities for a *de minimus* length. WKP considered that its request was consistent with the approach in other jurisdictions.

#### 5.5.1 Cominco Position

In its evidence, Cominco indicated that it had agreed with B.C. Hydro to jointly address loop flows by making the connection to Nelway (Exhibit 9G, p. 1). Cominco suggested that the proposed 230 kV line from Warfield to Waneta would form an easier path for the current flow and make the loop flow problem worse (T8: 1393 and 1394). In Argument, Cominco stated that it was considering the construction of the connection in a manner that meets its requirements. However, as discussed in Section 4.3, Cominco argued

that WKP's request for directions is not properly before the Commission, and that the Commission does not have the jurisdiction to grant the directions.

#### 5.5.2 B.C. Hydro Position

B.C. Hydro argued that the line diversion was necessary, and indicated that it was prepared to incur costs to achieve the benefits of the connection. In argument, B.C. Hydro requested that any Commission approval of the Kootenay 230 kV Project require that the new WKP facilities will not be energized until Line No. 71 is connected to Nelway.

B.C. Hydro argued that the Commission could not make a determination on the WTS tariff in this Decision, because WKP's request seeks to amend an existing B.C. Hydro tariff. B.C. Hydro felt that such a request can only be made by written complaint pursuant to Section 58 of the Act and that the Commission only has authority to grant such a request after a hearing. The Commission and others only became aware of the request during WKP's opening statement, and B.C. Hydro argued that this did not provide sufficient notice to all parties that could be affected by the outcome.

CAC (B.C.) et al. supported B.C. Hydro's position, arguing that the Commission is not in a position to impose a tariff on B.C. Hydro, as the issues related to the imposition of a tariff have not all been canvassed and the parties who could be affected by it have not all had an opportunity to participate.

#### 5.5.3 Commission Findings

The Commission accepts that connection of Line No. 71 to Nelway is necessary and in the public interest. However, due to the lack of direct WKP involvement in the intertie facilities, it is not appropriate to include such facilities in a CPCN to WKP. Moreover, the Commission believes that the connection between Line No. 71 and Nelway will proceed under the guidance of B.C. Hydro and Cominco without the need for Commission intervention. Therefore, the direction to Cominco requested by WKP and the direction to WKP requested by B.C. Hydro related to the connection at Nelway appear to be unnecessary.

With regard to the applicability of the WTS tariff, the Commission and other participants in the proceeding did not become aware of this issue until the start of the hearing. The Commission considers that the communications that identified the applicability of the WTS tariff as an issue in this proceeding were insufficient to be considered reasonable notice in this instance. In particular, some parties who decided not to participate in the proceeding on the basis of the Application and the Hearing Notice could be impacted if the Commission makes a determination on the matter. The Commission declines to make the directions to B.C. Hydro that WKP requested.

WKP does not need a direction from the Commission to approach B.C. Hydro regarding the tariff charges that would apply in the event of a connection at Nelway station. Apparently Cominco is exploring similar matters with B.C. Hydro (T7: 1328). In the event that WKP is not satisfied with the response of B.C. Hydro, it can make a specific application to the Commission on the matter.

**The Commission declines, at this time, to direct Cominco to connect Line No. 71 to Nelway substation, and refuses WKP's request for a CPCN for the connection**. If the connection does not proceed as currently anticipated, and on application by an interested party, the Commission will consider what authority it may have to require the interconnection.

**To the extent that B.C. Hydro and/or Cominco may otherwise require a CPCN under Section 45 of the Act for facilities connecting Line No. 71 to Nelway Station, as set out in the WKP Application, the Commission confirms that the parties do not need to apply for such a separate CPCN.**

### 5.6 Rate Schedule 110 – Long-Term Alternate Path Transmission Service

WKP, in its January 10, 2000 revision to the Application, applied for approval of Rate Schedule 110 – Long-Term Alternate Path Transmission Service ("APTS"). The APTS tariff is intended for firm transmission of the customer's full load requirements between any two points on the WKP owned 230 kV transmission lines interconnecting hydro-electric plants on the Kootenay River with switching facilities at Warfield (Exhibit 1, Appendix G).

WKP proposed billing for APTS at a monthly rate of $0.67 per kVA of reserved capacity (Exhibit 4, Tab 1, p. 17). The monthly rate for APTS is based on one-twelfth of the estimated annualized cost of the Kootenay Canal to Brilliant and Brilliant to Warfield portions of the proposed facilities divided by the total capacity of the line. WKP indicated that, if Cominco took service under the APTS tariff, then it would be required to nominate its total demand not partial demand (Exhibit 4, Tab 1, pp. 17 and 18; WKP Argument, pp. 44 and 45).

WKP's position was that Cominco should pay the APTS tariff because it was receiving the benefit of the capacity north of Warfield. WKP further stated that its transmission service tariffs might satisfy Cominco's needs for WKP transmission services (rather than sharing facilities under the FSA), but that the cost of firm Point–to-Point Network Service would exceed those under the APTS tariff.

WKP indicated that if it was unable to reach an agreement for facilities sharing with any of the third parties, then the third parties would take service under the APTS (Exhibit 4, Tab 1, p. 1). WKP agreed that the APTS would be unnecessary if WKP's proposed facilities were included in a negotiated nomination under the FSA that covered all of the facilities encompassed by the APTS (T2: 327 and 328).

Cominco stated that the APTS tariff is not required at this time, as it is needed only if the parties cannot agree on cost allocations for the facilities and the Commission must adjudicate the issue (Exhibit 9G, p. 2). Moreover, Cominco suggested that WKP and Cominco currently provide each other with interconnection support at Warfield for no charge, and that Cominco would not take service under the APTS tariff (Exhibit 83).

#### 5.6.1 Commission Finding

The Commission notes that WKP has indicated that the APTS is an alternative to a negotiated nomination under the FSA. The Commission agrees with Cominco that the APTS is not required now, and will only be required if and when it is clear that the parties are unable to reach a negotiated agreement. **Therefore, the Commission does not approve the APTS tariff at this time.**

## 6.0 FINANCIAL CONSIDERATIONS AND RATEPAYER IMPACTS

### 6.1 Cost Estimates and Potential Variances

In its Application, WKP presented five potential system configuration options as discussed in Chapters 2 and 3. The total project cost of the Kootenay 230 kV Transmission Project based on the Company's preferred option K3, as amended during the hearing, is $109,990,000 (Exhibit 27D, WKP Argument pp. 9 and 29). This cost includes the Utility's decision during the hearing to change its preferred northern section routing from the East Low Elevation route to the East High Elevation route. The deemed WKP cost component, which is net of proposed contributions and rentals by other transmission owners for use of WKP facilities, was $79,954,000 (Exhibit 27D). WKP noted that reduction in its deemed cost component for rentals referred not to a revenue but to an asset valuation amount (T5: 879).

The Commission, in this Decision, has approved many of the components of option K3 applied for by WKP but with some modifications. Based on the Commission's findings the design, cost and sharing of costs at the Brilliant and Warfield Substations may be modified by negotiations with CPC/CBT and Cominco, respectively. The following table provides an estimate of the costs associated with the system that the Commission has determined is necessary, based on the component cost and sharing estimates provided by WKP.

Table 6.1

**WKP Estimates – Approved K3 Components**

| Component | Cost | WKP Cost | Others Cost | Rented | Deemed WKP Share |
|---|---|---|---|---|---|
| South Slocan Modification | 9,716,000 | 9,716,000 | 0 | 0 | 9,716,000 |
| Tie to Kootenay Canal | 229,000 | 229,000 | 0 | 0 | 229,000 |
| Kootenay Canal Modifications | 6,934,000 | 6,934,000 | 0 | 532,134 | 6,401,866 |
| Kootenay Canal to Brilliant 230 kV Transmission Line | 9,828,000 | 9,828,000 | 0 | 3,272,724 | 6,555,276 |
| Brilliant 63/230 kV Switchyard | 16,463,000 | 16,463,000 | 0 | 1,097,533 | 15,365,467 |
| Brilliant to Warfield 230 kV Transmission Line | 13,603,000 | 13,603,000 | 0 | 4,529,800 | 9,073,200 |
| Warfield 230 kV Switchyard | 13,140,000 | 13,140,000 | 0 | 5,474,453 | 7,665,547 |
| Warfield 63 kV Modifications including retiring Tadanac | 12,596,000 | 5,197,000 | 7,399,000 | 0 | 5,197,000 |
| Warfield Line Diversions | 540,000 | 44,000 | 496,000 | 0 | 44,000 |
| Waneta to Warfield 230 kV Transmission Line | n/a | n/a | n/a | n/a | n/a |
| Waneta 230 kV Modifications | n/a | n/a | n/a | n/a | n/a |
| Tie Line No. 71 to Nelway | 636,000 | | 636,000 | | 0 |
| Nelway Modifications | 1,748,000 | | 1,748,000 | | 0 |
| Miscellaneous Improvements | 8,480,000 | 8,480,000 | 0 | 0 | 8,480,000 |
| Kootenay Communications | 4,097,000 | 2,716,000 | 1,381,000 | 0 | 2,716,000 |
| Feasibility Study | 431,000 | 319,000 | 112,000 | 0 | 319,000 |
| Reduced Warfield Cost* (Section 4.3.5) | -1,600,000 | -1,600,000 | 0 | -666,600 | -933,400 |
| Larger Warfield Transformer | 500,000 | 500,000 | 0 | 208,313 | 291,687 |
| North Kootenay Generation Dropping RAS** | 1,000,000 | 1,000,000 | | | 1,000,000 |
| Cominco WKP Load Dropping RAS** | 1,000,000 | 1,000,000 | | | 1,000,000 |
| **TOTAL** | 99,341,000 | 87,569,000 | 11,772,000 | 14,448,356 | 73,120,644 |

* The reduced Warfield costs and the larger Warfield transformer are assumed to be offsetting costs that relate to the Warfield 230 kV Switchyard. Therefore, incremental costs and savings are shared in the same percentage as the Warfield 230 kV Switchyard.

** The Remedial Action Schemes required by WKP because the Warfield–Waneta 230 kV line and Waneta 230 kV modifications are not implemented are assumed to be borne solely by WKP.

However, in Section 4.3.3, the Commission noted that if CPC/CBT refused to allow WKP to interconnect at Brilliant, an additional transformer at Waneta may be required at a cost of $10.3 million. The Commission anticipates that an agreement between WKP and Cominco would be required for such a transformer to be installed.

## 6.2 Cost Sharing

Potentially, the greatest risk of variances from the estimated revenue requirement faced by WKP ratepayers arises from variations in the share of costs to be borne by WKP. For some of the components there is limited potential for variation because WKP assumed that it will bear all of the costs and that these costs would be recovered in rates. For several of the components, WKP's application assumed that others would bear a certain share of the costs, either through a contribution to capital costs, through the amendments to the FSA or through revenues collected through the APTS tariff. WKP's evidence stated that given the stage of cost-sharing discussions at that time (February 2000), there was only a small chance that the WKP share would change by more than $10 million (Exhibit 4, Tab 1, p.11).

Recovery of costs from other parties for their use of WKP's proposed facilities would require amendments to the facilities or nominations listed in the FSA, as discussed in Section 1.3.4. As noted there, WKP has applied for approval of amendments to the FSA. Whether or not the Commission has the authority to approve or order such amendments is a subject of disagreement in this hearing and is discussed in Chapters 4 and 5.

The Commission reviewed the evidence to attempt to develop a range of costs depending on the outcome of cost-sharing arrangements assumed by WKP for each of the components. These cost estimate ranges are as follows:

Brilliant 63/230 kV Switchyard

By the end of the hearing, WKP proposed that it would own the Brilliant Switchyard and that CPC/CBT would rent a portion of the switchyard under the FSA in 2006 after the Brilliant Expansion was complete (Exhibit 27D, argument, p. 36). CPC/CBT argued that its involvement in the Brilliant Switchyard would be immediate if the Project went ahead as proposed, and that it was in the interests of CPC/CBT and WKP ratepayers for CPC/CBT to own the common Brilliant Switchyard (CPC/CBT Argument, p. 24).

Two ownership and cost sharing scenarios were considered for a common Brilliant 230 kV Switchyard utilized by both WKP and CPC/CBT. Under one option WKP would own and finance the switchyard, and CPC/CBT would pay WKP for its use of the facility. Under the second option CPC/CBT would own the switchyard and WKP would pay CPC/CBT for use of a portion of the facility. Both WKP and CPC/CBT attached conditions to their acceptance of ownership of the switchyard by the other party (WKP Argument, p. 37; CPC/CBT Argument, p. 25).

WKP indicated that its incremental cost of constructing the Brilliant Switchyard to accommodate CPC/CBT would be in the order of $3.2 million to $3.3 million (T2: 406). CPC/CBT stated that the cost to construct its own dedicated switchyard at Brilliant would be approximately $6 million (T7: 1237). Consequently WKP argued that, based on its proposal that it would be compensated by CPC/CBT for use of a WKP-owned joint switchyard through a 20% nomination of the facility under the FSA, CPC/CBT would be no worse off than if it constructed its own dedicated switchyard (WKP Argument, pp. 45-46).

If WKP constructed a switchyard at Brilliant designed to meet only its own needs, the capital costs would be expected to fall by $3.2 to 3.3 million. However, this would be partially offset by the loss of rental revenue of $1.098 million (Exhibit 27D).

Kootenay Canal Plant Modifications

The Kootenay Canal plant modifications are deemed by WKP to cost $6.934 million with Cominco to pay $532,000 through the FSA, leaving a deemed WKP share of approximately $6.401 million. B.C. Hydro in argument, stated that it was not prepared pay a share of the capital costs of interconnection with its Kootenay Canal plant, and noted that WKP had accepted B.C. Hydro's position (WKP Argument p. 46).

Kootenay Canal to Brilliant and Brilliant to Warfield 230 kV Transmission Lines

The Kootenay Canal to Brilliant 230 kV line (East High Elevation route) was assumed to cost $9.828 million, with Cominco's share under the FSA equaling $3.273 million, leaving WKP to pay $6.555 million. WKP indicated that, alternatively, Cominco would likely pay $4.472 million (NPV) under the proposed APTS tariff.

The Brilliant to Warfield 230 kV line was assumed to cost $13.603 million and Cominco was to accept $4.530 million, under the FSA. Consequently, WKP's share would be $9.073 million.

Cominco stated during the hearing that it was attempting to renegotiate the Canal Plant agreement, and that if it was successful it would not require use of the Kootenay Canal to Warfield 230 kV system. Until it knew whether or not it would require capacity on the Kootenay Canal to Warfield 230 kV line, Cominco proposed contributing approximately $2 million to the cost of the lines so that the system had sufficient capacity to accommodate Cominco's needs, if required (T7: 1188). WKP indicated that if Cominco did not require any of the 230 kV transmission capacity, the effect on WKP ratepayers would be approximately $14 million.

Warfield 230 kV Substation

WKP assumed that the costs of the Warfield 230 kV Switchyard would be shared with Cominco under the FSA, with Cominco absorbing $5.474 million of the estimated $13.140 million estimated cost. WKP proposed that it would own the switchyard and Cominco would pay rent based on a 50% deemed utilization by Cominco. Cominco would rent one of the 230/63 kV transformers and one-third of the 230 kV line termination to Brilliant. WKP expected to receive $1.189 million in annual payments from Cominco for its use of the Warfield Switchyard (Exhibit 3, Tab 1, p. 17; Appendix E; Exhibit 16, p. 1). WKP's deemed cost share under such an outcome would be $7.665 million.

Additional costs and benefits at Warfield resulting from elimination of the proposed Warfield to Waneta 230 kV line, include a cost increase of $0.5 million for a larger 230/63 kV transformer at Warfield and a reduction of $1.6 million due to fewer required line positions. The net result of these changes is a reduction of $1.1 million. Additional costs of another transformer at Waneta ($3.6 million), other costs at Waneta ($6.7 million), and a north Kootenay Switchyard generation dropping remedial action scheme ($1.0 million), are considered in Section 4.3.3.

In the scenario described above, the total costs of the Warfield Switchyard would decrease to $12.040 million. If Cominco were to share costs in the same proportion as proposed by WKP for the switchyard, then WKP would pay approximately 58% or $6.983 million and Cominco would pay approximately 42% or $5.057 million.

Cominco indicated that rather than cost sharing, each party could pay for its own facilities (Exhibit 9G, p. 1). To estimate the cost to WKP under this scenario, it is necessary to assume that WKP's costs would be the same whether Cominco permanently reduced its load at Trail or whether it maintained its existing load but constructed its own facilities to serve its load. In that instance, additional transformer capacity at Warfield would not be required. This would result in a net cost reduction of approximately $1.6 million (T6: 995-998). Under this scenario, WKP would be required to absorb all of the remaining Warfield costs, estimated at $12.540 million.

Consequently, the costs that may apply to WKP in the absence of the Warfield to Waneta line are in the range of $6.983 million to $12.040 million depending on cost sharing arrangements.

Warfield 63 kV Modifications Including Retiring Tadanac

In its application, WKP assumed a cost of modifications to Warfield, including retiring the Tadanac switchyard, of $10.537 million with Cominco paying all of the capital cost and WKP renting a 35 percent share of the asset (Exhibit 1, Tab 3, Table 3.1; Exhibit 3, Tab 1, p. 17). Subsequently, the WKP costs increased to $5.197 million due to Cominco's requirement to establish two distinct switchyards at Warfield (Exhibit 14, p. 2). This cost is shown in Table 6.1.

Cominco stated during the hearing that Cominco and WKP should each pay for their own portions of the switchyard, but that Cominco was not insisting on two physically separate switchyards. Consequently, Cominco thought that the cost estimate might be different (T8: 1388). For the low capital cost scenario in Table 6.2, the original cost of $10.5 million is assumed with WKP assuming a 35 percent share of the cost or 3.7 million.

The Warfield Line Diversions

WKP stated in its Application that diversions of Cominco-owned 63 kV lines into the expanded Warfield 63 kV switchyard would be the responsibility of Cominco. WKP's involvement in the switchyard would be a function of the number of its line terminations at the station. On this basis, WKP has indicated that it would be responsible for $44,000 related to the Warfield line diversions, while Cominco would be responsible for $540,000. Cominco stated in its evidence that it had agreed with WKP that there is a need to replace the Tadanac/Warfield switchyards and that the two parties had agreed what the total range of cost might be (Exhibit 96, p. 1). As the WKP proposal also appears consistent with Cominco's position that each party should be responsible for its own facilities, this sharing of costs does not appear to be in dispute.

Miscellaneous Improvements

In its Application, WKP has proposed to accept all of these costs without any cost sharing.

### 6.2.1 Commission Findings

Based on the analysis above, the Commission has concluded that a likely range of costs, based on WKP's capital cost estimates for the approved components, but allowing for some uncertainty regarding cost sharing, is in the range of $73.1 million to $80.4 million. The basis of this estimate is shown in Table 6.2. However, as discussed in Sections 6.1 and 6.2, if WKP were unable to interconnect at Brilliant, a larger transformer could be required at Waneta at an additional cost of $10.3 million. Until WKP provides final

Table 6.2

## West Kootenay Power Ltd., 230 kV Capital Cost and Cost Sharing Amounts

| Components with Sharing Uncertainty | Low Capital Cost | Sharing Estimate | WKP Share | High Capital Cost | Sharing Estimate | WKP Share |
|---|---|---|---|---|---|---|
| Kootenay Canal plant modifications | 6,934 | 0 | 6,934 | 6,934 | 532 | 6,401 |
| 230 kV line –K3 Kootenay Canal to Warfield | 21,430 | 0 | 21,430 | 23,430 | 7,803 | 15,627 |
| Brilliant new 230/63 kV Switchyard | 13,263 | 0 | 13,263 | 16,463 | 1,098 | 15,365 |
| Warfield Switchyard, new 230/63 kV substation | 11,540 | 0 | 11,540 | 12,040 | 5,057 | 6,983 |
| Tadanac/Warfield 63 kV reconstruction | 10,537 | 6,849 | 3,688 | 12,596 | 7,399 | 5,197 |
| N. Kootenay Generation Dropping RAS | 1,000 | 0 | 1,000 | 1,000 | 0 | 1,000 |
| Cominco/WKP Load Dropping RAS | 1,000 | 0 | 1,000 | 1,000 | 0 | 1,000 |
| Subtotal - Shared Components & Adjustments | 65,704 | 6,849 | 58,855 | 73,463 | 21,889 | 51,573 |

| Components with Sharing Certainty | Capital Cost | Sharing Estimate | WKP Share |
|---|---|---|---|
| South Slocan Modification | 9,716 | 0 | 9,716 |
| Tie to Kootenay Canal | 229 | 0 | 229 |
| Warfield Line Diversions | 540 | 496 | 44 |
| Waneta-Warfield 230 kV line | n/a | n/a | n/a |
| Waneta 230 kV modifications | n/a | n/a | n/a |
| Tie Line No. 71 to Nelway | 636 | 636 | 0 |
| Nelway Modifications | 1,748 | 1,748 | 0 |
| Miscellaneous Improvements | 8,480 | 0 | 8,480 |
| Kootenay Communications | 4,097 | 1,381 | 2,716 |
| Feasibility Study | 431 | 112 | 319 |
| Subtotal | 25,877 | 4,373 | 21,504 |

| | Low Capital Cost | Sharing Estimate | WKP Share | High Capital Cost | Sharing Estimate | WKP Share |
|---|---|---|---|---|---|---|
| **TOTALS** | **91,581** | **11,222** | **80,359** | **99,340** | **26,262** | **73,077** |

Notes:

1. The costs estimates of the Warfield Switchyard include the adjustments for a larger transformer and reduced line terminations.
2. For both low and high cases, the estimates are based on the assumption that no Warfield to Waneta line is constructed.
3. As noted in Section 6.2 the WKP share could increase by an additional $10.3 million for a transformer at Waneta to approximately $91 million if WKP was unable to connect with CPC/CBT at Brilliant.
4. The potential scenario under which Cominco requires no capacity on the WKP system is included in the Table under the low capital cost/low sharing scenario.

cost estimates for all components of the final configuration of its system upgrade, additional uncertainty exists in the base estimates as well.

**Although these estimates are based on preliminary data and contain a relatively high level of uncertainty, the Commission has determined that the items which it has approved are necessary for safe and reliable service to residents of the Kootenays. This Project is a necessary refurbishment of a transmission system that has reached the end of its physical life, and, therefore, approval cannot be delayed until final costs and cost sharing arrangements are complete.**

### 6.3 Financing and Funding Alternatives

During the hearing, several financing alternatives were explored. These included traditional funding by WKP through a mixture of debt and equity. Other alternatives proposed included the use of a mixture of debt or equity financing, or both, by third parties.

Except for the common facilities at Warfield, WKP proposed to own all of the facilities proposed in its Application. WKP proposed to finance the Project through its normal ratio of Utility debt and equity financing. WKP calculated its revenue requirement and rate impacts based on the assumptions of a weighted average cost of debt of 7.5% and a return on equity of 10%.

In their initial evidence, the Regional Districts proposed to take an ownership role of the Project facilities (Exhibit 9H, pp. 4-8). The Regional Districts suggested that, by participating in the Project, they could reduce the cost of the Project sufficiently that their preferred option, K5, would become comparable to that of WKP's preferred option, K3. Subsequent to the conclusion of the evidentiary portion of the hearing, the Regional Districts indicated that they were no longer pursuing an ownership position.

During the hearing, the Regional Districts stated that, while an alternative would be for them to act as a financier alone, this would likely not be a realistic or viable option as there are express prohibitions against local governments acting as financing institutions (Exhibit 9H, pp. 8 and 9). The Regional Districts indicated that they did not see their role as necessarily providing debt financing for 100% of the Project, but rather that they could finance a portion of the project through debt, with another partner possibly taking an equity portion (T3: 455).

WKP stated that, while it opposed third party ownership, it welcomed the opportunities for third parties such as the Regional Districts or CPC/CBT to participate by providing debt financing. To the extent that the cost of debt was lower than WKP's weighted average cost of debt, WKP's ratepayers would benefit (WKP Final Argument, p. 39).

**The Commission determines that the Project should be financed in the traditional manner of 40% utility equity and 60% debt. The Commission has utilized the funding rates presumed by WKP for estimating ratepayer impacts, but expects WKP to secure the least cost debt funding possible, which may be from local governments or a Crown Corporation.**

### 6.4 Revenue Requirements and Ratepayer Impacts

The Commission has attempted to estimate the rate impact of the Kootenay 230 kV Project, based on the routing selections determined by the Commission in Chapter 4 of this Decision and the substations and interconnection determinations in Chapter 5. The range of costs is relatively large because the level and method of cost sharing is not yet fully agreed to. For example, should Cominco decide that it will not need any transmission capacity in the 230 kV system between Kootenay Canal and Warfield, the ratepayer impact would be a approximately 1.5% (T5: 882 and 883).

WKP's evidence (Exhibit 27D) indicated that if it owned and financed the Brilliant Substation, the six-year cumulative rate impact of the Project was 6.20%. The largest rate impacts were evident in 2002 and 2003 with increases of 3.98% and 2.40% respectively with slight decreases in subsequent years. WKP's evidence indicated that a $5 million increment in capital expenditure would result in a revenue requirement change and rate impact of about 0.42% in the year in which it occurred (Exhibit 55; T3: 575, T5: 873).

**The Commission estimates that the approximate cumulative rate impact over the first six years could range from 5.6% to 6.4%,[4] depending on the outcome of negotiations with parties and final costs for the system upgrade as constructed. The worst case scenario would raise rates by approximately 7.2%.**

### 6.5 Cost Collar Incentive Mechanism

WKP also applied to the Commission for the approval of a 10% "Cost Collar" mechanism to be applied to the amount to be included in the Utility's rate base. The proposed cost collar would be 90 to 110% of the cost estimate to be applied to the deemed WKP cost component of $79,954,000 (Exhibit 27D; WKP

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[4] The high rate impact and the 'worst case' rate impact assume the low capital cost, low sharing for all instances except for the Warfield 63 kV station where the higher WKP share is assumed.

Final Argument, pp. 9 and 10; T5: 813). WKP proposed that if the actual project costs were within the collar, then the project costs would be treated the same as an extraordinary capital project. If the actual project costs were outside the collar, then the rate base at the end of the in-service year would be adjusted to 90 or 110% of the estimate, whichever is applicable.

The cost collar as proposed by WKP is based on several critical cost assumptions related to components of the project (Exhibit 1, Tab 1, p. 4). Those are as follows:

1. The price of aluminum estimates based on the June 1999 LME price;

2. Price of a class one, 65-foot pole of $2,150;

3. The chosen design concepts for substations;

4. Price of a 150 MVA 230/63 kV transformer of $1.8 million;

5. The total length of the chosen rights of way:

   - Brilliant to Warfield - 29 km,
   - Warfield to Waneta – 17 km,
   - Canal to Brilliant - 24 km;

6. Total Cost of access road construction:

   - Brilliant to Warfield – $75,000,
   - Warfield to Waneta - $10,000,
   - Canal to Brilliant - $360,000;

7. Rate for tradesmen - $28.15 per hour; and

8. Environmental Remediation, Land Acquisition and Permitting costs (Exhibit 27A).

WKP proposed that the estimate would be adjusted for changes in the critical cost assumptions and that changes to cost assumptions for aluminum prices, pole prices, price of a 150 MVA 230/63 kV transformer, tradesmen wages and environmental remediation, land acquisition and permitting would result in one to one changes to the estimate. Moreover, WKP proposed that subject to approval by the Commission, design changes to the South Slocan and Warfield substations would result in changes to the estimate. Cost assumptions related to routing would be removed once the preferred route options were approved. Finally, all adjustments would be made prior to July 30, 2000. WKP also proposed that following the in-service date, the quality of service benchmarks used in the WKP PBR mechanism would be adjusted to reflect the improved reliability of the transmission system (Exhibit 27A).

The City of Nelson accepted the method by which WKP developed the cost estimates for the application and supported the 10% cost collar concept. Nelson argued that the concept is consistent with PBR principles (Final Argument, p. 4).

CAC (B.C.) et al. argued that WKP's proposed cost collar did not provide it with much comfort given that it was to be based on a cost to be finalized at a later date (Final Argument, p. 6). During cross-examination, WKP agreed that, as the structure of the incentive mechanism was such that a higher cost estimate offered greater benefits to utility shareholders, it was important that the estimate be a fair estimate. Moreover, WKP agreed that the cost estimate should be based on as small a band of uncertainty as possible (T1: 153 and 154).

#### 6.5.1 Commission Findings

The Commission supports incentive mechanisms both in rate setting and for capital projects. Incentive regulation is a common component of current utility revenue requirements settlements and approval of the BC Gas Utility Ltd., Southern Crossing Pipeline included a cost collar incentive. Consequently, the Commission commends WKP for bringing forward an incentive mechanism proposal.

However, unlike the BC Gas Southern Crossing Pipeline project, the cost of the WKP Project is not the result of competitive options; nor has a detailed review of the base costs and the risks been done.

**Therefore, the Commission does not approve the use of a cost collar for this project, but encourages its development for future projects.**

## 7.0 FUTURE INTEGRATION ISSUES

### 7.1 Emergence of a Regional Transmission Organization

During the hearing WKP stated that, based on its discussions with B.C. Hydro, it sees significant advantages to a RTO and that one could be established within the next five to seven years (T1: 23 and 100). The RTO model being discussed between WKP and B.C. Hydro could include a single provincial transmission organization where transmission assets of B.C. Hydro and WKP would be amalgamated into one province-wide grid on a voluntarily basis. The RTO would provide the single operator of these assets (T1: 24, 103 and 122). With respect to generation dispatch, WKP mentioned that the discussions to date have not dealt with dispatch, but that generation in the area could be dispatched pursuant to the Canal Plant Agreement. WKP did not state which assets in its Project would be included in a RTO because it had not considered the issue fully (T1: 102).

WKP stated that CPC/CBT has not been directly involved in the discussions between WKP and B.C. Hydro, but WKP has had discussions with CPC/CBT representatives (T1: 103). During the hearing, Cominco and CPC/CBT expressed concerns about how a new RTO could impact their operations;

specifically, whether certain of the directions that WKP requested from the Commission to facilitate system integration would impose undue business risks upon them. The concerns of CPC/CBT and Cominco, as they relate to potential system integration, are examined in the next two sections.

### 7.2 Impacts of a RTO on Transmission Pricing and Access

Both Cominco and CPC/CBT expressed reservations about providing access to particular lines, in part because of concerns that the pricing structure to be established could raise their cost of access to their own lines.

In response to WKP's request that Cominco's Line No. 71 be available for the general benefit of WKP's customers, Cominco stated that if it allowed such access to Line No. 71, then it would have to provide open access to all parties under a RTO type of structure (Exhibit 83, p. 7). Regarding usage charges, in Cominco's view, if its line were incorporated in a RTO it could face tariffs that were based on the costs of the entire RTO (T1: 61 and 62). Furthermore, Cominco foresaw future risk that there would be high postage-stamp rates. Cominco's transmission system is short and was built at a time of much lower costs, so that the cost-based fees that Cominco could charge for the use of its system could be much lower than the postage-stamp rates to use its own transmission system, if the latter becomes part of a RTO. For example, Cominco stated that if its surplus sale of 700 GW.h per year were to attract postage-stamp transmission rates of six or seven mills per kWh, (i.e., the range of B.C. Hydro postage-stamp charges), then the cost to Cominco could be $4 to 5 million per year. If such charges were applied to all power transmitted to its industrial load of 1,800 GW.h per year, then the additional cost would be about $10 million (Exhibit 83, p. 8). These concerns led Cominco to reject WKP's request for firm access to Line No. 71.

WKP indicated that there was no evidence in front of the Commission concerning the long-term costs that Cominco would have to incur by having its line open to others (T1: 61). Mr. Saleba, WKP's witness, stated that the range of potential cost increases to Cominco would be a function of how pricing for a RTO would be set up and as far as he was concerned "… it's not a fait accompli that it would be postage stamp…" (T1: 64).

CPC/CBT also noted the commercial disadvantages and price risks it could face in providing open access to their Keenleyside to Selkirk line. CPC/CBT stated that if it was no longer the exclusive user of its transmission line and if a RTO could establish a tariff of six to 10 mills per kilowatt hour, it might receive revenues of one and one-half mills, thereby creating a non-compensated cost (T7: 1287). CPC/CBT also noted it would be a matter of rate structure, which is unknown at this point, in determining whether or not a regulated RTO rate would penalize it (T7: 1290).

With respect to the FERC industry standards of reciprocity, CPC/CBT commented that it would not want to see the FSA revised unless it is done in a manner that would address open access principles and correct provisions that contravene open access. CPC/CBT indicated that if it were to interconnect with WKP, it could be forced to provide open access to WKP or other eligible users in the future.

### 7.3 Participation in an Integrated System : Regulatory Concerns

Both Cominco and CPC raised regulatory concerns as a result of the interconnection requirements requested by WKP. In essence, integration through interconnection with WKP facilities could lead to the imposition of regulation within a RTO structure.

Cominco's concerns were primarily driven by the current uncertainties in the transmission world. In providing access to Line No. 71, Cominco foresaw the risk of becoming part of a RTO and hence subject to regulation. According to Cominco, this could require it to divide generation and transmission activities with attendant costs (Exhibit 83, p. 7). Cominco also argued that to the extent it offered services, such as transmission to others, it would be exposed to losing its provincial exemption from regulation (T7: 1313).

Another vehicle through which Cominco could be made subject to regulation, was possible ownership of transmission facilities in the Kootenay Valley. Cominco indicated that under its proposal it was difficult to say to what extent it might be an owner of a regulated transmission facility, since the facility could be included in the Facilities Sharing Agreement (T7: 1322). However, Cominco remained concerned that, were it to be an owner of a regulated transmission facility, the consequences of a new RTO were not evident (T7: 1322).

WKP responded that these regulatory concerns raised by Cominco, to the extent they exist, should not be the basis upon which the Commission made its decision. The Commission should base its decision on the public interest, not the commercial or strategic interest of Cominco.

CPC/CBT expressed concern over any interconnection of their Keenleyside to Selkirk line with the WKP system. CPC/CBT stated that since it is not presently subject to regulation, it would require assurance that this status would not be impaired before agreeing to be interconnected. CPC/CBT also stated that if suitable conditions on interconnection could not be met, then its Keenleyside to Selkirk line would remain a radial line. If these conditions were met then it could proceed toward interconnection (T7: 1286).

CPC/CBT also outlined its intention to avoid future regulatory risk that it may face under broader transmission regulatory reforms. CPC/CBT stated that it had hoped to enter into new arrangements where it could grandfather certain provisions that would withstand possible challenges arising from changes in the U.S. However, until it received this protection, it felt exposed (T7: 1288).

CPC/CBT related the risk of being regulated to some of the provisions in the FSA. CPC/CBT indicated that it would only agree to the transmission facilities becoming shared facilities, if the discrimination in the treatment of the shared facilities was addressed (Exhibit 10B, p. 4). According to CPC/CBT, this discrimination is related to a restriction in the FSA allowing it to move power to only the perimeter of shared facilities (T7: 1224).

### 7.4 Commission Findings

Today four entities are involved in the generation and transmission of electricity in the area, and they operate with varying degrees of cooperation. There is substantial agreement among the parties that efficiencies would result from integrated planning and operation of an electrical grid.

The Commission recognizes that the transition to a fully integrated system could impose business risks on some of the parties, but finds it premature to address these issues in this proceeding. The Commission continues to believe that an integrated transmission system is in the best interests of ratepayers in British Columbia. It urges the parties to continue to engage in negotiations that are directed at achieving this goal. With the evolution of competitive electricity markets, the Commission believes that planning of transmission system additions is required on an integrated basis and that operation of the system on an integrated basis will become necessary. This Application has demonstrated the current conundrum wherein the most efficient network of facilities in the Kootenays may impinge on the commercial interests of individual transmission owners. It is to be hoped that the parties will negotiate reasonable access and interconnections (at least for reliability reinforcement) based on the determinations in this Decision. If the parties are not able to accommodate their interests in ways which benefit electricity users throughout the region, the Commission believes that a RTO-type organization will be required as soon as possible. When this comes about issues of access and rate structure will be addressed.

Dated at the City of Vancouver, in the Province of British Columbia, this 5th day of June 2000.

*Original signed by:*
Peter Ostergaard
Chair

*Original signed by:*
Paul G. Bradley
Commissioner

*Original signed by:*
Barbara L. Clemenhagen
Commissioner

*Original signed by:*
Kenneth L. Hall, P. Eng.
Commissioner

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER C-10-00

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by West Kootenay Power Ltd.
for a Certificate of Public Convenience and Necessity
for its Kootenay 230 kV System Development

**BEFORE:** P. Ostergaard, Chair )
K.L. Hall, Commissioner ) June 5, 2000
P.G. Bradley, Commissioner )
B.L. Clemenhagen, Commissioner )

## CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

**WHEREAS:**

A. On November 12, 1999, West Kootenay Power Ltd. ("WKP") applied to the Commission for a Certificate of Public Convenience and Necessity ("CPCN") for its Kootenay 230 kV System Development Project ("the Kootenay 230 kV Project", "the Application") pursuant to Section 45(1) of the Utilities Commission Act; and

B. The Application was preceded by the filing of a 20 Year Transmission and Distribution Master Plan; and

C. By Order No. G-125-99 dated December 2, 1999, the Commission established a Regulatory Agenda and Timetable to review the Application; and

D. A public hearing in Castlegar and Brilliant, B.C. was conducted from February 21 to February 24, 2000, and from March 13 to March 16, 2000.

**NOW THEREFORE** the Commission orders as follows:

1. Pursuant to Section 45 of the Act, a CPCN is granted to WKP for the following components of the Kootenay 230 kV Project:

   (a) The modification and upgrade of the South Slocan substation to upgrade circuit breakers and terminate a 63 kV transmission line from British Columbia Hydro and Power Authority's Kootenay Canal substation;

   (b) The installation of a remedial action scheme for generation shedding at the South Slocan generating station;

   (c) The construction of a 63 kV line from the South Slocan substation to the Kootenay Canal substation;

   (d) The modification of B.C. Hydro's Kootenay Canal substation for the addition of another 63 kV transmission connection and a 63/230 kV transformer and 230 kV line termination;

…/2

(e) The construction of a 230 kV transmission line from the Kootenay Canal substation to a new Brilliant substation following the "East High Elevation route";

(f) The construction of a 63/230 kV substation near the Brilliant generating station or, under certain conditions, an agreement to participate with Columbia Power Corporation/CBT Power Corporation in a Brilliant substation;

(g) The construction of a new 230 kV transmission line from the Brilliant substation, built generally along the present corridor to a redeveloped substation at Warfield;

(h) The reconstruction of the Warfield and Tadanac substations to terminate the 230 kV transmission line and provide transformation to 63 kV, and to correct present equipment deficiencies conditional upon Cominco and WKP coming to an agreement upon appropriate changes to the Facilities Sharing Agreement and cost sharing arrangements; and

(i) Other remedial action schemes, transformers and communication equipment as identified in the Commission's Decision, dated June 5, 2000, which accompanies this Order.

2. WKP is to comply with the determinations and directions of the Commission in the Decision.

3. WKP is to resubmit for final approval all agreements and final cost estimates of the approved facilities.

**DATED** at the City of Vancouver, in the Province of British Columbia, this 5th day of June 2000.

BY ORDER

*Original signed by:*

Peter Ostergaard
Chair

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# 1.0 INTRODUCTION

## 1.1 Background

West Kootenay Power Ltd. ("WKP", "the Company", "the Utility") is an investor-owned electric utility providing wholesale and retail service in the west Kootenay and south Okanagan regions of British Columbia. It is a public utility regulated by the British Columbia Utilities Commission ("the Commission", "the BCUC") in accordance with the Utilities Commission Act ("the Act").

WKP forecasts its system peak load for 2000 at 628 MW. The Utility owns four small hydro-electric plants on the Kootenay River with a combined rated capacity of 214 MW, which is expected to increase to 236 MW by 2009. Remaining energy and capacity needs are met through contracts with the British Columbia Hydro and Power Authority ("B.C. Hydro"), a contract with a joint venture of the Columbia Power Corporation ("CPC") and the CBT Power Corporation (collectively "CPC/CBT"), and other market purchases.

On November 12, 1999, WKP applied to the BCUC for a Certificate of Public Convenience and Necessity ("CPCN"), pursuant to Section 45(1) of the Act ("the Application"). The Application describes the proposed new transmission lines, and new or rehabilitated substations that WKP states it needs to upgrade and expand in the west Kootenay region ("the Kootenay 230 kV Project"). Commission Order No. G-125-99, dated December 2, 1999, established the Regulatory Agenda and Timetable to review the Application.

WKP filed amendments to its Application on January 10, 2000, which included changes to its preferred route. The filing also included an application under Section 61 of the Act for approval of a new Rate Schedule 110 - Long-Term Alternate Path Transmission Service ("APTS").

Order No. G-125-99 set February 21, 2000 as the commencement date for a public hearing in Castlegar. Two subsequent procedural Orders were issued:

1. No. G-17-00 (February 10, 2000), declining a request by counsel for the Regional District of Central Kootenay ("RDCK") and the Regional District of Kootenay Boundary ("RDKB") for a postponement of the hearing; and

2. No. G-21-00 (February 24, 2000), establishing March 13, 2000 as the date for recommencement of the hearing at Brilliant, B.C.

The evidentiary portion of the public hearing lasted eight days, from February 21 to 24 and March 13 to 16, 2000. Evening sessions were held on February 22 and 23 and March 13 to give the public – and particularly residents concerned about routing – an opportunity to ask questions and state their views. Written argument followed, with WKP's Submission filed on March 27, Intervenor Submissions on April 7, and WKP's Reply Submission on April 14, 2000.

### 1.2 Related Reports, Meetings and Workshops

Public utilities have an ongoing responsibility to monitor the costs, issues, and options associated with maintaining and upgrading their systems. The public hearing into WKP's CPCN Application was the product of a two-year process of meetings and workshops to review reports, described in more detail in Chapter 2 of this Decision. The first report, the 20 Year Transmission and Distribution Master Plan (Exhibit 5), was filed with the BCUC in April 1999 and was the subject of a public workshop in Penticton on May 27, 1999.

The Commission's Letter No. L-28-99 of June 15, 1999 noted that Workshop participants favoured at least the replacement of the Columbia "river lines" with a 230 kV system between Brilliant and Warfield, plus two new substations. At the Workshop it was also agreed that WKP would proceed expeditiously with a CPCN Application, and would consider the benefits and costs of pursuing an option to extend a 230 kV line north from Brilliant to Kootenay Canal. Workshop participants expressed concern that action to refurbish the WKP transmission system must proceed quickly to maintain adequate system reliability.

In mid-1999, WKP prepared a joint system impact study with B.C. Hydro, which was followed by a transmission system expansion feasibility study. Both studies form part of the Application, which was made available to participants involved in WKP's revenue requirements review in Kelowna on November 15, 1999.

A Workshop and Pre-hearing Conference was held in Castlegar on January 14, 2000. Representatives for all active Intervenors were present, except the Concerned Citizens of South Slocan, Shoreacres, Glade, Tarrys and Thrums ("the Concerned Citizens"). WKP presented its justification for the Kootenay 230 kV Project and system options. It was noted that negotiations with B.C. Hydro, CPC/CBT, and Cominco Ltd. ("Cominco") were not complete, and WKP agreed to file a report on the status of negotiations by February 7, 2000 (Exhibit 6). B.C. Hydro, CPC/CBT, and Cominco articulated their positions at that juncture in letters dated February 10, February 10, and February 18 respectively.

As part of the December 16, 1999 Revenue Requirements Decision, the Commission required WKP to file a report to advise on measures being taken to address near-term power quality and reliability issues in the Slocan Valley region. The March 10, 2000 System Risk Management Report was not filed as an exhibit at the hearing. In making copies available to participants of both the revenue requirements and CPCN proceedings on March 24, 2000, the Commission noted that the System Risk Management Report may be relevant to CPCN hearing issues. Peripheral reference was made to this Report in submissions. The Commission has not considered the System Risk Management Report in this Decision.

In its March 27, 2000 Submission, WKP asserted it had expended substantial efforts on its system upgrade process, providing ample opportunity for input at both a technical and a strategic level (Argument, 4.14, p. 14). WKP further argued that the comprehensive process to date "underscores the need for the Commission to decide these issues and make clear that further discussion and analysis of these issues is not likely to result in a negotiated resolution" (Argument, 4.15, p. 14).

### 1.3 Generation and Transmission Providers

Four companies own electrical generation and transmission facilities in the Kootenay area. Generation currently totals 2,100 MW, and is likely to increase to 2,500 MW or more (Exhibit 83, p. 4). However, the maximum Kootenay area load is only 450 MW, comprised of Cominco's 250 MW load plus WKP's customer load of up to 200 MW. This section describes the four companies and the agreements that are currently in place to coordinate the operation of their facilities, to provide a context for reviewing WKP's Kootenay 230 kV Project within the overall electrical system configuration.

The generation and transmission infrastructure and ownership structure in the Kootenay/lower Columbia region is unusually complex. The WKP transmission system in the region is reaching the end of its physical life. Cominco has its own aging generation and transmission system, which it views as a strategic asset to ensure its regional economic viability. B.C. Hydro superimposed a new 230 and 500 kV system to connect its large generation plants with loads outside the region, and to meet Columbia River Treaty obligations. More recently, the Columbia Basin Trust was established with a mandate to invest in and develop power projects, using some of the Province's proceeds from the sale of the Columbia River Treaty downstream benefits.

Figure 1.1 shows the region's electrical system. B.C. Hydro has 500 kV lines looping around WKP's service area, running from Selkirk substation southeast of Trail to Ashton Creek substation north of Vernon, to Nicola substation near Merritt and back to Selkirk. The regional transmission system is interconnected with the U.S. Pacific Northwest and with Alberta. One connection is a B.C. Hydro 230 kV line from Selkirk to Nelway to the Bonneville Power Administration ("BPA") substation at the Seattle

City Light's Boundary generating plant on the Pend d'Oreille River, just south of the international boundary. Another is Cominco's 230 kV Line No. 71 from Waneta directly to BPA's Boundary substation.

### 1.3.1 West Kootenay Power Ltd.

Generation Resources and Load

As shown in Figure 1.2, WKP has four hydroelectric plants on the Kootenay River:

| | |
|---|---|
| Corra Linn (Plant 4) | 45.0 MW capacity |
| Upper Bonnington (Plant 2) | 64.0 MW capacity |
| Lower Bonnington (Plant 1) | 52.5 MW capacity |
| South Slocan (Plant 3) | 52.5 MW capacity |
| | 214.0 MW |

Generator upgrades are expected to add 22 MW of capacity over the next ten years. Power output varies from 80 MW in the winter to 200 MW during the spring and summer (Exhibit 1, Appendix D, p. 15).

WKP forecasts its peak load for 2000 at 628 MW, of which about 200 MW is in the Kootenay area and the remainder is in the south Okanagan (Exhibit 1, Appendix D, p. 24). WKP's peak load is forecast to increase to 734 MW by 2010, with most of the growth occurring in the Okanagan.

Under the Brilliant Power Purchase Agreement with CPC/CBT, WKP buys the power produced at, or resulting from entitlements related to the Brilliant plant. The Agreement runs to 2056. The Brilliant plant has a generating capacity of 128 MW. The Brilliant Upgrade is expected to add 20 MW by 2003, and the Brilliant Expansion another 100 MW by 2006.

WKP buys up to 160 MW of power from B.C. Hydro that is delivered in the Okanagan and Princeton areas. WKP also purchases about 120 MW of additional power from the market.

Transmission Facilities

WKP operates the transmission facilities that WKP and Cominco own. The principal transmission lines in the Kootenay area are known as the river lines: six 63 kV lines between South Slocan and Brilliant near Castlegar; eight 63 kV lines between Brilliant and Warfield near Trail; and four 63 kV lines between Warfield and Waneta.

WKP also has a 63 kV line that runs from its Kootenay River generating plants to Nelson, Salmo and Trail, and which connects to the Waneta generating plant. As well, WKP owns Line No. 30 from South Slocan to Crawford Bay, and Cominco owns the portion of this line that extends to Kimberley. Other 63 kV lines serve communities in the Slocan Valley, Kaslo, Creston, and Grand Forks.

The principal connections between WKP's Kootenay transmission system and neighbouring systems are at Waneta (Cominco's 230 kV Line No. 71 from Waneta to the BPA Boundary substation with a capacity of 450-500 MW but limited to 360 MW by the transformer capacity at Waneta) and at South Slocan (the short 63 kV Line No. 13 to B.C. Hydro at Kootenay Canal with a capacity of 160 MW). WKP's Line No. 11 to the Okanagan is a 161 kV line from WKP's Mawdsley substation in Warfield, and has a capacity of about 140 MW (Exhibit 1, Appendix D, p. 27).

WKP uses its Line No. 11 and wholesale transmission over the B.C. Hydro system to move power from the Kootenay area to the Okanagan. WKP expects later in 2000 to file a CPCN application to improve delivery to the Okanagan. The Feasibility Study for the Transmission System Expansion Report considered two alternatives: a substation in the south Okanagan connected to B.C. Hydro's 500 kV system (Option O1) or a 230 kV transmission line from Trail to Penticton (Option O3). The optimal solution from a WKP ratepayer perspective will depend on the rate that WKP would pay to wheel power over the B.C. Hydro system.

WKP stated that its Kootenay 230 kV Project is independent of the option that is selected to reinforce deliveries to the Okanagan. The proposed Warfield switch station is sized to accommodate an additional line termination, but no components are included for the Okanagan 230 kV line option (Exhibit 4, Tab 1, p. 21). WKP stated that the option ultimately selected to reinforce the Okanagan does not affect, and would not be affected by, the conductor size selected by WKP for the Kootenay 230 kV Project (T6: 1034 and 1035).

### 1.3.2 Cominco Ltd.

In British Columbia, Cominco is engaged primarily in mining, and lead and zinc smelting. Cominco's industrial operations at Trail employ approximately 2000 people, and form an important part of the economic base of the region (Exhibit 83, p. 1).

Generation Facilities and Load

Cominco owns the Waneta generating plant on the Pend d'Oreille River, which has a capacity of 370 MW. The plant is being upgraded, and an increase in capacity of 94 MW is expected by 2005 (Exhibit 1, Appendix D, p. 15).

Cominco's load in the Trail area is up to 250 MW (Exhibit 83, p. 4). About 120 MW of this load can be shut off instantaneously for a number of hours without having much impact on production over a month (T8: 1371 and 1405). Cominco's load at Kimberley of 30 MW will end when the Sullivan Mine shuts down in 2002.

Transmission Facilities, Including Line No. 71

Cominco owns three of the 63 kV transmission lines between South Slocan and Warfield, and all four 63 kV lines between Warfield and Waneta. These transmission lines connect at the Warfield and Tadanac switching stations to Cominco's industrial operations at Trail and to WKP transmission facilities. Cominco and WKP are negotiating to replace both stations at Warfield and Tadanac (T7: 1322).

Cominco also owns the 230 kV Line No. 71 between Waneta and the BPA Boundary substation. The line was built in 1964 to deal with varying levels of generation at the Waneta plant (T8: 1390-1393). Cominco uses Line No. 71 mainly to export surplus power at low cost. The line can also be used to import power during periods of low water flow or when the Waneta plant is out of service. WKP uses Line No. 71 to import power and to export small amounts of its own electricity (Exhibit 1, Appendix D, p. 18; T7: 1316). WKP has an arrangement with Cominco for the use of the line on an interruptible basis for a fee of 0.2 mills per kW.h (Exhibit 26). Cominco is no longer prepared to allow WKP firm access to Line No. 71 if this access would lead to open access precedents (Cominco Argument, p. 6, and Exhibit 83, p. 7).

Both Line No. 71 and a B.C. Hydro 230 kV transmission line connect to the BPA Boundary substation. To prevent loop flows, B.C. Hydro and Cominco have agreed to connect Line No. 71 to the phase-shifter at the Nelway station on B.C. Hydro's 230 kV line (Exhibit 9G, p. 1).

Cominco As Power Supplier To Wkp, And Cominco Exemption

Cominco historically was an electricity supplier to WKP. In 1994, Cominco entered into the Power Asset Sale Agreement which provided for the sale to the Province of British Columbia of the right to construct expansions at the Brilliant and Waneta generating plants, and the extension of benefits received by Cominco under the Canal Plant Agreement to the earlier of the date of termination of the Columbia River Treaty or December 31, 2035. The province assigned the expansion rights to CPC.

In 1996, CPC/CBT bought the existing Brilliant plant from Cominco and, by the Brilliant Power Purchase Agreement, agreed to sell to WKP the power from the plant. Commission Order No. E-7-96 approved the Brilliant Power Purchase Agreement and several related agreements. One of these was the Residual Power Supply Agreement between Cominco and WKP, which expired at the end of 1999. Currently Cominco does not sell power to WKP (T5: 876; Exhibit 71; Exhibit 79).

Starting in 1982, Cominco was exempted from provisions of Part 3 of the Act under exemption orders issued by the Minister responsible for the Act. The most recent exemption order issued in 1996 (the "Cominco Exemption Order") replaces earlier orders (Exhibit 47A).

### 1.3.3 CPC/CBT

The Mandate

The mandate of CPC and the Columbia Basin Trust was legislated by the Columbia Basin Trust Act in 1995. It includes investing and developing power projects in the Columbia Basin using some of the revenues from British Columbia's sale of the Columbia River Treaty Downstream Benefits. The CBT Power Corporation ("CBT") is a subsidiary of the Columbia Basin Trust. CPC is a Crown Corporation wholly-owned by the Province of British Columbia and is in a joint venture partnership with Columbia Basin Trust to develop and run various power projects. All the outstanding shares of CPC and the Columbia Basin Trust are owned by the Province (Exhibits 47B and 94). Their core projects are the Keenleyside Power Plant, the Brilliant Redevelopment Project and the Waneta Expansion.

Current and Proposed Facilities

CPC/CBT are constructing a 170 MW power plant at the Keenleyside Dam and a 49 km, 230 kV transmission line to B.C. Hydro's Selkirk substation.

CPC/CBT purchased from Cominco the Brilliant Dam and Powerhouse, and expansion rights to Cominco's Waneta plant. The two-stage Brilliant Redevelopment Project consists of a 20 MW upgrade, which is expected to be completed in 2003, and a 100 MW Expansion scheduled for completion in 2006. CPC/CBT own a switching station at Brilliant that connects the Brilliant plant to WKP's transmission lines. CPC/CBT had intended to tie the Brilliant Expansion project through a small, dedicated substation into the new 230 kV line from Keenleyside to Selkirk.

An upgrade (94 MW) and an expansion (250 MW) are also planned for Waneta. CPC/CBT is seeking to participate in the upgrade. The Expansion is planned for a time frame after 2006. Purchase of the Waneta Expansion Rights included certain transmission rights to Cominco's Line No. 71, which CPC/CBT would use to deliver Waneta Expansion electricity.

CPC/CBT is concerned that WKP's Kootenay 230 kV Project may interfere with its Keenleyside-Selkirk line and its rights on Line No. 71. WKP has proposed a larger Brilliant substation, which would preclude CPC/CBT's planned smaller one. Both WKP and CPC/CBT proposed to finance and own this larger substation. Ownership and sizing of combined or separate substations at Brilliant were not resolved prior to the hearing.

The Waneta Upgrade, the Keenleyside Project, and the Brilliant Project acquired from Cominco in 1996 are among the projects subject to a Minister's Exemption Order (Exhibits 47B and 91) (the "CPC/CBT Exemption Order"). While open to differing interpretations, the intent of the CPC/CBT Exemption Order is to exempt CPC/CBT from utility regulation with respect to Commission approval for the named projects and their associated electricity supply contracts.

#### 1.3.4 1996 Facilities Sharing Agreement

CPC/CBT, WKP, and Cominco are parties to the 1996 Facilities Sharing Agreement ("FSA") (Exhibit 48). The FSA replaced a similar agreement signed in 1987 by adding CPC/CBT and incorporating changes to facilities and their ownership. Its purpose is to optimize the benefits of each party's facilities by making portions that are surplus to the owning party's requirements available to the other parties.

The FSA defines two types of facilities. "Shared Facilities" as set out in Appendix I to the FSA are lines, substations and switches where nominated uses are specified and an annual rent is paid based on capital and operating costs. Appendix I is reviewed each year for the next four-year period beginning the following January 1: a new Appendix I is prepared with revisions to the facilities list, their nominated uses, and their capital, operating, and financing costs. "Common Facilities", set out in Appendix II, are generally the river lines and switches at associated switching stations. No charges apply to Cominco or WKP for their use of Common Facilities.

WKP confirmed in testimony that Line No. 71 was not included as a Shared Facility under the 1987 Facilities Sharing Agreement (T3: 568). The FSA provides that Line No. 71 will become a Shared Facility under the FSA when CPC/CBT fulfills certain conditions related to the Waneta Upgrade Project. CPC/CBT hoped that it would reach agreement with Cominco on these matters in 2000 (T7: 1279). CPC/CBT also stated that it holds transmission rights on Line No. 71 that the Province of British

Columbia acquired when it purchased the expansion rights at Waneta from Cominco in 1994. CPC/CBT intends to use the transmission rights for the Waneta Expansion Project. Use of Line No. 71 "shall be subject to Cominco's requirements for use of Line No. 71, as determined by Cominco acting reasonably" (Exhibit 48, paragraph 6.2).

The use of Shared Facilities by CPC/CBT is for the sole purpose of transferring electricity to the Perimeter of the Shared Facilities. The Perimeter is defined currently as three points of interconnection – at Crawford Bay, at Kootenay Canal, and at Waneta. Once Line No. 71 is available as a Shared Facility, BPA's Boundary substation becomes an interconnection point for the purpose of defining "Perimeter".

The Kootenay 230kV Project would likely trigger the need for amendments to the FSA. WKP has proposed revisions to Appendix I of the FSA, as described in Exhibit 16, to which the other parties have not consented. In its Submission, WKP seeks the BCUC's approval for its proposed amendments to Appendix 1 of the FSA.

#### 1.3.5 British Columbia Hydro and Power Authority

B.C. Hydro is a Crown-owned electric utility regulated by the BCUC under the Act. WKP buys energy and capacity under B.C. Hydro's Rate Schedule 3808. As a wholesale transmission customer, WKP also transfers electricity from the Kootenays to the Okanagan/Similkameen using B.C. Hydro's 500 kV transmission system.

Generation Resources and The Canal Plant Agreement

B.C. Hydro has two large generating stations in the region: the 530 MW Kootenay Canal plant on the Kootenay River and the 607 MW Seven Mile plant on the Pend d'Orielle River between Boundary and Waneta (Figure 1.2).

Under the Columbia River Treaty, B.C. Hydro built and operates the Keenleyside storage dam on the Columbia River, to which CPC/CBT is adding generation. By 2003, up to 290 MW of capacity from the Treaty's downstream benefits can be returned to British Columbia using the 230 kV Boundary-Nelway intertie.

Under the 1972 Canal Plant Agreement, B.C. Hydro granted average peak capacity and average energy entitlements to Cominco and WKP in exchange for additional water rights on the Kootenay River. This Agreement expires in 2005. If it is not extended or renewed, WKP may resume independent operation of its four plants under its existing water license.

In 1974, B.C. Hydro built a canal bypassing the four WKP generating stations and installed the Kootenay Canal plant, with its tailrace just downstream of the South Slocan plant. In 1991, Cominco and WKP executed the Canal Plant Sub-Agreement, which divides capacity and energy entitlements between them. This Sub-Agreement was replaced by the 1996 Canal Plant Sub-Agreement when CPC/CBT bought the Brilliant plant.

The Canal Plant agreements integrate the WKP, Cominco, and CPC/CBT facilities with the B.C. Hydro system. Effective control of Kootenay River flows and of plants on the Kootenay and Pend d'Oreille River rests with B.C. Hydro. The electricity available at any given time to WKP, Cominco, and CPC/CBT is seldom the actual production at their plants; rather, these agreements determine monthly capacity and energy entitlements.

B.C. Hydro is required to provide 150 MW of capacity between the Kootenay Canal plant and the South Slocan substation in order to supply the entitlements. The Feasibility Study Report states that the 63 kV interconnection between WKP and B.C. Hydro at South Slocan/Kootenay Canal is the contractual point of delivery for these entitlements (Exhibit 1, Appendix D, p. 19). However, Cominco is of the view that the present Canal Plant Agreement does not specify a point of delivery (T7: 1325). The entitlements are accounted for at the Waneta bus (T8: 1402). An extension to the Agreement is under negotiation, and Cominco is seeking to have its entitlement delivered at Selkirk or Nelway. If Cominco receives its entitlements at South Slocan, it would prefer to use WKP's Kootenay 230 kV Project to transmit the electricity to Warfield, but it is also considering other options (T8: 1368).

Transmission Facilities

B.C. Hydro's regional transmission system is shown on Figure 1.2. The Selkirk substation serves as a collection point for generation from Seven Mile and Kootenay Canal, each delivered by two 230 kV lines. A fifth 230 kV line connects with Nelway. The two 230/500 kV transformers at Selkirk have been operating close to thermal capacity limits, and a third transformer is to be completed in 2001 (Exhibit 1, Appendix C, p. 7). Three 500 kV lines radiate from Selkirk, east to Cranbrook, northwest to Ashton Creek and west to Nicola.

## 2.0 WKP APPLICATION FOR SYSTEM DEVELOPMENT

### 2.1 The 20 Year Transmission and Distribution Master Plan

The purpose of the 20 Year Transmission and Distribution Master Plan was to establish capital spending priorities for WKP's transmission and distribution networks over a 20-year planning horizon and a five-year action period. For Kootenay transmission facilities, the March 1999 report entitled "20 Year System Plan for the Period 1999-2018" focussed on the condition of the river lines from South Slocan, and the condition and capacity of the substations. This report also addressed interconnections with B.C. Hydro, Cominco, and CPC/CBT; these companies were represented on a review panel.

Three transmission options were identified for the Kootenay/Columbia Valleys:

K1: A Rehabilitation of the Existing 63 kV river line system;
K2: A new "Small Scale" 230kV line between Brilliant and Waneta; and
K3: A new "Large Scale" 230kV line between Kootenay Canal and Waneta (i.e., K2 plus a new line between Brilliant and Kootenay Canal).

That report recommended that option K2 be undertaken in conjunction with a new east-west line to the Okanagan (option O3). Compared to option K1, the small scale 230 kV project provided enhanced security and reliability, as well as reduced line losses and aesthetic improvements associated with the removal of the old poles and lines. K3 would provide improved generation security for the Kootenay Canal plant, but was considered too costly.

### 2.2 System Impact Studies for Transmission System Expansion

To translate the recommendations of the 20-year plan into a business case suitable for financing and regulatory review, WKP initiated additional project feasibility studies in 1999 for the major new Kootenay and Okanagan proposals. A Draft Executive Summary of the "System Impact Studies for Transmission System Expansion" is included as Appendix C of the Application. Its purposes were to verify or refine cost estimates, to quantify operational performance impacts, and to assess financial impacts of the various planning options. A Technical Oversight Committee and a Strategic Oversight Committee were formed.

The main conclusions of this summary were:

1. Definitive rejection of the concept of the life extension of the 63 kV river lines in favour of a new 230 kV "backbone";

2. The addition of two new options: K4, a new 230 kV line from Keenleyside to Trail, and K5, a new 230 kV line from Kootenay Canal to Brilliant and from Keenleyside to Trail; and

3. A recommendation for an aggressive 230 kV development (K3 or K5) over the modest 230 kV options (K2 or K4).

Justification for the 230 kV development north of Brilliant included improvements in generation security to B.C. Hydro, added security to WKP loads and generation, and security for CPC/CBT generation at Keenleyside under multiple outage conditions. "The risk management issue used to reject large scale 63 kV life extension can also be applied to life extension for the Brilliant-South Slocan 63 kV circuits, although these circuits are generally found to be in better condition than the Brilliant-Trail circuits" (p. 18 of Appendix C of the Application). With regard to the choice between K3 or K5, this summary noted the decision becomes one of tradeoffs between impacts on people and impacts on the environment. It recommended K5 – Keenleyside termination and backcountry routing to Trail – conditional upon recognition by all parties of the benefits realized.

### 2.3 Feasibility Study for Transmission System Expansion

A third report was prepared by Acres International for WKP in November 1999. The "Feasibility Study for Transmission System Expansion: Feasibility Study Report" appears as Appendix D of the Application. It evaluates the impacts of the two Okanagan and five Kootenay (K1 through K5) supply options on the B.C. Hydro and WKP systems, covering four test years, seasonal load and generation simulations, and contingencies.

The preferred development strategy recommended in this Report is O3 and K5: a new east-west line to the Okanagan, coupled with new 230 kV lines from Kootenay Canal to Brilliant, and from Keenleyside to Trail. Despite a $5 million added cost, K5 was preferred over K3 on the strength of improved aesthetics in the Columbia Valley, and the reduced safety risks and operational problems associated with building a new line in an energized corridor. The Report suggests the benefits to CPC/CBT associated with improved security for its generation at Keenleyside and Brilliant could be used to reduce rate impacts on WKP customers, in spite of a lack of persuasive incremental benefits to those customers associated with K5.

### 2.4 Public Consultation

As stated in the Application, WKP's public consultation objective was to enable input from concerned citizens and communities while building consensus for a solution for improving the reliability and security of power transmission in the region. Consultation involved:

- three BCUC staff-initiated Workshops in May 1999, September 1999 and January 2000;
- meetings with elected and appointed local government officials;
- media briefings;

- meetings of WKP customer advisory panels in December 1999; and
- seven community open houses.

Exhibit 19 reports results from the community open houses and customer advisory panels.

WKP's approach was premised on its view that the overall impact of the Project would be positive with respect to aesthetics and public safety, and any negative impacts would be confined to local property matters which would be mitigated where feasible.

As the hearing date approached, it became apparent that some intervenors and residents considered the public consultation process to be inadequate. There was confusion and mistrust over the January 10, 2000 Application amendment that changed WKP's preferred route option between Brilliant and Warfield from K5 to K3. Residents of rural communities along the Kootenay River north of Brilliant, affected by transmission line changes and dissatisfied with WKP's routing proposal and its consultation process, formed the Concerned Citizens, who intervened actively in the public hearing.

The RDCK and RDKB were concerned with what they considered to be the short time frame allotted to local government and general public input. In particular, the Regional Districts felt that local Advisory Planning Commissions had not been provided with enough time to become informed and comment knowledgeably on the routing options.

In response to these concerns, the BCUC held three well attended evening sessions as part of the public hearing, and attempted to ensure they were well publicized in advance.

In the two weeks between the two segments of the public hearing, WKP retained a communications consultant and a noise consultant, and met with community representatives. When the hearing resumed on March 13, 2000, WKP announced it had reviewed the line routing options between South Slocan/Kootenay Canal and Brilliant in response to concerns raised by residents in the area, and had changed its preferred transmission line route to avoid the concerned communities.

### 2.5 The Application

The Application, as amended, requested approval of option K3. From north to south, this is comprised of:

| | | |
|---|---|---|
| 1. | South Slocan substation rehabilitation | ($9,716,000) |
| 2. | 63 kV tie to Kootenay Canal | ($229,000) |
| 3. | Kootenay Canal substation modification | ($6,934,000) |
| 4. | Kootenay Canal to Brilliant 230 kV line via the "East High" route | ($9,828,000) |

| | | |
|---|---|---|
| 5. | New 63 kV/230 kV Brilliant substation | ($16,463,000) |
| 6. | Brilliant to Warfield 230 kV line via existing river lines corridor | ($13,603,000) |
| 7. | Warfield 63 kV substation expansion | ($12,596,000) |
| 8. | Warfield 230 kV substation addition | ($13,140,000) |
| 9. | Warfield line diversions | ($540,000) |
| 10. | Warfield to Waneta 230 kV line via existing river lines corridor | ($4,835,000) |
| 11. | Waneta 230 kV substation expansion | ($6,714,000) |
| 12. | New 230 kV transmission line from Cominco's Line No. 71 to B.C. Hydro's Nelway substation | ($636,000) |
| 13. | Nelway substation modifications | ($1,748,000) |
| 14. | Breakers and improved protection at WKP generating stations and Rosemont Switching Station | ($8,480,000) |
| 15. | Communications system for Option K3 | ($4,097,000) |
| 16. | Feasibility Study | ($431,000) |

WKP sought approval for a total Project cost of $109,990,000. After cost sharing and rental payments, WKP expected to be responsible for $79,954,356 of the cost (Exhibit 27D). WKP had expected that proposed Project cost sharing arrangements with Cominco, CPC/CBT, and B.C. Hydro would be completed by the time of the hearing.

In the Application, WKP also sought approval of a 10% cost collar for the purposes of cost containment and to protect ratepayers from being exposed to cost overruns exceeding 110% of WKP's share of the total Project costs. WKP would be motivated to minimize costs by the opportunity to keep savings below 90% of target cost.

WKP also sought approval for a new tariff, Rate Schedule 110, for APTS, namely a monthly rate of $0.67 per kVA of reserved capacity (Exhibit 1, Appendix G as amended in Exhibit 13, p. 2). WKP proposed that APTS would be available to provide full service to Cominco's operations at Trail through the use of the new 230 kV lines between Kootenay Canal and Warfield, in the absence of changes to the FSA. Cominco's position was that it would not use the APTS (Exhibit 83, p. 6).

The Project schedule in the Application was premised on receipt of a final unconditional CPCN by July 2000. Construction would be completed by October 2002, and river line decommissioning and salvage would finish in April 2003.

### 2.6 WKP Requests for Commission Directions

During the hearing and in Argument, WKP requested Commission directions or orders related to facilities, agreements, and tariffs involving Cominco, CPC/CBT and B.C. Hydro. These included:

1. approval of WKP's proposed changes to the FSA;
2. a direction to Cominco to make Line No. 71 available to WKP;
3. a direction to Cominco to permit construction of the Warfield and Waneta substations;
4. an order to Cominco to connect its Line No. 71 to B.C. Hydro's Nelway substation;
5. a direction to CPC/CBT to interconnect its Keenleyside-Selkirk 230kV line with WKP at Brilliant, to file a report on the benefits of interconnection, and to cooperate in the construction of the Brilliant substation;
6. a direction to WKP and CPC/CBT to negotiate cost sharing for the Brilliant substation, and failing agreement on ownership and cost sharing, a determination by the Commission; and
7. a direction to B.C. Hydro to either confirm that the WTS tariff will not apply to the short Boundary-Nelway intertie or, alternatively, that B.C. Hydro file a new, lower WTS tariff specific to this line. WKP later clarified that it was seeking a direction for the parties to enter into negotiations on the appropriate tariff.

The statutory authority of the Commission to make these requested directions and orders was the subject of considerable discussion.

## 3.0 WKP PLAN AND INTEGRATION OF SYSTEM

### 3.1 Evaluation of Present WKP / Cominco System

#### 3.1.1 Physical Condition and Safety

The eight 63 kV lines between Brilliant and Warfield and six similar transmission lines between Brilliant and South Slocan (the "river lines") were originally constructed in the 1930s, and WKP is concerned that the safety risks inherent with the aging plant are not being adequately managed by the standard eight-year inspection cycle and current maintenance levels. The wooden poles and crossarms are visibly deteriorated, and the structural steel elements are badly rusted. The insulators have lost almost their entire original glazing, and the copper line conductor has lost some strength and has experienced localized corrosion. WKP is concerned about its recent experiences with pole fires, and with the potential for structural failure to endanger workers and the public. WKP also considers that the degraded insulation on the lines may have contributed to recent system islanding events (Exhibit 3, Tab 1, pp. 4 and 5; T3: 604).

WKP anticipates that property damage incidents will occur at a frequency of once in five years, and that incidents that threaten worker or public safety will occur once in ten years (Exhibit 1, Tab 4, p. 20). WKP and Cominco spent almost $1 million in 1999 on a short-term program to rehabilitate the river lines for two years, and may need to repeat the expenditure if the lines are still in service in 2003 (T3: 623). Cominco agrees that there are public liability and safety issues with the lines (T7: 1180). However, Cominco is of the view that the three river lines that it owns could be kept in service for a very long time with adequate maintenance. Cominco acknowledged pole and conductor replacements will be necessary, and expected that maintenance costs would average about $500,000 per year (T8: 1411).

WKP also has concerns about the condition of substations in the system. The Warfield substation and the nearby Tadanac substation cannot be properly maintained and are inflexible in operation. There is also concern about the adequacy of fault-current interrupting capacity at both stations and inadequate grounding (Exhibit 1, Tab 4, p. 4). WKP has adopted lengthy defensive work routines to protect staff working in the stations (T1: 73). Cominco also is concerned, and the parties are negotiating to replace both stations with a new substation at Warfield (Exhibit 9G, p. 1) or two independent, but connected, substations (Exhibit 14).

WKP has also identified similar problems at the substations at South Slocan, Lower Bonnington, Upper Bonnington, Cora Linn and the Rosemont Station near Nelson. Initiatives to address islanding problems and to upgrade the generating units will increase short-circuit currents to levels above the normal operating levels of the breakers. At South Slocan there are additional concerns about the condition of the structural supports and the substation grounding, and the suitability of the bus configuration (Exhibit 3, Tab 1, pp. 6 and 7; Exhibit 1, Tab 4, p. 4).

#### 3.1.2 System Stability, Reliability and Power Quality

WKP's system is vulnerable to power quality and stability problems when WKP is unable to maintain sufficient capacity on its interconnections to other systems. System stability and load flow studies were performed under various system configurations to predict deficiencies on the system.

In the System Impact Studies, WKP conducted system load flow studies with B.C. Hydro under certain assumed loading and generation conditions (Exhibit 1, Appendix C). The studies have demonstrated that insufficient intertie capacity from the WKP/Cominco Kootenay region to the B.C. Hydro or BPA systems can cause islanding of various segments of load and generation on the WKP system. The formation of islands with an excess of generation will cause high voltages and over-frequency conditions until the generation is tripped off. The formation of islands with a deficiency of generation will cause frequency and voltage sags until load is tripped off. WKP has experienced both situations upon the loss of a key system element or number of elements. These conditions lead to power quality and reliability problems for WKP's

customers. The studies have also demonstrated that under certain conditions WKP is also at risk from system collapse which would affect major portions of its load in the Okanagan as well as the Kootenays.

### 3.2 Minimum System Planning Criteria

As discussed in Section 2.1 WKP's 20 Year Transmission and Distribution Master Plan reviewed the present condition of the Kootenay and Okanagan transmission systems. Objectives of the Plan included safety risk management, reliability improvements, power quality improvements and the avoidance of redundant facilities from a single system operator viewpoint.

To meet these objectives, WKP applied a number of planning criteria. WKP applied these criteria to the present system without considering ownership of the system components, in order to achieve overall objectives from a system perspective. The most important criterion has been the adoption of a single contingency outage for the bulk transmission system, which requires that after the failure of any single major system element the system can be quickly reconfigured to pick up all the load. This is referred to as N-1 criteria.

The predominant criterion of all utilities in North America is N-1. It is required by the Reliability Management Agreement between WKP and the Western Systems Coordinating Council ("WSCC"). Exhibit 76, entitled "General Instructions for WSCC Compliance with North American Electric Reliability Council ("NERC") Planning Standards" requires that in the event of a single contingency, that there be no loss of demand and the system remain stable. It also notes that for single contingencies a planned or controlled interruption of generators to radial customers, or some local network customers, may occur in certain areas without impacting the overall system stability. WKP's loads and generation in the Kootenay region are interspersed on the transmission system and, therefore, would be impacted by generation and load remedial action schemes. Such Remedial Action Schemes[1] ("RAS") for interspersed loads would be less desirable under the NERC guidelines but may be necessary in less developed areas.

Other minimum system planning criteria included thermal loading to 100% of emergency rating and voltage limits to +/– 10% of nominal. Systems are frequently planned to meet higher criteria. Higher level criteria would include N-2 and N-3 outage criteria, reduced line loss levels, increased system stability and increased reliability. Planning criteria to deal with power quality included the requirement to avoid system conditions such as generation islanding and avoidance of the use of remedial action schemes.

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[1] A Remedial Action Scheme is a protection scheme which will trip off generation or load when voltage, current or frequency levels meet certain, pre-defined conditions.

### 3.3 Voltage of Transmission System

WKP has studied two voltage levels to address the needs of the transmission system. The 63 kV level would involve either the rebuild of the present system (K1) or a possible rebuild with fewer but heavier lines (KlA) referred to in the WKP 20 Year Transmission System Plan. The present capacity of the river lines is approximately 50 MW/line for a total capacity of 400 MW between Brilliant and Warfield. The proposed 230 kV line will have a rating of 550 MW. This higher capacity is required to accommodate increased flows caused by the lower resistance 230 kV interconnections. A 230 kV system provides several advantages: it creates a stronger path for the bulk transfer of power; a more compact structure configuration is possible; and it is more readily integrated into the present 230 kV transmission system of B.C. Hydro, CPC/CBT and Cominco. Lower voltages would require additional transformation to integrate them and would have higher resistances to power flow.

### 3.4 System Configurations to Address System Deficiencies

To attempt to meet the foregoing planning criteria WKP selected five options labeled as Kl, K2, K3, K4, and K5. Other options were studied and rejected.

The K1 system option consists of the following basic elements:

1. The construction of an additional 63 kV line from South Slocan to B.C. Hydro's Kootenay Canal plant and a 63/230 kV transformer at Kootenay Canal. This element is needed to strengthen the interconnection capacity of the region in order to satisfy system stability and power quality problems associated with generation islanding events. It corrects the present lack of capacity on the Line No. 13. It is required for all options.

2. The extensive refurbishment of all present 63 kV river lines between South Slocan and Trail to satisfy safety and system reliability deficiencies.

3. The replacement of aging circuit breakers at the Brilliant and South Slocan generating stations in order to satisfy safety and reliability concerns.

4. A reconstruction of the Tadanac and Warfield substations to satisfy safety and reliability concerns. Present deficiencies consist of inadequate grounding, breakers and other equipment which are suspect and which may not perform properly, and circuit and bus arrangements which do not adequately clear and protect against N-1 contingencies.

5. The addition of a third transformer at Waneta Generating station. This is required to export excess generation in the Kootenays caused by spring freshet conditions at the Kootenay River, Brilliant and Waneta Generating stations and light loads in the Kootenays. The total amount of possible excess generation under these conditions is 400 MW and the present transformers are limited to 350 MW.

6. The construction of a 230 kV line diversion from Cominco's Line No. 71 (Waneta to BPA's Boundary substation) to the B.C. Hydro Nelway substation. Although this may not be strictly required to satisfy the above planning criteria, before any further interconnections with B.C. Hydro's system would be allowed, B.C. Hydro requires the construct of this line diversion to mitigate the impact of exacerbated loop flows caused by the strengthened interconnection. This component element is required for all options.

This option satisfies the planning concerns for safety and reliability and satisfies present N-1 criteria for WKP load. However, the extensive refurbishment of equipment has been calculated to take from 8 to 15 years and during this time WKP may be exposed to the multiple outage situations similar to those which occurred during the summer of 1999. This would require WKP to install remedial action schemes for the generation at South Slocan and the load at Cominco.

The K2 system option consists of the following basic elements:

1. A second South Slocan to Kootenay Canal connection (same as K1).

2. The retermination of the six 63 kV lines from South Slocan into a new Brilliant substation in order to facilitate the replacement of the remaining portions of 63 kV lines to Trail, and to connect to the 230 kV line that CPC/CBT is building from Keenleyside to Selkirk.

3. The extensive structural rehabilitation of the South Slocan to Brilliant lines in order to satisfy safety and reliability concerns.

4. The demolition of the existing eight 63 kV lines from Brilliant to Trail.

5. A 230 kV line from the new Brilliant substation to Warfield to replace the present 63 kV lines for safety and reliability concerns and to provide additional capacity on an alternate path for increased generation from the South Slocan (all plants) and the Brilliant generation stations.

6. An additional 230 kV line from Warfield substation to Waneta substation. This is needed to provide additional capacity to the present 63 kV lines which are inadequate to serve the load in Trail in the event of an outage to one of the lines.

7. The addition of two 230/63 kV transformers at Brilliant to transform the output of the Brilliant plant to 230 kV for transmission on the 230 kV lines.

8. The addition of two 230/63 kV transformers at Warfield to supply local distribution substations and the Cominco load.

9. A reconstruction of the Tadanac and Warfield substations (same as K1).

10. Replacement of circuit breakers at Brilliant and South Slocan (similar to K1).

11. Line No. 71 diversion to Nelway (same as K1).

The major differences between K1 and K2 are: the change in voltage from 63 kV to 230 kV between Brilliant and Waneta; the interconnection with CPC/CBT at Brilliant; and the addition of a 230 kV line from Warfield to Waneta. The addition of this line eliminates the need for remedial action schemes for

Cominco load and for Waneta generation, and for additional transformer capacity at Waneta. Remedial action schemes are still required for generation at South Slocan.

The K3 system option is similar to K2 except for the demolition of six 63 kV river lines between South Slocan and Brilliant and their replacement with one 230 kV line from Kootenay Canal to Brilliant.

The K4 and K5 system options are similar to the K2 and K3 options respectively except that in each case the 230 kV line from Brilliant to Warfield is replaced by a 230 kV line from Keenleyside to Warfield.

## 3.5 Comparison of System Planning Options

### 3.5.1 Qualitative Comparisons

Each of the options was developed from the perspective of a single system operator. Option K1 satisfied the minimum system planning criteria, however, all options provided varying degrees of benefits to the various participants (Exhibit 1, Appendix D, pp. 49-54).

The benefits that option K1 would provide to WKP include: elimination of system collapse exposure for N-1 events; mitigation of safety hazards on WKP owned river lines; mitigation of worker safety hazards on Cominco owned river lines; necessary safety and reliability improvements at the Tadanac and Warfield Switching Stations; and, some resilience against system islanding events.

The additional benefits to WKP for option K2 over option Kl include: elimination of safety hazards on the Cominco and WKP river lines from Brilliant to Trail (Kl only mitigates these hazards); elimination of worker safety hazards in the Cominco Tadanac and Warfield substations; elimination of system collapse and loss of load for N-2 events; elimination of system collapse exposure for common mode N-3 or N-4 events (e.g. loss of all four Waneta to Trail 63 kV lines); reduced line losses; avoided cost of transformation at Mawdsley substation near Warfield; greater resiliency against system islanding events; reduced pole replacement costs on WKP owned river lines between Brilliant and Trail; and, improved aesthetics.

The additional benefits to WKP of K3 over K2 include: elimination of public/worker safety hazards on WKP and Cominco lines from Brilliant to South Slocan; elimination of system collapse; and, load loss exposure for N-2 events and improved resiliency against system islanding.

Option K5 has reduced line losses over K3 and improved aesthetics.

The benefits to Cominco of option Kl are similar to those of WKP. The additional benefits to Cominco of K2 over Kl are also similar to those of WKP, plus: reduced cost of 63 kV reconstruction at Tadanac and Warfield; avoided cost of additional transformation at Waneta; and, land redevelopment potential of the Brilliant to Trail corridor. The additional benefits of Option K3 are similar to those of WKP plus land redevelopment potential of the South Slocan to Brilliant corridor. Option K4 and K5 benefits are identical to K2 and K3.

There are no benefits to CPC/CBT of option K1. However the benefits of K2 and K3 include: reduced losses on the Brilliant to Selkirk transmission line; improved generation security; avoided costs of single phase reclosing on the Keenleyside to Selkirk line; and, aesthetic and environmental improvements. The additional benefits of K5 and K4 include: reduced line losses compared to K2 or K3; increased generation security; and, improved aesthetics.

The benefits to B.C. Hydro for all options include avoided loop flows and for higher level options some reduced losses and generation security improvements.

### 3.5.2 Economic Comparisons

The following is a comparison of costs and rate impacts of the options and amended Application (Exhibit 4, Tab 1, p. 3, Table 2). The revenue requirements analysis assumes certain cost sharing assumptions based on a partial WKP quantification of the benefits listed above.

Table 3.1

**Estimated Project Costs and Rate Impacts**

| Planning Option | Capital Cost ($ million) | WKP Share | Rate Impact Cumulative - 6 year |
|---|---|---|---|
| K1 (63 kV life extension) | 75.0 | 49.7 | 3.78 %[2] |
| K1A (15 year line replacement) | 111.2 | 70.6 | 3.78 % |
| K1B (8 year line replacement) | 110.4 | 69.8 | 3.78 % |
| K2 (Waneta-Brilliant) | 104.5 | 69.8 | 5.15 % |
| K3 (Waneta-Kootenay Canal) | 106.5 | 74.3 | 5.04 % |
| K4 (Waneta-Keenleyside) | 110.0 | 70.2 | 5.88 % |
| K5 (Waneta-Kootenay Canal) | 112.3 | 74.6 | 5.68 % |
| K3 Application (as amended) | 110.0 | 80.0 | 6.20 % |

[2] Although the K1 option has a lower capital cost and WKP share than the K1A and K1B options, the rate impact is the same because of higher facilities maintenance costs for the K1 option vs. higher capital costs for the other two options. Both of these impacts are spread over later years.

Cominco, CPC/CBT and B.C. Hydro have disputed the cost sharing assumptions of WKP based on their evaluation of the benefits WKP has assigned to each party, however, no parties have argued that the benefits described by WKP are non-existent. Safety benefits, aesthetic improvements, and some reliability benefits are not quantified.

WKP provided information about the effect of deferring the 230 kV transmission line north of Brilliant (Exhibit 4, Tab 1, pp. 2 and 3). To avoid negatively affecting reliability and power quality in the Slocan-Nelson area, certain additional capital expenditures would be required. WKP stated that development of the northern part of the 230 kV system could be deferred to 2007 and the capital expenditure reduced by $11 million, however, approximately $4 million of stranded investment would result. WKP felt that a deferral would not be prudent, as it would increase the 20-year net present value ("NPV") revenue requirements by $2.2 million (Exhibit 4, Tab 1, Tables 1 and 2.3). WKP considered that a transmission line from Kootenay Canal to Brilliant would provide an alternative path for generation, and would make the system more robust against voltage and frequency excursions that comprimised power quality standards.

## 3.6 Other Planning Options from a Single System Viewpoint

### 3.6.1 The Current Status of System Integration

Pursuant to the Commission's Decision on WKP's Transmission Access Application, WKP is required to provide a report by June 2000 to the Commission detailing the status of a single-system operator proposal. During the hearing WKP stated that, based on its discussions with B.C. Hydro, it sees significant advantages to a Regional Transmission Organization ("RTO"). WKP anticipates that a RTO could be present sometime in the next five to seven years (T1: 23 and 100). Intervenors expressed support for cooperation of various forms.

CPC/CBT indicated that it supported integrated planning as demonstrated by their participation in WKP's system development planning process. CPC/CBT contemplated that in the future that it could play a similar role to ensure that duplicate lines would not be constructed (T7: 1294). CPC/CBT felt, however, that any integrated solution must be one that accommodated its strategic business interests and that it was prepared to consider construction and interconnection of certain facilities, upon acceptable commercial, financial and regulatory conditions (Exhibit 1, Appendix A). CPC/CBT also indicated that there may be a public interest related to interconnection with WKP but maintained it was WKP's responsibility to meet this interest (T7: 1220).

Despite CPC/CBT support for integrated planning, the transmission grid in the Kootenays has evolved in a disjointed fashion. CPC/CBT indicated that its own needs for transmission for its generation projects were decided three to five years ago, before WKP determined its transmission requirements (T7: 1294). As a result it expressed reservations about interconnecting with WKP, and required assurances that interconnection would not disrupt its other projects.

Cominco agreed that there would be merit in attempting to plan the system taking into account all stakeholders in the region. It felt that the interests of the public and users of the system could not be met if other parties' interests were not considered in planning the facilities (T6: 1089). Cominco characterized its own involvement in the planning process for the 230 kV facilities as "not intensive involvement or close supervision but rather as representation" (T6: 1108). Cominco recognized the need for a unified strategy to coordinate the replacement or modification of transmission facilities in the Kootenays. However, it expressed the need for negotiations to align project benefits with Cominco's strategic interests (Exhibit 1, Appendix A).

With respect to construction of interconnecting facilities, Cominco indicated that its system and WKP's system are more separate than in the past and each should construct the facilities it needs (T7: 1176). Cominco suggested that WKP should construct facilities as if Cominco were not necessarily connected to WKP's system. If it was beneficial to Cominco to interconnect with the WKP system, then Cominco would pay for those facilities. In Cominco's view, WKP should not construct specific facilities for Cominco unless requested by it (T7: 1176).

### 3.6.2 Alternative System Configurations and Possible Redundancies

Cominco, in its opening statement, cautioned against the risk of WKP building transmission facilities that might become redundant in a short time. Cominco outlined the essential components that it considered necessary to improve reliability in the Kootenay area. Cominco cited two key unresolved issues related to future development of an integrated system. They were: (a) the desirability of a 230 kV connection to the South Okanagan; and, (b) renegotiation of the Canal Plant Agreement.

Cominco argued that the primary purpose of the 230 kV connection from the Canal plant to Warfield is to move generation out of the Kootenays to the Okanagan via a proposed 230 kV line from Warfield to the Okanagan. In these circumstances, Cominco queried the need for 230 kV transmission between the Canal plant and Warfield. Instead, Cominco suggested that south Okanagan supply could be reinforced by a tap off B.C. Hydro's 500 kV transmission system near Oliver (Exhibit 83, p. 3), eliminating the need for a 230 kV line from Warfield to the Okanagan. This, in turn, would reduce the need for capacity between the Canal plant and Warfield (Final Argument, p. 3). Cominco also questioned whether WKP's 230 kV plan

was intended to ensure that it had adequate facilities to move power into the Okanagan upon the expiry of a transmission wheeling agreement between WKP and B.C. Hydro.

Cominco further stated that the need for capacity from the Canal plant to Warfield would be lessened if, as a result of the Canal Plant Agreement negotiations, Cominco elected to curtail its deliveries over WKP facilities to Warfield. In short, under these scenarios, WKP's proposed facilities might not be required now or in the future (Argument, p. 4).

Cominco suggested that a single-system operator (such as under an RTO) might rationalize the system differently than proposed by WKP. To illustrate, it provided Exhibits 30 and 95 and suggested that this represented a system conforming to the single owner concept. Exhibit 30 proposed a transmission line (63 kV or 230 kV) from Brilliant to Warfield, an additional 63 kV line from South Slocan to the Kootenay Canal plant and the elimination of the 63 kV lines from South Slocan to Brilliant. This proposal envisions that the generation from the four Kootenay River plants and from the Kootenay Canal plant would be transmitted out of the area via B.C. Hydro's 230 kV transmission lines from Kootenay Canal to the Selkirk substation. The generation from Keenleyside and Brilliant would be transmitted out of the area via CPC/CBT's 230 kV transmission line from Keenleyside/Brilliant to Selkirk and local load would be supplied via a transmission line from Brilliant to Warfield. There was considerable debate regarding the limitations of the B.C. Hydro system and what was required to correct these limitations. However, Cominco's engineering consultant considered that such a system with the appropriate remedial action schemes met the N-1 criterion (T6: 1073, T7: 1146). Cominco, therefore, argued that WKP's proposal should be dismissed given insufficient confidence that the facilities proposed by WKP would be required in a new transmission world.

Cominco characterized Exhibit 30 as an initial model which could provide the base for implementation while recognizing that there are many business aspects still to be resolved (T6: 1073). Cominco acknowledged that its alternative had only been given a preliminary engineering review and required more study. Furthermore, it indicated that the primary motivation behind Exhibit 30 was to support the continued viability of its Trail operations (T6: 1087). Cominco agreed that WKP's proposal seemed to solve the electrical problems, but added that it seemed wasteful and that other solutions should be aggressively explored (T6: 1085). Cominco stated that it was not designing the system but was looking at its interests and the impact of WKP's proposed system on its own operations (T7: 1144).

In reply, WKP indicated that whether or not there was a RTO to be in place, the river lines needed to be replaced and that the Project was necessary (T1: 25 and 124). WKP also indicated that planning of the 230 kV facilities was done from the perspective of a single operator (T2: 317). In terms of the Kootenay supply system, there was no consideration given to factors that went outside the bounds of the owners

already in existence and the system was treated as one system covering all owners in this area. The studies that formed the basis of a feasibility planning study were jointly undertaken by WKP and B.C. Hydro from a single system perspective (T6: 999).

With respect to a future line from the Kootenays to the Okanagan, WKP stated that there had not been a decision on whether the line should be built (T1: 22). WKP stated the two projects were independent and there were no designated facilities in the 230 kV application designed to accommodate any future Okanagan upgrade (T2: 22).

At the suggestion of Atco Lumber Ltd. ("Atco"), WKP filed an alternative system configuration diagram that showed a connection to B.C. Hydro's 500 kV system near the Kootenay Canal plant and connection of the CPC/CBT Keenleyside line to one of the B.C. Hydro 230 kV lines from Kootenay Canal (Exhibit 53). This configuration had no WKP 230 kV transmission lines between Kootenay Canal and Waneta, but required a 230 kV connection from Warfield to Selkirk. WKP suggested that this configuration would have a $13 million higher cost, and would be of lower quality and less robust than its preferred option (T4: 733). Atco also filed a "Facility Rationalization" diagram, which was similar in concept to Exhibit 53, but excluded some facilities between Kootenay Canal and Selkirk (Exhibit 57). WKP considered this configuration to be technically inadequate (T4: 736).

The Consumers' Association of Canada (B.C. Branch) et. al. ("CAC (B.C.) et al.") submitted that there was no compelling reason for issuing a CPCN since there is no clear agreement on the nature and the extent of the required upgrade. It stated that in hindsight WKP should first have proceeded with a CPCN application for the Kootenay-Okanagan connection project. The CAC (B.C.) et al. reasoned that all of the uncertainties concerning WKP's application would be the basis for buying some time before approving final transmission facilities in the Kootenay region (Argument, p. 19).

### 3.7 Commission Findings

WKP's initial preference, developed during the planning process described in Chapter 2 and contained in the Application submitted November 12, 1999, was option K5. However, in its January 10, 2000 filing, WKP proposed option K3. This was modified during the hearing process with respect to routing. The K3 and K5 options provide superior safety and reliability benefits compared to Kl, K2, and K4 by removing all of the 63 kV river lines. They also offer significant aesthetic benefits compared to K1 and K2.

**The Commission determines that the added benefits of the K3 and K5 options make them preferable to the other options. The Cominco and Atco variations are found to be inferior to the K3 or the K5.**

**The Commission determines that the substantial risk to public and worker safety of the status quo dictates that the river lines, and some substations, must be replaced. The K3 and K5 options would accomplish this. The Commission considers that K3 and K5 options are compatible with future Okanagan reinforcement either by the South Okanagan substation or a new 230 kV transmission line from the Kootenays.**

K3, as modified at the hearing, is less costly than K5, with correspondingly reduced impacts on WKP ratepayers. The Commission cannot turn back the clock to reconfigure existing transmission facilities as if they had been planned and were operated as an integrated system. Both options are analyzed in more detail in subsequent chapters.

K5 is not viable at this time owing to the failure of WKP and CPC/CBT to negotiate satisfactory interconnection arrangements, a point discussed further in Chapter 4. Nevertheless, further consideration is given to K5 because of its alternative routing remote from existing communities. A variant of WKP's K3 option that was suggested during the hearing – the so-called cross-over diversion – will also be discussed in connection with routing. Finally, the Commission will evaluate other possible modifications of the K3 option.

## 4.0 TRANSMISSION LINES

As noted in Section 2.5, WKP proposes to replace the six 63 kV transmission lines between South Slocan and Brilliant with one 230 kV line. WKP also proposes to replace the eight 63 kV lines between Brilliant and Trail (Warfield) with a 230 kV line, and to build another 230 kV line between Warfield and Waneta. In the Kootenay area a 230 kV system provides the optimum design for major new components. One or two of the 63 kV lines would remain in some areas to supply local loads. In addition, WKP plans to add a second 63 kV intertie built from South Slocan to the Kootenay Canal plant in parallel to Line No. 13, and to upgrade several substations.

In each of the proposed line sections, South Slocan to Brilliant, Brilliant to Warfield and Warfield to Waneta, several routing alternatives were explored by WKP before selecting a preferred route option.

### 4.1 South Slocan to Brilliant

Three options were examined for this section of the proposed line:

- West Route
- Low Elevation Route
- High Elevation Route

### 4.1.1 West Route

The West route option follows the existing 63 kV transmission corridor along the west side of the Kootenay River, from South Slocan to Brilliant, as shown on Figure 4.1. Replacement of the 63 kV lines with one 230 kV line on single pole structures and reducing the width of the corridor would reduce the visual impact and enhance aesthetics in the area. However, the corridor would continue to affect landowners and community values in Shoreacres, Tarrys and Thrums (Exhibit 3, Tab 2, p. 2). Two of the 63 kV lines would be retained from South Slocan to Tarrys to supply local loads. Figure 4.2 is a sketch to scale showing the cross-section of the existing corridor north of Glade/Tarrys, under the different routing alternatives (Exhibit 65, p. 14, drawing BCUC6).

The Kootenay River Valley between South Slocan and Brilliant is fairly heavily developed, and the existing right-of-way is covered by over 70 agreements with private landowners. Most of the old agreements would need to be renegotiated, as they contain restrictions on voltage level and pole height that would not currently permit a 230 kV line (T5: 901-903). WKP has not made a detailed assessment of the restrictions, but expects that acquisition of a right-of-way across Crown land would be much simpler.

Wildlife and wildlife habitat would not be directly impacted by the West option, and may benefit to the extent the right-of-way width is reduced with a 230 kV line (Exhibit 3, Tab 2, p. 7). Other land uses, including agriculture and recreation, would show a similar beneficial impact to the extent the right-of-way is reduced. The impact on stream crossings is expected to be minimal.

A West High Elevation route on the west side of the Kootenay River was considered briefly in the hearing. The route would require three river crossings and the cutting of a new transmission corridor through forest land. The sections near Brilliant and South Slocan would be highly visible. At the north end, locating a new 230 kV transmission corridor through the relatively heavily populated South Slocan area would be a challenge. WKP concluded that the route was feasible but highly unattractive (Exhibit 65, pp. 1-3).

### 4.1.2 Low Elevation Route

The Low Elevation route was WKP's preferred option when it applied for the project. A new 230 kV line on H-frame structures would follow the B.C. Hydro right-of-way from the Kootenay Canal plant on the east side of the Kootenay River, and then run in a south-west direction along a new corridor to join with the CPC/CBT corridor to Brilliant.

The existing B.C. Hydro right-of-way is very visible from the valley and WKP expects that the additional line would have a similar high visual impact. The southern portion where the line approaches Brilliant would be visible from Castlegar. WKP expects that the affect on residential areas would be slight. However, residents of Glade, who live near the B.C. Hydro right-of-way, consider any further development that expands the transmission line corridor towards their properties would be highly undesirable (TC1: CH15 and CH22; TC2: CH136).[3] Figure 4.3 is a sketch to scale showing the cross-section of the Glade Hill section of the B.C. Hydro transmission corridor, under several routing options.

The Low Elevation route would have a moderate impact on wildlife and wildlife habitat. The impact on aquatic resources would be low, and could be mitigated through proper construction and maintenance procedures for stream crossings. However, residents of Glade rely on several of the streams for domestic water supply and were concerned about short and long term impacts on their water supply (TC1: CH21, CH29 and CH97; TC2: CH127).

WKP expected the route to have a low level impact on forest resources and forestry operations. About 60 hectares of forest land would need to be cleared (Exhibit 2, p. 59). The new line would traverse about 4.4 km of land that Atco holds in fee simple (T4: 756). Atco holds approximately 20,000 acres of fee simple land, and is concerned about the ongoing alienation of forest land for utility corridors (T4: 763 and 764). Atco is also concerned that the need to carry out its forest management and harvesting activities in the vicinity of a transmission line would add costs and interfere with sound forest management (Exhibit 9A, pp. 10 and 11). Atco expects to be compensated by WKP for any financial impact resulting if lands are removed from the Forest Land Reserve (T4: 782). Atco recently completed a land swap with CPC/CBT in exchange for a transmission line right-of-way (T4: 785).

The Low Elevation route would also cross a parcel of forest land held by Selkirk College. The College suggested the use of double circuiting where the WKP and CPC/CBT lines share a common corridor, and expressed a desire to coordinate access road construction and clearing activities (Exhibit 10G, p. 1). WKP has written to CPC/CBT to inquire about double circuiting through the Selkirk College block, but has not received a reply (T5: 907). This would require CPC/CBT to interrupt the purchase of materials for their line and to implement a changed design.

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[3] TC1: CH15 refers to Transcripts, Community Hearing, Vol. 1: page 15 of Community Hearing.

### 4.1.3 High Elevation Route

The High Elevation route was adopted by WKP as its preferred route option during the hearing. The route runs on the east side of the Kootenay River, in a new corridor east of the existing B.C. Hydro right-of-way, before turning west to Brilliant. This route would have the least visual impact, and would only be visible from the Valley near Kootenay Canal plant and Brilliant (Exhibit 4, Tab 1, pp. 29 and 30).

The High Elevation route crosses the same streams as the Low Elevation route, and WKP expects that the impact on aquatic resources will be low. Residents of Glade did not express concern about the impact of the High Elevation route on their water supplies.

The route would have a moderate impact on wildlife and wildlife habitat. WKP stated that the route does not traverse much ungulate winter range, but traverses an area with a moderate rating for grizzly bears. Additional access roads would be required which could increase human access and habitat fragmentation in the absence of access controls.

The High Elevation route is expected to traverse more old growth and mature forests than the Low Elevation option, and clearing of 80 to 120 hectares of forest land would be required. Atco estimates that the route would cross 5.3 km of its fee simple land (T4: 756). The High and Low Elevation options would have similar impacts on Selkirk College's parcel of forest land (T5: 904 and 905).

### 4.1.4 Economic Impacts

WKP filed a cost estimate for each route option, including right-of-way acquisition and compensation, environmental mitigation and line termination costs (Exhibit 65, p. 7).

During the hearing, in response to the concerns raised by area residents, WKP evaluated the cost of mitigating the impact of the Low Elevation route by constructing its 230 kV line on the uphill side of the B.C. Hydro corridor through the Glade area and building the Glade Hill portion of the line as a double circuit on one of the B.C. Hydro 230 kV lines. WKP estimated the up hill location would increase the cost of the Low Elevation alternative from $8.428 million to $9.528 million (T5: 811). Also, WKP identified that the need to coordinate the construction project with B.C. Hydro would impose severe logistical constraints. As the revised difference in cost between the Low (Uphill Side) and the High Elevation options was only $300,000, WKP adopted the High Elevation option as its preferred route.

The cost comparison for the route options is shown in Table 4.1.

Table 4.1
**Cost Comparison of Route Options**

| Route Option | Capital Cost Total ($ million) |
|---|---|
| West (Existing Right-of-Way) | 10.132 |
| Low Elevation (Downhill Side) | 8.428 |
| Low Elevation (Uphill Side) | 9.528 |
| High Elevation | 9.828 |

WKP did not prepare a comparative cost-benefit analysis of the economic and social impacts of the Project. Compared to the environmental and cost impacts described in the Application, other economic and social impacts were considered to be of a lower order of magnitude (Exhibit 4, Tab 2, p. 1).

WKP argued that the High Elevation route reasonably balances all the competing interests. However, selection of the High Elevation option may delay finalization of permitting and final cost estimates for this part of the Project by one to two months. WKP considered that the primary impact from the route will be to forestry operations, and proposed the following mitigation measures where possible:

- consolidate the routing out of Brilliant with the CPC/CBT transmission line;
- use land swaps for compensation;
- coordinate the timing and sequence of logging; and
- use large spans near McPhee Creek to reduce clearing of forest land.

The Concerned Citizens and other local residents supported the High Elevation option, as it would remove the transmission line from the valley and reduce the impact on communities. The Regional Districts took a similar position.

Atco argued in support of the West option as it would be in an existing transmission corridor which is wider than would be needed, and would not require cutting another new right-of-way through productive forest land. The City of Nelson expressed concern that the High Elevation option would burden ratepayers with higher capital and operating costs.

#### 4.1.5 Commission Findings

The West route has the highest capital cost of the options, and is the most intrusive on residents in the area. The Low Elevation route impacts overall are more negative than those of the High Elevation route. The estimated costs for the Low and High alternatives are not significantly different, particularly if the Low Elevation route is to be placed on the Uphill Side of the B.C. Hydro corridor. The impact of the High Elevation option on forestry activities can be mitigated to some extent, and WKP will need to compensate

owners or tenure holders for the right-of-way that it requires. This compensation may take the form of land swaps.

**The Commission determines that construction of a 230 kV transmission line is required between South Slocan and Brilliant along the East High Elevation route, subject to the filing of final line alignment, right-of-way acquisition plans and an updated cost estimate. WKP is directed to implement the mitigation measures that it identified, where possible. These include consolidating its routing with that of the CPC/CBT line, the use of large spans to reduce clearing and coordination of the timing and sequence of logging.**

## 4.2 Brilliant to Warfield

The Application as originally filed on November 12, 1999, proposed a 230 kV transmission line in option K5 route from the Keenleyside plant to Warfield. WKP's January 10, 2000 filing amended the Application to adopt the K3 route from Brilliant to Warfield as the preferred option for the 230 kV line.

Three route options were examined for this section of line:

- the K3 route;
- the K5 route; and
- the Cross-over route.

### 4.2.1 The K3 Route

Option K3 transmission line would generally follow the existing 63 kV transmission corridor, as shown on Figures 4.4 and 4.5. WKP proposed to replace the eight 63 kV lines with one 230 kV line. Two of the 63 kV lines would be retained from Brilliant to Blueberry and from Warfield to Stoney Creek to supply local loads. Short diversions are proposed to bypass the communities of Blueberry, Fairview, Genelle and Rivervale, and for the approach to Warfield (Exhibit 1, Tab 3, p. 1). Figure 4.6 is a sketch to scale showing the cross-section of the existing corridor in south Ootischenia, compared to the situation with a 230 kV transmission line in the corridor and with a 230 kV transmission line routed from Keenleyside to Warfield. Figure 4.7 shows a similar comparison for the section of the existing corridor between Blueberry and Stoney Creek.

The new 230 kV transmission line would have a significant beneficial impact relative to the existing eight 63 kV lines. WKP proposed to use single-pole structures with longer 100 to 150 metre intervals between poles to minimize the impact on local communities (Exhibit 3, Tab 2, p. 4). Adjacent residents, agriculture and aesthetics would all benefit. Wildlife and wildlife habitat have been affected by the existing

development in the area, and would be expected to benefit from a narrower right-of-way and fewer poles. Very few new access roads or stream crossings would be needed.

The divergences around residential communities, plus a change in the approach to Warfield, would require short sections of new right-of-way, which would have some local impacts. WKP estimated the diversions would cost $291,000, and would have significant positive economic and social impacts on the communities involved. WKP was compiling individual property ownership information as part of the environmental management plan process, but did not intend to contact individual property owners until the route selection process was complete (Exhibit 4, Tab 1; p. 32).

#### 4.2.2 The K5 Route

The K5 route would entail a new 230 kV transmission line from the Keenleyside generating plant to Warfield. The K5 configuration relies on the use of CPC/CBT's line from Keenleyside to Brilliant to complete the 230 kV circuit from the Kootenay Canal plant to Warfield.

The K5 route would be a new transmission corridor that would avoid developed areas. WKP expects that existing access would provide much of the required access (Exhibit 3, Tab 2, p. 4). This route would reduce, and in some sections eliminate, the existing right-of-way along the valley bottom between Castlegar and Trail. This could encourage commercial and residential development and tourism opportunities, increasing land values and assessments for taxation purposes. The reduced visual impact would have aesthetic benefits for residents and travelers. The new 230 kV line would not be visible from the valley, except for the portions near Keenleyside and Trail. WKP expected that the need to clear a new right-of-way would have a moderate negative impact on wildlife and wildlife habitat. The new right-of-way would also increase human access, which could negatively impact wildlife resources.

For the new right-of-way, WKP would need to clear 60 to 120 hectares of mainly mature forest. The elimination of this land from forest production would be expected to reduce the amount of wood that Atco could cut in its Arrow timber supply area licence. Selkirk College owns a block of forest land along this route which WKP might be able to avoid (T6: 978).

Stream crossing impacts would be generally expected to be low, although steep terrain may require more extensive mitigation measures. The Environmental Screening Report stated that access road construction and transmission line installation near the drainage divide between Blueberry and China Creeks has the potential to increase erosion and destabilize the steep slopes (Exhibit 2, p. 9). Allowance was made in the capital cost estimate for measures to address these concerns, but the impact on future maintenance costs has not been explicitly reflected.

### 4.2.3 The Crossover Route

During the hearing, WKP identified a Crossover route option, which would go east from Brilliant along the CPC/CBT line that runs to Selkirk, cross over the Columbia River near Blueberry and then follow the southern portion of the K5 route to Warfield.

The Crossover route was generally expected to have similar impacts as the Keenleyside to Brilliant route, except for somewhat greater (but still relatively small) residential, visual and recreational impacts. This route option would also cross some Atco fee simple land (T4: 756, and Exhibit 60).

### 4.2.4 Economic Impacts

WKP considered that option K5 has the greatest electrical and economic benefits if planning is done from a single owner perspective. However, WKP was unable to obtain agreement from the other parties about how to share the incremental costs associated with option K5 (T2: 363). WKP's evidence indicated that option K5 would increase the deemed WKP share of the cost of the Project by $6.9 million (Exhibits 27C and 27D).

WKP filed a cost estimate for each of the three options, including right-of-way acquisition and compensation, environmental mitigation and line termination costs. To provide a proper comparison of the options, the capital costs included the 230 kV transmission line and Brilliant substation for each option, plus a substation at Keenleyside for option K5. The cost comparison for the route options is shown in Table 4.2.

Table 4.2
**Cost Comparison of Route Options**

| Route Option | Capital Cost Total ($ million) |
|---|---|
| K3 (Brilliant – Warfield) | 30.1 |
| K5 (Keenleyside – Warfield) | 35.4 |
| Crossover | 33.7 |

WKP did not prepare a comparative cost-benefit analysis of the economic and social impacts of the options. Compared to the environmental and cost impacts set out in the Application, WKP considered other economic and social impacts to be of a lower order of magnitude.

WKP filed an Environmental Screening Report, and will prepare an Environmental Management Plan, an Access Management Plan, a Visual Impact Management Plan and a Vegetation Management Plan for the Project (Exhibit 1, Tab 3, p. 7). WKP stated that it would continue to consult with the appropriate agencies, stakeholders and the public through the next stages of project planning and development regarding corridor and alignment decisions, in order to mitigate potential impacts.

WKP argued that the proposed K3 Brilliant to Warfield route eliminates the need for new clearing, that the diversions would minimize the impact on most residential areas and that much of the right-of-way would be on land owned by Cominco.

Opponents to the K5 and Crossover routes included Atco, who generally opposed cutting new rights-of-way through productive forest land. Mr. Wood, a retired biologist, noted that the region has a population of grizzly bear, elk and other large animals which are under threat from human encroachment. Transmission corridors and other development have compromised the valley as wildlife habitat. Mr. Wood, therefore, submitted that the new transmission lines should be built in the existing corridors (T7: 1248 to 1252).

The Regional Districts supported the K5 Keenleyside to Warfield route, on the basis that any line in the existing corridor would be a barrier to staged development and would have a significant visual impact. The lines are expected to remain in place for 50 to 70 years, and the Regional Districts felt that efforts should be made to consider what will be appropriate throughout that extended period.

Residents in the area presented views that were generally similar to those of the Regional Districts. Residents who made submissions at the evening hearing sessions and who filed written submissions generally supported removal of transmission lines from the river valleys.

Mr. Karow, on behalf of the Coalition to Reduce Electropollution ("CORE") supported the remote routes, to keep the lines out of the present corridor in the valley. In that way, the lines would be removed from populated areas, and possible health concerns related to the transmission lines would be avoided.

#### 4.2.5 Commission Findings

The Commission recognizes that the K3 routing not only has the lowest cost for all ratepayers but also that the proposed line with the diversions around most populated areas will greatly reduce the impact on the public compared to the existing lines. This route also minimizes the impact on wildlife and forest resources.

The Commission is of the view that the K5 route and the Crossover route, together with being more costly, provide little in the way of additional benefits to the public interest. The increased alienation of timber reserves and the additional access to wilderness areas offset the marginal benefits of not using a major portion of the existing right-of-way between Brilliant and Warfield. Unlike the linear residential settlement pattern that has emerged along the transmission line corridor between South Slocan and Brilliant, the corridor between Brilliant and Waneta is less continuously inhabited. Mitigation of the impact of the new 230 kV line on the communities and the highway can be achieved with little additional cost by the diversions that WKP has proposed. Where there are no diversions, the present wide right-of-way required for the present lines offers latitude in the alignment of the new single line, as well as the potential for new land uses and public amenities that are compatible with the new line. WKP will be expected to take the interests of residents and landowners into consideration when it is determining the alignment and pole placements for the line.

The K5 route would require connection to the CPC/CBT line from Keenleyside to Selkirk. WKP has not been able to negotiate an agreement for the connection and for sharing the cost of the connection. As discussed in Section 5.2, the Commission considers that it does not have jurisdiction at this time to direct CPC/CBT to connect its transmission system with that of WKP. In this circumstance, the K5 route may not be a viable alternative.

**The Commission determines that construction of a 230 kV transmission line is required between Brilliant and Warfield along the K3 route, subject to the filing of final line alignment, right-of-way acquisition plans and updated cost estimates. WKP is directed to proceed with project planning and development for the line.**

## 4.3 Warfield to Waneta

### 4.3.1 Connection to Waneta

Cominco owns the generation facilities at the Waneta dam and four 63 kV transmission lines connecting Waneta to Warfield. The lines have a rated capacity of 130 MW per line (Exhibit 4, Tab 7, p. 1). The lines are about 50 years old but recent pole tests and visual inspections have indicated that they are in reasonably good condition.

Under an historical arrangement with Cominco, WKP has had limited use of the Cominco 63 kV lines and Cominco's Line No. 71 for the import of contracted energy.

To complete the 230 kV configuration, WKP proposed to build a new 230 kV line in parallel with the four 63 kV lines at a cost of $4.8 million (Exhibit 27D). The Waneta 230 kV substation would be modified to include relocation of the two 150 MW transformers and terminations for the line to Warfield and Line No. 71, at a cost of $6.7 million. WKP assumed that Cominco would pay one half of the cost of the Waneta substation upgrade (Exhibit 27D).

WKP is concerned that flows now approach the capacity ratings of the two transformers at Waneta during spring freshet periods of high generation and light load (Exhibit 3, Tab 1, p. 7). The generator upgrade of 94 MW scheduled for Waneta, plus generator upgrades at Brilliant and the Kootenay River plants, would require an increase in transformer capacity, or the redirection of power along different transmission routes, by 2002.

In Argument, WKP asked the Commission for a direction to Cominco to permit construction of the proposed Waneta substation with modifications to allow connection of the proposed 230 kV line from Warfield to Waneta. WKP also asked the Commission to direct WKP and Cominco to negotiate an agreement on the nature and extent of firm access to Line No. 71 by WKP within a specified time period.

#### 4.3.2 Selkirk and Nelway Alternatives

A 230 kV line from Warfield to B.C. Hydro's Selkirk station or Nelway station was considered as an alternative to the proposed 230 kV line from Warfield to Waneta. Based on a preliminary review, WKP considered that the system configuration with a connection to Selkirk would be identical to option K3 in terms of electrical performance and system reliability (Exhibit 4, Tab 7, p. 3).

WKP estimated this alternative would avoid the Waneta substation costs of $6.7 million, but would require a $1.5 million termination at the B.C. Hydro station plus $6.0 million for the additional line length from Warfield to Selkirk. An overall cost increase of about $0.8 million would result (Exhibit 4, Tab 7, p. 3). WKP subsequently filed information that a line from Waneta to Selkirk would cost $3.2 million, so that this alternative would have a lower overall cost (Exhibit 20B). However, WKP was concerned that a connection to Selkirk would expose it to payment of B.C. Hydro's WTS tariff for power imports (T2: 300).

Under a separate alternative, WKP estimated that the additional line length from Waneta to Nelway would cost $7.7 million. This would also avoid the Waneta substation costs of $6.7 million but require an additional termination cost of $1.5 million. Therefore, the line from Warfield to Nelway would cause an overall cost increase of about $2.5 million relative to the proposed system (Exhibit 20B).

WKP argued that a line to Selkirk would be a duplication of facilities, which would be contrary to the trend toward formation of RTOs. Also, WKP felt that while the cost of a 230 kV connection to Waneta may be shared, WKP ratepayers would pay all of the cost of a line to Selkirk.

#### 4.3.3 Warfield to Waneta Alternatives

If the proposed 230 kV line to Waneta is not approved, WKP must otherwise reinforce its Kootenay transmission system under N-1 contingencies. The options for system reinforcement will depend on whether WKP interconnects with CPC/CBT at Brilliant.

Scenario 1 Interconnection with CPC/CBT at Brilliant with Keenleyside to Selkirk line occurs

Under this scenario if the Warfield to Waneta line was deferred indefinitely WKP has testified that under spring freshet conditions and a loss of the Brilliant to Selkirk line, power flows would overload B.C. Hydro lines and generation rejection would be necessary at one of the Kootenay generation stations. Under winter low generation conditions, loss of the Brilliant to Warfield circuit would result in overload of the Waneta generating station and load rejection would be required (at Cominco's Trail operation) to avoid transformer damage (Exhibit 4, Tab 7, p. 1). In addition, the loss of Line No. 71 under winter low generation conditions, would cause an overload of the proposed Warfield transformers. The overload of the Waneta transformers could also be accommodated by increased transformer capacity at Waneta. (T2: 292).

Under this scenario with the load rejection scheme, the cost reductions to the project would consist of:

| | |
|---|---|
| 230 kV line from Warfield to Waneta | $ 4.8 million |
| Waneta switchyard upgrade | 6.7 million |
| One 230 kV line position at Warfield | 1.6 million |

Additional costs would be required for Remedial Action Schemes and additional transmission capacity at Warfield:

| | |
|---|---|
| Additional transformer capacity at Warfield | $ 0.5 million |
| Kootenay generation rejection | 1.0 million |
| Trail load rejection | 1.0 million |

This would result in a savings of $10.6 million. However, the overall project would lose some system benefits and the exposure to possible islanding problems in the South Slocan area would increase compared to K3.

Scenario 2 If WKP fails to secure an interconnection with CPC/CBT at Brilliant

Under this scenario, a 230 kV line deferral from Warfield to Waneta would require additional transformer capacity at Waneta to handle the spring freshet generation in the Kootenays. With the additional transformer capacity an interruption in the Brilliant to Warfield circuit would not cause an overload on the Waneta transformers and therefore no load rejection would be required at Trail (K1 option).

The cost reductions to the project would consist of:

| | |
|---|---|
| 230 kV line from Warfield to Waneta | $ 4.8 million |
| Waneta substation upgrade | 6.7 million |
| One 230 kV line position at Warfield | 1.6 million |

Additional costs would include:

| | |
|---|---|
| Additional transformer capacity at Warfield | $ 0.5 million |
| Kootenay generation rejection | 1.0 million |
| Additional transformer and substation at Waneta | 10.3 million |

The cost reductions under this scenario are $1.3 million.

Under this scenario, if WKP is unable to build either a transmission line to Waneta or add an additional transformer, generation in the region would be restricted and an alternate solution to its export would be required. This could require a transmission line from Warfield to Selkirk and/or the upgrade of Selkirk substation to increase the capacity of the B.C. Hydro lines from the Kootenay Canal.

#### 4.3.4 Cominco Exemption Order Considerations

The Cominco Exemption Order dated March 29, 1996 was issued pursuant to Section 27 (now Section 22) of the Act, and in it the Minister:

> "exempts Cominco from the provisions of Part 3 of the Act, except sections 51 and 53, and notwithstanding the generality of this clause, in particular exempts Cominco from the provisions of Part 3 of the Act (except section 51 and 53) for: [list of specific items]
>
> subject to the following Conditions:
>
> CONDITIONS
>
> 1. Cominco and West Kootenay shall maintain in force the Facilities Sharing Agreements, as they may be amended from time to time, for the common use of transmission and switching facilities, so that the electrical systems owned by Cominco, West Kootenay, and CPC and the Trust can be operated together as one integrated system;"

Sections 51 and 53 are now Sections 45 and 46, which relate to CPCNs.

WKP argued that Cominco is a public utility under the Act, and that Cominco has an exemption only from the items that are set out in the Cominco Exemption Order. WKP considered that it is a condition of the exemption that Cominco allow its transmission and switching facilities to be used in an integrated manner with the other regional transmission system owners, WKP and CPC/CBT. WKP stated that the FSA requires a party to the Agreement to make available the use of facilities that are surplus to its requirements, and argued that Cominco must act reasonably and in good faith when assessing its surplus capacity on Line No. 71. WKP considers that Section 72 of the Act gives the Commission authority to enforce the terms of the Cominco Exemption Order.

Cominco Position

Cominco stated that it is not prepared to allow WKP firm access to Line No. 71, and objected to the construction of a 230 kV line to Waneta on the basis that it would provide access to Line No. 71 (T7: 1314). The foundation of its operations at Trail has been its generation and transmission lines, which provide low cost power for industrial operations and revenue from surplus sales. Line No. 71 provides Cominco with direct access at low cost to markets for its surplus power (Exhibit 83, p. 7). Cominco was concerned that further integration with the new WKP system could expose it to regulated control of its own 63 kV lines and Line No. 71, and to the application of tariff rates to the movement of its own power over these lines.

Cominco stated that an arrangement is being put in place currently whereby 120 MW of its load could be dropped to keep the system in balance (T6: 1054). Cominco gave evidence that high loads on the Waneta transformers occur in the winter, when ambient temperatures are low, and that the units can operate at 20 to 30% above rated capacity (T6: 1076).

Cominco suggested that WKP connect directly from Warfield to the B.C. Hydro system at either Selkirk or Nelway, and argued that a direct connection between Warfield and Selkirk is less costly and would be superior in terms of electrical capacity and stability of supply.

Cominco argued that WKP's request for directions is not properly before the Commission, and that the Commission does not have the jurisdiction to grant the directions. Cominco stated that WKP does not require access to Line No. 71 for an operational reason, but rather seeks to avoid the payment of B.C. Hydro tolls. Cominco also stated that it does not contemplate that common facilities will be constructed at Waneta, and that there is no evidence Line No. 71 has excess capacity.

Cominco stated that it is not a public utility, and that it is exempt from all of Part 3 except for Sections 45 and 46. Cominco considered that it does not provide a "public utility service", and that consequently Section 72 of the Act does not apply to it. Cominco further argued that it intends to maintain the FSA in effect, that it has not breached its Exemption Order, and that it is the Minister rather than the Commission that can properly enforce the Cominco Exemption Order.

Cominco argued that WKP's remedy for any alleged breach of the FSA is with the courts rather than the Commission. This would include disputes about modifications to Appendix I of the FSA. Cominco stated that, although the Commission approved the FSA as part of the arrangements associated with the Brilliant Power Purchase Agreement, this does not empower it to amend the FSA without the consent of the other parties.

Cominco also stated that Line No. 71 is an international power line, parts of which are regulated by the National Energy Board in Canada and by the Federal Energy Regulatory Commission in the United States. WKP responded that Line No. 71 is under provincial jurisdiction, or will be after it is connected to Nelway.

Views of Other Parties

CAC (B.C.) et al. argued that the Commission does not have jurisdiction to order Cominco to interconnect with WKP, or to order Cominco to allow WKP use of its Line No. 71. CAC (B.C.) et al. considered that Cominco is exempt from Part 3 of the Act except for Sections 45 and 46, and that Sections 70 and 72 do not give the Commission jurisdiction to make the orders requested by WKP. CAC (B.C.) et al. felt that granting WKP's request would likely result in a legal challenge, and preferred giving the parties an opportunity to negotiate a settlement of the issues.

CPC/CBT argued that any rights with respect to Line No. 71 that the Commission grants to WKP should be subordinate to CPC/CBT's existing contractual rights regarding the line.

#### 4.3.5 Commission Findings

The Commission notes that the existing 63 kV lines from Warfield to Waneta and the 71 line are reported to be in reasonably good condition. Not building a 230 kV line from Warfield to Waneta is expected to reduce the cost of the Project by up to $10.6 million.

Use of the lines between Warfield and Waneta and of Line No. 71 by WKP has historically been by agreement between Cominco and WKP. The Commission does not want to abrogate contracts, or to jeopardize corporate options and assets that may have significant economic benefit. A RTO is expected to

be in place in the not distant future, and this may resolve many of the questions about rights of access and many of Cominco's concerns about tariffs. Moreover, Cominco and WKP have acted pragmatically and cooperatively to date, and the Commission encourages them to continue in this spirit. The Commission prefers to give the parties an opportunity to negotiate. **The Commission is not prepared, at this time, to make the directions to Cominco requested by WKP.**

In the event that WKP believes the FSA provides WKP with the right to use Line No. 71, the Commission has concluded that WKP should apply to the courts to enforce such rights.

**The Application by WKP for approval to build a 230 kV transmission line from Warfield to Waneta is denied. WKP is directed to continue to negotiate with all area transmission owners to further develop a safe and reliable 230 kV integrated system that is both cost-efficient and acceptable to all parties.**

The Commission believes that a system reinforcement through interconnection with CPC/CBT is the preferred alternative. Such an interconnection would bring benefits to both CPC/CBT and WKP and would be both pragmatic and supportive of regional system planning for the benefit of all users. The Commission believes that such an interconnection can be negotiated without jeopardizing CPC/CBT's concerns about regulation.

If an agreement beneficial to WKP customers cannot be negotiated with CPC/CBT, WKP is to consider options to connect to Selkirk or negotiate with Cominco for the 230 kV line to Waneta or a new transformer at Waneta. The Commission believes that the 230 kV line would offer improved system reliability compared to the transformer option, at a similar cost.

The Commission concludes that if the parties are not willing to negotiate system development in a reasonable way to recognize the broad interest of the region and development of a least cost and most reliable system, then development of an RTO is required as soon as possible.

### 4.4 Communication System

The Project as proposed by WKP includes a communications system estimated to cost $4.1 million. The initial design of the system assumed a fiber optic system along most lines. A fiber optic system would have a large capacity compared to the alternatives of a power line carrier option or a microwave option. It was considered the most reliable of the options but was also expected to have the highest cost (Exhibit 4, Tab 1, pp. 34 and 35; T5: 831).

WKP indicated that a design review was ongoing which included examining the other alternatives. WKP stated that it would only depart from its initial estimates and design in order to achieve the least expensive system overall. Of the $4.1 million estimated cost, WKP expected that others would absorb $1.4 million.

No party took issue with the communications system proposed by WKP.

**The Commission determines that construction of a communications system is required, subject to the filing of an updated cost estimate demonstrating that the most cost effective design has been chosen.**

### 4.5 Electric and Magnetic Fields, Radio Interference and Noise Levels

In 1989 the Commission reviewed a 230 kV transmission line CPCN on Vancouver Island, during which the Commission heard detailed evidence about the health effects of electric and magnetic fields ("EMF"). In that Decision, the Commission concluded that there was insufficient scientific evidence to link health impacts to EMF. Since that time this issue has been raised by concerned individuals at the transmission line hearings that the Commission has conducted, and there have been many new research projects conducted by the scientific community.

At a hearing in June 1998 regarding the replacement of WKP's transmission line between Oliver and Osoyoos the subject was again dealt with in some detail. In response to public concern, the Commission retained an expert to give testimony with regard to the latest scientific findings on the subject. In its Decision on the Oliver to Osoyoos line, the Commission concluded:

> "The Commission has been keeping itself apprised of EMF research since 1989, and has taken the position that evidence that EMF causes adverse health effects is, to date, inconclusive and inconsistent. Even if one holds the view that magnetic fields from power lines do cause cancer, the fact that the connection has been so hard to prove means that the risk cannot be large."

Prior to the hearing, the Commission determined it would not revisit the scientific research previously reviewed but was willing to hear evidence on new issues related to EMF (Commission letter dated February 4, 2000; T1: 187).

A number of participants presented opinions on the effects of EMF, and stated that the perception of health risks associated with transmission lines has a negative impact on property values. Several people who spoke at the Community hearings expressed concern that EMF might pose health hazards even though they acknowledged that any effects might not yet be proven.

Additional presentations on the possible health effects of transmission lines were submitted by Dr. Marjorie Lundquist and Mr. Hans Karow (Exhibits 9B, 9C, 9D, 9E, 9F, 41, 66 and 73). Dr. Lundquist submitted a paper which proposed that cancer could be caused by a power line carrier system used for the transmission of data on the high voltage lines. Mr. Karow claims that there are multiple health hazards associated with transmission lines and requested that the Commission acknowledge these effects and require that transmission lines be kept away from human habitation.

WKP presented evidence of magnetic and electric field levels which would be present with the new proposed lines compared to the existing lines (Exhibit 4, Tab 5, p. 1). The Kootenay 230 kV Project would reduce the level of magnetic fields to which the public may be exposed. This results from the triangular configuration of the phase conductors on the single-pole structures, and the lower current levels as a result of increasing the operating voltage. Also, the transmission line would be relocated away from or diverted around most residential communities (Exhibit 3, Tab 4, pp. 7 and 8).

The maximum radio interference that WKP calculated for the 230 kV line between Brilliant and Warfield is within the maximum allowable level of the Canadian Standards Association (Exhibit 65, pp. 16 and 17). The noise level at a standard distance of 100 feet in fair weather was calculated to be only 14.6 dbA. However, a resident of Glade indicated that noise from transmission lines in his area is a problem when there is moisture in the air (TC1: CH16). WKP retained a consultant to measure noise levels but was unable to obtain useful information when the readings were taken.

#### 4.5.1 Commission Findings

The Commission recognizes that there are a large number of conflicting scientific papers and scientific opinions with regard to the interpretation of highly complex physical and physiological phenomena related to EMF. The body of scientific evidence continues to grow. To date the advice from scientific forums, such as the National Academy of Sciences, is that there is no conclusive evidence to support the theories that EMF from power lines is a health hazard. Given the large number of studies completed without demonstrating a clear relationship, the Commission is less concerned that EMF is a significant health risk compared to its view in 1989. In the case of this project, the levels of EMF will be substantially reduced from those which currently exist.

## 5.0 SUBSTATIONS AND INTERCONNECTIONS

It is in the public interest that the WKP system be connected with other transmission facilities in the area to provide the safety, stability and reliability that results from a looped and intermeshed system. The substations and interconnections that are either essential, desirable or possible include:

- South Slocan to Kootenay Canal plant intertie;
- Interconnection at Brilliant;
- Substations at Warfield and Waneta; and
- Line No. 71 to Nelway.

### 5.1 South Slocan to Kootenay Canal Plant

A 63 kV intertie between the South Slocan plant and Kootenay Canal plant now exists as Line No. 13. The capacity of this line is limited to 160 MW. WKP proposes to install a second 63 kV line in parallel to Line No. 13 and a second 230/63 kV, 150 MW transformer at the Kootenay Canal plant (Exhibit 3, Tab 1, p. 31). B.C. Hydro agrees with the need for this second connection and is prepared to proceed providing WKP bears the cost.

WKP is also concerned about the conditions in the substations at South Slocan, Lower Bonnington, Upper Bonnington, Cora Linn and the Rosemont substation near Nelson, as discussed in Section 3.1. Initiatives to address islanding problems and to upgrade the generating units will increase short-circuit currents to levels above the normal operating levels of the breakers. At South Slocan there are additional concerns about the condition of the structural supports and the substation grounding, along with the suitability of the bus configuration.

WKP plans to rebuild the South Slocan substation. Breakers will be upgraded at the Kootenay River generating plants and at Rosemont.

The Commission considers it essential that these upgrades be carried out to maintain safe, reliable and secure service to the public.

**The Commission determines that construction of the second 63 kV intertie with the Kootenay Canal plant and a second transformer at the Kootenay Canal plant are required, subject to the filing of an updated cost estimate. WKP is directed to finalize arrangements with B.C. Hydro.**

**The Commission approves the rebuild of the South Slocan substation and the breaker upgrades at the Kootenay River generating plants and at Rosemont substation.**

### 5.2 Connection at Brilliant

WKP buys power from CPC/CBT that is produced at the Brilliant generating station, under the terms of the Brilliant Power Purchase Agreement. This purchase includes the additional power that will result from the Brilliant Upgrade Project. WKP proposes to construct a substation at Brilliant to include connection to

the Brilliant plant 63 kV substation and two 63/230 kV transformers, along with terminations for 230 kV lines to Warfield, Kootenay Canal, Keenleyside and Selkirk, and to the Brilliant Expansion Project. The estimated cost of this substation is $16.5 million. WKP assumed that CPC/CBT would rent line terminations to Keenleyside and Selkirk when the Brilliant Expansion is completed (Exhibit 16, p. 1).

In the hearing, WKP provided summary matrices showing the environmental and sociocommunity impacts associated with the substation developments (Exhibits 20A and 20B). WKP expected that the new Brilliant substation would have impacts at a relatively low level on vegetation, wildlife and aquatic resources.

CPC/CBT is constructing the Keenleyside generating plant and a 230 kV line to Selkirk, and expects them to be in service by late 2001 (T7: 1240). CPC/CBT is also planning a 100 MW Expansion project at Brilliant to be in service by 2006, which would connect to the Keenleyside to Selkirk line through a new, small substation at Brilliant (T7: 1197 and 1198). CPC/CBT expects the small substation will cost about $6 million (T7: 1236).

#### 5.2.1 CPC/CBT Exemption Order

The CPC/CBT Exemption Order dated November 25, 1998 was issued pursuant to Section 22 of the Act, and, in one provision of it, the Minister exempts from:

> *" … all the provisions of Part 3 of the Act, CPC, CPC Subsidiaries and CBT and CBT Subsidiaries when acting jointly with CPC or CPC Subsidiaries, and their respective successors and assigns, in respect only of the production and sale of a power service produced by the Keenleyside Project and their respective equipment, facility, plant, project or system that is used solely for the production or sale of that power service;"*

The Keenleyside Project is defined as "a hydro-electric generation facility at the Keenleyside Dam".

WKP considered CPC/CBT to be a public utility, and argued that the Commission has a general authority to make orders respecting the construction, operations and sharing of facilities of public utilities. WKP argued that the CPC/CBT Exemption Order does not exempt CPC/CBT generally from the application of the Act. It exempts specific projects from Part 3, including the Keenleyside Project and facilities that are used solely for the sale of power from Keenleyside. WKP noted that the exemption does not include Part 5, or the Brilliant substation.

#### 5.2.2 CPC/CBT Position

CPC/CBT stated it would be willing to participate in a larger, common Brilliant substation, provided it can negotiate a satisfactory arrangement with WKP covering the following:

1. The substation would be financed and owned by CPC/CBT, with cost recovery according to a formula similar to that in the Brilliant Power Purchase Agreement and assured by a long-term commitment from the users of the substation, principally WKP (T7: 1203);

2. There would be no interference with current and planned power projects, including the Keenleyside line and CPC/CBT's rights on Line No. 71. Also, extra non-compensatable costs would not be imposed (T7: 1204);

3. The Facilities Sharing Agreement would be amended to remove certain restrictions on CPC/CBT, and to make the agreement ready for a RTO environment (T7: 1225-1229); and

4. Regulatory issues would be "appropriately dealt with". CPC/CBT stated that it would seek an exemption for its own smaller substation, but it was not clear whether CPC/CBT would require that the larger substation be exempt from Part 3 of the Act (T7: 1271 and 1272).

If CPC/CBT owned the Brilliant substation, it would expect to have control over modifications to it. CPC/CBT anticipates an arrangement similar to that for the Brilliant generating plant, where WKP operates and maintains the equipment and a committee manages modifications and upgrades to the facility (T7: 1283).

CPC/CBT felt that the CPC/CBT Exemption Order includes the line to Selkirk (Exhibit 47B; T7: 1269). CPC/CBT has a similar exemption for the Brilliant plant, including the upgrades (Exhibit 91; T7: 1269). Although CPC/CBT does not have an exemption for a Brilliant substation to connect the Brilliant expansion project to the Keenleyside to Selkirk line, CPC/CBT stated that it intended to request one from the Minister (T7: 1272).

CPC/CBT argued that the Commission does not have jurisdiction to direct CPC/CBT to interconnect their Keenleyside to Selkirk line with the WKP system. CPC/CBT argued that the Keenleyside to Selkirk line is included under the exemption for the Keenleyside Project, and that Part 5 and Section 72 do not give the Commission broad powers to make directions respecting CPC/CBT as they have been exempted from Part 3 by Ministerial Order. CPC/CBT argued that when the Minister makes an exemption order under Section 22(2), the Minister assumes responsibility for protection of the public interest.

CAC (B.C.) et al. supported CPC/CBT's position that the Commission does not have jurisdiction to order CPC/CBT to interconnect with WKP. CAC (B.C.) et al. considered that the exemption for the Keenleyside Project is broad enough to preclude a direction to interconnect with WKP at either Brilliant or Keenleyside.

#### 5.2.3 Commission Findings

The need to deliver power generated at Brilliant to the WKP system and the construction of a 230 kV transmission line to Warfield will require a substation at Brilliant. There appear to be considerable advantages to construction of one common substation, and benefits to all parties from interconnection of

the WKP and CPC/CBT systems. However, to date, WKP has not been able to negotiate an agreement for the connection, and for fairly and reasonably sharing the cost of the connection.

The Commission considers that at this time it does not have authority to direct CPC/CBT to connect its Keenleyside to Selkirk line to the WKP system at the Brilliant substation or at Keenleyside. The current lack of uniform regulatory oversight regarding electrical system reliability, quality, and potential for facility duplication is not desirable, but the situation may change in the future, depending on future actions of CPC/CBT and actions by the Minister related to the exemption. **At this time the Commission declines to direct CPC/CBT to connect its Keenleyside to Selkirk line to the WKP system, and declines to make the other directions to CPC/CBT requested by WKP.**

In the absence of an agreement with CPC/CBT which benefits WKP ratepayers, it seems appropriate for WKP to construct and own the substation. As the substation will be a critical part of the Kootenay transmission system, the public interest is likely to require Commission oversight of the facility.

It may be possible for the Commission to support an exemption for a common substation provided that the terms of access to it by WKP and others are set out in a long-term agreement. However, any such exemption should be granted under Section 88(3) of the Act.

**The Commission directs WKP to resume negotiations with CPC/CBT to determine the design and ownership arrangements of a larger Brilliant substation to accommodate the needs of all parties at reasonable cost to WKP ratepayers.**

**If a negotiated settlement cannot be reached by September 15, 2000, the Commission authorizes WKP to construct and own a substation at Brilliant that is designed to meet the requirements of WKP and its ratepayers.**

### 5.3 Warfield Substation

Substations are currently located at Warfield and at nearby Tadanac which serve the local WKP load, provide a termination for Line No. 11 to the Okanagan and serve the Cominco smelter load. As discussed in Chapter 3, WKP has concerns about the condition of the substations, which are difficult to maintain and are inflexible in operation. There is also concern about the adequacy of fault-current interrupting capacity at both substations. Cominco shares these concerns and the parties have agreed to replace both substations with a new substation at Warfield.

WKP originally estimated that the modifications to the 63 kV portion of the Warfield substation would cost $10.5 million. At the start of the hearing, WKP filed a revised cost estimate for the Warfield 63 kV substation of $12.6 million, and assumed WKP would be responsible for $5.2 million. This estimate anticipated that separate WKP and Cominco facilities would be built at Warfield (Exhibit 14, p. 2). The Kootenay 230 kV Project also included a WKP 230 kV substation at Warfield with two 63-230 kV 150 MW transformers, costing $13.1 million (Exhibit 27D).

In argument, WKP asked for a direction to Cominco for construction of the 230 kV substation at Warfield in a manner to facilitate the 230 kV tie-in.

#### 5.3.1 Cominco Position

Cominco stated that it would make land available to WKP for the latter's portion of the new substation. Cominco disputed the cost sharing proposal of WKP and suggested that each party could pay for its own facilities (Exhibit 9G, p. 1).

At Warfield, Cominco distinguished between firm transmission service provided to and by WKP, and interconnection support. Cominco considered interconnection support to mean that it would connect with WKP at Warfield, and the parties would provide each other with increased system reliability and stability, but no firm transmission service. Power would be transferred as available to meet operational or emergency conditions (Exhibit 83, p. 5). Cominco also stated that it would consider disconnecting from WKP at Warfield if WKP required Cominco to pay for interconnection support.

#### 5.3.2 Commission Findings

It is the Commission's view that the interests of safety and quality of service necessitate the reconstruction of the Warfield and Tadanac substations.

The proposed Warfield substation is an integral part of the WKP transmission system. Interconnection of the WKP and Cominco systems at the Warfield substation is essential so that the systems can be operated as one system under the FSA, as required by the Cominco Exemption Order.

Certain matters about the design of the 230 kV substation and the related 63 kV facilities, and the sharing of costs for these new facilities, need to be resolved. The Commission declines to issue specific directions to Cominco but encourages the two parties to work together on mutually dependent facilities in the spirit of support and cooperation that has historically characterized their relationship. Amendments to the FSA may be required and Cominco is reminded of the Conditions attached to its Exemption Order.

**The Commission determines that construction of a new 230 kV and 63 kV substation at Warfield is required, subject to the filing of an updated facility design and an updated estimate of costs and cost-sharing. WKP is directed to resume negotiations with Cominco on the design, construction and cost-sharing of a new substation at Warfield that meets their needs.**

### 5.4 Waneta Substation

WKP proposed to modify Cominco's Waneta 230 kV substation, relocating the two transformers and providing terminations for the proposed 230 kV line to Warfield. WKP estimated the modifications would cost $6.7 million. The substation modifications, the 230 kV connection to Warfield and concerns related to the existing transformer capacity at the Waneta substation are discussed in Section 4.3.

Work is proceeding to split the bus at the Waneta plant so that a bus fault problem will take only one-half of the plant off line at a time rather than the whole plant, so as to prevent a total system collapse if a fault were to occur at the Waneta bus. This change is expected to be fully commissioned by May 2000 (T6: 1054).

In argument, WKP asked for a direction to Cominco for construction of the proposed Waneta substation with modifications to allow connection of the proposed 230 kV line from Warfield to Waneta.

#### 5.4.1 Commission Findings

In Section 4.3.5, WKP's requests for a CPCN for a 230 kV line from Warfield to Waneta and for a direction to Cominco related to connection of the 230 kV line are denied. The remedial work on the Waneta bus as described above is now underway. Therefore, the relocation of the two transformers to allow the 230 kV line connection described by WKP as being required at the Waneta substation for the K3 option is not applicable at this time.

Remedies to the system constraints resulting from a denial of the 230 kV line from Warfield to Waneta are discussed in section 4.3. One remedy could include a third transformer at Waneta. WKP is to negotiate the most cost effective alleviation of the potential system constraints with CPC/CBT, Cominco and/or B.C. Hydro and report back to the Commission.

**The Commission declines to approve construction of the requested works at Waneta, and declines to make directions to Cominco regarding the requested works.** All parties must realize that the evolution of electricity markets will likely require changes to historic rights in the not too distant future.

The Commission remains optimistic that the positive working relations between WKP and Cominco will result in a voluntary agreement which will meet the needs of both parties.

### 5.5 Connection of Line No. 71 to Nelway

Nelway is a B.C. Hydro 230 kV substation that is connected to Selkirk and to the BPA Boundary substation. The phase-shifter transformer at Nelway was put in place to control loop flows from northeastern Washington through the B.C. Hydro system to Northwestern Washington (Exhibit 1, Tab 4, p. 24) Cominco's Line No. 71 also connects to Boundary substation.

Heavy flows of current can now bypass the phase-shifter by following a circuit from Boundary to Waneta to Warfield to Kootenay Canal and back to Selkirk. Unless Line No. 71 is connected to Nelway, strengthening of the transmission system and interties in the Kootenay Region threatens to impair the effectiveness of the phase-shifter. To prevent loop flows, B.C. Hydro and Cominco are negotiating to connect Line No. 71 to the phase-shifter at Nelway (Exhibit 9G, p. 1).

The section of new line from Line No. 71 to Nelway will be approximately one kilometre long. WKP expected that it will have a minimal impact on mineral and forest resources, and on wildlife and wildlife habitat. It would not impact residential areas, or other resources (Exhibit 20D).

WKP included the intertie to Nelway in the Application for the 230 kV Project even though it did not anticipate playing any role in the construction or ownership of the intertie (T2: 247).

In argument, WKP asked the Commission to direct Cominco to connect Line No. 71 to Nelway. WKP also asked for a Commission direction to B.C. Hydro to confirm that the Wholesale Transmission Service ("WTS") tariff does not apply to the intertie at Nelway and to direct that B.C. Hydro and WKP negotiate an appropriate tariff. WKP argued that the B.C. Hydro WTS should not apply to the connection at Nelway, as WKP power will flow on B.C. Hydro facilities for a *de minimus* length. WKP considered that its request was consistent with the approach in other jurisdictions.

#### 5.5.1 Cominco Position

In its evidence, Cominco indicated that it had agreed with B.C. Hydro to jointly address loop flows by making the connection to Nelway (Exhibit 9G, p. 1). Cominco suggested that the proposed 230 kV line from Warfield to Waneta would form an easier path for the current flow and make the loop flow problem worse (T8: 1393 and 1394). In Argument, Cominco stated that it was considering the construction of the connection in a manner that meets its requirements. However, as discussed in Section 4.3, Cominco argued

that WKP's request for directions is not properly before the Commission, and that the Commission does not have the jurisdiction to grant the directions.

#### 5.5.2 B.C. Hydro Position

B.C. Hydro argued that the line diversion was necessary, and indicated that it was prepared to incur costs to achieve the benefits of the connection. In argument, B.C. Hydro requested that any Commission approval of the Kootenay 230 kV Project require that the new WKP facilities will not be energized until Line No. 71 is connected to Nelway.

B.C. Hydro argued that the Commission could not make a determination on the WTS tariff in this Decision, because WKP's request seeks to amend an existing B.C. Hydro tariff. B.C. Hydro felt that such a request can only be made by written complaint pursuant to Section 58 of the Act and that the Commission only has authority to grant such a request after a hearing. The Commission and others only became aware of the request during WKP's opening statement, and B.C. Hydro argued that this did not provide sufficient notice to all parties that could be affected by the outcome.

CAC (B.C.) et al. supported B.C. Hydro's position, arguing that the Commission is not in a position to impose a tariff on B.C. Hydro, as the issues related to the imposition of a tariff have not all been canvassed and the parties who could be affected by it have not all had an opportunity to participate.

#### 5.5.3 Commission Findings

The Commission accepts that connection of Line No. 71 to Nelway is necessary and in the public interest. However, due to the lack of direct WKP involvement in the intertie facilities, it is not appropriate to include such facilities in a CPCN to WKP. Moreover, the Commission believes that the connection between Line No. 71 and Nelway will proceed under the guidance of B.C. Hydro and Cominco without the need for Commission intervention. Therefore, the direction to Cominco requested by WKP and the direction to WKP requested by B.C. Hydro related to the connection at Nelway appear to be unnecessary.

With regard to the applicability of the WTS tariff, the Commission and other participants in the proceeding did not become aware of this issue until the start of the hearing. The Commission considers that the communications that identified the applicability of the WTS tariff as an issue in this proceeding were insufficient to be considered reasonable notice in this instance. In particular, some parties who decided not to participate in the proceeding on the basis of the Application and the Hearing Notice could be impacted if the Commission makes a determination on the matter. The Commission declines to make the directions to B.C. Hydro that WKP requested.

WKP does not need a direction from the Commission to approach B.C. Hydro regarding the tariff charges that would apply in the event of a connection at Nelway station. Apparently Cominco is exploring similar matters with B.C. Hydro (T7: 1328). In the event that WKP is not satisfied with the response of B.C. Hydro, it can make a specific application to the Commission on the matter.

**The Commission declines, at this time, to direct Cominco to connect Line No. 71 to Nelway substation, and refuses WKP's request for a CPCN for the connection**. If the connection does not proceed as currently anticipated, and on application by an interested party, the Commission will consider what authority it may have to require the interconnection.

**To the extent that B.C. Hydro and/or Cominco may otherwise require a CPCN under Section 45 of the Act for facilities connecting Line No. 71 to Nelway Station, as set out in the WKP Application, the Commission confirms that the parties do not need to apply for such a separate CPCN.**

### 5.6 Rate Schedule 110 – Long-Term Alternate Path Transmission Service

WKP, in its January 10, 2000 revision to the Application, applied for approval of Rate Schedule 110 – Long-Term Alternate Path Transmission Service ("APTS"). The APTS tariff is intended for firm transmission of the customer's full load requirements between any two points on the WKP owned 230 kV transmission lines interconnecting hydro-electric plants on the Kootenay River with switching facilities at Warfield (Exhibit 1, Appendix G).

WKP proposed billing for APTS at a monthly rate of $0.67 per kVA of reserved capacity (Exhibit 4, Tab 1, p. 17). The monthly rate for APTS is based on one-twelfth of the estimated annualized cost of the Kootenay Canal to Brilliant and Brilliant to Warfield portions of the proposed facilities divided by the total capacity of the line. WKP indicated that, if Cominco took service under the APTS tariff, then it would be required to nominate its total demand not partial demand (Exhibit 4, Tab 1, pp. 17 and 18; WKP Argument, pp. 44 and 45).

WKP's position was that Cominco should pay the APTS tariff because it was receiving the benefit of the capacity north of Warfield. WKP further stated that its transmission service tariffs might satisfy Cominco's needs for WKP transmission services (rather than sharing facilities under the FSA), but that the cost of firm Point–to-Point Network Service would exceed those under the APTS tariff.

WKP indicated that if it was unable to reach an agreement for facilities sharing with any of the third parties, then the third parties would take service under the APTS (Exhibit 4, Tab 1, p. 1). WKP agreed that the APTS would be unnecessary if WKP's proposed facilities were included in a negotiated nomination under the FSA that covered all of the facilities encompassed by the APTS (T2: 327 and 328).

Cominco stated that the APTS tariff is not required at this time, as it is needed only if the parties cannot agree on cost allocations for the facilities and the Commission must adjudicate the issue (Exhibit 9G, p. 2). Moreover, Cominco suggested that WKP and Cominco currently provide each other with interconnection support at Warfield for no charge, and that Cominco would not take service under the APTS tariff (Exhibit 83).

#### 5.6.1 Commission Finding

The Commission notes that WKP has indicated that the APTS is an alternative to a negotiated nomination under the FSA. The Commission agrees with Cominco that the APTS is not required now, and will only be required if and when it is clear that the parties are unable to reach a negotiated agreement. **Therefore, the Commission does not approve the APTS tariff at this time.**

## 6.0 FINANCIAL CONSIDERATIONS AND RATEPAYER IMPACTS

### 6.1 Cost Estimates and Potential Variances

In its Application, WKP presented five potential system configuration options as discussed in Chapters 2 and 3. The total project cost of the Kootenay 230 kV Transmission Project based on the Company's preferred option K3, as amended during the hearing, is $109,990,000 (Exhibit 27D, WKP Argument pp. 9 and 29). This cost includes the Utility's decision during the hearing to change its preferred northern section routing from the East Low Elevation route to the East High Elevation route. The deemed WKP cost component, which is net of proposed contributions and rentals by other transmission owners for use of WKP facilities, was $79,954,000 (Exhibit 27D). WKP noted that reduction in its deemed cost component for rentals referred not to a revenue but to an asset valuation amount (T5: 879).

The Commission, in this Decision, has approved many of the components of option K3 applied for by WKP but with some modifications. Based on the Commission's findings the design, cost and sharing of costs at the Brilliant and Warfield Substations may be modified by negotiations with CPC/CBT and Cominco, respectively. The following table provides an estimate of the costs associated with the system that the Commission has determined is necessary, based on the component cost and sharing estimates provided by WKP.

Table 6.1

**WKP Estimates – Approved K3 Components**

| Component | Cost | WKP Cost | Others Cost | Rented | Deemed WKP Share |
|---|---|---|---|---|---|
| South Slocan Modification | 9,716,000 | 9,716,000 | 0 | 0 | 9,716,000 |
| Tie to Kootenay Canal | 229,000 | 229,000 | 0 | 0 | 229,000 |
| Kootenay Canal Modifications | 6,934,000 | 6,934,000 | 0 | 532,134 | 6,401,866 |
| Kootenay Canal to Brilliant 230 kV Transmission Line | 9,828,000 | 9,828,000 | 0 | 3,272,724 | 6,555,276 |
| Brilliant 63/230 kV Switchyard | 16,463,000 | 16,463,000 | 0 | 1,097,533 | 15,365,467 |
| Brilliant to Warfield 230 kV Transmission Line | 13,603,000 | 13,603,000 | 0 | 4,529,800 | 9,073,200 |
| Warfield 230 kV Switchyard | 13,140,000 | 13,140,000 | 0 | 5,474,453 | 7,665,547 |
| Warfield 63 kV Modifications including retiring Tadanac | 12,596,000 | 5,197,000 | 7,399,000 | 0 | 5,197,000 |
| Warfield Line Diversions | 540,000 | 44,000 | 496,000 | 0 | 44,000 |
| Waneta to Warfield 230 kV Transmission Line | n/a | n/a | n/a | n/a | n/a |
| Waneta 230 kV Modifications | n/a | n/a | n/a | n/a | n/a |
| Tie Line No. 71 to Nelway | 636,000 | | 636,000 | | 0 |
| Nelway Modifications | 1,748,000 | | 1,748,000 | | 0 |
| Miscellaneous Improvements | 8,480,000 | 8,480,000 | 0 | 0 | 8,480,000 |
| Kootenay Communications | 4,097,000 | 2,716,000 | 1,381,000 | 0 | 2,716,000 |
| Feasibility Study | 431,000 | 319,000 | 112,000 | 0 | 319,000 |
| Reduced Warfield Cost* (Section 4.3.5) | -1,600,000 | -1,600,000 | 0 | -666,600 | -933,400 |
| Larger Warfield Transformer | 500,000 | 500,000 | 0 | 208,313 | 291,687 |
| North Kootenay Generation Dropping RAS** | 1,000,000 | 1,000,000 | | | 1,000,000 |
| Cominco WKP Load Dropping RAS** | 1,000,000 | 1,000,000 | | | 1,000,000 |
| **TOTAL** | 99,341,000 | 87,569,000 | 11,772,000 | 14,448,356 | 73,120,644 |

* The reduced Warfield costs and the larger Warfield transformer are assumed to be offsetting costs that relate to the Warfield 230 kV Switchyard. Therefore, incremental costs and savings are shared in the same percentage as the Warfield 230 kV Switchyard.

** The Remedial Action Schemes required by WKP because the Warfield–Waneta 230 kV line and Waneta 230 kV modifications are not implemented are assumed to be borne solely by WKP.

However, in Section 4.3.3, the Commission noted that if CPC/CBT refused to allow WKP to interconnect at Brilliant, an additional transformer at Waneta may be required at a cost of $10.3 million. The Commission anticipates that an agreement between WKP and Cominco would be required for such a transformer to be installed.

## 6.2 Cost Sharing

Potentially, the greatest risk of variances from the estimated revenue requirement faced by WKP ratepayers arises from variations in the share of costs to be borne by WKP. For some of the components there is limited potential for variation because WKP assumed that it will bear all of the costs and that these costs would be recovered in rates. For several of the components, WKP's application assumed that others would bear a certain share of the costs, either through a contribution to capital costs, through the amendments to the FSA or through revenues collected through the APTS tariff. WKP's evidence stated that given the stage of cost-sharing discussions at that time (February 2000), there was only a small chance that the WKP share would change by more than $10 million (Exhibit 4, Tab 1, p.11).

Recovery of costs from other parties for their use of WKP's proposed facilities would require amendments to the facilities or nominations listed in the FSA, as discussed in Section 1.3.4. As noted there, WKP has applied for approval of amendments to the FSA. Whether or not the Commission has the authority to approve or order such amendments is a subject of disagreement in this hearing and is discussed in Chapters 4 and 5.

The Commission reviewed the evidence to attempt to develop a range of costs depending on the outcome of cost-sharing arrangements assumed by WKP for each of the components. These cost estimate ranges are as follows:

Brilliant 63/230 kV Switchyard

By the end of the hearing, WKP proposed that it would own the Brilliant Switchyard and that CPC/CBT would rent a portion of the switchyard under the FSA in 2006 after the Brilliant Expansion was complete (Exhibit 27D, argument, p. 36). CPC/CBT argued that its involvement in the Brilliant Switchyard would be immediate if the Project went ahead as proposed, and that it was in the interests of CPC/CBT and WKP ratepayers for CPC/CBT to own the common Brilliant Switchyard (CPC/CBT Argument, p. 24).

Two ownership and cost sharing scenarios were considered for a common Brilliant 230 kV Switchyard utilized by both WKP and CPC/CBT. Under one option WKP would own and finance the switchyard, and CPC/CBT would pay WKP for its use of the facility. Under the second option CPC/CBT would own the switchyard and WKP would pay CPC/CBT for use of a portion of the facility. Both WKP and CPC/CBT attached conditions to their acceptance of ownership of the switchyard by the other party (WKP Argument, p. 37; CPC/CBT Argument, p. 25).

WKP indicated that its incremental cost of constructing the Brilliant Switchyard to accommodate CPC/CBT would be in the order of $3.2 million to $3.3 million (T2: 406). CPC/CBT stated that the cost to construct its own dedicated switchyard at Brilliant would be approximately $6 million (T7: 1237). Consequently WKP argued that, based on its proposal that it would be compensated by CPC/CBT for use of a WKP-owned joint switchyard through a 20% nomination of the facility under the FSA, CPC/CBT would be no worse off than if it constructed its own dedicated switchyard (WKP Argument, pp. 45-46).

If WKP constructed a switchyard at Brilliant designed to meet only its own needs, the capital costs would be expected to fall by $3.2 to 3.3 million. However, this would be partially offset by the loss of rental revenue of $1.098 million (Exhibit 27D).

Kootenay Canal Plant Modifications

The Kootenay Canal plant modifications are deemed by WKP to cost $6.934 million with Cominco to pay $532,000 through the FSA, leaving a deemed WKP share of approximately $6.401 million. B.C. Hydro in argument, stated that it was not prepared pay a share of the capital costs of interconnection with its Kootenay Canal plant, and noted that WKP had accepted B.C. Hydro's position (WKP Argument p. 46).

Kootenay Canal to Brilliant and Brilliant to Warfield 230 kV Transmission Lines

The Kootenay Canal to Brilliant 230 kV line (East High Elevation route) was assumed to cost $9.828 million, with Cominco's share under the FSA equaling $3.273 million, leaving WKP to pay $6.555 million. WKP indicated that, alternatively, Cominco would likely pay $4.472 million (NPV) under the proposed APTS tariff.

The Brilliant to Warfield 230 kV line was assumed to cost $13.603 million and Cominco was to accept $4.530 million, under the FSA. Consequently, WKP's share would be $9.073 million.

Cominco stated during the hearing that it was attempting to renegotiate the Canal Plant agreement, and that if it was successful it would not require use of the Kootenay Canal to Warfield 230 kV system. Until it knew whether or not it would require capacity on the Kootenay Canal to Warfield 230 kV line, Cominco proposed contributing approximately $2 million to the cost of the lines so that the system had sufficient capacity to accommodate Cominco's needs, if required (T7: 1188). WKP indicated that if Cominco did not require any of the 230 kV transmission capacity, the effect on WKP ratepayers would be approximately $14 million.

Warfield 230 kV Substation

WKP assumed that the costs of the Warfield 230 kV Switchyard would be shared with Cominco under the FSA, with Cominco absorbing $5.474 million of the estimated $13.140 million estimated cost. WKP proposed that it would own the switchyard and Cominco would pay rent based on a 50% deemed utilization by Cominco. Cominco would rent one of the 230/63 kV transformers and one-third of the 230 kV line termination to Brilliant. WKP expected to receive $1.189 million in annual payments from Cominco for its use of the Warfield Switchyard (Exhibit 3, Tab 1, p. 17; Appendix E; Exhibit 16, p. 1). WKP's deemed cost share under such an outcome would be $7.665 million.

Additional costs and benefits at Warfield resulting from elimination of the proposed Warfield to Waneta 230 kV line, include a cost increase of $0.5 million for a larger 230/63 kV transformer at Warfield and a reduction of $1.6 million due to fewer required line positions. The net result of these changes is a reduction of $1.1 million. Additional costs of another transformer at Waneta ($3.6 million), other costs at Waneta ($6.7 million), and a north Kootenay Switchyard generation dropping remedial action scheme ($1.0 million), are considered in Section 4.3.3.

In the scenario described above, the total costs of the Warfield Switchyard would decrease to $12.040 million. If Cominco were to share costs in the same proportion as proposed by WKP for the switchyard, then WKP would pay approximately 58% or $6.983 million and Cominco would pay approximately 42% or $5.057 million.

Cominco indicated that rather than cost sharing, each party could pay for its own facilities (Exhibit 9G, p. 1). To estimate the cost to WKP under this scenario, it is necessary to assume that WKP's costs would be the same whether Cominco permanently reduced its load at Trail or whether it maintained its existing load but constructed its own facilities to serve its load. In that instance, additional transformer capacity at Warfield would not be required. This would result in a net cost reduction of approximately $1.6 million (T6: 995-998). Under this scenario, WKP would be required to absorb all of the remaining Warfield costs, estimated at $12.540 million.

Consequently, the costs that may apply to WKP in the absence of the Warfield to Waneta line are in the range of $6.983 million to $12.040 million depending on cost sharing arrangements.

Warfield 63 kV Modifications Including Retiring Tadanac

In its application, WKP assumed a cost of modifications to Warfield, including retiring the Tadanac switchyard, of $10.537 million with Cominco paying all of the capital cost and WKP renting a 35 percent share of the asset (Exhibit 1, Tab 3, Table 3.1; Exhibit 3, Tab 1, p. 17). Subsequently, the WKP costs increased to $5.197 million due to Cominco's requirement to establish two distinct switchyards at Warfield (Exhibit 14, p. 2). This cost is shown in Table 6.1.

Cominco stated during the hearing that Cominco and WKP should each pay for their own portions of the switchyard, but that Cominco was not insisting on two physically separate switchyards. Consequently, Cominco thought that the cost estimate might be different (T8: 1388). For the low capital cost scenario in Table 6.2, the original cost of $10.5 million is assumed with WKP assuming a 35 percent share of the cost or 3.7 million.

The Warfield Line Diversions

WKP stated in its Application that diversions of Cominco-owned 63 kV lines into the expanded Warfield 63 kV switchyard would be the responsibility of Cominco. WKP's involvement in the switchyard would be a function of the number of its line terminations at the station. On this basis, WKP has indicated that it would be responsible for $44,000 related to the Warfield line diversions, while Cominco would be responsible for $540,000. Cominco stated in its evidence that it had agreed with WKP that there is a need to replace the Tadanac/Warfield switchyards and that the two parties had agreed what the total range of cost might be (Exhibit 96, p. 1). As the WKP proposal also appears consistent with Cominco's position that each party should be responsible for its own facilities, this sharing of costs does not appear to be in dispute.

Miscellaneous Improvements

In its Application, WKP has proposed to accept all of these costs without any cost sharing.

### 6.2.1 Commission Findings

Based on the analysis above, the Commission has concluded that a likely range of costs, based on WKP's capital cost estimates for the approved components, but allowing for some uncertainty regarding cost sharing, is in the range of $73.1 million to $80.4 million. The basis of this estimate is shown in Table 6.2. However, as discussed in Sections 6.1 and 6.2, if WKP were unable to interconnect at Brilliant, a larger transformer could be required at Waneta at an additional cost of $10.3 million. Until WKP provides final

Table 6.2

## West Kootenay Power Ltd., 230 kV Capital Cost and Cost Sharing Amounts

| Components with Sharing Uncertainty | Low Capital Cost | Sharing Estimate | WKP Share | High Capital Cost | Sharing Estimate | WKP Share |
|---|---|---|---|---|---|---|
| Kootenay Canal plant modifications | 6,934 | 0 | 6,934 | 6,934 | 532 | 6,401 |
| 230 kV line –K3 Kootenay Canal to Warfield | 21,430 | 0 | 21,430 | 23,430 | 7,803 | 15,627 |
| Brilliant new 230/63 kV Switchyard | 13,263 | 0 | 13,263 | 16,463 | 1,098 | 15,365 |
| Warfield Switchyard, new 230/63 kV substation | 11,540 | 0 | 11,540 | 12,040 | 5,057 | 6,983 |
| Tadanac/Warfield 63 kV reconstruction | 10,537 | 6,849 | 3,688 | 12,596 | 7,399 | 5,197 |
| N. Kootenay Generation Dropping RAS | 1,000 | 0 | 1,000 | 1,000 | 0 | 1,000 |
| Cominco/WKP Load Dropping RAS | 1,000 | 0 | 1,000 | 1,000 | 0 | 1,000 |
| Subtotal - Shared Components & Adjustments | 65,704 | 6,849 | 58,855 | 73,463 | 21,889 | 51,573 |

| Components with Sharing Certainty | Capital Cost | Sharing Estimate | WKP Share |
|---|---|---|---|
| South Slocan Modification | 9,716 | 0 | 9,716 |
| Tie to Kootenay Canal | 229 | 0 | 229 |
| Warfield Line Diversions | 540 | 496 | 44 |
| Waneta-Warfield 230 kV line | n/a | n/a | n/a |
| Waneta 230 kV modifications | n/a | n/a | n/a |
| Tie Line No. 71 to Nelway | 636 | 636 | 0 |
| Nelway Modifications | 1,748 | 1,748 | 0 |
| Miscellaneous Improvements | 8,480 | 0 | 8,480 |
| Kootenay Communications | 4,097 | 1,381 | 2,716 |
| Feasibility Study | 431 | 112 | 319 |
| Subtotal | 25,877 | 4,373 | 21,504 |

| | Low Capital Cost | Sharing Estimate | WKP Share | High Capital Cost | Sharing Estimate | WKP Share |
|---|---|---|---|---|---|---|
| **TOTALS** | **91,581** | **11,222** | **80,359** | **99,340** | **26,262** | **73,077** |

Notes:

1. The costs estimates of the Warfield Switchyard include the adjustments for a larger transformer and reduced line terminations.
2. For both low and high cases, the estimates are based on the assumption that no Warfield to Waneta line is constructed.
3. As noted in Section 6.2 the WKP share could increase by an additional $10.3 million for a transformer at Waneta to approximately $91 million if WKP was unable to connect with CPC/CBT at Brilliant.
4. The potential scenario under which Cominco requires no capacity on the WKP system is included in the Table under the low capital cost/low sharing scenario.

cost estimates for all components of the final configuration of its system upgrade, additional uncertainty exists in the base estimates as well.

**Although these estimates are based on preliminary data and contain a relatively high level of uncertainty, the Commission has determined that the items which it has approved are necessary for safe and reliable service to residents of the Kootenays. This Project is a necessary refurbishment of a transmission system that has reached the end of its physical life, and, therefore, approval cannot be delayed until final costs and cost sharing arrangements are complete.**

### 6.3 Financing and Funding Alternatives

During the hearing, several financing alternatives were explored. These included traditional funding by WKP through a mixture of debt and equity. Other alternatives proposed included the use of a mixture of debt or equity financing, or both, by third parties.

Except for the common facilities at Warfield, WKP proposed to own all of the facilities proposed in its Application. WKP proposed to finance the Project through its normal ratio of Utility debt and equity financing. WKP calculated its revenue requirement and rate impacts based on the assumptions of a weighted average cost of debt of 7.5% and a return on equity of 10%.

In their initial evidence, the Regional Districts proposed to take an ownership role of the Project facilities (Exhibit 9H, pp. 4-8). The Regional Districts suggested that, by participating in the Project, they could reduce the cost of the Project sufficiently that their preferred option, K5, would become comparable to that of WKP's preferred option, K3. Subsequent to the conclusion of the evidentiary portion of the hearing, the Regional Districts indicated that they were no longer pursuing an ownership position.

During the hearing, the Regional Districts stated that, while an alternative would be for them to act as a financier alone, this would likely not be a realistic or viable option as there are express prohibitions against local governments acting as financing institutions (Exhibit 9H, pp. 8 and 9). The Regional Districts indicated that they did not see their role as necessarily providing debt financing for 100% of the Project, but rather that they could finance a portion of the project through debt, with another partner possibly taking an equity portion (T3: 455).

WKP stated that, while it opposed third party ownership, it welcomed the opportunities for third parties such as the Regional Districts or CPC/CBT to participate by providing debt financing. To the extent that the cost of debt was lower than WKP's weighted average cost of debt, WKP's ratepayers would benefit (WKP Final Argument, p. 39).

**The Commission determines that the Project should be financed in the traditional manner of 40% utility equity and 60% debt. The Commission has utilized the funding rates presumed by WKP for estimating ratepayer impacts, but expects WKP to secure the least cost debt funding possible, which may be from local governments or a Crown Corporation.**

### 6.4 Revenue Requirements and Ratepayer Impacts

The Commission has attempted to estimate the rate impact of the Kootenay 230 kV Project, based on the routing selections determined by the Commission in Chapter 4 of this Decision and the substations and interconnection determinations in Chapter 5. The range of costs is relatively large because the level and method of cost sharing is not yet fully agreed to. For example, should Cominco decide that it will not need any transmission capacity in the 230 kV system between Kootenay Canal and Warfield, the ratepayer impact would be a approximately 1.5% (T5: 882 and 883).

WKP's evidence (Exhibit 27D) indicated that if it owned and financed the Brilliant Substation, the six-year cumulative rate impact of the Project was 6.20%. The largest rate impacts were evident in 2002 and 2003 with increases of 3.98% and 2.40% respectively with slight decreases in subsequent years. WKP's evidence indicated that a $5 million increment in capital expenditure would result in a revenue requirement change and rate impact of about 0.42% in the year in which it occurred (Exhibit 55; T3: 575, T5: 873).

**The Commission estimates that the approximate cumulative rate impact over the first six years could range from 5.6% to 6.4%,[4] depending on the outcome of negotiations with parties and final costs for the system upgrade as constructed. The worst case scenario would raise rates by approximately 7.2%.**

### 6.5 Cost Collar Incentive Mechanism

WKP also applied to the Commission for the approval of a 10% "Cost Collar" mechanism to be applied to the amount to be included in the Utility's rate base. The proposed cost collar would be 90 to 110% of the cost estimate to be applied to the deemed WKP cost component of $79,954,000 (Exhibit 27D; WKP

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[4] The high rate impact and the 'worst case' rate impact assume the low capital cost, low sharing for all instances except for the Warfield 63 kV station where the higher WKP share is assumed.

Final Argument, pp. 9 and 10; T5: 813). WKP proposed that if the actual project costs were within the collar, then the project costs would be treated the same as an extraordinary capital project. If the actual project costs were outside the collar, then the rate base at the end of the in-service year would be adjusted to 90 or 110% of the estimate, whichever is applicable.

The cost collar as proposed by WKP is based on several critical cost assumptions related to components of the project (Exhibit 1, Tab 1, p. 4). Those are as follows:

1. The price of aluminum estimates based on the June 1999 LME price;

2. Price of a class one, 65-foot pole of $2,150;

3. The chosen design concepts for substations;

4. Price of a 150 MVA 230/63 kV transformer of $1.8 million;

5. The total length of the chosen rights of way:

   - Brilliant to Warfield - 29 km,
   - Warfield to Waneta – 17 km,
   - Canal to Brilliant - 24 km;

6. Total Cost of access road construction:

   - Brilliant to Warfield – $75,000,
   - Warfield to Waneta - $10,000,
   - Canal to Brilliant - $360,000;

7. Rate for tradesmen - $28.15 per hour; and

8. Environmental Remediation, Land Acquisition and Permitting costs (Exhibit 27A).

WKP proposed that the estimate would be adjusted for changes in the critical cost assumptions and that changes to cost assumptions for aluminum prices, pole prices, price of a 150 MVA 230/63 kV transformer, tradesmen wages and environmental remediation, land acquisition and permitting would result in one to one changes to the estimate. Moreover, WKP proposed that subject to approval by the Commission, design changes to the South Slocan and Warfield substations would result in changes to the estimate. Cost assumptions related to routing would be removed once the preferred route options were approved. Finally, all adjustments would be made prior to July 30, 2000. WKP also proposed that following the in-service date, the quality of service benchmarks used in the WKP PBR mechanism would be adjusted to reflect the improved reliability of the transmission system (Exhibit 27A).

The City of Nelson accepted the method by which WKP developed the cost estimates for the application and supported the 10% cost collar concept. Nelson argued that the concept is consistent with PBR principles (Final Argument, p. 4).

CAC (B.C.) et al. argued that WKP's proposed cost collar did not provide it with much comfort given that it was to be based on a cost to be finalized at a later date (Final Argument, p. 6). During cross-examination, WKP agreed that, as the structure of the incentive mechanism was such that a higher cost estimate offered greater benefits to utility shareholders, it was important that the estimate be a fair estimate. Moreover, WKP agreed that the cost estimate should be based on as small a band of uncertainty as possible (T1: 153 and 154).

#### 6.5.1 Commission Findings

The Commission supports incentive mechanisms both in rate setting and for capital projects. Incentive regulation is a common component of current utility revenue requirements settlements and approval of the BC Gas Utility Ltd., Southern Crossing Pipeline included a cost collar incentive. Consequently, the Commission commends WKP for bringing forward an incentive mechanism proposal.

However, unlike the BC Gas Southern Crossing Pipeline project, the cost of the WKP Project is not the result of competitive options; nor has a detailed review of the base costs and the risks been done.

**Therefore, the Commission does not approve the use of a cost collar for this project, but encourages its development for future projects.**

## 7.0 FUTURE INTEGRATION ISSUES

### 7.1 Emergence of a Regional Transmission Organization

During the hearing WKP stated that, based on its discussions with B.C. Hydro, it sees significant advantages to a RTO and that one could be established within the next five to seven years (T1: 23 and 100). The RTO model being discussed between WKP and B.C. Hydro could include a single provincial transmission organization where transmission assets of B.C. Hydro and WKP would be amalgamated into one province-wide grid on a voluntarily basis. The RTO would provide the single operator of these assets (T1: 24, 103 and 122). With respect to generation dispatch, WKP mentioned that the discussions to date have not dealt with dispatch, but that generation in the area could be dispatched pursuant to the Canal Plant Agreement. WKP did not state which assets in its Project would be included in a RTO because it had not considered the issue fully (T1: 102).

WKP stated that CPC/CBT has not been directly involved in the discussions between WKP and B.C. Hydro, but WKP has had discussions with CPC/CBT representatives (T1: 103). During the hearing, Cominco and CPC/CBT expressed concerns about how a new RTO could impact their operations;

specifically, whether certain of the directions that WKP requested from the Commission to facilitate system integration would impose undue business risks upon them. The concerns of CPC/CBT and Cominco, as they relate to potential system integration, are examined in the next two sections.

### 7.2 Impacts of a RTO on Transmission Pricing and Access

Both Cominco and CPC/CBT expressed reservations about providing access to particular lines, in part because of concerns that the pricing structure to be established could raise their cost of access to their own lines.

In response to WKP's request that Cominco's Line No. 71 be available for the general benefit of WKP's customers, Cominco stated that if it allowed such access to Line No. 71, then it would have to provide open access to all parties under a RTO type of structure (Exhibit 83, p. 7). Regarding usage charges, in Cominco's view, if its line were incorporated in a RTO it could face tariffs that were based on the costs of the entire RTO (T1: 61 and 62). Furthermore, Cominco foresaw future risk that there would be high postage-stamp rates. Cominco's transmission system is short and was built at a time of much lower costs, so that the cost-based fees that Cominco could charge for the use of its system could be much lower than the postage-stamp rates to use its own transmission system, if the latter becomes part of a RTO. For example, Cominco stated that if its surplus sale of 700 GW.h per year were to attract postage-stamp transmission rates of six or seven mills per kWh, (i.e., the range of B.C. Hydro postage-stamp charges), then the cost to Cominco could be $4 to 5 million per year. If such charges were applied to all power transmitted to its industrial load of 1,800 GW.h per year, then the additional cost would be about $10 million (Exhibit 83, p. 8). These concerns led Cominco to reject WKP's request for firm access to Line No. 71.

WKP indicated that there was no evidence in front of the Commission concerning the long-term costs that Cominco would have to incur by having its line open to others (T1: 61). Mr. Saleba, WKP's witness, stated that the range of potential cost increases to Cominco would be a function of how pricing for a RTO would be set up and as far as he was concerned "… it's not a fait accompli that it would be postage stamp…" (T1: 64).

CPC/CBT also noted the commercial disadvantages and price risks it could face in providing open access to their Keenleyside to Selkirk line. CPC/CBT stated that if it was no longer the exclusive user of its transmission line and if a RTO could establish a tariff of six to 10 mills per kilowatt hour, it might receive revenues of one and one-half mills, thereby creating a non-compensated cost (T7: 1287). CPC/CBT also noted it would be a matter of rate structure, which is unknown at this point, in determining whether or not a regulated RTO rate would penalize it (T7: 1290).

With respect to the FERC industry standards of reciprocity, CPC/CBT commented that it would not want to see the FSA revised unless it is done in a manner that would address open access principles and correct provisions that contravene open access. CPC/CBT indicated that if it were to interconnect with WKP, it could be forced to provide open access to WKP or other eligible users in the future.

### 7.3 Participation in an Integrated System : Regulatory Concerns

Both Cominco and CPC raised regulatory concerns as a result of the interconnection requirements requested by WKP. In essence, integration through interconnection with WKP facilities could lead to the imposition of regulation within a RTO structure.

Cominco's concerns were primarily driven by the current uncertainties in the transmission world. In providing access to Line No. 71, Cominco foresaw the risk of becoming part of a RTO and hence subject to regulation. According to Cominco, this could require it to divide generation and transmission activities with attendant costs (Exhibit 83, p. 7). Cominco also argued that to the extent it offered services, such as transmission to others, it would be exposed to losing its provincial exemption from regulation (T7: 1313).

Another vehicle through which Cominco could be made subject to regulation, was possible ownership of transmission facilities in the Kootenay Valley. Cominco indicated that under its proposal it was difficult to say to what extent it might be an owner of a regulated transmission facility, since the facility could be included in the Facilities Sharing Agreement (T7: 1322). However, Cominco remained concerned that, were it to be an owner of a regulated transmission facility, the consequences of a new RTO were not evident (T7: 1322).

WKP responded that these regulatory concerns raised by Cominco, to the extent they exist, should not be the basis upon which the Commission made its decision. The Commission should base its decision on the public interest, not the commercial or strategic interest of Cominco.

CPC/CBT expressed concern over any interconnection of their Keenleyside to Selkirk line with the WKP system. CPC/CBT stated that since it is not presently subject to regulation, it would require assurance that this status would not be impaired before agreeing to be interconnected. CPC/CBT also stated that if suitable conditions on interconnection could not be met, then its Keenleyside to Selkirk line would remain a radial line. If these conditions were met then it could proceed toward interconnection (T7: 1286).

CPC/CBT also outlined its intention to avoid future regulatory risk that it may face under broader transmission regulatory reforms. CPC/CBT stated that it had hoped to enter into new arrangements where it could grandfather certain provisions that would withstand possible challenges arising from changes in the U.S. However, until it received this protection, it felt exposed (T7: 1288).

CPC/CBT related the risk of being regulated to some of the provisions in the FSA. CPC/CBT indicated that it would only agree to the transmission facilities becoming shared facilities, if the discrimination in the treatment of the shared facilities was addressed (Exhibit 10B, p. 4). According to CPC/CBT, this discrimination is related to a restriction in the FSA allowing it to move power to only the perimeter of shared facilities (T7: 1224).

### 7.4 Commission Findings

Today four entities are involved in the generation and transmission of electricity in the area, and they operate with varying degrees of cooperation. There is substantial agreement among the parties that efficiencies would result from integrated planning and operation of an electrical grid.

The Commission recognizes that the transition to a fully integrated system could impose business risks on some of the parties, but finds it premature to address these issues in this proceeding. The Commission continues to believe that an integrated transmission system is in the best interests of ratepayers in British Columbia. It urges the parties to continue to engage in negotiations that are directed at achieving this goal. With the evolution of competitive electricity markets, the Commission believes that planning of transmission system additions is required on an integrated basis and that operation of the system on an integrated basis will become necessary. This Application has demonstrated the current conundrum wherein the most efficient network of facilities in the Kootenays may impinge on the commercial interests of individual transmission owners. It is to be hoped that the parties will negotiate reasonable access and interconnections (at least for reliability reinforcement) based on the determinations in this Decision. If the parties are not able to accommodate their interests in ways which benefit electricity users throughout the region, the Commission believes that a RTO-type organization will be required as soon as possible. When this comes about issues of access and rate structure will be addressed.

Dated at the City of Vancouver, in the Province of British Columbia, this 5th day of June 2000.

*Original signed by:*
Peter Ostergaard
Chair

*Original signed by:*
Paul G. Bradley
Commissioner

*Original signed by:*
Barbara L. Clemenhagen
Commissioner

*Original signed by:*
Kenneth L. Hall, P. Eng.
Commissioner

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER C-10-00

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by West Kootenay Power Ltd.
for a Certificate of Public Convenience and Necessity
for its Kootenay 230 kV System Development

**BEFORE:** P. Ostergaard, Chair )
K.L. Hall, Commissioner ) June 5, 2000
P.G. Bradley, Commissioner )
B.L. Clemenhagen, Commissioner )

## CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

**WHEREAS:**

A. On November 12, 1999, West Kootenay Power Ltd. ("WKP") applied to the Commission for a Certificate of Public Convenience and Necessity ("CPCN") for its Kootenay 230 kV System Development Project ("the Kootenay 230 kV Project", "the Application") pursuant to Section 45(1) of the Utilities Commission Act; and

B. The Application was preceded by the filing of a 20 Year Transmission and Distribution Master Plan; and

C. By Order No. G-125-99 dated December 2, 1999, the Commission established a Regulatory Agenda and Timetable to review the Application; and

D. A public hearing in Castlegar and Brilliant, B.C. was conducted from February 21 to February 24, 2000, and from March 13 to March 16, 2000.

**NOW THEREFORE** the Commission orders as follows:

1. Pursuant to Section 45 of the Act, a CPCN is granted to WKP for the following components of the Kootenay 230 kV Project:

   (a) The modification and upgrade of the South Slocan substation to upgrade circuit breakers and terminate a 63 kV transmission line from British Columbia Hydro and Power Authority's Kootenay Canal substation;

   (b) The installation of a remedial action scheme for generation shedding at the South Slocan generating station;

   (c) The construction of a 63 kV line from the South Slocan substation to the Kootenay Canal substation;

   (d) The modification of B.C. Hydro's Kootenay Canal substation for the addition of another 63 kV transmission connection and a 63/230 kV transformer and 230 kV line termination;

…/2

(e) The construction of a 230 kV transmission line from the Kootenay Canal substation to a new Brilliant substation following the "East High Elevation route";

(f) The construction of a 63/230 kV substation near the Brilliant generating station or, under certain conditions, an agreement to participate with Columbia Power Corporation/CBT Power Corporation in a Brilliant substation;

(g) The construction of a new 230 kV transmission line from the Brilliant substation, built generally along the present corridor to a redeveloped substation at Warfield;

(h) The reconstruction of the Warfield and Tadanac substations to terminate the 230 kV transmission line and provide transformation to 63 kV, and to correct present equipment deficiencies conditional upon Cominco and WKP coming to an agreement upon appropriate changes to the Facilities Sharing Agreement and cost sharing arrangements; and

(i) Other remedial action schemes, transformers and communication equipment as identified in the Commission's Decision, dated June 5, 2000, which accompanies this Order.

2. WKP is to comply with the determinations and directions of the Commission in the Decision.

3. WKP is to resubmit for final approval all agreements and final cost estimates of the approved facilities.

**DATED** at the City of Vancouver, in the Province of British Columbia, this 5th day of June 2000.

BY ORDER

*Original signed by:*

Peter Ostergaard
Chair

IN THE MATTER OF

# West Kootenay Power Ltd.

## CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

## Kootenay 230 kV System Development Project

## EXECUTIVE SUMMARY OF DECISION

**June 5, 2000**

**Before:**

**Peter Ostergaard, Chair**
**Kenneth L. Hall, P.Eng., Commissioner**
**Paul G. Bradley, Commissioner**
**Barbara L. Clemenhagen, Commissioner**

## EXECUTIVE SUMMARY

West Kootenay Power Ltd. is an investor-owned electric utility providing wholesale and retail service in the west Kootenay and south Okanagan regions of British Columbia. It is a public utility regulated by the British Columbia Utilities Commission in accordance with the Utilities Commission Act. Annual peak loads on the WKP system are in the order of 600 to 650 MW. The Utility owns four small hydroelectric plants on the Kootenay River with a combined rated capacity of 214 MW. Remaining needs are met through power purchase contracts.

The WKP transmission system in the Kootenay and Columbia valleys consists of a series of 63 kV lines mounted on wooden poles. Much of the system was built in the 1930's and has deteriorated to the point where safety, reliability and quality of service are compromised. Also, the system is somewhat isolated from 230 kV systems developed more recently in the area. This isolation can cause outages and related difficulties. In April 1999, following a series of studies, WKP filed with the Commission a 20-year Transmission and Distribution Master Plan. In November 1999, WKP applied to the Commission for a Certificate of Public Convenience and Necessity to develop a fully-integrated, 230 kV system to upgrade its transmission and substation system in the Kootenay region.

The generation and transmission infrastructure in the Kootenay/Lower Columbia region is unusually complex. Four companies own electrical generation and transmission facilities in the area. Generation totals 2,100 MW and is likely to increase to 2,500 MW or more in the near future. In contrast, the maximum Kootenay area load is only 450 MW, comprised of WKP's customer load of 200 MW and Cominco's 250 MW industrial load. Cominco has its own aging generation and transmission system, which it views as a strategic asset to ensure its regional economic viability. In the 1960's and 1970's, B.C. Hydro superimposed a new 230 and 500 kV system to connect its large generation plants with loads outside the region, and to meet Columbia River Treaty obligations. More recently, the Columbia Basin Trust was established with a mandate to invest in and develop power projects, using some of the Province's proceeds from the sale of the Columbia River downstream benefits. In 1996, a joint venture of the Columbia Power Corporation and the CBT Power Corporation ("CPC/CBT") purchased from Cominco the Brilliant Dam and Powerhouse and expansion rights to Cominco's Waneta plant.

WKP's Application for a 230 kV system development describes proposed new transmission lines, and new or rehabilitated substations and switchyards, that WKP states it needs to upgrade and expand its transmission system in the Kootenay region. It includes proposed additional connections to adjoining 230 kV systems for additional reliability and system security. There has been a long history of mutual support and co-operation between WKP and Cominco in the joint use of facilities. The WKP proposal depends upon agreements with Cominco at the Warfield and Waneta facilities, with CPC/CBT at Brilliant and with B.C. Hydro for connections at the Kootenay Canal plant and at the Nelway substation.

There are a number of agreements among the four owners of generation and transmission facilities in the Kootenay region. All parties were involved in the preliminary studies and negotiations were undertaken to seek amendments to agreements where necessary to accommodate the WKP system development proposal. In its Application, WKP stated that it expected to have all the agreements in place prior to the opening of the public hearing; however, the negotiations were not completed successfully. As a result, WKP requested that the Commission issue directions to the other parties to meet WKP's requirements. This, as explained in the Reasons for Decision, the Commission declined to do. In its Decision the Commission directed WKP to resume negotiations and urged all parties to work together to find solutions for their mutual benefit.

By Order No. G-125-99, the Commission established the Regulatory Agenda and Timetable to review the Application. A public workshop and pre-hearing conference was held in Castlegar on January 14, 2000. A public hearing was held in Castlegar and Brilliant from February 21 to 24, and from March 13 to 16, 2000. Evening sessions were held on February 22 and 23 and on March 13 to ensure that concerned residents could participate in the hearing. The Application, as amended, requested approval of option K3 of the Feasibility Study Report.

The Application requested approval for construction of the following facilities:

- South Slocan switchyard modifications and an additional 63 kV tie to the B.C. Hydro Kootenay Canal plant, and Kootenay Canal substation modifications
- Kootenay Canal to Brilliant 230 kV line via the East High Elevation route
- New Brilliant substation
- Brilliant to Warfield 230 kV line via existing river line route
- Warfield substation replacement
- Warfield to Waneta 230 kV line along existing route
- Waneta switchyard expansion
- Connection from Cominco's 230 kV Line No. 71 to B.C. Hydro's Nelway substation
- Breakers and improved protection at WKP generation stations
- Communications system

The transmission assets in the region are identified on Figure 1, attached.

Participants in the hearing generally agreed that WKP's transmission assets in the Kootenay region were reaching the end of their physical life and that a major refurbishment was required. However, several participant groups opposed specific routings or the sizing and ownership of specific assets.

Residents of Glade and nearby settlements expressed their opposition to routing the transmission line between South Slocan and Brilliant nearby their communities. This group supported a new route east of the present B.C. Hydro right-of-way, and WKP adopted this "East High Elevation" route as its preferred option during the hearing.

Atco Lumber Ltd. and others concerned about forest, wildlife and wilderness values, opposed the routing of new transmission corridors through forest and unroaded lands.

CPC/CBT expressed numerous concerns about the Project, primarily with respect to the ownership, cost sharing and implications for regulation of the proposed new Brilliant substation. CPC/CBT was also concerned that the proposed new transmission line between Warfield and Waneta could jeopardize their rights in future to the use of Cominco's Line No. 71.

Cominco's concerns related to maintaining the viability of its operations at Trail and minimizing its transmission and substation costs, along with maintaining low cost access to export its surplus power to the United States. If Cominco is able to renegotiate the delivery point of its power under the Canal Plant Agreement, it would not require capacity on the proposed Kootenay Canal to Warfield 230 kV line. Cominco proposed a more modest 230 kV upgrading and opposed WKP's planned expansions at Warfield along with the proposed cost sharing. Cominco also opposed the construction of the new 230 kV line from Warfield to Waneta and any proposed changes to the Waneta switchyard or firm access by WKP to Cominco's Line No. 71.

B.C. Hydro asked that the new WKP facilities not be energized until Line No. 71 was connected to the Nelway substation, to avoid worsening loop flows on its system. B.C. Hydro also took the position that any discussion of a modified rate under its Wholesale Transmission Service should not be determined in this Decision.

The Regional Districts of Kootenay Boundary and Central Kootenay supported the construction of a transmission link between Keenleyside and Warfield so as to allow removal of most of the eight transmission lines in the corridor between Brilliant and Trail.

WKP applied for approval of Rate Schedule 110 – Long-Term Alternate Path Transmission Service ("APTS"). WKP indicated that if it were unable to reach an agreement for facilities sharing with any of the third parties, the third parties would take service under the APTS. Cominco stated that the APTS tariff was not required at this time and that it would not take service under that tariff. The Commission has determined that approval of the APTS tariff is premature, since agreement on cost sharing with Cominco is still likely.

In this Decision, the Commission has determined that a major rebuilding of the Kootenay transmission system is required to maintain reliable and safe electricity service to ratepayers. The cost of these upgrades is substantial, but the Commission finds that reliable, safe, high quality service to customers cannot be provided without them. The Commission's determinations with respect to the major segments of the new transmission line and the substations are as follows:

## 1.0 Transmission Lines

### 1.1 South Slocan to Brilliant

Construction of a 230 kV transmission line is required between South Slocan and Brilliant along the East High Elevation route, subject to filing of final line alignment, right-of-way acquisition plans and updated cost estimates. WKP is to pursue mitigation measures such as consolidating its routing with that of the CPC/CBT line, the use of large spans to reduce clearing and coordination of the timing and sequencing of logging.

### 1.2 Brilliant to Warfield

Construction of a 230 kV transmission line is required between Brilliant and Warfield along the general routing of the existing lines (K3), subject to the filing of final line alignment, right-of-way acquisition plans and updated cost estimate. The K3 routing not only has the lowest cost for all ratepayers but also the proposed line, with diversions around most populated areas, will greatly reduce the impact on the public compared to the existing lines. This route also minimizes the impact on wildlife and forest resources.

### 1.3 Warfield to Waneta

The Application to build a 230 kV transmission line from Warfield to Waneta is denied, at this time. WKP has historically been able to obtain access to Line No. 71 by agreement with Cominco. Cominco and WKP have acted pragmatically and cooperatively in the past and the Commission encourages them to assist each other. If the transmission owners in the Kootenays cannot cooperate then a Regional Transmission Organization will be required, as soon as possible.

## 2.0 Substations and Interconnections

### 2.1 South Slocan to Kootenay Canal Plant

Construction of a second 63 kV intertie with the Kootenay Canal Plant and a second transformer at the Kootenay Canal Plant is required, subject to the filing of an updated cost estimate. The Commission also finds that the rebuild of the South Slocan switchyard and the Breaker Upgrades at the Kootenay River generating plants and at Rosemont substation are required.

### 2.2 Connection at Brilliant

The need to deliver power generated at Brilliant to the WKP system and the construction of a 230 kV transmission line to Warfield will require a substation at Brilliant. There appear to be considerable advantages to the construction of one common substation, and benefits to all parties from interconnection of the WKP and CPC/CBT systems. To date, WKP has not been able to negotiate an agreement for the connection, and for sharing the costs of the connection.

The Commission considers that at this time it does not have authority to direct CPC/CBT to connect its Keenleyside to Selkirk line to the WKP system at the Brilliant substation or at Keenleyside, even though interconnection could be beneficial to both parties. Without integration WKP ratepayers may face higher utility rates. In the absence of an agreement with CPC/CBT, which benefits WKP ratepayers, it seems appropriate for WKP to construct and own the substation. As the substation will be a critical part of the Kootenay transmission system, the public interest is likely to require Commission oversight of the facility.

The Commission directs WKP to resume negotiations with CPC/CBT to determine the design and the ownership arrangements of a larger Brilliant substation to accommodate the needs of both parties at a reasonable cost to WKP ratepayers. If a negotiated settlement cannot be reached by September 15, 2000, the Commission authorizes WKP to construct and own a substation at Brilliant that is designed to meet the requirements of WKP and its ratepayers.

### 2.3 Warfield Substation

The proposed Warfield substation is an integral part of the WKP transmission system. Interconnection of the WKP and Cominco systems at the Warfield substation is essential so that the systems can be operated together, as required by the Cominco Exemption Order. Construction of a new 230 kV and 63 kV substation at Warfield is required. WKP is directed to resume negotiations with Cominco on the design, construction and cost sharing of a new substation at Warfield. The Commission declines to issue specific

directions to Cominco, since the Commission believes that Cominco and WKP will be able to design and cost-share the mutually dependent facilities.

### 2.4 Waneta Substation

The Commission declines to approve construction of the requested works at Waneta, and declines to make directions to Cominco regarding the requested works. However, the Commission recognizes that with its denial of the 230 kV line from Warfield to Waneta a system constraint is again an issue. WKP needs to find an alternative solution: a preferred solution would include interconnection with CPC/CBT's Keenleyside to Selkirk line.

### 2.5 Connection of Line No. 71 to Nelway

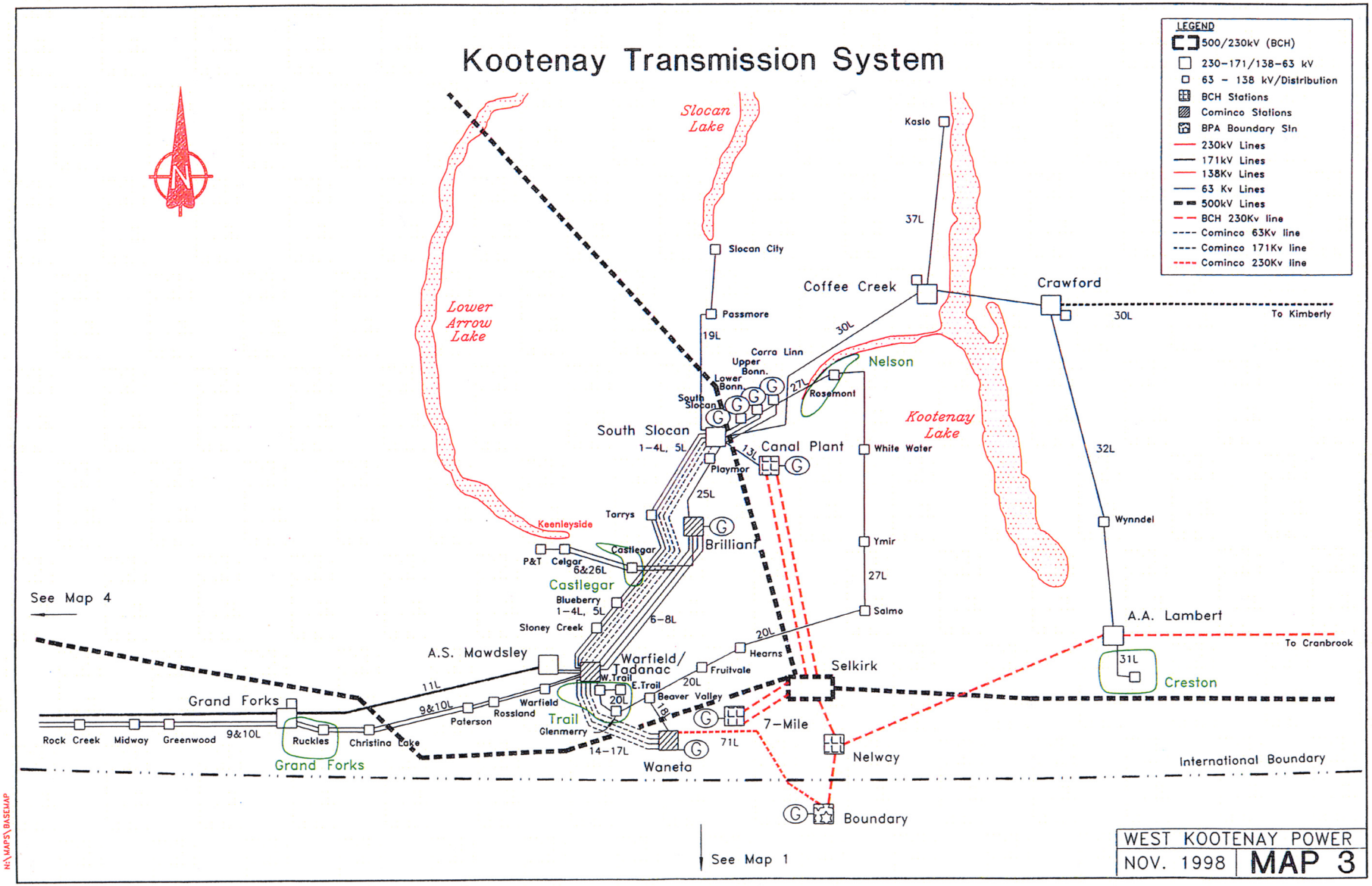
The Commission accepts that connection of Line No. 71 to Nelway is necessary and in the public interest. Due to the lack of direct WKP involvement in the intertie facilities, it is not appropriate to include such facilities in a CPCN to WKP. Moreover, the Commission believes that the connection between Line No. 71 and Nelway will proceed under the guidance of B.C. Hydro and Cominco without the need for Commission intervention.

## 3.0 Capital Costs and Impact on Rates

The capital cost estimates of the Project varied significantly during the course of the hearing and the potential for cost sharing with other parties was not resolved. The Commission estimates that the capital costs of the facilities approved in this Decision are likely to range between $93 and $100 million with WKP's share of the capital costs likely to be between $73 and $80 million. The Commission determines that the Project should be financed with traditional utility equity and debt financing. In keeping with the debate during the hearing on alternative financing methods, the Commission expects WKP to secure the least cost debt funding possible, which may be from local governments or a Crown Corporation.

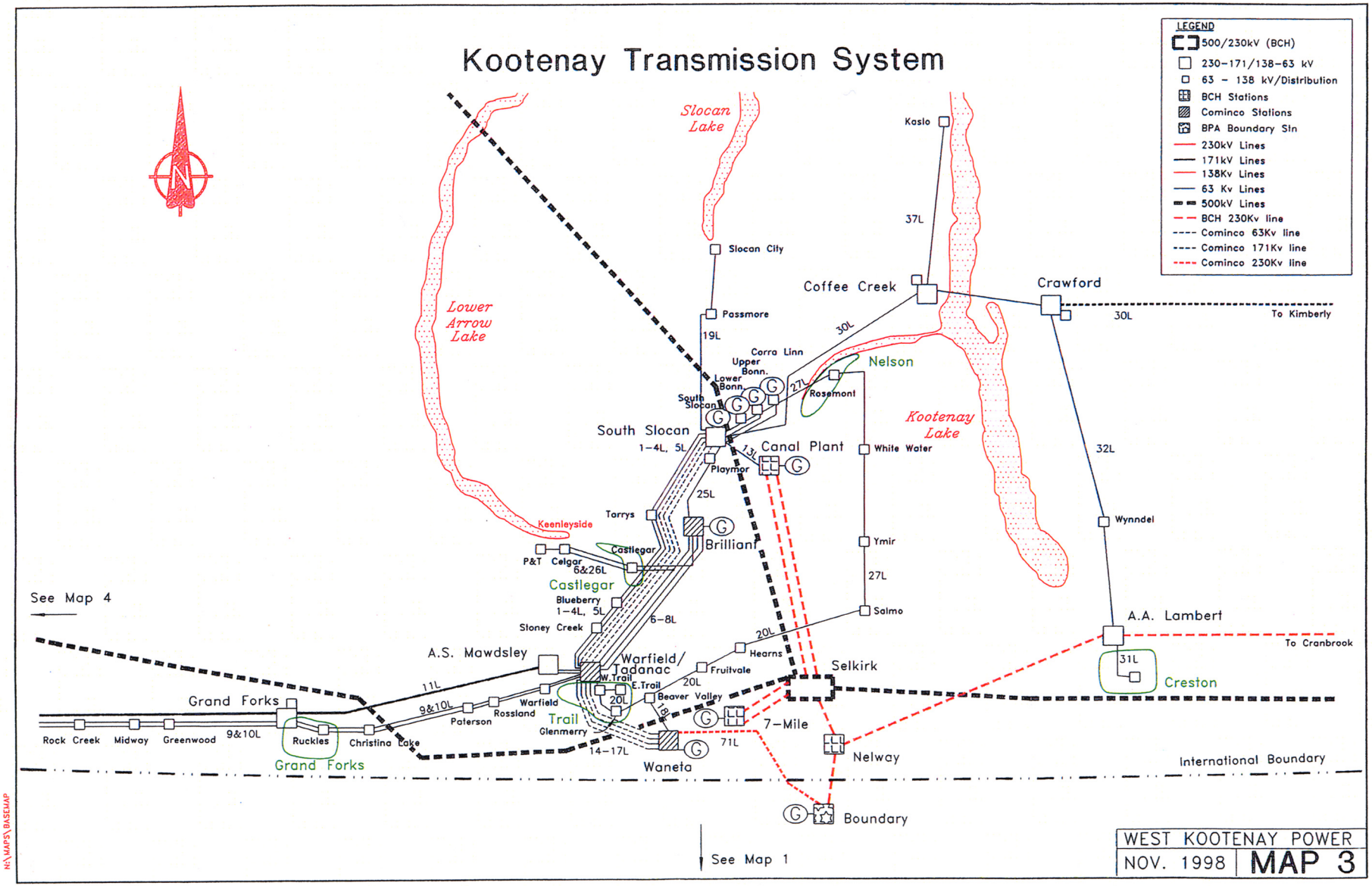
Over the next six years, the cumulative impact on customer rates is expected to range between 5.6% and 6.4%. The revenue requirement impact will be influenced by sharing arrangements with CPC/CBT and Cominco.

Figure 1



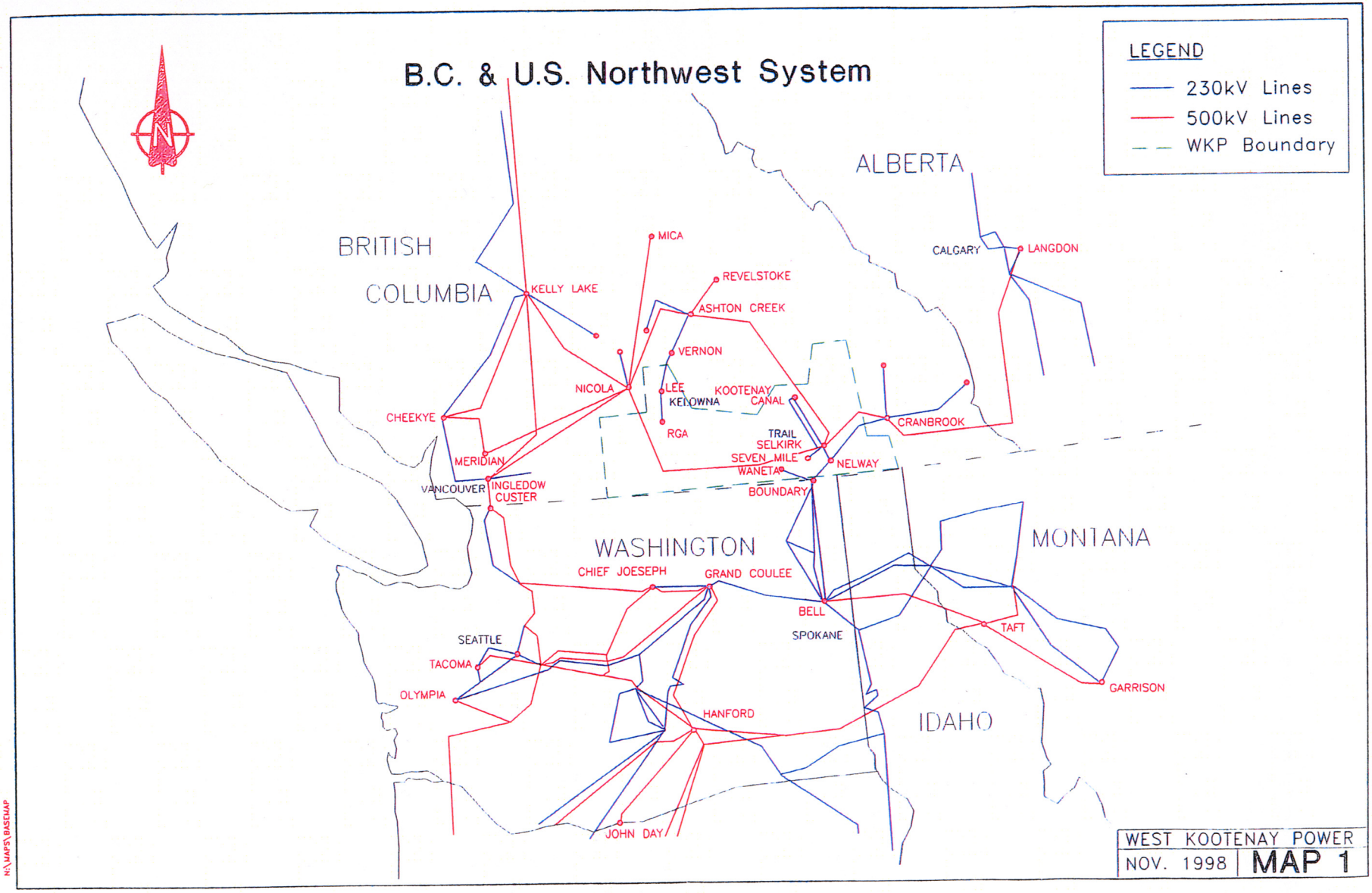

Source: WKP Feasibility Study Report (Exhibit 1, Appendix D, Map 3)

Figure 1



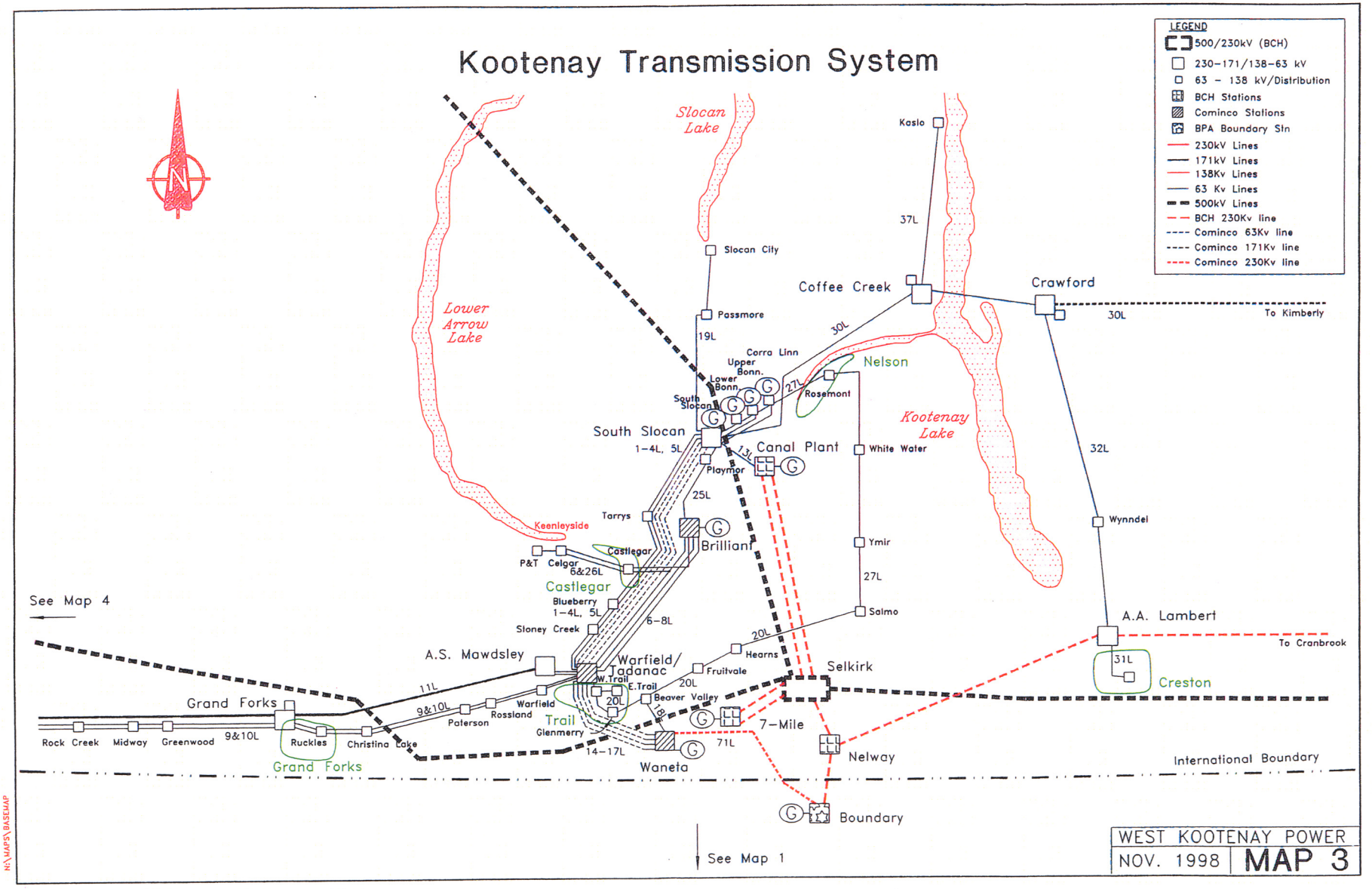

Source: WKP Feasibility Study Report (Exhibit 1, Appendix D, Map 3)

Figure 1.1



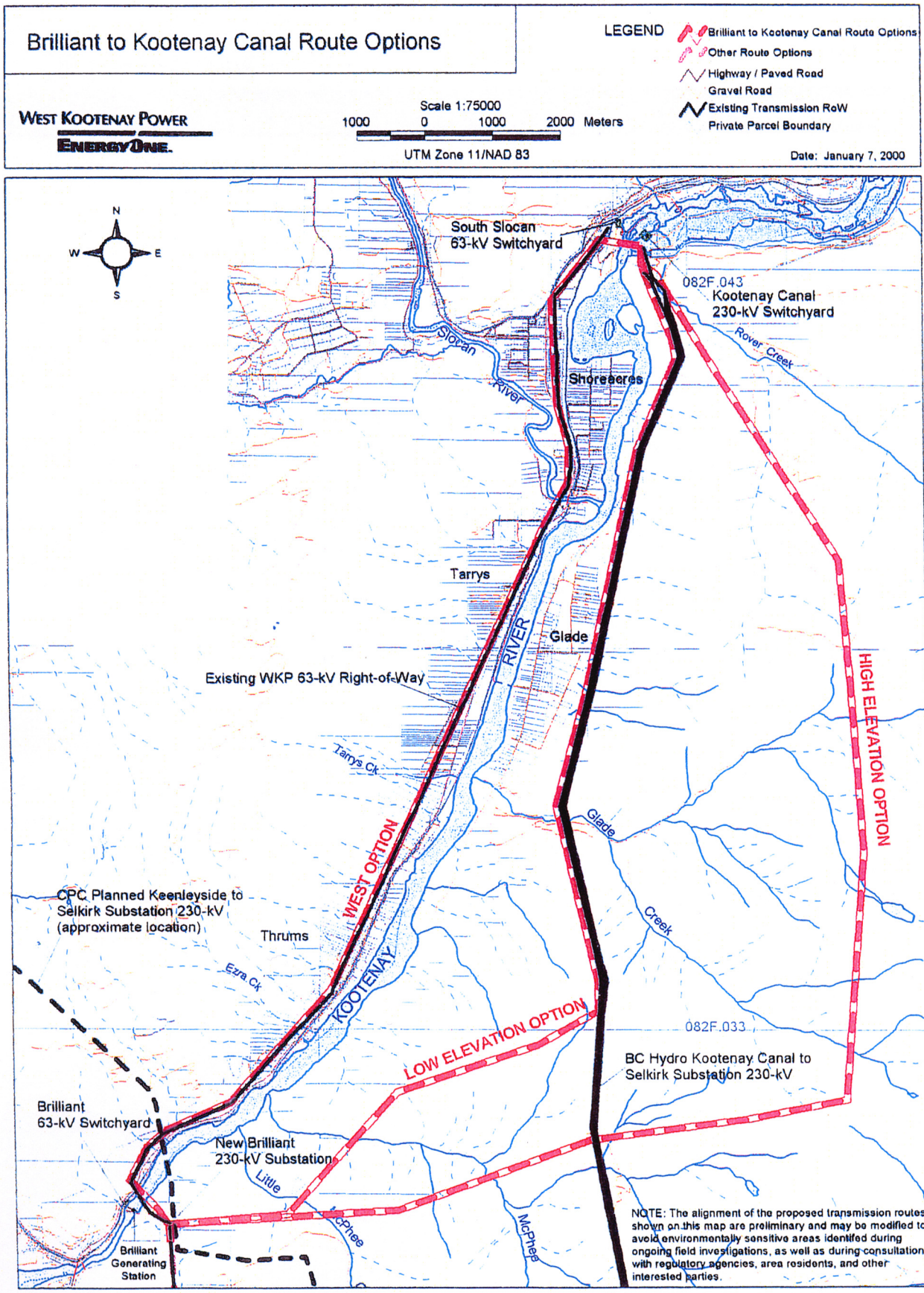

Source: WKP Feasibility Study Report (Exhibit 1, Appendix D, Map 1)

Figure 1.2



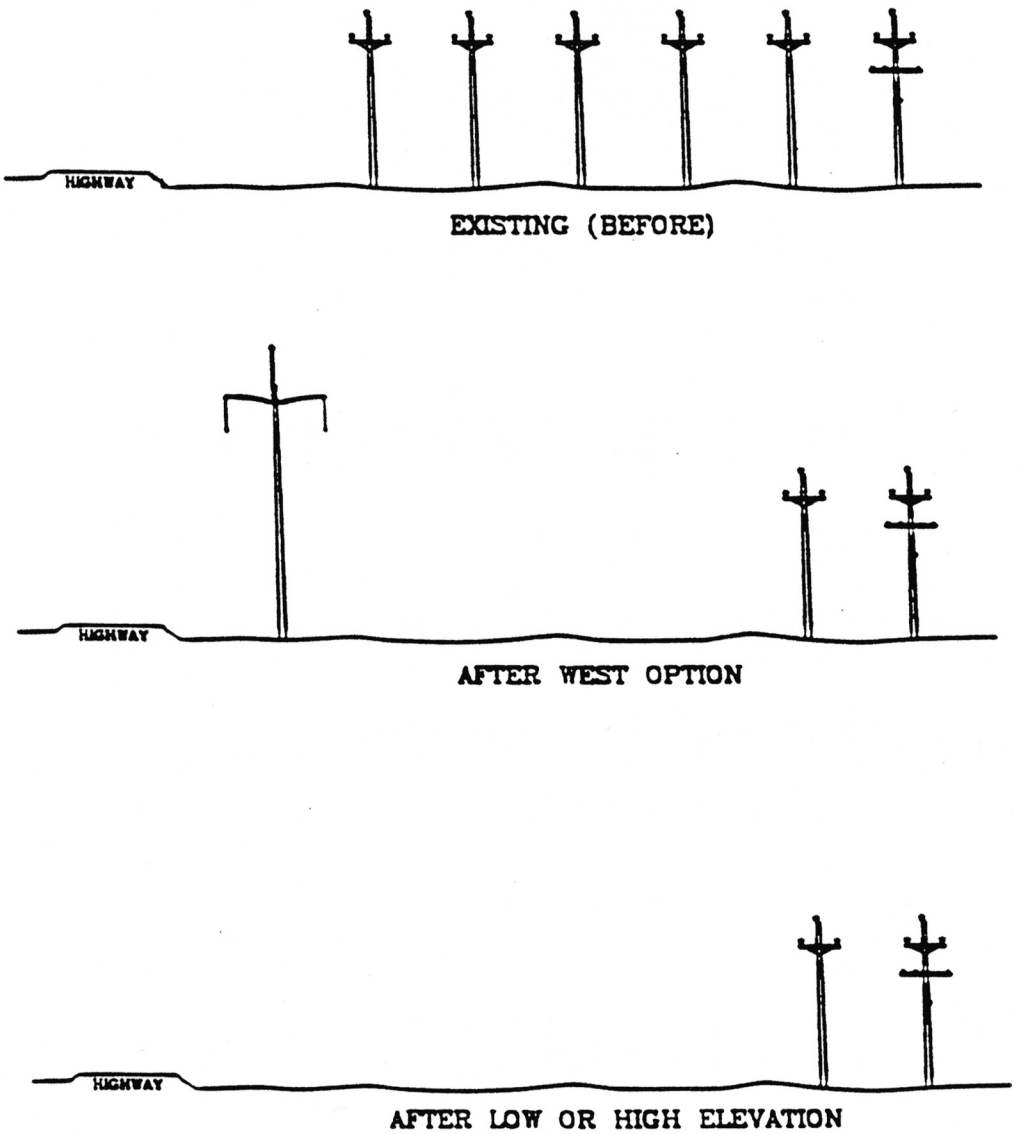

Source: WKP Feasibility Study Report (Exhibit 1, Appendix D, Map 3)

Figure 4.1



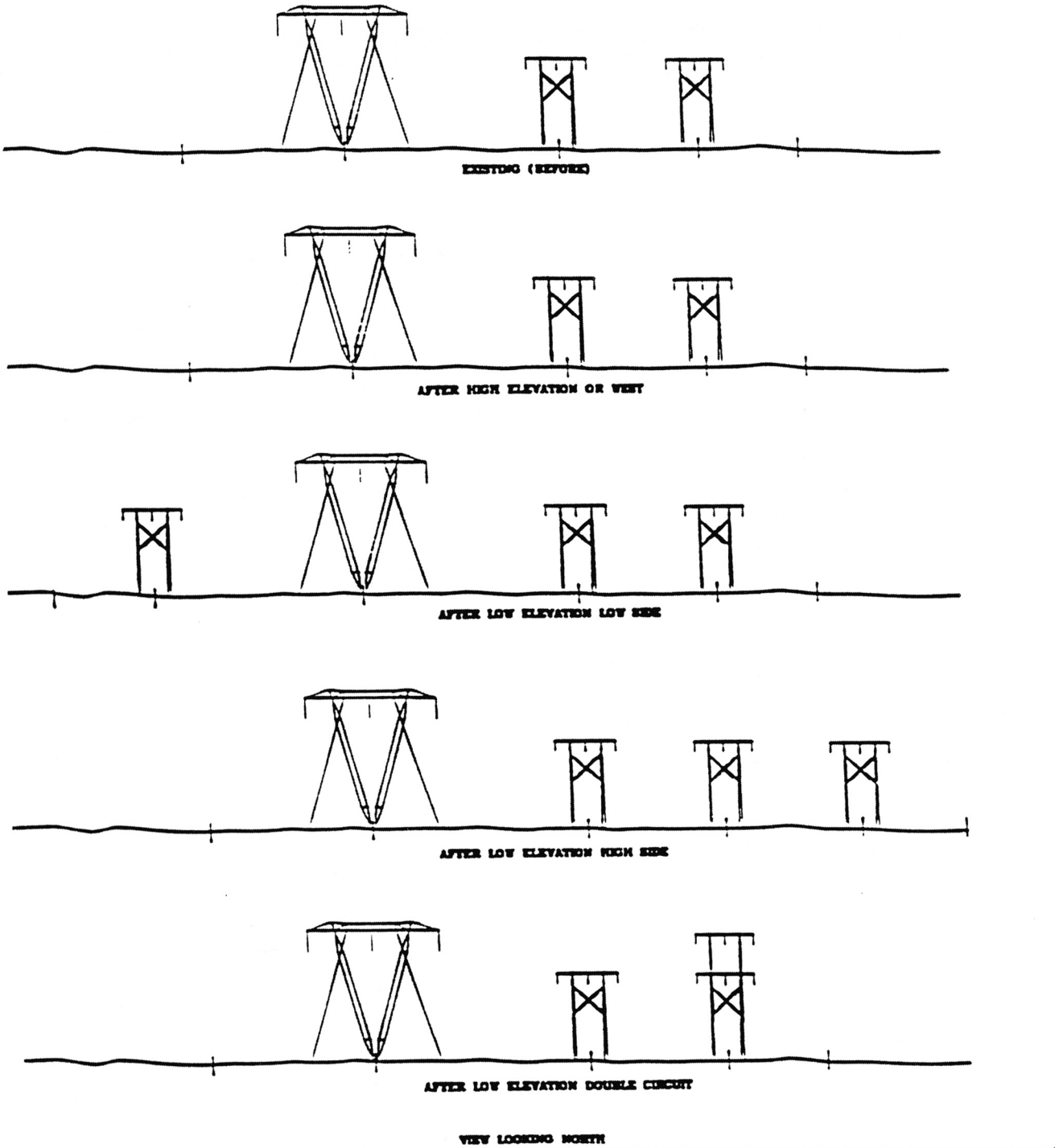

Source: Exhibit 3, Tab 2, Attachment 1 (materials originally filed by WKP)

Figure 4.2



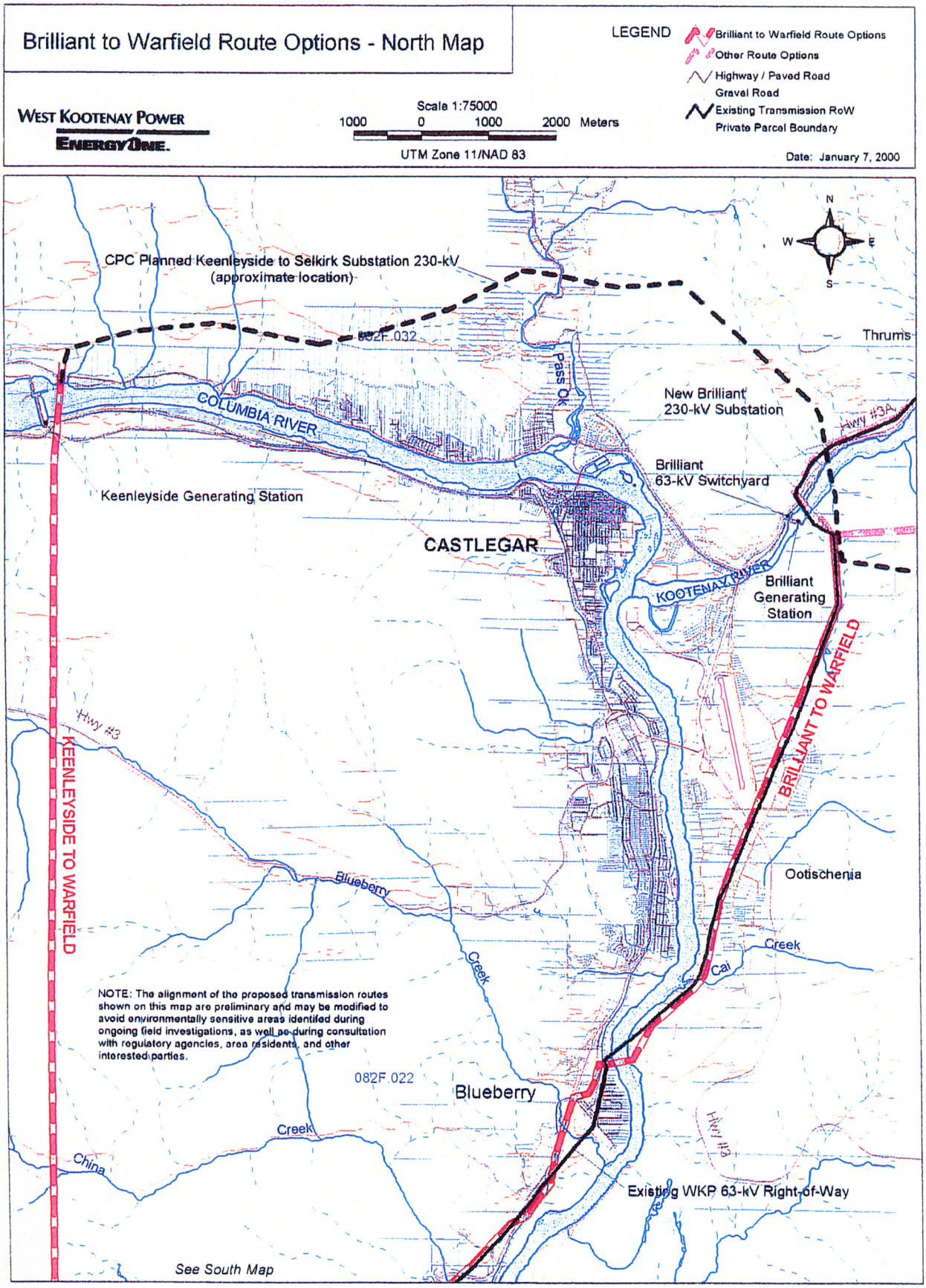

Source: Exhibit 65, p. 14, BCUC 6 (edited) (materials originally filed by WKP)

Figure 4.3



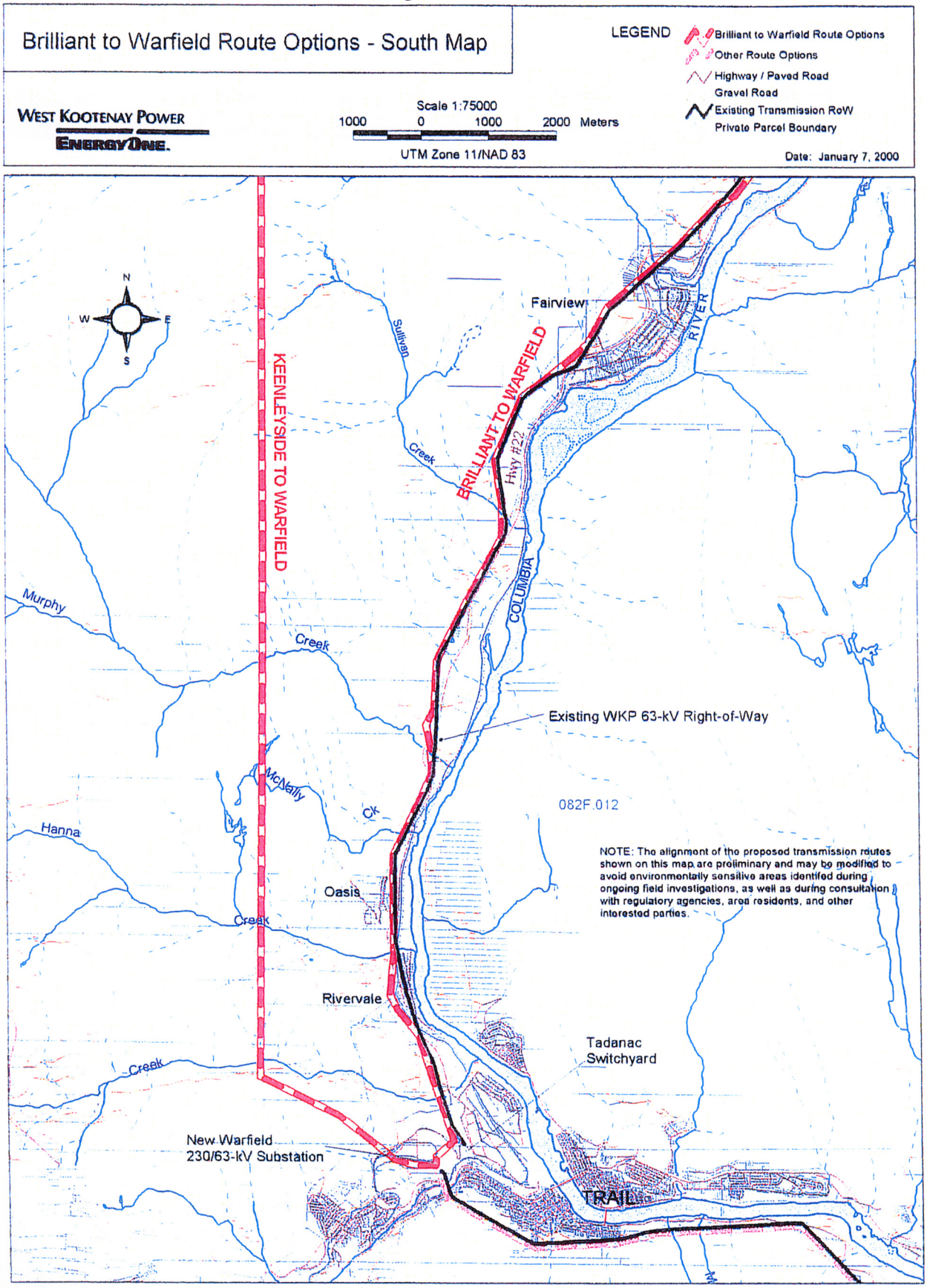

Source: Exhibit 65, p. 15, BCUC 7 (materials originally filed by WKP)

Figure 4.4



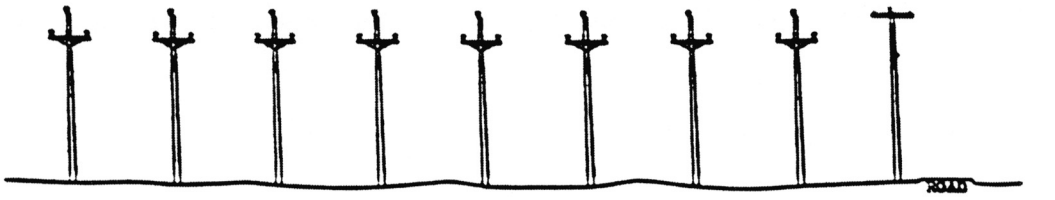

Source: Exhibit 3, Tab 2, Attachment 1 (materials originally filed by WKP)

Figure 4.5

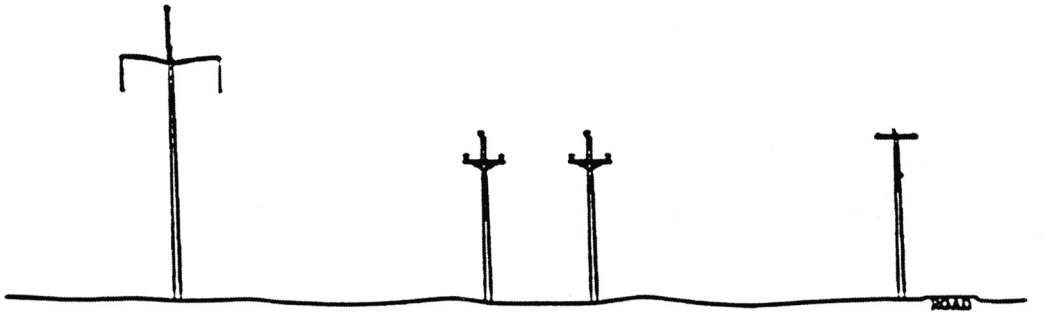



Source: Exhibit 3, Tab 2, Attachment 1 (materials originally filed by WKP)

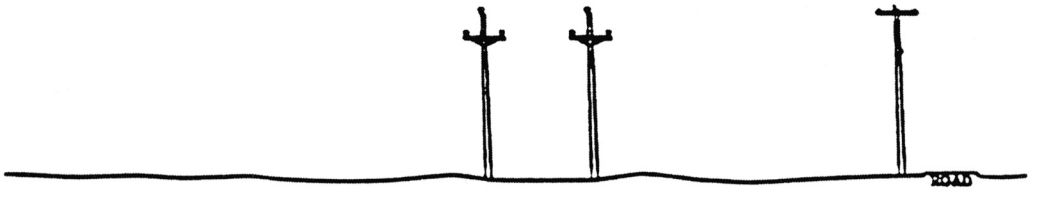
Figure 4.6




EXISTING (BEFORE)




AFTER BRILLIANT – WARFIELD




AFTER KEENLEYSIDE – WARFIELD
OR CROSSOVER

VIEW LOOKING SOUTH

REVISIONS

| No. | BY | DATE | DESCRIPTION | APP |
|---|---|---|---|---|
| 1 | JMD | 100/03/06 | NEW DRAWING | |

SKETCH OF ARRANGEMENTS
BEFORE AND AFTER
(SOUTH OOTISCHENIA BY D-BAR-D)

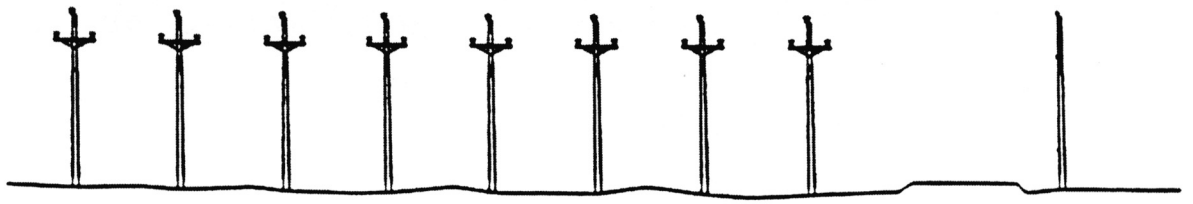
SCALE 1: 400

Detmold Consulting Ltd.

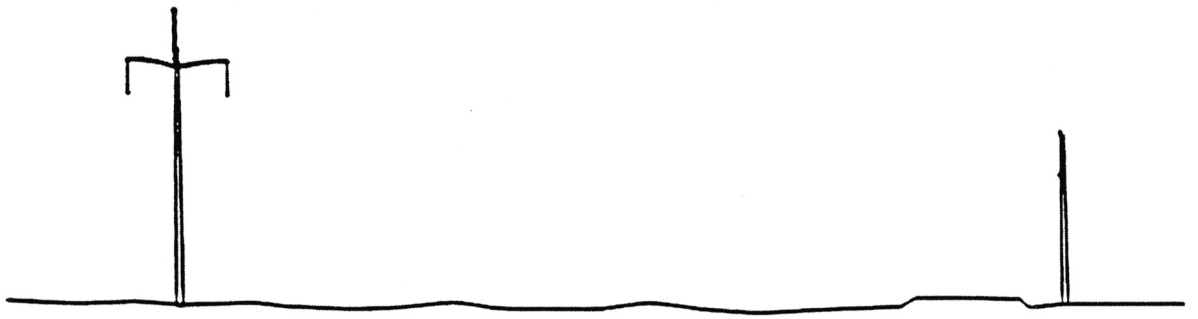
| DRAWING No. | REV. |
|---|---|
| BCUC2 | 0 |

Source: Exhibit 65, p. 16, BCUC 2 (materials originally filed by WKP)

Figure 4.7



EXISTING (BEFORE)



AFTER BRILLIANT TO WARFIELD

AFTER KEENLEYSIDE TO WARFIELD
OR CROSSOVER

VIEW LOOKING NORTH

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| No. | BY | DATE | DESCRIPTION | APP | |
| 1 | JMD | 100/03/07 | NEW DRAWING | | |

SKETCH OF ARRANGEMENTS
BEFORE AND AFTER
(BLUEBERRY TO STONEY CREEK)

SCALE 1: 400

Detmold Consulting Ltd.

| DRAWING No. | REV. |
|---|---|
| BCUC4 | 0 |

Source: Exhibit 65, p. 16, BCUC 4 (materials originally filed by WKP)

# *News Release*

June 5, 2000

**BCUC RELEASES DECISION ON KOOTENAY TRANSMISSION FACILITIES**

**Vancouver** — The B.C. Utilities Commission has released its Decision on West Kootenay Power's application to rebuild its transmission system in the Columbia and Kootenay valleys.

In the Decision, the Commission approved a new 230 kV transmission line between Kootenay Canal and Brilliant along a high elevation route east of the Kootenay River. It also approved a new 230 kV line between Brilliant and Trail along the existing corridor, with diversions around most populated areas. The Commission denied West Kootenay Power's application to build a new transmission line between Trail and Waneta. As a result of this Decision, most of the old wood pole "river lines" will be removed from the valley north of Trail.

The Commission also approved new or upgraded substations at South Slocan, Brilliant and Warfield, but denied the proposed expansion of the Waneta substation.

The Commission directed West Kootenay to resume negotiations with Columbia Power and Cominco on cost sharing and interconnections for the new substations at Brilliant and Warfield. Depending on the negotiations, West Kootenay Power's share of the cost of the approved facilities is expected to be between $73 and $81 million. Total costs are in the $92 to $100 million range. The overall rate increase to customers is expected to be approximately 6%.

The decision follows a public hearing in Castlegar and Brillant in late February and March.

For Further Information: Mr. Bill Grant
Executive Director
Telephone: 660-4728

For a copy of the Executive Summary or the Decision: Mr. Robert J. Pellatt
Commission Secretary
Telephone: 660-4727

BC Toll Free: 1-800-663-1385