



**IN THE MATTER OF**

**FORTISBC INC.**

**AND**

**AN APPLICATION FOR A  
CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY  
FOR THE OKANAGAN TRANSMISSION REINFORCEMENT PROJECT**

**DECISION**

**October 2, 2008**

**Before:**

**A.W. Keith Anderson, Panel Chair and Commissioner  
Nadine F. Nicholls, Commissioner  
Michael R. Harle, Commissioner**



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## **1.0 BACKGROUND AND REGULATORY PROCESS**

On December 14, 2007 FortisBC Inc. (“FortisBC” or the “Company”) filed an application (“Application”) with the British Columbia Utilities Commission (“Commission” or “BCUC”) for an Order issuing a Certificate of Public Convenience and Necessity (“CPCN”) for its proposed Okanagan Transmission Reinforcement project (“OTR Project”) to upgrade the capacity of the transmission system and related infrastructure in the Kelowna to Oliver corridor.

### **1.1 The Applicant**

FortisBC is an investor-owned, integrated utility engaged in the business of generation, transmission, distribution and sale of electricity in the Southern Interior region of British Columbia. The Company serves approximately 152,000 customers directly and indirectly, and employs approximately 570 people. It was incorporated in 1897, and is regulated by the BCUC under the *Utilities Commission Act* (“UCA” or “Act”) of British Columbia.

### **1.2 The Application**

FortisBC Inc. applied to the BCUC, pursuant to Sections 45 and 46 of the *UCA*, for a CPCN for its OTR Project. In its 2007-2008 Capital Expenditure Plan (“2007/08 Capital Plan”), the Company proposed a CPCN process for the OTR Project. The Company has filed this Application pursuant to Commission Order G-147-06 approving the 2007/08 Capital Plan.

### **1.3 OTR Project Description**

FortisBC states that the OTR Project proposed by the Company “will result in the completion of a 230 kV transmission backbone in the Okanagan region by replacing the existing 161 kV transmission 40 Line between Vaseux Lake and Oliver and 76 Line between Vaseux Lake and Penticton with 230 kV lines, and adding a second 230 kV line, 75 Line, between Vaseux Lake and Penticton. The OTR Project includes modifications to the Oliver, Vaseux Lake, RG Anderson, FA Lee and DG Bell

Terminal stations, as well as the construction of the new Bentley Terminal station in Oliver.”

(Exhibit B-1-1, Executive Summary, p.2) The OTR Project is described in more detail in Section 3.

The primary limitations of the existing Kelowna-Oliver system network which are driving the need for this project are stated by FortisBC to be:

1. Capacity limitations at the British Columbia Transmission Corporation (“BCTC”) Vernon Terminal to supply FortisBC areas during peak load periods;
2. South-to-North (Vaseux Lake-Penticton-Kelowna) transmission capacity limitations and bottleneck at Penticton due to overloading of RG Anderson Transformer 1 and Transformer 2;
3. Capacity limitations of the 161 kV, Vaseux Lake - RG Anderson Transmission 76 Line; and
4. Unavailability of Reactive Compensation facilities in the Okanagan System Network. (Exhibit B-1-1, Executive Summary, p. 1)

#### **1.4 Regulatory Background and Process**

In 2005 the South Okanagan Reinforcement Project (“SOK Project”) was approved to improve the power supply to the Okanagan region. It was approved on the basis that there would be a net provincial benefit and it was the first of a two stage development identified in the Okanagan System Impact Studies (FortisBC–October 2002) filed to support the SOK Project. The second stage of development is the OTR Project, the subject of this Application. The OTR Project is also referenced in the BCTC 2006 South Interior Bulk System Development Plan. Its components were outlined in FortisBC’s 2005-2024 System Development Plan and its 2007/08 Capital Plan.

After receipt of the Application from FortisBC, the Commission established a Procedural Conference and Regulatory Timetable by Order G-160-07. A letter from the Commission on January 9, 2008 to FortisBC and Registered Intervenors explained that a list of preliminary issues to be discussed at the Procedural Conference would be issued, and invited Intervenors to provide



additional matters for consideration at the Conference. No additional matters were provided by these parties prior to the Conference. The Preliminary Issues List was provided to FortisBC and Registered Intervenors on February 21, 2008, again providing the opportunity to raise additional issues in writing by February 25, 2008 or at the Procedural Conference.

The Procedural Conference was held on February 27, 2008. Intervenors were provided the opportunity to comment on FortisBC's reliance on previous BCUC decisions. The Commission Panel notes that no submissions were made during the Procedural Conference to revisit the previous decisions.

The Commission issued a series of Information Requests to FortisBC on January 22, March 27, and April 24, 2008. Several Intervenors issued Information Requests to FortisBC. The Commission also issued Information Requests to various Intervenors on May 29, 2008.

An Issues List and updated Regulatory Timetable were established by Order G-35-08. The Order established the date of an Oral Public Hearing. The Order indicated that discussion of issues during the Oral Public Hearing would be limited to those items on the Issues List; all other issues would be addressed through written submission as identified in the Regulatory Timetable. The Order provided that the review of matters related to electric and magnetic fields ("EMF") would be limited to evidence and developments that are subsequent to the evidence considered by the Commission in the Vancouver Island Transmission Reinforcement Project ("VITR") proceeding.

The Commission notes that no additional issues were identified by Intervenors within the Regulatory Timetable. Intervenor Mr. Alan Wait raised a number of concerns in his Argument; however, these were not consistent with the Regulatory Timetable, and were not supported by any evidence.

The Oral Public Hearing was held on June 23 and 24, 2008 in Penticton and a Community Input Session ("CIS") was held during the evening of June 23, 2008. Following the Hearing, on June 24, 2008 the Commission Panel toured sections of the existing right-of-way ("ROW"), including the

Heritage Hills area, with the aid of a map provided by Intervenors and discussed during the Hearing (Exhibit A2-1; T3: 553-56).

FortisBC filed its Argument on July 3, 2008, Intervenor Arguments were submitted on July 17, 2008 and FortisBC filed its Reply on August 1, 2008.

### **1.5 Consultation Process**

FortisBC undertook public consultation for the OTR Project to ensure interested stakeholders and First Nations had the opportunity to review the OTR Project plan and to provide feedback prior to filing the Application. This process was designed to create dialogue with stakeholders, to explain the need for the OTR Project, to present FortisBC's preferred proposal, and to ensure that interested parties were aware that FortisBC must consider environmental impacts, constructability, and rate impacts.

As part of its public consultation process FortisBC established a number of communications objectives, established messaging to support these, identified stakeholders and First Nations to be included in the public consultation process, and defined key issues to be included in the public consultations. The public consultation process followed by FortisBC is described in section 1.5 and Appendix J of the Application, and summarized below.

Public consultation included open houses for local area residents in Oliver, Okanagan Falls, and Penticton on March 6, 7, and 8, 2007 and on May 22, 23, and 24, 2007. Displays, orthographic photos, and brochures were available at the first series of open houses and these were updated for the second series. Attendees were encouraged to complete questionnaires expressing their opinions, concerns, and suggestions. FortisBC and BC Hydro and Power Authority ("BC Hydro") engineering, technical, environmental, and public consultation staff members were available at these events to respond to questions and to explain the OTR Project.

Notification of residents of Oliver, Okanagan Falls, and southeast Penticton about these open house meetings took place through direct mail letters, hand delivered invitations, and newspaper advertisements. Personal letters of invitation were provided to all landowners 500 metres to the east and 1,000 metres to the west of the existing transmission line along the Oliver to Penticton corridor. A web page on FortisBC's web site was established and FortisBC contact center staff members were provided information to respond to inquiries.

The majority of participants concurred with the need for the OTR Project. A variety of views were expressed in relation to project routing. Strong support was expressed for a higher elevation route east of the Heritage Hills sub-division, often with concerns identified for effects on property values, impacts on views, and EMF considerations associated with routing along the existing ROW.

FortisBC held two on-site meetings in March of 2007 with landowners in Heritage Hills. Three petitions were received from groups opposing routing through the existing ROW. FortisBC met with individuals from the groups representing these petitioners to discuss the groups' desire to move to an upland routing or to place the transmission lines underground.

Emails and phone calls were responded to regarding concerns expressed, principally in relation to the routing of the proposed transmission line.

Since the fall of 2006 FortisBC provided public overviews of the OTR Project to various stakeholders including municipal and local governments, various BC Ministries, business organizations, and the Nature Trust of B.C. Other discussion took place with various environmental groups and letters were sent to several other environmental groups soliciting feedback on the draft Environmental and Social Impact Assessment done for the OTR Project. Informal consultations were held with individuals including lease and tenure holders potentially impacted by the OTR Project.

Formal and informal presentations were made to various First Nations organizations including the Okanagan First Nations Alliance, the Osoyoos Indian Band and the Penticton Indian Band. As result of the public consultation process and the concerns raised in regard to the use of the existing ROW routing, FortisBC evaluated higher elevation transmission line routes around the East Skaha Lake area. A viable alternative upland route was identified (“Upland route”) and is discussed in the Application.

## 2.0 JURISDICTION AND OTHER LEGAL ISSUES

This Section considers the legal and policy framework that may affect the OTR Project. In particular, in February of 2007 the BC Government released the BC Energy Plan – A Vision for Clean Energy Leadership (“2007 Energy Plan”) and on May 1, 2008 the *Utilities Commission Amendment Act 2008* (“UCAA 2008”) received Royal Assent and was brought into force.

### 2.1 2007 Energy Plan

The 2007 Energy Plan contains a number of policy actions relating to electricity and the provincial transmission system, at least one of which is relevant to FortisBC’s OTR Project Application:

“14. Ensure that the province remains consistent with North American transmission reliability standards.”

(2007 Energy Plan, p. 39)

### 2.2 Utilities Commission Act

Section 46 of the *UCA* as amended by the *UCAA 2008* requires the Commission to consider the BC Government’s energy objectives before granting a CPCN. Section 46(3.1) of the *UCA* states:

“46 (3.1) In deciding whether to issue a certificate under subsection (3), the commission must consider

- (a) the government's energy objectives,
- (b) the most recent long term resource plan filed by the public utility under section 44.1, if any, and
- (c) whether the application for the certificate is consistent with the requirements imposed on the public utility under sections 64.01 and 64.02, if applicable.” [Emphasis added]

Section 1 of the *UCA* as amended by the *UCAA 2008* defines the “government's energy objectives” as:

- “(a) to encourage public utilities to reduce greenhouse gas emissions;
- (b) to encourage public utilities to take demand side measures;
- (c) to encourage public utilities to produce, generate and acquire electricity from clean or renewable sources;
- (d) to encourage public utilities to develop adequate energy transmission infrastructure and capacity in the time required to serve persons who receive or may receive service from the public utility;
- (e) to encourage public utilities to use innovative energy technologies
  - (i) that facilitate electricity self sufficiency or the fulfillment of their long term transmission requirements, or
  - (ii) that support energy conservation or efficiency or the use of clean or renewable sources of energy;
- (f) to encourage public utilities to take prescribed actions in support of any other goals prescribed by regulation.” [Emphasis added.]

### **2.3 Public Interest**

Sections 45 and 46 of the *UCA* authorize the Commission to issue, refuse to issue, or issue with conditions, a CPCN for a project such as the OTR Project. In deciding whether to issue a CPCN, the Commission must determine whether a project meets the test of public convenience and necessity, and properly conserves the public interest. The *UCA* does not define public convenience and necessity, or public interest.

The Commission has considered the issue of what constitutes the public interest and public convenience and necessity in several recent decisions. In the Vancouver Island Generation Project Decision (“VIGP Decision”) the Commission concluded that “the test of what constitutes public convenience and necessity is a flexible test” (VIGP Decision, p. 76). In the VITR Decision, the Commission found “that there is a broad range of interests that should be considered in determining whether an applied-for project is in the public convenience and necessity” and “that it

is both impractical and undesirable to attempt a precise definition of general application” (VITR Decision, p. 15). In the Amended and Restated Long-Term Energy Purchase Agreement Decision (“LTEPA+Decision”), the Commission reiterated the foregoing conclusions and added that it “should not exclude from consideration in determining the public interest any class or category of interests which form part of the totality of the general public interest” (LTEPA+ Decision, p. 29).

In this proceeding, there were no comments or debate which specifically addressed the scope of the public interest. Consistent with previous decisions, the Commission Panel accepts that there is a broad range of interests that should be considered in determining whether the OTR Project is in the public interest. Socioeconomic, environmental and other non-financial considerations may be relevant to a determination of public interest and are considered in Section 7 of this Decision.

### 3.0 PROJECT DESCRIPTION AND SCHEDULE

The OTR Project principal elements are:

1. Modifying the BCTC and FortisBC portions of Vaseux Lake Terminal station to facilitate the conversion from 161 kV to 230 kV;
2. 28 kilometres of two new parallel (double circuit) 230 kV transmission lines (75 Line/76 Line) from the Vaseux Lake Terminal station north of Oliver to RG Anderson Terminal station on the east side of Penticton;
3. Replacing 11 kilometres of 161 kV line with 230 kV on 40 Line from the Vaseux Lake Terminal station to the new Bentley Terminal station;
4. A new Bentley Terminal station in Oliver, which will connect to the new 230 kV line as well as existing lines including 11 Line (161 kV ) from Warfield, 43 Line (138 kV) to Princeton as well as area 63 kV sub-transmission lines;
5. Installation of capacitor banks at both the FA Lee and DG Bell Terminal stations in Kelowna; and
6. The conversion of Oliver Terminal station to a distribution substation.

(Exhibit B-1-1, Executive Summary, p. 2)

FortisBC has engaged BC Hydro Engineering Services as an independent contractor to perform planning, design, engineering, procurement, construction, and construction management services on behalf of the Company under the terms of an Engineering, Procurement, and Construction (“EPC”) contract.

The OTR Project is described in Exhibit B-1-1, Tab 4, and is summarised by the following extracts:

(Exhibit B-1-1, Tab 4, pp. 4, 5, 7 and 8.)



### **3.1 Vaseux Lake Terminal Conversion**

“The Vaseux Lake Terminal station upgrades include re-connecting existing pre-equipped transformers and minor equipment change-outs to accommodate the voltage change from 161 to 230 kV; adding two 230 kV circuit breakers for the new 230 kV line to Penticton with the addition of associated protection and control equipment to allow independent switching of the transformers; and providing a new 500 kV circuit breaker on the BCTC 500 kV side of the station, with protection and control changes to accommodate independent switching of the FortisBC transformers.”

### **3.2 Anderson – Vaseux Lake – Bentley 230 kV Transmission**

“The existing 28 kilometre 161 kV 76 Line will be replaced with two 230 kV transmission lines (a double circuit) to provide needed supply capacity and improve single and double-contingency reliability for the Penticton and Kelowna areas. The proposed line Alternative 1A, using single steel pole construction, will be used to fit the two lines within the existing ROW.”

“The existing 11 kilometre 40 Line (161 kV) between Vaseux Lake and Bentley Terminal stations will be replaced with a 230 kV line to increase transmission capacity and to be compatible with the conversion to 230 kV at the Vaseux Lake Terminal station. Steel pole H-frame construction will be used to reduce the risk of line loss due to wildfire as has been experienced in events such as the Okanagan Mountain Park wildfire of 2003.”

### **3.3 Terminal Stations**

“The new Bentley Terminal station is required for transmission voltage conversion and switching in the Oliver area and notes that the existing Oliver Terminal station is not adequate, as it has less than 20 percent of the required space for new transmission equipment, and adjacent development does not allow expansion of the existing site. The new Bentley Terminal station will connect to the new 230 kV line as well as the existing 11W Line (161 kV supplied from Warfield), 43 Line (138 kV to Princeton) and area 63 kV sub-transmission lines.”

“The FA Lee [and DG Bell] Terminal station upgrades include installing one 138 kV circuit breaker and a 30 Mvar capacitor bank for voltage support during transmission contingencies at each station.”

“The RG Anderson Terminal station upgrades include completing a 230 kV ring bus with three new 230 kV circuit breakers for the two new 230 kV lines from Vaseux Lake Terminal station with addition of associated protection and control equipment; and replacing Transformer 2 with a new transformer (Transformer 4) that is more electrically compatible to operate in parallel with the existing Transformer 1.”

“The Oliver Terminal station upgrade includes converting the station from a 161/138/63 kV transmission and distribution terminal to a 63/13 kV distribution station. The aged distribution portion of the station will be replaced, and the rebuilt substation will then include room for future distribution expansion.”

### **3.4 Remedial Action Schemes**

“Due to the proposed stronger interconnection with the BCTC transmission system supplying the Okanagan region, FortisBC funded stability studies for the interconnection. The results of these studies indicated that minor modifications to the FortisBC and BCTC Remedial Action Schemes (“RAS”) are needed. The FortisBC and BCTC RAS maintain system stability by automatically adjusting the power system to respond to contingency events.”

## **4.0 NEED AND PROJECT JUSTIFICATION**

This Section reviews the factors that drive the need for the OTR Project, and considers timing requirements.

### **4.1 Need for Okanagan Transmission Reinforcement**

FortisBC states that the OTR Project is required to accommodate load growth in the Penticton area, provide full supply to Kelowna under normal and single-contingency conditions, and enhance double-contingency reliability for the Kelowna area. FortisBC also submits that the OTR Project, when combined with BCTC's planned transformer upgrades at the Selkirk Substation, will help address current short-term capacity shortfalls within the BCTC transmission system, resulting in a benefit to the provincial grid. In FortisBC's view, the OTR Project also supports the 2007 BC Energy Plan, in particular the objective of "Ensuring a Reliable Transmission Network." (Exhibit B-1-1, Executive Summary, pp. 1-3)

#### 4.1.1 Load Growth

FortisBC notes that the population of the Central Okanagan and Okanagan/Similkameen areas has grown by 9 percent since 2002, a rate 4 percent higher than the provincial average. The number of business incorporations in the area has doubled since 2002 and is 40 percent higher than the provincial average. The Company also states that the total load in the Okanagan region, served by the FA Lee and DG Bell Terminal stations in Kelowna, RG Anderson Terminal station in Penticton, and the Oliver Terminal station, is expected to grow by 250 MVA (50 percent) within 20 years, which amounts to an average growth rate of 2.5 percent per year. Growth in the range of 4 percent per year is expected until 2011/12, beyond which the growth rate is forecast to ease slightly (Exhibit B-1-1, Tab 3, p. 4).

#### 4.1.2 Inadequate Transmission Capacity

FortisBC provided evidence that the normal and emergency capacity limits of RG Anderson Transformer 2 have already been exceeded. The load has been served by running the transformer at its short-time emergency rating, and those peak-time overloads will increase in severity as the load continues to grow. The transformer overload, coupled with limitations on the 161 kV 76 Line from Vaseux Lake to RG Anderson, results in a bottleneck of transmission capacity between the two major interconnections with BCTC at Vernon Terminal and Vaseux Lake. As a result of that bottleneck, there is insufficient available transmission capacity to meet the Kelowna and Penticton area loads if certain critical elements are lost. (Exhibit B-1-1, Tab 3, pp. 5, 7.)

FortisBC states that, over the last 10 years, the lack of sufficient capacity to supply Kelowna from the south has resulted in an average of one or two blackouts per year due to a loss of supply from the north. From March 1997 to July 2007 there were 38 transmission-related outages, one third of which resulted in complete or partial blackouts in the Kelowna area (Exhibit B-1-1, Tab 3, p. 10). These incidents cumulatively affected more than one million customers over the period, with customer-hour losses exceeding 200,000. The yearly average data for the period indicates that approximately 84,000 Kelowna customers are being affected by transmission-related outages each year, with an approximate annual loss of 17,000 customer-hours. In June 2007, a single event resulted in a black-out of Kelowna that affected 70,000 customers and resulted in a loss of approximately 28,600 customer-hours. Since the strong load growth in the Okanagan observed over the last five years is expected to continue, the risk and frequency of blackouts will likely grow and begin to encompass a larger area (Exhibit B-1-1, Executive Summary, pp. 6-7).

### 4.1.3 Reliability Criteria

In Table 3-1-3-2 (Exhibit B-1-1, Tab 3, pp. 11-12), FortisBC defines the N-0, N-1, N-1-1, and N-2 reliability criteria.

- N-0 (no contingency): If a power system meets only the N-0 criterion, then all major elements of the system must be in service to avoid loss of customer load.
- N-1 (single contingency): If a system meets the N-1 criterion then, with all other elements in service, an outage on a single element (e.g., a transmission line, a transformer, a generating unit, a capacitor bank, or a reactor) can be accommodated with no load loss. This is a normal bulk transmission system design criterion.
- N-1-1 (double-contingency): Meeting this criterion means that an outage on an element during the prior outage of another element (e.g., an outage on a transmission line while another transmission line is already out for maintenance) can be accommodated with no loss of load. This criterion is typically used for major urban centers.
- N-2 (double-contingency): Meeting the N-2 criterion means that the power system can tolerate simultaneous outages on two elements (e.g., the simultaneous outage of both circuits of a double circuit transmission line or an outage of two single-circuit transmission lines on a common ROW) without loss of load. The difference from N-1-1 is the size of the sudden or transient change in supply capacity that the system must be able to ride through with no customer load loss.

According to FortisBC, the transmission bottleneck between Vernon Terminal and Vaseux Lake prevents optimum utilization of the two supply interconnections to maintain system security and to supply customer load during N-1, N-2, or N-1-1 events. The N-1 capacity of the Kelowna to Penticton system has already been exceeded during system peak-load periods, the capacity deficit in 2007 being 109 MVA or 25 percent of the Kelowna/Penticton system peak. The system could be unable to meet the standard N-1 reliability criterion in over 1000 hours per year by 2011, and by 2024, approximately 300 MVA will be at risk (Exhibit B-1-1, Tab 3, pp. 7 and 19).

The overall transmission capacity for the Kelowna to Penticton region under normal (N-0) operating conditions will be exceeded by 2009 (Exhibit B-1-1, Tab 3, p. 18). The inability of the system to meet customer load could reach 300 hours per year by 2024 (Exhibit B-1-1, Tab 3, pp. 7-8), and the total annual energy shortfall could reach 390 GWh (Exhibit B-1-1, Tab 3, p. 18).

FortisBC states that the present Kelowna to Penticton system does not meet the double-contingency criterion (Exhibit B-1-1, Tab 3, pp. 19-20), which in its view was supported by the Commission in Order G-52-05 (Exhibit B-1-1, Tab 3, p.13). FortisBC notes that the N-1-1 and N-2 criteria can only be met for approximately 1,575 hours during 2007, outside of this, any sequential or coincidental outage of two system elements could result in the complete blackout of the Kelowna area. By 2014, double-contingency criteria will only be met for approximately 440 hours per year. Under the most severe scenario (the N-2 contingency arising from a simultaneous failure of 72 Line and 74 Line or BCTC's 2L255 and 2L256), the load loss in the Kelowna to Penticton region could reach approximately 65 percent of regional peak demand (320 MVA) in 2010, and approximately 73 percent of regional peak demand (460 MVA) by 2024. This type of event has occurred one or two times per year in the past ten years, as shown in Table 3-1-3-4 (Exhibit B-1-1, Tab 3, p. 17).

FortisBC submits that "a solution must to be designed to achieve the following: Introduce double-contingency (N-1-1/N-2) security to the Kelowna-Penticton area for close to 100% of such events during 2010 and nearly 90% levels during year 2024" (Exhibit B-1-1, Tab 3, p. 33). The Company also stated that the OTR Project provides N-2 reliability at no incremental cost (Exhibit B-3, BCUC 1.7.4).

### **Commission Determination**

The Commission Panel accepts FortisBC's evidence that the load in the Okanagan region is growing and will continue to do so. The Commission Panel also accepts the Company's evidence that the existing transmission system in the region is inadequate to meet that growth and that the system will be unable to meet N-0 reliability by 2009. Further, no party opposed the need for facility

upgrades, and indeed the OTR Project received support from several parties, as evidenced by the letters in Appendix A to the Application. **Therefore, the Commission Panel finds that the OTR Project is needed in order to reliably serve FortisBC's load in the region.**

The Commission Panel notes that FortisBC takes the position that the Commission supports a double-contingency reliability planning criterion for Kelowna. FortisBC bases its position on Commission Order G-52-05, which related to FortisBC's 2005 Revenue Requirements, System Development Plan and Resource Plan. Quoting from page 59 of the Reasons for Decision accompanying that Order, FortisBC wrote:

“With respect to the appropriate reliability levels for the City of Kelowna, the Commission panel notes that the criteria of N-1 is a minimum standard set by the WECC for bulk transmission systems and adopted by most utilities. The Commission Panel acknowledges that there are situations (particularly in large urban centers) where the consequence of a lower probability occurrence of an N-1-1 or N-2 event requires the N-1 standards to be exceeded. Each case is a judgment call and must be evaluated on its own merits. However it is common practice to have N-2 contingency levels for certain load centers in large urban centers (e.g. Vancouver and Victoria). The Commission Panel accepts that an N-1-1 contingency level for Kelowna is appropriate at this time.”

The Commission Panel finds that FortisBC has misinterpreted the intent of the Commission's earlier determination. On June 23, 2005, following the release of the aforementioned Order, the Commission issued Letter L-48-05, which states in part:

“The Commission Panel is concerned that the determination on page 59 of the Decision and a discussion on page 57 of the Decision may be interpreted to mean that the Commission Panel has set increased standards of reliability for the City of Kelowna and, by inference, for other similar load centers. This is not the case. The Commission Panel's determination was that for the particular circumstances the City of Kelowna is facing, i.e., the risk of losing the two lines from Vernon due to various causes (including forest fires) and in consideration of the consequences in losing those lines for the loss of load in Kelowna, the advancement of a 230 kV line from Vaseux Lake to Penticton to alleviate that risk, would be a prudent investment. This would have the result of increasing the level of reliability for Kelowna beyond what is commonly referred to as an N-1 contingency level but this outcome should not be interpreted as meaning the Commission Panel has set

increased design standards of reliability for the City of Kelowna or for other similar load centers. Each case involving facilities which improve reliability levels must be evaluated on its own merits. In doing so the Commission Panel is guided by good Utility practice, public safety and the economics of providing service.”

The Commission Panel reiterates the statements made in the letter that “this outcome should not be interpreted as meaning the Commission Panel has set increased design standards of reliability for the City of Kelowna” and that “each case involving facilities which improve reliability levels must be evaluated on its own merits.” **Therefore, the Commission Panel does not support a double-contingency reliability planning criterion.** Consequently, the Commission Panel does not accept FortisBC’s statement that “a solution must to be designed to achieve the following: Introduce double-contingency (N-1-1/N-2) security to the Kelowna-Penticton area for close to 100% of such events during 2010 and nearly 90% levels during year 2024.”

In the particular case of the OTR Project, the Commission Panel notes that an N-2 event is a credible contingency, as evidenced by the frequency of N-2 outages listed in Table 3-1-3-4 of the Application. Further, the OTR Project provides N-2 reliability at no incremental cost. Meeting the N-2 reliability criterion in this case is therefore both economic and consistent with good utility operating practice, but it is not a prerequisite to the Commission Panel’s approval.

#### **4.2 Timing Requirements**

FortisBC argues that there is no dispute regarding the need for the applied for in service date by the end of 2010, and notes that it would be useful today in order to meet the N-1 reliability capability. FortisBC also argues that it is undisputed that the Upland route would take at least two years longer to complete, and suggests that two additional years for completion of the Upland route would be optimistic. FortisBC concludes that timing is a factor supporting the selection of the existing corridor. (FortisBC Argument, para. 34)



South Okanagan for Alternate Route & Wiltse Holdings Ltd [“SOFAR & Wiltse”] argue, with respect to timing, that:

“...in our view this Application has urgency written all over it and the debate has been skewed in favour of those factors that help resolve the urgency to the potential exclusion of factors that, if urgency was taken out of the equation, would cast the choices between the existing route and the AUR [Alternate Upland route] in a completely different light.”

SOFAR & Wiltse conclude their argument with respect to urgency by “...urging the Commission to remove urgency as a factor in the decision-making equation (perhaps by ordering FortisBC to take other steps to manage the overload risk) and give proper weight to those factors (such as the wishes of the vast majority of the affected communities) that ought rightly to be considered in a 50-year decision.” (SOFAR & Wiltse Argument, pp. 5-6)

Mr. Wait comments, with respect to timing: “In my experience as a contractor, often the schedule is affected by the delivery dates of major equipment, so that a two-year delay in finalizing the Upland route need not necessarily result in a full two-year delay in the OTR project completion. Transformers, breakers etc. can be ordered so as not to be a factor in completion timing.” (Wait Argument, p. 3)

BCOAPO notes that: “If FortisBC had applied to the Commission at an earlier date for this Project, then consideration of the alternative Upland routes would have been viable, and the possibility of accommodating the need for the Project, First Nations interests, local ROW residents’ concerns, and environmental approvals, may have been possible.” (BCOAPO Argument, para. 15)

Mr. Harlinton, CORE and Ms. Kistner do not address the timing issue in their arguments.

### **Commission Determination**

The Commission Panel has accepted in Section 4.1 FortisBC's assessment of the need for the OTR Project, particularly in light of the inability of the present Okanagan transmission system to meet N-0 level of reliability by 2009. The current state of the system does not meet NERC (North American Electric Reliability Corporation) reliability standards, nor is it consistent with either the 2007 Energy Plan policy action # 14 or the BC Government's energy objectives as defined in section 1(d) of the *UCA*. As noted in FortisBC's argument, the need for the OTR Project was not in dispute in the course of the hearing.

The Commission Panel does not accept the SOFAR & Wiltse argument that urgency should be, in effect, ignored in the decision making process.

**The Commission Panel considers that there is indeed a need and related degree of urgency surrounding the execution of the OTR Project, driven by the inadequate level of reliability of the existing transmission system.** The urgency and related timing of the OTR Project cannot be simply set aside, but must be considered along with all the other factors which must be taken into account in reaching a decision. In the view of the Commission Panel, timing, or urgency, is a significant factor for the reasons discussed above.

## 5.0 OTHER SUPPLY OPTIONS CONSIDERED

FortisBC addresses alternative solutions to the supply option capacity deficiencies in the Okanagan area in section 6 of its Application, which states:

“FortisBC identified several potential solutions in addition to the preferred option, to resolve current and future supply deficiencies in the Okanagan area. With the exception of the “Do Nothing” scenario, each of the options briefly described below would meet the capacity and reliability requirements of the OTR Project however they were rejected for environmental, permitting, social, technical and cost considerations. Also, none of these options would meet the required 2010 in-service date for the OTR Project and all have a higher degree of cost and schedule risk.”

The alternatives considered by FortisBC were:

1. Do nothing
2. East West Transmission Reinforcement
3. North South Transmission Reinforcement
4. Westbank 230 kV BCTC Inter-Tie
5. Gas Fired Generation

FortisBC comments that “Maintaining the status quo (Do-Nothing) is not considered a viable alternative. Without improvements, the existing system will violate FortisBC planning criteria for a number of operating scenarios.” FortisBC goes on to observe that under various reliability scenarios, (N-0, N-1, N-1-1/N-2), the “Do-Nothing” alternative violates FortisBC and utility industry transmission planning criteria and the N-1-1 planning criterion “previously approved by the Commission”. (Exhibit B-1-1, Tab 6, pp. 2-3)

In response to Information Requests, FortisBC also examined the option of installing a single-circuit transmission line instead of a double-circuit line, but rejected it as inadequate. The Company stated that a single high-capacity circuit would not be N-1 compliant, even at the in-service date of

the OTR Project, because an outage of this circuit (an N-1 event) would require supplying the entire Kelowna and Penticton load from the Vernon Terminal supply. Since the peak load for this area already significantly exceeds the import limit at Vernon, there would be a requirement for load shedding following an N-1 outage to avoid exceeding the limit. The load shedding exposure will grow over time as the area load continues to increase. (Exhibit B-3, BCUC 1.15.1)

Other supply options were not addressed as an issue by any of the participants in the hearing other than Mr. Wait, who suggests that another alternative be considered (Wait Argument, p. 2).

Mr. Wait's argument is discussed at Section 8.3 of this Decision.

### **Commission Determination**

**The Commission Panel accepts FortisBC's assessment of other supply options and determines that the OTR Project, as modified by directions in this Decision, is the most viable means of addressing the electricity supply capacity deficiencies in the Okanagan area.**

## **6.0 COST ESTIMATES AND FINANCIAL FACTORS**

This Section reviews financial factors and cost estimates of the OTR Project, including capital and operating costs, escalation of cost estimates, rate impacts, cost risk analysis, a possible cost control mechanism, and contributions in aid of construction.

### **6.1 Methodology and Assumptions**

#### 6.1.1 Capital Costs

Capital cost estimates include planning, environmental, consultation, properties, engineering, project and construction management, procurement, construction, and commissioning for all physical components of the OTR Project (Exhibit B-1-3, App. G, p.1).

#### 6.1.2 Operation and Maintenance Costs

Operation and maintenance costs are associated with the substation and line infrastructure additions, replacements, and changes which are part of the OTR Project. These are expected to increase about \$24,000 per year on average through the planning horizon to 2024. This is largely due to the infrastructure additions at the Bentley, FA Lee, DG Bell, and RG Anderson Terminals. These increases will be offset somewhat by the removal of aging infrastructure at the Oliver Terminal, and by the replacement of aged wood poles on 40 Line and 76 Line with new steel infrastructure (Exhibit B-1-1, Tab 5, pp. 2–3).

#### 6.1.3 Basis of Cost Estimates

Cost estimates were developed using “Bottom-up Estimating” described in Max Wideman’s Comparative Glossary of Project Management Terms v3.1 as: “The preparation of detailed estimates for every task in the work breakdown structure and summing them up to provide a total project cost estimate or cost plan.” (Exhibit B-3, BCUC 31.1)

A project contingency at 15 percent has been provided on all engineering, procurement, construction, and project and construction management costs. Pricing has been based on historical costs, previous purchase orders, and installation tenders for other similar projects (Exhibit B-1-3, App. G, p. 3).

A FortisBC capital overhead charge of 7 percent has been applied to all project costs with the exception of AFUDC (Exhibit B-3, BCUC 31.4).

FortisBC has a +20/-10 percent level of confidence in the cost estimates (Exhibit B-1-3, App. G, p.1). This qualifies as a Class 3 estimate under Association for the Advancement of Cost Engineering ("AACE") classifications (Exhibit B-3, BCUC 31.6).

No Intervenor challenges FortisBC's basis of estimating, project contingency, capital overhead charge, or confidence estimates.

## 6.2 Capital Cost of Project

Capital costs of the OTR Project (Alternative 1A) are detailed as follows:

	<b>\$ millions</b>
Double circuit 230kV Vaseux to Penticton (75/76 Line)	55,527
Single circuit 230kV Vaseux to Bentley (40 Line)	4,550
63 & 138kV Circuits Bentley to Oliver	672
New Bentley Terminal	30,990
Oliver Substation Upgrade	5,687
RG Anderson Terminal Upgrade	10,498
Lee Terminal 138kV Capacitor Upgrade	1,675
Bell Terminal 138kV Capacitor Upgrade	1,622
Vaseux 230kV Terminal Upgrade	4,440
Vaseux 500kV Terminal Upgrade	2,928
Planning & Preliminary Engineering	5,363
Project Management, Engineering, & Operations Support	3,807
<b>Sub-total</b>	<b>127,760</b>
AFUDC	9,736
Removal & Salvage	3,912
<b>Total</b>	<b>141,408</b>

(Exhibit B-1-1, Tab 5, Table 5-1, p.2)

## 6.3 Escalation of Cost Estimates

### 6.3.1 Inflation Rates Used In Estimates

Estimates are based on May 2007 dollars. Project inflation for civil, substation, and transmission components are escalated at 6 percent for the balance 2007 and 5 percent, 5 percent, and 4 percent for years 2008, 2009, and 2010 respectively (Exhibit B-1-3, App. G, p. 3). These rates are

consistent with the recommended construction inflation allowances in the BC Hydro Construction Cost Tends and Outlook prepared by MMK Consulting, September 17, 2007 (Exhibit B-1-3, App. G). The total cost escalation is \$14.346 million (Exhibit B-3, BCUC 37.2).

No Intervenor challenged FortisBC's inflation escalations.

### 6.3.2 Actual Escalation of Estimates since Project Inception

The original cost estimate for the OTR Project was \$57 million (expressed in \$2005 excluding overheads and AFUDC) as reflected in the 2005 – 2024 System Development Plan. This was adjusted to \$78.05 million (including \$3.05 million in removals and salvage) in the 2007/08 Capital Plan. Detailed scope refinement and preliminary engineering had not taken place in the development of these estimates. The scope did include double circuit 230kV from Vaseux to RGA, single circuit 230kV from Vaseux to Oliver, the Bentley Terminal, and capacitors in the Kelowna region.

While the main conceptual scope did not change from the 2005 System Development Plan to the 2007/08 Capital Plan, the latter Plan also included the replacement of one transformer at RGA and its subsequent replacement to Bentley, as well as the inclusion of additional 230kV and 500kV breakers at Vaseux Lake Terminal to improve the reliability of the station. These additions add almost \$17.9 million (\$2007). Subsequent scope refinement of all project elements, combined with unanticipated inflation in labour and commodity markets has further increased the costs of the OTR Project, using Alternative 1A, to \$141.4 million. The inflation impacts, as well as the inclusion of overhead items for planning, preliminary engineering, project management, and AFUDC represent the largest elements of the increase (Exhibit B-3, BCUC 29.3 and BCUC 29.4).



#### **6.4 Financial Costs and Rate Impacts for All Project Options**

FortisBC provided capital cost estimates for the five route Alternatives, discussed in Section 8.1.1, in nominal or as-spent dollars (Exhibit B-1-1, Tab 4, pp. 40, 41; Exhibit B-3, BCUC 1.29.1, 1.37.2). The estimates for Alternatives 1A, 1B and 2B are at a +20/-10 percent preliminary design level of precision, while the estimates for Alternatives 2A and 3 are at a +35/-15 percent planning level, reflecting the higher degree of uncertainty associated with these alternatives. The estimates include removals, Allowance for Funds Used During Construction (“AFUDC”), and capitalized overhead. Estimates were provided for an in-service date of 2010 for Alternatives 1A and 1B on the existing ROW and for all Alternatives for a 2012 in-service date.

The estimates for the existing ROW alternatives include contingency at 15 percent for engineering, procurement, construction, and project and construction management services. Costs in May 2007 dollars were inflated at 6 percent for the remainder of 2007 and at 5, 5, 4, 3, and 3 percent for years 2008, 2009, 2010, 2011 and 2012, respectively. Estimates for the Upland route alternatives include contingency at 20 percent (Exhibit B-1-3, Appendix G, pp. 3, 9).

FortisBC also provided estimates of the Net Present Value (“NPV”) of revenue requirements and the One-Time Equivalent Rate Impact for each Alternative over the period to the end of 2047. The NPV amounts were updated during the proceeding (Exhibit B-3, BCUC 1.45.4; Exhibit B-25). The following table summarizes the updated information.

**Table 6-4-1**  
**Capital Costs and NPV Revenue Requirements of Route Alternatives**

In-Service Date	Alternative	1A	1B	2A	2B	3
(\$000s)						
2010	TOTAL CAPITAL COST	141,408	129,915			
	Net Present Value of Revenue Requirements	69,659	62,077			
	One-Time Equivalent Rate	2.29%	2.04%			
2012	TOTAL CAPITAL COST	152,173	139,774	167,883	153,391	159,852
	Net Present Value of Revenue Requirements	60,375	53,604	68,966	61,047	64,591
	One-Time Equivalent Rate Impact	1.98%	1.76%	2.27%	2.01%	2.12%

(Exhibit B-3, BCUC 1.45.4, and as updated in Exhibit B-25)

It is evident that Alternative 1A is not the lowest cost option. It has the second lowest cost for Alternatives with comparable in-service dates. While Alternative 1B is approximately \$11-12 million lower in cost than Alternative 1A and could be considered the least-cost option, FortisBC considers Alternative 1A to be the most cost-effective solution when considering reliability, environmental impact, visual impact, and EMF concerns, as well as cost (T1: 178).

FortisBC submits that an Upland route (Alternatives 2A, 2B or 3) would have a capital cost that is approximately \$20 million higher than a brownfield route, based on a common in-service date and construction methodology (FortisBC Argument, para. 9).

SOFAR & Wiltse state that the difference in NPV of revenue requirements between FortisBC's preferred Alternative 1A and Alternative 2B (that is, the least expensive of the Upland route options), is shown in the Application as only approximately \$700,000 (SOFAR & Wiltse Argument, p. 7). Mr. Harlingten made a similar submission (Harlingten Argument, p. 4). SOFAR & Wiltse state that the response in Exhibit B-3 to BCUC IR 1.45.4 indicates that the NPV of revenue requirements for Alternative 2B of \$61.047 million is approximately \$2.3 million less than the NPV for Alternative 1A of \$63.375 million. SOFAR & Wiltse submit that Alternative 2B on the Upland route is less costly to ratepayers than Alternative 1A. (SOFAR & Wiltse Argument, pp. 1, 8)

However, neither SOFAR & Wiltse nor Mr. Harlingten had the most current information provided in Exhibit B-25 when they made their submissions comparing the NPV revenue requirements of Alternatives 1A and 2B. Based on the values in the foregoing table for a common 2012 in-service date, the NPV of revenue requirements of Alternative 1A is approximately \$0.7 million lower.

#### 6.4.1 Monopoles vs. H-Frame Poles

The monopole structures for Alternatives 1A and 2A are significantly more expensive than the double-circuit H-frame structures for Alternatives 1B and 2B. The foregoing Table 6-4-1 shows the higher capital cost of the monopole structures is \$11.5 million when comparing Alternatives 1A and 1B completed in 2010 and \$14.5 million for Alternatives 2A and 2B completed in 2012.

In response to questions about using a combination of monopoles and H-frame structures on the existing ROW, FortisBC stated this approach would make it necessary to stock a wider variety of materials and require multiple maintenance work procedures, but it was not expected to have a significant financial impact with regard to maintenance. FortisBC estimates Alternative 1B would have two monopoles between Vaseux Lake and RG Anderson, and that each additional monopole structure would increase the cost of Alternative 1B by approximately \$150,000 (Exhibit B-8, BCUC 2.73.1, 2.73.2, 2.73.3). There appear to be 26 pole structures between the tap connection for Vaseux Lake and where Alternatives 2A and 2B leave the existing ROW (Exhibit B-1-2,

Appendix C, p. 54). This indicates an additional capital cost of approximately \$150,000 x 26 poles = \$3.9 million for monopoles in this section, to make Alternative 2B more comparable to Alternative 1A. This adjustment to the Alternative 2B capital cost would significantly increase the NPV of revenue requirements advantage of \$0.7 million that Alternative 1A already shows over Alternative 2B.

### **Commission Determination**

The Commission Panel considers that a valid comparison of the costs of Alternatives 1A and 2B needs to recognize that both use the same ROW from Vaseux Lake to the point where the Upland route diverges from the existing ROW near Shuttleworth Creek. The Alternatives should be compared on the basis of the same pole structures where they use the same ROW.

The Commission Panel concludes that construction of the Vaseux Lake to RG Anderson section on the Upland route is likely to significantly increase the OTR Project cost, relative to using the existing ROW.

### **6.5 Cost Risk Analysis**

A number of cost risks have been identified by FortisBC. These include:

- an active construction industry limits competitive bidding, increasing costs above estimates, compounded by a shortage of skilled workers
- equipment and materials prices may differ from estimates
- technical issues with transmission or station design that are not addressed in the project scope or estimates may require extra unplanned costs to resolve
- design completion and maturity is not adequate and gaps are not addressed in the project scope or estimates, requiring extra unplanned costs to resolve
- losses arise during construction due to fire, flood, theft, or other risks.

FortisBC has identified a risk response for each of these risks (Exhibit B-3, BCUC 1.34.3). Cost mitigation measures will focus on procurement strategies to obtain competitive pricing, including bundled purchases to achieve “bulk” purchasing power, discussion with BC contractors to assess capacity and constraints, letting tenders in package sizes to be attractive to the most number of bid firms capable of doing the work, and national or international tendering (Exhibit B-3, BCUC 1.37.1). The contingency allowances could also address some of risks (Exhibit B-3, BCUC 1.39.2).

BCOAPO has acknowledged these risks and observes that FortisBC plans to manage the cost of the OTR Project through an internal Quality, Schedule and Cost monitoring methodology (BCOAPO Argument, p. 5).

FortisBC also notes that 85 percent of all costs for the OTR Project are expected to fall under fixed price contractual arrangements. It will monitor and assess these costs during the tender evaluation process. Identification of potential cost overruns and appropriate course corrections will be carried out during the OTR Project as contracts are tendered, awarded, and executed (Exhibit B-8, BCUC 2.72.4).

## **6.6 Possible Cost Control Mechanism**

No cost control or capping mechanism is proposed by FortisBC. It anticipates that its Internal Project management tools and functions will be sufficient (Exhibit B-3, BCUC 1.60.6). Furthermore, FortisBC believes that a cost control or capping mechanism is not appropriate. It believes that active project management and competitive bidding are adequate. Costs controllable by the company are managed efficiently and fall within the proposed confidence limits of +20 percent/-10 percent. A cost collar to encourage efficient management is redundant and would allocate risks unfairly to the Company for items that are beyond its reasonable control, such as volatility in labour and commodity markets or force majeure events. If a cost collar were imposed on the Company, FortisBC would consider it necessary to adjust its risk premium for its return on equity and, indeed, reserves the right to determine if it would be willing to proceed with the project at this time (Exhibit B-3, BCUC 1.60.7).

BCOAPO recognizes the foregoing and expects that FortisBC will regularly advise BCUC, as part of the Capital Expenditure Plan approval process about the status of the OTR Project cost outlook and reasons for variance from the CPCN application. BCOAPO expects FortisBC to report specific measures it has taken, or will take, to control costs of the OTR Project as part of its next Capital Expenditure Plan filing with the Commission (BCOAPO Argument, p. 5). FortisBC agrees to this request (FortisBC Reply, p. 1).

### **Commission Determination**

**The Commission accepts the FortisBC estimation of costs, including project contingency, capital overhead charge, AFUDC, confidence estimates, and inflation. The Commission directs FortisBC to advise it on the status of the OTR Project cost outlook and the variances from its CPCN Application, and to report on specific measures it has taken, or will take, to control the costs of the OTR Project as part of its next Capital Expenditure Plan filing.**

## **6.7 Contributions In Aid of Construction**

### 6.7.1 The Upland Route

There was considerable discussion related to the possibility of the collection of community contributions in aid of construction (“CIAC”) or rate riders from property owners along the existing ROW from Shuttleworth Creek to RG Anderson Terminal in order to cover the costs of moving upland if an Upland route was to be approved. FortisBC indicated that there would be difficulty in administering such a regime, particularly because of the need to secure unanimous agreement from those ratepayers affected (T1: 259-61).

The representatives of SOFAR believe that SOFAR members who are in the vicinity of the existing ROW would be willing to pay up to \$25 per month on their monthly utility bills for such contributions. These representatives indicated that 40 members attending a community meeting unanimously agreed that they would be willing to pay such a contribution. These individuals are 40

of the total SOFAR membership of about 350. However, SOFAR has provided no concrete proposal regarding the form or function of a CIAC or rate rider mechanism. (T3: 507–509)

BCOAPO has indicated support for CIAC or rate riders if the Upland route is approved. However, it is concerned that SOFAR has not advanced any concrete proposals on what the mechanism would be (BCOAPO Argument, p. 7).

### **Commission Determination**

The Commission Panel has concerns about the feasibility of requiring rate riders from specific residents near the existing ROW. If the Upland route were approved, the specific benefits to individual ratepayers along the ROW from Shuttleworth Creek to RG Anderson Terminal would not be quantifiable. In Section 8 the Commission Panel approves the OTR Project on the existing ROW and, because the potential revenue that might be collected through a rate rider is not determinative, makes no finding as to whether a rate rider would be appropriate in this case.

## **7.0 SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS**

This Section first addresses the health-related issues associated with EMF and corona emissions from transmission lines. The potential impact of the OTR Project on property values is then considered. Finally, other environmental and social impacts are reviewed, including First Nations, environmental and aesthetic impacts, and effects during construction.

### **7.1 Electric and Magnetic Fields**

Although both electric and magnetic fields surround operating alternating current (“ac”) transmission lines, most health concerns raised by Intervenors relate to magnetic field exposure. Therefore, most of the discussion in this Section concerns magnetic fields with a frequency of 60 Hz, measured in milligauss (“mG”), and the term EMF is generally used to refer to magnetic fields.

#### 7.1.1 EMF Exposure Guidelines

There is currently no federal or provincial legislation or regulation addressing power line frequency EMF levels or exposures. FortisBC quotes Health Canada as stating: “Typical exposures present no known health risks...the scientific evidence is not strong enough to conclude that typical exposures cause health problems” (Exhibit B-1-1, Tab 4, p. 54).

Two international scientific organizations International Commission on Non-Ionizing Radiation Protection (“ICNIRP”) and the International Committee for Electromagnetic Safety (“ICES”) have published guidelines for limiting public exposure to EMF in order to protect against the direct, acute health effects that can occur from short-term exposure to high levels, but “both organizations judged that evidence for effects from long-term exposure to ELF [Extremely Low Frequency] -EMF was insufficient for setting exposure standards.” ICNIRP recommends a residential magnetic field exposure limit of 833 mG, and ICES recommends a limit of 9,040 mG. (Exhibit B-12, Appendix 57.3, p. 23)



FortisBC's expert witness, Dr. Bailey, explained that ICNIRP continually examines and updates its guidelines (T3: 413), and that the most recent review of the guidelines, the World Health Organization ("WHO") review of June 2007 ("WHO 2007"), included a review of the science up to approximately 2005 or 2006 (T3:432). Dr. Bailey stated that his firm, Exponent, has monitored the science since then and that he has not "seen any scientific developments since that time that would prompt the revision of the ICNIRP guidelines" (T3: 432). Dr. Blank, appearing as Mr. Harlinton's witness, also confirmed that since WHO 2007 no government agency has indicated that the 833 mG level should be reduced (T3: 467).

The Commission has addressed EMF in several previous decisions, most extensively in the VITR Decision in 2006. In that decision, the Commission concluded that, "In the absence of convincing new evidence that indicates that change is warranted and/or imminent, the Commission Panel concludes that it should not impose lower EMF exposure standards on VITR" (VITR Decision, p. 71).

In the VITR Decision, the Commission directed BCTC to file a public report with the Commission every two years or sooner that summarizes the latest results of EMF risk assessments and any changes in guidelines developed by the WHO, ICNIRP, Health Canada and others where relevant (VITR Decision, p. 72). In the recent Interior to Lower Mainland Transmission Project Decision ("ILM Decision"), the Commission found that the 2007 Exponent report met that requirement (ILM Decision, p. 120). FortisBC filed the 2007 Exponent report in this proceeding (Exhibit B-12, Appendix 57.3) and included Dr. Bailey in its witness panel to speak to the report.

The 2007 Exponent report includes a review of peer-reviewed research and reviews by scientific panels on the subject of health impacts of power line EMF, and concludes that the body of research does not suggest that magnetic fields are the cause of any adverse health outcome at the levels encountered in our everyday environments (Exhibit B-12, Appendix 57.3, p. 20). The report relied heavily upon WHO 2007, which provided the following conclusions:

“Acute biological effects [i.e., short term, transient health effects such as small shock (See section 3.2)] have been established for exposure to ELF [Extremely Low Frequency] electric and magnetic fields in the frequency range up to 100 kHz that may have adverse consequences on health. Therefore, exposure limits are needed. International guidelines exist that have addressed this issue. Compliance with these guidelines provides adequate protection. Consistent epidemiological evidence suggests that chronic low-intensity ELF magnetic field exposure is associated with an increased risk of childhood leukemia. However, the evidence for a causal relationship is limited, therefore exposure limits based upon epidemiological evidence are not recommended, but some precautionary measures are warranted (p. 355).”

(Exhibit B-12, Appendix 57.3, p. 21)

The 2007 Exponent report summarized the general recommendation of the WHO as follows:

“Countries are encouraged to adopt international science-based guidelines. In the case of EMF, the international harmonization of standard setting is a goal that countries should aim for (WHO, 2006). If precautionary measures are considered to complement the standards, they should be applied in such a way that they do not undermine the science-based guidelines (p.367).”

(Exhibit B-12, Appendix 57.3, p. 29)

#### 7.1.2 EMF levels with the Existing and Proposed Lines

FortisBC provided electric field calculations that indicate that levels will remain well below the ICNIRP guideline, and that there will be an increase from existing levels for the 40 Line and a decrease for the 75 Line and 76 Line (Exhibit B-1-1, Tab 4, p. 57).

FortisBC states that magnetic field levels are, and will be, well below the ICNIRP guidelines, and predicts that magnetic fields will decrease because of the increased height, compact transmission pole design, and higher operating voltage of the proposed new and upgraded lines (Exhibit B-1-1, Tab 4, p. 54).

FortisBC states that the OTR Project will be compliant with all recognized and applicable EMF standards of which it is aware (Exhibit B-3, BCUC 57.2). It describes the ICNIRP, WHO and Health Canada guidelines and conclusions, and confirms that these have not changed since the VITR Decision (Exhibit B-3, BCUC 57.1 and 57.3).

FortisBC relies on Health Canada's conclusions regarding EMF health risks, but acknowledged the concerns of some of its customers and included several precautionary mitigation measure in its proposed design, including compact transmission line construction, the double-circuiting of lines, and phase orientation to maximize field cancellation (Exhibit B-3, BCUC 59.3).

Measurements of EMF were provided in several IR responses, using different conductor heights and pole types. FortisBC reconciled the different EMF measurements (Exhibit B-11, BCUC 3.103.2) and filed the table shown below, which summarizes the most accurate estimates of EMF levels (Exhibit B-11, BCUC 3.103.3).

**Magnetic Fields Maximum and Edge of Right-of-Way  
(Reference IR: 57.6, 57.7, 57.8, 57.9, 57.10, 57.11)**

IR #	Configuration	Average Case Magnetic Field (mG)			Maximum Case Magnetic Field (mG)		
		Maximum On Right-of-Way	Edge of Right-of-Way (side)		Maximum On Right-of-Way	Edge of Right-of-Way (side)	
			East	West		East	West
	40 Line - Cross Section A at 161 kV (Existing)	17	2	7	71	10	31
	76 Line - Cross Section A at 161 kV (Existing)	37	5	20	109	15	58
57.6	40 Line - Cross Section B at 230 kV (Post OTR)	13	3	6	49	9	21
57.7	75 Line and 76 Line - Cross Section C at 230 kV (Post OTR)	8	1	1	38	7	7
57.8	75 Line and 76 Line - Cross Section E at 230 kV (Post OTR)	11	5	5	53	24	24
57.9	75 Line and 76 Line - Cross Section D at 230 kV (Post OTR)	15	11	11	74	54	54
57.10	76 Line High Capacity - Cross Section F at 230 kV (Post OTR)	37	11	11	183	54	54
57.11	76 Line High Capacity - Cross Section C at 230 kV (Post OTR)	20	7	9	101	33	44

7.1.3 Intervenors' Views

Intervenors' EMF concerns were limited to transmission lines on the RG Anderson to Vaseux Terminals section of the existing ROW, as the Upland route avoids current residential areas.

Mr. Harlington filed references to, and summaries of, a number of studies concerning the impact of EMF exposure on animal and human health (various C3 exhibits). He submits that there is a possible conflict of interest for some WHO scientists, and also cautions the Commission not to take the 2007 Exponent report as absolute. Mr. Harlington refers to the more stringent EMF exposure limits recommended in the Bioinitiative Report, and the minimum set-backs from power lines imposed in some jurisdictions (Harlington Argument, p. 8).

Mr. Harlingten's witness, Dr. Blank, testified that the Bioinitiative Report involved the scientists who generate the science, rather than being a secondhand assessment of the science (T3: 471). However, when asked for a recommendation regarding the OTR Project, he explained that, "I kind of part company, informally, with the Bioinitiative", and that the group had to come up with a consensus in order to make a recommendation of 1 mG and 1/10 of a microwatt per square centimetre, which "are very, very low values and certainly much lower than what's accepted" (T3: 473-74).

Dr. Blank admitted that he was "not quite sure what to do" in this case, and that he did not know the details of the magnetic field distribution. He declined to venture an opinion and stated that, even if he gave an opinion, it would only be one opinion and not that of an expert on power line construction. He concluded that, as a biologist, he thought that if FortisBC achieved the low magnetic field values it had estimated, then that would be an improvement (T3: 475-77).

Mr. Karow also cited the Bioinitiative Report's recommendation to lower EMF exposure limits to 1 to 2 mG, and submits that the "present ICNIRP/WHO and Health Canada EMF guidelines are not to be trusted..." (CORE Argument, para. 1, 6).

Some SOFAR members expressed their concern in written submissions and at the CIS about the possible health impacts of EMF if the OTR Project proceeds on the existing ROW. Both SOFAR panel members stated that EMF exposure was their prime concern if the new lines are located on the existing ROW (T3: 564), although one panel member also stated that he preferred the high capacity single circuit alternative (T3: 557-58) which would have a higher magnetic field at the east edge of the ROW than would the proposed alternative (Exhibit B-11, BCUC 3.103.3).

The SOFAR panel members acknowledged that they were aware of, and accepted, the presence of the existing line when they purchased their properties and that they were aware of FortisBC's evidence that EMF would be lower with the new lines, but stated that FortisBC's numbers were just theoretical and that they did not believe them (T3: 517-18, 521-22).

Ms. Kistner submits that exposure to EMF from the existing transmission line adversely affects her health and safety and that the transmission line should therefore be relocated. She further submits that the fact that EMF levels on the ROW edge will be reduced with the OTR Project is a flawed basis for Fortis BC's proposal to use the existing ROW (Kistner Argument, pp. 1-2).

### **Commission Determination**

The Commission Panel concludes that the EMF exposure guidelines established by the WHO, ICNIRP, and Health Canada provide a relevant and useful reference point for considering the safety of EMF levels from the proposed OTR Project, and finds no basis to support Mr. Karow's view that these guidelines are not to be trusted. The Commission Panel accepts the 2007 Exponent report as an update of EMF risk assessments and guidelines. Based on the evidence in this proceeding, including the testimony of Dr. Bailey and Dr. Blank, the Commission Panel finds no indication that guidelines are about to change.

The Commission Panel concludes that the evidence does not support Mr. Harlingten's submission that the Commission should disregard the WHO and Health Canada conclusions and establish lower EMF limits for the OTR Project. In particular, the Commission Panel finds no evidentiary basis for establishing magnetic field limits that are lower than the levels FortisBC expects from the proposed lines.

The Commission Panel accepts FortisBC's evidence that magnetic field levels from the existing and proposed lines are well below the guidelines. The evidence in this proceeding is that the magnetic field levels from the proposed lines will be lower than the existing lines on the ROW and at the edges of the ROW.

Much of the residents' concern about EMF appears to be based on misunderstanding, an unwillingness to accept, or disbelief of the evidence. The Commission Panel acknowledges these concerns but concludes that, because EMF exposure will decrease if the new lines are constructed, the OTR Project should result in reduced health concerns. **The Commission Panel finds that it is**

**reasonable to include the EMF mitigation measures proposed by FortisBC for the OTR Project, subject to the determinations regarding pole selection in Section 8.**

## **7.2 Corona Emissions**

FortisBC states that corona discharge from transmission lines generates both radio frequency and audible noise, but the audible noise is generally not a problem for transmission lines operating at voltages below 345 kV (Exhibit B-3, BCUC 1.55.2). FortisBC states that its transmission line design complies with Industry Canada Standards that limit radio noise field intensity (Exhibit B-8, BCUC 2.80.1).

Corona emissions are affected by conductor size and line configuration, and the types and condition of hardware used on line structures. Therefore, FortisBC has increased the proposed conductor size for the 75 Line/ 76 Line double circuit from “Drake” (785 kcmil) to “Bunting” (1192 kcmil), and plans to use corona-free suspension clamps and compression hardware in order to limit radio interference (Exhibit B-8, BCUC 2.80.1).

FortisBC states that the corona emissions from the new lines would be higher, but not significantly more noticeable, than the existing line (Exhibit B-9, BCUC 2.80.2).

FortisBC also states that the corona ion emissions are minimal and are below detectable levels at the ROW edge (Exhibit B-9, Harlington, 1.5.1) and that, although they will increase during wet weather, they will not be detectable at ground level on the ROW, due to the low level of emissions and dispersion (Exhibit B-11, Harlington, 2.1.1).

Mr. Harlington filed a study about corona ion emissions from high voltage power lines (Exhibit C3-29), and submits that corona ions are a health hazard because they attract pollutants and can then be inhaled (Harlington Argument, p. 7).

## **Commission Determination**

The Commission Panel concludes that FortisBC has included appropriate corona discharge reduction measures in its proposed OTR Project design. The Commission Panel does not find that the evidence supports Mr. Harlingten's submission that corona ion emissions from the OTR Project will have adverse health effects.

### **7.3 Property Impacts**

Some Intervenors expressed the view that transmission lines may affect property values for reasons that include health concerns associated with EMF exposure and aesthetics. As EMF and noise have been reviewed earlier in this Section, this part of the Decision will primarily address view impacts and the overall impact of transmission lines on property values.

There was no disagreement that the existing transmission line was constructed before most, if not all, of the SOFAR members made their decisions to purchase properties in the vicinity of the existing ROW (T3: 535). The concern for many Intervenors is the impact of the larger OTR Project.

A SOFAR panel member stated, "I accepted that it will be there, as long as I'm there", but explained that he did not imagine the upgrade proposed by FortisBC (T3: 495-96). He was concerned about both aesthetic and health impacts, stating that the most beautiful building site on his property would be affected if more imposing lines are constructed (T3: 502), but that EMF is more important (T3: 564).

A SOFAR panel member, who described himself as "the official representative for the SOFAR group" (T3: 482), considered the proximity of the existing line when he decided to purchase his property but then learned of the OTR Project as site preparation was starting. He stated that he was initially devastated by the view impact and then learned about EMF and became afraid of the health impact (T3: 484-86). Commenting on property values he stated that, when he bought his property, one reason he paid less for it was the existing transmission line (T3: 526), and that his



property value would increase if the existing ROW is released (T3: 560).

FortisBC states that it does not consider any perceived increase in property values due to removal of the line from the existing ROW to be relevant, as there is no benefit to either the OTR Project or the ratepayers (Exhibit B-1-1, Tab 4, p. 47). The Application includes a report by Interwest Property Services (“Interwest”) that addresses the impacts of the proposed and Upland alternatives on properties along the existing ROW (Exhibit B-1-3, Appendix K).

FortisBC’s property witness, who wrote the Interwest report, agreed that the existing line probably did have an impact on raw land values, but that it is highly unlikely that there would be any measurable incremental impact from the OTR Project (T2: 144, 258-59). He gave evidence that, because of the increased conductor height for the OTR Project, the view impact depends from which property you are viewing the lake and hills (T2: 145-46; Exhibit B-1-3, Appendix K, pp. 11-14). Referring to other transmission line upgrades, he stated that he is not aware of a property owner indicating that the steel towers are more offensive than H-frames (T2:140).

A number of photos were filed during the proceeding, some showing the existing line and others attempting to portray the proposed new lines (Exhibits B-1-1, Tab 4; B-22; B-23; C1-12). The Commission Panel’s visit to some of the areas near the existing ROW provided an additional perspective.

Regarding the impact of EMF on property values, the Interwest report concluded that, as the proposed line design is expected to “reduce EMF effects from the present lower voltage lines, there should not be any change in market values resulting from perceived health risks” (Exhibit B-1-3, Appendix K, p. 15).

## **Commission Determination**

The Commission Panel agrees that transmission lines may have a negative impact on property values but, where a proposed upgrade is on an existing ROW, the relevant consideration is the incremental impact.

As discussed earlier in this Section, the evidence is that EMF exposure will decrease if the new lines are constructed as proposed. The Commission Panel concludes that there would likely be no overall net incremental impact on property values resulting from perceived health risks.

The Commission Panel accepts FortisBC's opinion that some houses would have improved views and some would have more obstructed views if Alternative 1A is approved. There is no evidence that there will be a negative impact on property values as a group. There may be a small negative impact on the views from some specific properties, but the extent to which any negative impact on views may be offset by reduced EMF concerns cannot be determined.

Some property values in the vicinity of the existing lines would probably increase if the existing line is removed from the ROW and the Upland route used for the new lines. However, given the other public interest advantages of using the existing route, the potential benefit to private property owners is not a determinative factor.

## **7.4 Other Environmental and Social Impacts**

FortisBC describes its approach to impact assessment and management in sections 4.3.3, 4.3.4, 4.3.5 and 4.6 of the Application. An Environmental and Social Impact Assessment (ESIA) prepared for BC Hydro on behalf of FortisBC by Elements Network Inc. and attached as Appendix I, identifies environmental sensitivities, landowner impacts and potential stakeholder issues. Appended to the ESIA is an archaeological assessment. The Interwest report, attached as Appendix K, considers land use impacts, and the resulting costs and delays, of using the Upland route.

FortisBC includes a non-financial comparison of the alternatives in section 4 of the Application, in order to determine which alternative is the most cost-effective, as opposed to the least cost. Some of the factors in the comparison are addressed in other Sections of this Decision, while other issues, such as EMF and property values, have been reviewed earlier in this Section. Some additional factors, such as parks and recreation and public health, do not vary significantly among the alternatives. The remaining factors, i.e., First Nations, environmental, aesthetics and effects during construction, are reviewed below.

#### 7.4.1 First Nations

FortisBC submits that local First Nations support use of the existing ROW for the OTR Project (FortisBC Argument, para. 22, 23). The Penticton Indian Band informed FortisBC of its outstanding timber claim in the Upland area and wants FortisBC to use the existing ROW (Exhibit B-1-2, Appendix A, Item 16, p. 18). The Osoyoos Indian Band and the Okanagan Nation Alliance support the OTR Project, subject to it being on the existing ROW (Exhibit B-1-2, Appendix A, Item 12, p. 14 and Item 20, p. 26).

FortisBC states that the Upland route crosses traditional use areas of the First Nations and a pending claim to some land rights, and would require further consultation (Exhibit B-1-1, Tab 4, p. 46). FortisBC submits that it is concerned that the First Nations' positions regarding the Upland route could bring delays of at least two years to the OTR Project (FortisBC Argument, para. 24). The ESIA found that archaeological resources are present on, and adjacent to, the existing ROW, and that mitigation measures would be taken to protect these sites and to ensure that high potential areas around the sites are protected. There is also some potential for archaeological resources on the Upland route (Exhibit B-1-3, Appendix I, pp. 134-36).

SOFAR challenges FortisBC's assessment of the First Nations' impact on the project schedule, submitting that issues with the Penticton Indian Band "are matters of consultation and negotiation rather than showstoppers" (SOFAR & Wiltse Argument, p. 7). SOFAR and Wiltse offered no evidence in support of this opinion.

#### 7.4.2 Environmental Impacts

The ESIA provides a detailed assessment of the environmental impacts of the proposed Alternative 1A, and an overview of the Upland route (Exhibit B-1-3, Appendix I). Potential environmental impacts on the existing ROW include disturbances to wildlife, reduction or removal of vegetation, and effects on riparian habitat, and the ESIA identifies mitigation measures to minimize the impacts (Exhibit B-1-3, Appendix I, pp. 1-2).

The ESIA states that, on the Upland route, impact risk to riparian vegetation is significantly greater, three additional named streams would be crossed, and fish habitat is currently pristine. The entire Upland route has well-established natural forested vegetation communities associated with species at risk, which would be affected by construction activities and by the probable increased use and public access associated with a new ROW (Exhibit B-1-3, Appendix I, pp. 39-40).

The ESIA findings were forwarded to the project planning team for further analysis which resulted in the non-financial route comparison included in section 4 of the Application (Exhibit B-1-3, Appendix I, p. 63). In that comparison, Fortis BC assigns the highest environmental ranking to Alternative 1A, the second highest ranking to 1B, and lower rankings for alternatives using the Upland route (Exhibit B-1-1, Tab 4, p. 44). FortisBC stated that “the difference between the two routes 1A and 1B from an environmental perspective is primarily with the footprint during construction” (T2:174).

FortisBC submits that re-use of the existing ROW would be in keeping with Okanagan Shuswap Land Resource Management Plan (“LRMP”) objectives and strategies, while use of the Upland route would “reduce some quality habitat used by a variety of species in a pristine setting including at risk bird species such as the Williamson’s Sapsucker as well as the California Big Horn Sheep and other large mammals”. FortisBC states that a key concern is that use of the Upland route would provide undesired public access into pristine areas (Exhibit B-1-1, Tab 4, p. 46).

The Integrated Land Management Bureau (“ILMB”) prefers that the existing ROW be used, and states that consultation with First Nations, grazing leaseholders and the Ministry of Environment would be required for the Upland route (Exhibit B-1-2, Appendix A, Item 5, p. 6). FortisBC submits that ILMB tenure approval is uncertain due to conflict with area environmental objectives and strategies, and that the extent of environmental mitigation needed to obtain Upland ROW approval is also uncertain (Exhibit B-1-1, Tab 4, p. 49).

The Nature Trust of B.C. does not support the Upland route because in its view, it would result in significant degradation of habitat to Nature Trust owned conservation lands. It notes that the existing ROW, which passes through Nature Trust holdings, is in a degraded state and that any additional ROW would compound the habitat degradation (Exhibit B-1-2, Appendix A, Item 21, pp. 27-28).

Golden Hills Strata Plan K268 submitted that use of the Upland route would have “an irreversible, lasting, negative impact on the watershed for this area” and that several creeks and streams that it holds water rights to, for irrigation and domestic water supply, would be adversely affected by construction of the transmission line and by the improved access to the area for other users (Exhibits C14-1 and C14-2). No evidence was adduced in support of this view.

SOFAR challenged FortisBC’s portrayal of the Upland route as pristine, and its assessment of the environmental challenges associated with that route (T2: 156-57; T3: 490). SOFAR also submits that, because Golden Hills did not provide evidence to support their position, it should not be given any weight (SOFAR & Wiltse Argument, pp. 9-10). However, SOFAR did not submit any Information Requests to Golden Hills.

FortisBC submits that it is almost axiomatic that a brownfield corridor will cause less environmental harm than a greenfield corridor (FortisBC Argument, para. 30).

### 7.4.3 Aesthetics

FortisBC proposes to minimize the visual impact of the new lines by using streamlined monopoles and non-reflective conductors, which will improve their appearance relative to the least cost alternative, 1B, for residents and visitors (Exhibit B 1-1, Tab 4, pp. 46- 47). FortisBC submits that the visual impact of the new lines will be either similar to or better than what is there now (FortisBC Argument, para. 9).

FortisBC states that the Upland route alternatives 2A and 2B will have better aesthetics than the proposed alternative because they move away from developed areas (Exhibit B-1-1, Tab 4, pp. 44, 47), although the lines would be more visible to residents on the west side of Skaha Lake (Exhibit B-1-3, Appendix I, p. 55). Alternative 3 ranks lowest because it would maintain a presence on both the existing ROW and the Upland route (Exhibit B-1-1, Tab 4, p. 47).

### 7.4.4 Effects During Construction

FortisBC states that Alternatives 1A, 1B and 3, which use the existing route, would have somewhat higher construction impacts because of the proximity of development along several km of the route, but that no customer outages are expected during construction for any route alternatives (Exhibit B-1-1, Tab 4, p. 48). The Interwest report states that “notification of construction timing and compensation for construction damages should be expected for the facilities upgrade on the present route” (Exhibit B-1-3, Appendix K, p. 22).

### 7.4.5 Balancing Interests

In refining the transmission corridor, efforts were made to minimize impacts to wildlife, vegetation, watersheds and public use areas. FortisBC states that no significant environmental or community effects were identified for the majority of the proposed project Alternative 1A. (Exhibit B-1-1, Tab 4, pp. 52-53). FortisBC recognizes public concerns regarding the visual impact of the proposed lines in the area north of Shuttleworth Creek and, as a result, included the alternate route in its

Application. However, FortisBC notes that several other stakeholders indicated a preference for the upgraded lines to be located on the existing ROW (Exhibit B-1-1, Tab 8, pp.14-15).

FortisBC explained its preference for Alternative 1A over 1B in terms of seeking a balance of cost, reliability, environmental impact, other stakeholder concerns, including visual impact and EMF, to arrive at the most cost-effective solution (T2:178).

Several Intervenors addressed the issue of balancing conflicting interests.

BCOAPO submits that it is concerned about the increased costs to ratepayers of the Upland route, and aware of the need to avoid interference with First Nations claims affecting the Upland route. BCOAPO states that, if concerns of low-income ratepayers, First Nations and SOFAR members could be mitigated in a cost-effective and timely manner, then it would support such an option (BCOAPO Argument, para. 5). After reviewing the various positions of the parties, BCOAPO concludes that the OTR Project Alternative 1A should be approved (BCOAPO Argument, para.40).

As noted above, SOFAR challenged FortisBC's assessment of First Nations' concerns and of the environmental state of the Upland route, and disputed Golden Hills opinion regarding the impact on its water supply. SOFAR addresses concerns about ratepayer impacts by providing its own cost comparison and by raising the possibility of community contributions (SOFAR and Wiltse Argument, pp. 11-16). In support of its position, SOFAR and Wiltse refer to the City of Penticton and the RDOS letters in support of the Upland route.

The Regional District of Okanagan-Similkameen ("RDOS") supports the Upland route, although eight directors dissented on the motion (Exhibit C9-2). During the CIS, an RDOS director stated that the RDOS unanimously supports FortisBC in its effort to increase the power supply (T2A: 14-15), so it seems apparent that the dissents concerned the motion to oppose use of the existing ROW and/or the motion to intervene in the proceeding.

**Commission Determination**

The Commission Panel concludes that there are no insurmountable environmental or socioeconomic impacts associated with the proposed OTR Project on the existing ROW, and that an environmental management plan can mitigate many impacts.

The Commission Panel determines that the balance of impacts reviewed in Section 7.4 supports continuing use of the existing ROW. The Upland route would have lower impacts during construction and lower aesthetic impacts, but would have a greater impact on the environment and First Nations' interests.



## **8.0 ROUTING, POLE STRUCTURE AND TERMINAL STATIONS**

This Section discusses OTR Project elements relating to alternate transmission line routes, including the Wiltse realignment proposal, pole structure selection, and terminal and distribution stations.

### **8.1 Transmission Line Routing**

The transmission line component of the OTR Project comprises five distinct sections as illustrated at Exhibit B-1-3, Appendix C, p. 54:

1. Oliver Sub-station, (A), to Bentley Terminal, (B)  
These lines will be 63 kV feeds from Bentley to Oliver
2. 40 Line - Bentley Terminal to Vaseux Lake Tap (C), upgrade to 230kV
3. Vaseux Lake Tap to Vaseux Terminal (D)  
The lines to/from Vaseux Terminal will be 230 kV, upgraded from the current 161kV
4. 75 Line and 76 Line - Vaseux Lake Terminal to Shuttleworth Creek (E)
5. 75 Line and 76 Line - Shuttleworth Creek to RG Anderson Terminal (F)

The selection of an appropriate route and design for the transmission line component from Vaseux Lake Terminal to RG Anderson Terminal has been the most significant matter of public concern arising from the FortisBC Application. The Company summarizes its routing selection as follows:

“The OTR Project proposes that the 28 kilometre line remain on the existing right-of-way (established in 1965) along the east side of Skaha Lake, where it crosses 2 kilometres of farm acreage in the Shuttleworth Creek area and approximately 2 kilometres of vineyards and the Heritage Hills residential area south of Penticton. The remaining 24 kilometres are a combination of private and Crown land. This route is preferred because it is the most cost effective and has the least environmental impact of the routes considered.” (Exhibit B-1-1, Tab 1, pp. 2, 3)

### 8.1.1 Double Circuit Construction Between Vaseux and Anderson

FortisBC proposes that the existing 28 kilometres of 76 Line be reconstructed to a 230 kV transmission double circuit (75 Line and 76 Line). The new transmission lines will be on single braced-pole steel poles (double circuit construction) for normal length and straight spans, with steel davit arms or two steel poles for span turns and longer spans. The first 1.7 kilometres east of Vaseux Lake will be two sets of single poles before combining into double circuit structures. The double circuit structures are approximately 30 metres high, with conductors aligned to fit within the ROW, and the phasing configured to minimize the EMF at the ROW boundary. The new structures would be placed at approximately the same stationing as the existing ones.

(Exhibit B-1-1, Tab 4, pp. 11 – 12)

A number of residents whose homes and/or properties are situated in close proximity to the existing ROW on which FortisBC proposes to construct the upgraded transmission lines oppose the use of the existing ROW from Shuttleworth Creek to RG Anderson Terminal. A group intervention was undertaken by residents under the name of SOFAR. The grounds for the residents' opposition to the use of the existing ROW are primarily related to health impact concerns arising from EMF associated with electric transmission lines, together with concerns about the aesthetic (visual) impact on residential property and the perception of a related impact on property values. These issues are discussed in Section 7 of this Decision.

In response to the concerns expressed by the residents, FortisBC identified and evaluated five alternative routes and/or designs for consideration for the Shuttleworth Creek to RG Anderson section of the transmission line. The remaining section of Lines 75 and 76 from Vaseux Lake Terminal to Shuttleworth Creek would remain on the existing ROW. The alternatives are described and illustrated in the Application (Exhibit B-1-1, Tab 4, pp. 30–51; Exhibit B–3, pp. 166–79), and they are summarized as follows:

1. Alternative 1A: Existing brownfield (existing ROW) route 18.5 kilometres long with primarily a 30 metre high single steel pole two-circuit configuration (Cross Section C) located on the existing 40 metre wide ROW
2. Alternative 1B: Existing brownfield route 18.5 kilometres long with primarily a 30 metre high double circuit H-frame configuration (Cross Section E) located on the existing 40 metre wide ROW.
3. Alternative 2A: Upland greenfield route 19.2 kilometres long with primarily a 30 metre high single steel pole two circuit configuration (Cross Section C), requiring a new 40 metre wide ROW through tenured Crown land.
4. Alternative 2B: Upland greenfield route 19.2 kilometres long with primarily a 19 metre high two single-circuit, H-frame, steel pole circuit configuration (Cross Section D), requiring a new 51 to 60 metre wide ROW through tenured Crown land.
5. Alternative 3: Combination of existing brownfield route (18.5 kilometres) and Upland greenfield route (19.2 kilometres) with primarily a 19 metre high single-circuit steel pole H-frame configuration (Cross Section B) on each route. A new 40 metre wide ROW is required over Crown lands for the Upland route in addition to re-use of the existing ROW.

A comparison of the design and other features of each of the five alternatives for the Shuttleworth Creek to RG Anderson section is presented in the Application at Exhibit B-1-1, Tab 4, pp. 36-39.

Wiltse suggested an alternate route for the portion of the transmission line crossing their property near the RG Anderson Terminal. The Wiltse alternative route suggestion is discussed at Section 8.1.3 of this Decision.

FortisBC submits that, with respect to route selection:

“The existing route has been in place and in use since before most, if not all, SOFAR members acquired their properties in the vicinity of the right-of-way. Accordingly, the land values when they acquired their interests already took into account the existence of a right-of-way and of course, when those SOFAR members decided to live in the area, they did so taking into account the presence of the right-of-way. The new lines will reduce EMF levels even below those produced by the existing line. The continued use of the brownfield corridor will protect against the creation of an unnecessary greenfield corridor. It will also permit the project to be built in

a timely way. In short, FortisBC respectfully submits that there is not a reasonable argument for destroying upland habitat so that those who chose to buy and build near the existing right-of-way can now have it relocated elsewhere, at the expense of others and to the detriment of others.” (FortisBC Argument, para. 35)

FortisBC further submits that “...the evidence overwhelmingly supports utilizing the brownfield corridor with Alternative 1A, instead of relocating and constructing the lines on an upland (greenfield) route...” and that “...the Penticton hearing of this application...was particularly helpful in establishing the facts to demonstrate the safety and reasonableness of maintaining the brownfield corridor. Hopefully health concerns of open-minded attendees were put to rest so that the reasonableness of preserving the existing corridor could be recognized.” (FortisBC Reply, para. 36, 37)

The positions of the various Intervenors are summarised as follows:

SOFAR & Wiltse prefer the Alternative ‘2B’ or Upland route option for Shuttleworth to RG Anderson Terminal. SOFAR & Wiltse oppose the use of the existing ROW for this section of the transmission line. (SOFAR & Wiltse Argument, p. 2) The primary reasons for SOFAR’s opposition to this route are concerns about the health impacts of transmission lines related to EMF and the aesthetic/visual impact on property values. There seemed to be consensus amongst the SOFAR participants in the hearing that the most important concern was with respect to EMF. These matters, and other related socioeconomic and environmental impacts of the transmission line, are discussed in more detail in Section 7.

Wiltse submits that their ‘*preferred*’ route should be chosen. Alternatively, Wiltse states a willingness to accept their ‘*proposed*’ alternate route. Wiltse does not explicitly address routing or other transmission line considerations for sections of the line other than that crossing its property. (SOFAR & Wiltse Argument, p. 19)

Mr. Wait submits that additional ROW should be acquired, but does not indicate any route preference (Wait Argument, p. 3).

BCOAPO submits that the OTR Project should be approved with Alternative 1A along the existing ROW (BCOAPO Argument, para. 40).

Mr. Harlinton concludes that Alternative 2B on the Upland route is the 'best of both worlds' (Harlinton Argument, p. 10).

CORE submits that Alternative 2B is a 'win-win' solution (CORE Argument, p. 3).

Ms. Kistner, while not explicitly saying so, makes it clear that she prefers the Alternative 2A or 2B Upland Route (Kistner Argument).

### **Commission Determination**

The Commission Panel has carefully considered and weighed the evidence and views submitted by all parties with respect to the optimum routing for the transmission line components of the OTR Project. **The Commission Panel determines that, for the transmission lines from Vaseux Lake Terminal to RG Anderson Terminal, the use of the existing ROW, modified as discussed below, presents the solution that best balances the various and competing interests of all parties.**

The Commission Panel's reasons for its determination are based on its findings in earlier Sections of this Decision, summarized as follows:

- There has been a clearly established need for the OTR Project which is not disputed by any of the parties. (Section 4)
- The capacity limitations of the existing Okanagan transmission infrastructure bring the in-service date for the existing ROW into play as a significant factor. (Section 4)
- The socioeconomic and environmental mitigation measures and considerations included in the project design favour the selection of the existing ROW, including:

- Reduction of EMF from the existing low levels
  - Appropriate corona discharge reduction measures
  - Overall impact on property values is neutral
  - Avoidance of negative impacts with respect to First Nations, environmental and related matters associated with undertaking a new greenfield route.  
(Section 7)
- The capital and on-going operating costs associated with the use of the existing ROW, while not solely determinative, are projected to be less than the alternative Upland route. (Section 6)

### 8.1.2 Vaseux Lake Terminal To Bentley Terminal

The existing 40 Line will be reconstructed from single circuit 161 kV transmission line to a single circuit 230 kV transmission line. The existing 161 kV H-frame wood pole structures will be salvaged and replaced by new 17 metre high galvanized steel pole H-frame construction (Cross Section B) to reduce risk of outages due to wildfire. New structures would be placed at approximately the same stationing as the existing ones. (Exhibit B-1-1, Tab 4, pp.18 – 20).

FortisBC states: “The preferred route for the 230 kV rebuild of 40 Line from Vaseux Lake south to the new Bentley Terminal station is the existing ROW.” “...No reasons to modify the route were identified during the planning stage or during the public consultation process.” (Exhibit B-1-1, Tab 4, p. 40)

There were no issues raised in the course of the hearing with respect to the routing or pole structures along the existing ROW for the 230 kV upgrade for this section of the transmission line.

### **Commission Determination**

**The Commission Panel, having considered the evidence with respect to this element of the OTR Project, determines that the proposed routing and pole selection for the Vaseux Lake Terminal to Bentley Terminal portion of the OTR Project is appropriate.**

### 8.1.3 Wiltse Property

Wiltse, supported by the City of Penticton, proposes an alteration to the routing of part of the northern section of the OTR Project transmission line, near the RG Anderson Terminal, which crosses lands owned by Wiltse. The objective of the route change is to facilitate optimal development of lands, primarily for residential units, to meet the expected growth in population and related housing demand which the City is experiencing. The Wiltse land in question has been identified as desirable for near term development. FortisBC has requested further approval to its Application to modify the proposed routing within the Wiltse property if an agreement on a routing modification can be reached between the parties, and if Wiltse pays for the costs of the modification within specified timelines.

Wiltse's *preferred* realignment, as illustrated on the map at Exhibit C1-16, would relocate the transmission line away from the northeast corner of the Wiltse land and re-enter the Wiltse land toward the southwest corner of the property. An alternative re-routing of the transmission line, referred to as the *proposed* realignment, is illustrated on Exhibit C1-20. In cross-examination by FortisBC counsel, Mr. Wiltse indicated that the *proposed* realignment was intended to be constructed entirely on Wiltse land (T3:324 – 27). This matter was further discussed with the Commission Panel, and Mr. Wiltse stated "If the Commission rules against outside the property, [the *preferred* route] then we're prepared to look at this particular proposal with the altered [*proposed*] route. Mr. Wiltse agreed with FortisBC counsel that the relocation of the ROW is a developer's cost (T3:317), and indicated that "The only thing I'm concerned with is the escalation of the estimated costs" (T3:316).

In response to questions from BCOAPO Counsel, Wiltse's witness stated that no discussion had taken place with property owners, the Crown or First Nations who might be impacted or have an interest in the ROW requirements if the Wiltse *preferred* route were selected (T2: 297-99).

FortisBC summarises the discussions/negotiations with Wiltse as follows:

“Wiltse Holdings has agreed to work with FortisBC expeditiously to decide upon possible [ROW] relocation, with the understanding that FortisBC will be fully "transparent" in providing costing information to Wiltse Holdings. FortisBC is fully prepared to work with Wiltse Holdings on this basis in the hope that it can accommodate Wiltse Holdings. The limiting factor from the viewpoint of FortisBC will be time. If a Wiltse Holdings alternative route solution causes inordinate delay, FortisBC must weigh the interests of Wiltse Holdings as against all of its customers in the Okanagan who already require improved reliability in their service.”

(FortisBC Argument, para. 37)

FortisBC further states:

“...and FortisBC will proceed with respect to the Wiltse property in accordance with the remainder of the schedule in Exhibit C1-15, so that 30 days following CPCN approval, Wiltse Holdings Ltd. is to provide FortisBC a written approval to proceed, along with payment #1.” (FortisBC Argument, para. 38)

The Commission Panel notes that the initial payment requirement date of 30 days after the CPCN decision is based on the assessment referred to in Exhibit C1-15 having already being provided to Wiltse, prior to this Decision.

Wiltse takes the position with respect to the requested alternate route on Wiltse land that:

“Should the Commission not accede to the SOFAR and Wiltse request to relocate the corridor to the AUR, our clients have the following positions:

2. The OTR be relocated from its existing location on the Wiltse lands to another location to the east of the existing corridor, the routing of which is to be agreed upon between Wiltse and the Applicant. The new routing would enter and leave the Wiltse properties at the points where the existing line enters and leaves the Wiltse properties.” (SOFAR & Wiltse Argument, p. 19)



BCOAPO states that: “BCOAPO does not support moving the line off of the Wiltse property unless Wiltse Holdings covers the entire cost of relocating the lines and the relocation does not result in any delays to completion of the Project” (BCOAPO Argument, para. 39).

None of the other Intervenors specifically addressed the matter of the Wiltse request for a re-alignment of the transmission line away from that portion of the existing ROW which crosses the Wiltse land holdings.

### **Commission Determination**

The Commission Panel considers the time requirements to obtain ROW agreements and related approvals for the Wiltse *preferred* route to be problematic, and concludes that they would likely result in an unacceptable delay, inconsistent with the findings in Section 4.2 of this Decision.

The Commission Panel considers that the Wiltse *proposed* realignment represents an interesting and worthwhile convergence of public and private interests that can be beneficial. Wiltse Holdings Ltd, the owner of the property, stands to benefit financially. Wiltse will acquire additional development lands by way of the release of FortisBC’s existing ROW entitlement, and, apparently, from the enhanced value of the lands arising from the removal of the transmission line. Those factors, by themselves, would typically be given little weight in a case such as this, as they are clearly for the benefit of Wiltse, a private concern. However, the Commission Panel considers that the public interest is not harmed by the Wiltse proposal if it causes no delay and imposes no additional costs or other negative effects on the ratepayers.

The Commission Panel notes that the City of Penticton supports the Wiltse proposal because it makes additional lands available for residential development to meet the growth expectations of the City. The Commission Panel considers the needs of the City of Penticton to be part of the public interest, but gives more weight to the broader public interest, particularly that of the FortisBC ratepayers. In this case, there appears to be a reasonable prospect for an agreement between Wiltse and FortisBC which would eliminate any risk of FortisBC’s ratepayers having to bear any costs or other disadvantages relating to the realignment.

The Commission Panel therefore accepts the *proposed* Wiltse realignment, subject to the following conditions:

1. FortisBC and Wiltse shall proceed to negotiate an agreement for the terms and conditions, including timing matters. FortisBC and Wiltse will comply with the time schedule specified in Exhibit C1-15, and file with the Commission copies of any agreement and related undertakings with respect to the realignment arrangement within 7 days of the completion of the agreement.
2. The routing of the Wiltse realignment shall be entirely within the boundaries of the land holdings of Wiltse Holdings Ltd. and any of its affiliated organizations or persons.
3. The agreement between FortisBC and Wiltse shall accord with FortisBC's qualified acceptance (FortisBC Reply, para. 4 – 10) of Wiltse's backup position as stated in the SOFAR & Wiltse Argument at pages 19 and 20.
4. The ratepayers of FortisBC shall not be exposed to any risk of bearing any additional costs arising from the realignment relative to the costs which would be incurred by upgrading the existing ROW as otherwise approved in this Decision. Any costs related to such risks will be for the account of the shareholders of FortisBC and/or Wiltse, including, but not limited to, costs related to construction delays arising from inability to obtain rights of way equivalent to the existing ROW or any regulatory impediments which would not otherwise have been encountered by using the existing ROW.
5. The ROW agreement between FortisBC and Wiltse for the alternate route shall make provision for terms and conditions, including rights of access and upgrade, which are no less favourable to the FortisBC operating requirements than those in the existing agreement.
6. The agreement between FortisBC and Wiltse shall make provision for the terms, conditions and timing of the termination of FortisBC's existing ROW entitlements over lands no longer required for the purpose of the OTR Project as a result of the re-alignment agreement.
7. In the event that FortisBC and Wiltse are unable to agree within the specified time frame, the OTR Project will proceed along the existing ROW as otherwise determined in this Decision.

## 8.2 Pole Structure Selection, RG Anderson to Vaseux

The upgrade of the FortisBC transmission system from RG Anderson Terminal to Vaseux Lake Terminal includes replacing substantially all of the transmission towers along that route to facilitate the 230 kV infrastructure requirements. The various existing and proposed towers are described and illustrated in the Application (Exhibit B-1-1, Tab 4, pp. 32 – 34, and updated at Exhibit B-3, Attachment 42.1b). FortisBC proposes to use Cross Section C monopoles for substantially all of the RG Anderson Terminal to Vaseux Lake portion of the system, with H-frame structures (Cross Section B) being used for the Vaseux Lake to Bentley portion of the route. The selection of monopoles for a portion of the routing has a greater capital cost, but has been selected by FortisBC on the basis of being more aesthetically acceptable, using a smaller footprint on the ROW and being configured in a manner which decreases the level of EMF, together with other features (Exhibit B-1-1, Tab 4, pp. 36–39). Pole structure options for the various alternative routes for the RG Anderson to Vaseux Lake section are also included in the Application (Exhibit B-1-1, Tab 4, pp. 32 – 34, and updated at Exhibit B-3, Attachment 42.1b). FortisBC also considered double circuit H-frame (Cross Section E) structures for the existing brownfield route because they result in a lower cost option (Alternative 1B). However, this alternative was rejected because it occupies more of the ROW, and was considered to have lower mitigation of aesthetic and EMF aspects than Alternative 1A. (Exhibit B-1-1, Tab 4, pp. 32, 34)

In response to Information Requests (Exhibit B-8, BCUC 73.3), FortisBC has identified possible modifications to Alternatives 1A /1B, utilising a combination of H-frame (Cross Section E) and monopole (Cross Section C) structures in selected locations based on visual/aesthetic and other factors. In its response, FortisBC indicates that a minimum of 20 monopoles would be used on the RG Anderson – Vaseux Lake section, at a cost of some \$150,000 more per structure than the H-frame. This suggests an incremental cost of some three million dollars, plus applicable contingency, overhead, and inflation over the Alternative 1B cost estimate of \$129.9 million.

FortisBC agreed that it would be possible to use a mix of the single steel monopole and H-frame structures, but not if it represented a piecemeal checkerboard solution along the ROW, as it would then become complicated and costly to manage (T1: 249).

Some Intervenors expressed a strong preference for the Upland route, including the use of 18 metre wood H-frame poles (Option 2B). The only Intervenors to express a preference for pole types on the existing ROW were SOFAR and Wiltse. Both SOFAR panel members expressed a preference for the double circuit monopole for the Vaseux Lake to RG Anderson section (“I think in the end I would prefer the double circuit monopole to anything else...” (T3: 557); “Then it would be the monopole” (T3: 558)). SOFAR & Wiltse also state that “Cross Section C [the 30 metre steel monopole] ought to be used throughout” should the Commission not accede to its preference for the Upland route (SOFAR & Wiltse Argument, p. 19).

Mr. Wait makes a number of observations on the pole solution proposed by FortisBC for 75 Line and 76 Line. He states “I do not think that the 100 foot steel poles, with all the foundation support required and access problems for a built-up area, belong on the existing right-of way, if that can possibly be avoided (Wait Argument, pp. 1, 3). However, he offered no alternative solution to these poles.

FortisBC indicated that the proposed pole structure of any of the Alternatives under consideration could not be upgraded to handle an even higher voltage at a later date. If there was a need to move to a higher voltage in the future, the poles would have to be replaced again (T1: 190-91). There was no evidence indicating that a further upgrade of the transmission lines would be required in the foreseeable future.

Cost comparisons of the various Alternative routes and pole structures are discussed in Section 6.

## **Commission Determination**

**The Commission Panel determines that the transmission line component of the OTR Project, from RG Anderson Terminal to the Vaseux Lake Terminal shall be a combination of Alternatives 1A and 1B, comprising the use of Cross Section C monopole and Cross Section E H-frame pole structures. The selection of pole structure at various locations shall be based on the depiction at Exhibit B-8, Attachment A73.3, modified where appropriate to ensure that monopoles are used in areas of existing and feasible future development.**

The Commission Panel considers that using a combination of monopole and H-frame pole structures for the RG Anderson Terminal to the Vaseux Lake Terminal portion of the transmission line route best balances the socioeconomic, environmental and cost factors.

### **8.3 Terminal and Distribution Stations**

Additions of, and modifications to, terminal and sub-station facilities are proposed as elements of the OTR Project, and these are described in the Application at Exhibit B-1-1 Section 4.2.2. Intervenors raised questions regarding these various elements of the OTR Project, but no Intervenor except Mr. Wait challenged FortisBC's proposals or provided evidence that these physical infrastructure components are not appropriate for the OTR Project. Mr. Wait found it "somewhat strange that ... a new substation is required at Oliver" (Wait Argument, p. 1). However, he did not raise any Information Requests challenging the basic need for the new Bentley Terminal as integral to the transmission line upgrade to 230 kV. Mr. Wait also comments that "...There was an alternative that was never considered, due to the oral part of the hearing not dealing with the Engineering Design, except pole selection. I was unable to clarify many questions that I still had regarding the Oliver and Bentley Substations." (Wait Argument, p.2)

The Commission Panel notes that Mr. Wait did not take the opportunity at the Procedural Conference to suggest that another alternative to the OTR Project alternatives be included as an issue in the oral hearing, nor did he submit any evidence in support of his suggestions for alternative solutions.

### **Commission Determination**

The Commission Panel has reviewed the evidence and determines that the proposed terminal and distribution station elements are appropriate components of the OTR Project.

The Commission Panel considers that Mr. Wait's alternative, which seems to be somewhat implicit in his Information Requests, has been adequately addressed by FortisBC in its Information Request Responses to Mr. Wait. The Commission Panel does not accept Mr. Wait's alternative, or his proposal to impose a time extension for further investigation of his alternative.

## 9.0 SUMMARY OF KEY COMMISSION DETERMINATIONS

In reaching its determinations in this Decision, the Commission Panel has taken into account all relevant materials comprising the record of this proceeding, including the evidence of FortisBC and Intervenor, together with the Arguments and Reply provided by the parties. References in this Decision to specific parts of the record are intended to assist the reader in understanding the Commission Panel's reasoning relating to a particular matter and should not be taken as an indication that the Commission Panel did not consider and give appropriate weight to all relevant portions of the record with respect to that matter.

The Commission Panel has carefully considered and weighed the evidence and arguments of all parties participating in this proceeding, and has considered the distinction between the most cost-effective and the least-cost alternatives. The Commission Panel concludes that the OTR Project is the most cost-effective solution to the demonstrated need for transmission reinforcement in the Okanagan, and that it is in the public interest to approve the OTR Project, as modified by the determinations in this Decision.

The Commission Panel has concluded that the balancing of the competing interests and concerns of the public, ratepayers, affected residents and other private interests is best served by the following determinations:

The Commission Panel determines that:

1. The Application of FortisBC for a Certificate of Public Convenience and Necessity for the Okanagan Transmission Reinforcement Project is approved, subject to the determinations and directions in this Decision,
2. The routing of the FortisBC OTR Project shall follow, subject to the determination with respect to the Wiltse realignment proposal, the existing ROW.
3. The alternative routing of the OTR Project transmission component across the Wiltse property is subject to the conditions set out in Section 8.1.3 of this Decision.

4. The transmission line component of the OTR Project from Vaseux Lake Terminal to RG Anderson Terminal shall comprise a combination of Alternatives 1A and 1B as described in Section 8.2 of this Decision.
5. FortisBC shall file with the Commission an updated estimate of the costs of the project when the quantity of each type of pole structure has been determined, but in any event not later than March 31, 2009. In addition, FortisBC shall file an updated version of Exhibit B-8, Attachment A73.3, depicting the locations selected for the Cross Section C monopoles.
6. FortisBC shall comply with the reporting requirements as stated in Appendix A to Order C-5-08, issued concurrently with this Decision.
7. FortisBC shall file with the Commission Quarterly Progress Reports on the OTR Project showing planned versus actual schedule, planned versus actual costs, and any variances or difficulties that the OTR Project may be encountering. The Quarterly Progress Reports will be filed within 30 days of the end of each reporting period and will be generally as set out in Appendix A to Order C-5-08.
8. FortisBC shall file with the Commission, within six months of the end or substantial completion of the OTR Project, a Final Report that provides a complete breakdown of the final costs of the OTR Project, compares these costs to the updated cost estimate, and provides a detailed explanation and justification of all material cost variances.
9. Subject to paragraphs 7 and 8 above, the format and content of the Progress Reports and the Final Report will be determined by FortisBC in consultation with Commission staff, or by determination of the Commission.



**DATED** at the City of Vancouver, in the Province of British Columbia, this 2<sup>nd</sup> day of October 2008.

*Original signed by:*

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A.W.K. ANDERSON  
PANEL CHAIR & COMMISSIONER

*Original signed by:*

---

N.F. NICHOLLS  
COMMISSIONER

*Original signed by:*

---

M.R. HARLE  
COMMISSIONER



**BRITISH COLUMBIA  
UTILITIES COMMISSION**

**ORDER  
NUMBER C-5-08**



SIXTH FLOOR, 900 HOWE STREET, BOX 250  
VANCOUVER, B.C. V6Z 2N3 CANADA  
web site: <http://www.bcuc.com>

TELEPHONE: (604) 660-4700  
BC TOLL FREE: 1-800-663-1385  
FACSIMILE: (604) 660-1102

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

and

An Application by FortisBC Inc.  
for a Certificate of Public Convenience and Necessity  
for the Okanagan Transmission Reinforcement Project

**BEFORE:** A.W.K. Anderson, Panel Chair  
and Commissioner  
N.F. Nicholls, Commissioner October 2, 2008  
M.R. Harle, Commissioner

**O R D E R**

**WHEREAS:**

- A. On December 14, 2007 FortisBC Inc. ("FortisBC") applied (the "Application") to the British Columbia Utilities Commission (the "Commission") for a Certificate of Public Convenience and Necessity ("CPCN") for the Okanagan Transmission Reinforcement Project (the "OTR Project"); and
- B. FortisBC stated that the OTR Project is estimated to cost \$141.4 million and is required to alleviate system constraints, enhance reliability, and serve emerging load in the Okanagan region of FortisBC's service territory; and
- C. The OTR Project will replace the existing 28 kilometre 161 kilovolt ("kV") transmission line between Vaseux Lake and Penticton with two new 230 kV lines in double circuit configuration and upgrade 11 kilometres of 161 kV transmission line to 230 kV between Vaseux Lake and Oliver, all within the existing line corridor. Other major project components are upgrades to Vaseux Lake Terminal station near Oliver and RG Anderson Terminal station in Penticton to accommodate the voltage change from 161 to 230 kV, the construction of a new Bentley Terminal station approximately 300 metres from the existing Oliver Terminal station on Osoyoos Indian Band land, conversion of the Oliver Terminal station to a distribution substation, and installation of capacitor banks at the FA Lee and DG Bell Terminal stations in Kelowna; and
- D. By Order G-160-07 the Commission established a Regulatory Timetable for a Procedural Conference on February 27, 2008 in Penticton, BC; and

**BRITISH COLUMBIA  
UTILITIES COMMISSION**

**ORDER  
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- E. By Order G-35-08 the Commission established an Oral Public Hearing and Community Input Session for June 23, 2008 in Penticton, BC and a Regulatory Timetable; and
- F. By Order G-112-08 the Commission approved an extension of the Regulatory Timetable to the filing date for Intervenor Argument and FortisBC Reply Argument; and
- G. An Oral Public Hearing was held on June 23 and 24, 2008, and a Community Input Session was held on the evening of June 23, 2008 in Penticton; and
- H. FortisBC filed its Argument on July 3, 2008, Intervenor Arguments were submitted on July 17, 2008 and FortisBC filed its Reply on August 1, 2008; and
- I. The Commission Panel has considered the Application and the evidence and submissions presented on the Application, and has determined that a CPCN should be granted to FortisBC for the OTR Project subject to the conditions and directions set out in this Order and the Decision that is issued concurrently with it.

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

- 1. Pursuant to sections 45 and 46 of the *Utilities Commission Act* (the "Act"), a CPCN is granted to FortisBC for the OTR Project as described in the Application, subject to the determinations and conditions as set out in the Decision that accompanies this order.
- 2. The routing of the FortisBC OTR Project shall follow, subject to the Wiltse Holdings Ltd. ("Wiltse") realignment proposal, the existing right-of-way.
- 3. The alternative routing of the OTR Project transmission component across the Wiltse property shall comply with the determinations in Section 8.1.3 of the Decision.
- 4. The transmission line component of the OTR Project from Vaseux Lake Terminal to RG Anderson Terminal shall comprise a combination of dual circuit monopoles and dual circuit H-frame structure as described in Section 8.2 of the Decision.
- 5. FortisBC shall file with the Commission an updated estimate of the cost of the OTR Project when the quantity of each type of pole structure has been determined, but in any event, no later than March 31, 2009. In addition, FortisBC shall file an updated version of Exhibit B-8, Attachment A73.3 depicting the locations of the Cross Section C monopoles.

**BRITISH COLUMBIA  
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6. FortisBC shall comply with directions of the Commission Panel in the Decision that accompanies this Order.
7. FortisBC shall file with the Commission Quarterly Progress Reports on the OTR Project showing planned versus actual schedule, planned versus actual costs, and any variances or difficulties that the OTR Project may be encountering. The Quarterly Progress Reports will be filed within 30 days of the end of each reporting period and will be generally as set out in Appendix A to this Order.
8. FortisBC shall file with the Commission a Final Report, within six months of the end or substantial completion of the OTR Project, that provides a complete breakdown of the final costs of the OTR Project, compares these costs to the updated cost estimate, and provides a detailed explanation and justification of all material cost variances.
9. Subject to paragraphs 7 and 8 of this Order, the format and content of the Progress Reports and the Final Report will be determined by FortisBC in consultation with Commission staff, or by determination of the Commission.

**DATED** at the City of Vancouver, in the Province of British Columbia, this 2<sup>nd</sup> day of October 2008.

BY ORDER

*Original signed by:*

A.W. Keith Anderson  
Panel Chair and Commissioner

Attachment

FortisBC Inc.  
Certificate of Public Convenience and Necessity  
for the Okanagan Transmission Reinforcement Project  
Quarterly Progress Report

**Table of Contents**

**1. Project Status**

- 1.1.1 General Project Status
- 1.1.2 Major Accomplishments, Work Completed and Key Decisions Made
- 1.1.3 Project Challenges and Issues; Issues Currently Open, Date Opened, Dated Closed, Those Issues that are Past Due
- 1.1.4 Plans for Next Period
- 1.1.5 Site Photographs

**2. Project Schedule and Cost**

- 2.1.1 Project "S" Curve and schedule similar to Table A72.5 in Exhibit B-8 showing the budget at completion, actual cost to date, estimate to completion, estimate at completion, cost variance between estimated and budgeted cost at completion, schedule variance, percent budget spent, and percent complete. All values are to be shown in each report throughout the duration of the project.

**3. Project Schedule**

- 3.1.1 Milestone Summary with the planned finish date, actual finish date, variance in days, status
- 3.1.2 Procurement Summary with the planned finish date, actual finish date, variance in days, status
- 3.1.3 Contract Summary with the planned finish date, actual finish date, variance in days, status
- 3.1.4 Current Schedule
- 3.1.5 Schedule Summary
  - 3.1.5.1 Schedule Performance to Date
  - 3.1.5.2 Schedule Projection Going Forward
  - 3.1.5.3 Schedule Difficulties and Variances
- 3.1.6 Design Scope Change Summary with Description of Request, Explanation for Request, Request Amount, Approved Amount, Deferred Amount, Reject Amount, Under Investigation Amount.
- 3.1.7 Construction Scope Change Summary with Description of Request, Explanation for Request, Request Amount, Approved Amount, Deferred Amount, Reject Amount, Under Investigation Amount.

**4. Project Costs**

- 4.1.1 Project Cost Summary including explanation of variances
- 4.1.2 Financial Summary including explanation of variances
- 4.1.3 Summary of Individual Contracts (Construction and Procurement) Exceeding \$3M with Budget Amount, Award Amount, Approved Change Orders

**5. Project Resource Management**

- 5.1.1 Engineering Resources (Man-hours, Planned vs. Actual – non- cumulative) both in chart and table format. Provide explanation for variance and corrective action taken.
- 5.1.2 Construction Resources (Man-hours, Planned vs. Actual – non-cumulative) both in chart and table format. Provide explanation for variance and corrective action taken.

**6. Project Risks**

- 6.1.1 Current Project Risks
- 6.1.2 Risks Going Forward

**7. Stakeholder or First Nation Issues**

- 7.1.1 An ongoing cost report of all existing and new issues using the updated cost estimate as a budget. For each issue, the report should show “amount in capital budget”, “spent to date”, “estimate to complete”, “forecast total to complete”, and “variance”.
- 7.1.2 An Explanation of new issues and variances will be provided.

**LIST OF TABLES**

Table 1	Project Milestones
Table 2	Project Expenditure Summary, Table & Chart of CAPEX Cumulative Distribution Function showing an Updated Cost Estimate, Upper Bound (Cost Estimate), Current Forecast to Complete, Spent to Date (Escalation and Contingency are to be identified separately).
Table 3	Summary of Variances Greater than \$3M
Table 4	Summary of Contracts exceeding \$3M
Table 5	Summary of Outstanding Claims greater than \$3M
Table 6	Table of Project Risks including Risk Description & Explanation, Date Risk Originated, Date Risk Last Reviewed, Level/Severity of Risk, Mitigation Plan, Contingency Plan, Mitigation Cost Amount (including schedule delay), Contingency Reserve Amount Required, Total Contingency Reserve Required to Date, Contingency Reserve Remaining.





ACRONYMS AND ABBREVIATIONS

2007 Energy Plan	BC Energy Plan – A Vision for Clean Energy Leadership
2007/08 Capital Plan	2007-2008 Capital Expenditure Plan
AACE	Association for the Advancement of Cost Engineering
ac	Alternating Current
Act	<i>Utilities Commission Act</i>
AFUDC	Allowance for Funds Used During Construction
(the) Application	Proposed Okanagan Transmission Reinforcement Project
BCTC	British Columbia Transmission Corporation
BCUC	British Columbia Utilities Commission
CIAC	Contributions in Aid of Construction
CIS	Community Input Session
Commission	British Columbia Utilities Commission
(the) Company	FortisBC Inc.
CPCN	Certificate of Public Convenience and Necessity
EMF	Electric and Magnetic Fields
EPC	Engineering, Procurement, and Construction
ESIA	Environmental and Social Impact Assessment
FortisBC	FortisBC Inc.
Hz	Hertz
ICES	International Committee for Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ILM Decision	Interior to Lower Mainland Transmission Project Decision
ILMB	Integrated Land Management Bureau

**APPENDIX A**

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Interwest	Interwest Property Services
Kcmil	Thousand Circular Mil
km	kilometre(s)
LRMP	Land Resource Management Plan
LTEPA+	Amended and Restated Long-Term Energy Purchase Agreement
mG	milligauss
MVA	Mega Volt Amp
Mvar	Mega Volt Ampere Reactive; one million vars
NERC	North American Electric Reliability Corporation
NPV	Net Present Value
OTR	Okanagan Transmission Reinforcement
RAS	Remedial Action Schemes
RDOS	Regional District of Okanagan-Similkameen
ROW	Right of Way
SOFAR	South Okanagan for Alternate Route
SOK Project	South Okanagan Reinforcement Project
<i>UCA</i>	<i>Utilities Commission Act</i>
<i>UCAA 2008</i>	<i>Utilities Commission Amendment Act 2008</i>
Upland route	A viable alternative upland route was identified
VIGP	Vancouver Island Generation Project
VITR	Vancouver Island Transmission Reinforcement Project
WHO	World Health Organization
WHO 2007	World Health Organization review of June 2007
Wiltse	Wiltse Holdings Ltd

LIST OF APPEARANCES

G. FULTON, Q.C.	Commission Counsel
G. MACINTOSH, Q.C.	FortisBC Inc.
S. KHAN	B.C. Old Age Pensioners' Organization, <i>et al.</i>
K. CAIRNS	South Okanagan for Alternate Route Wiltse Holdings Ltd. Chris Danninger
B. SCHWARZ	Regional District of Okanagan Similkameen
R. ARMSTRONG	Golden Hills Strata Plan K268
H. KAROW	Coalition to Reduce Electropollution
C. HARLINGTEN	On His Own Behalf
D. FEHR	On Her Own Behalf
A. WAIT	On His Own Behalf
P. KREEFT	On His Own Behalf
L. DENBOER	City of Penticton

---

B. Williston T. Roberts D. Flintoff D. Chong	Commission Staff
R. Stubbings	Commission Contract Staff
H. Bemister	Allwest Reporting Ltd./Hearing Officer

**LIST OF WITNESSES**

P. Chernikhowsky  
D. Sam  
G. Barnett  
G. Shtokalko  
Dr. W. Bailey  
D. Grant  
S. Morck  
P. Dufour

**FORTISBC INC.**

Dr. M. Blank

**COLIN HARLINGTON**

R. Advocaat  
C. Danninger

**SOUTH OKANAGAN FOR ALTERNATE ROUTE**

E. Grifone  
T. Wiltse

**WILTSE HOLDINGS LIMITED**

IN THE MATTER OF  
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473  
and  
FortisBC Inc.  
Certificate of Public Convenience and Necessity  
for the Okanagan Transmission Reinforcement Project (“OTR Project”)

**EXHIBIT LIST**

<b>Exhibit No.</b>	<b>Description</b>
<i>COMMISSION DOCUMENTS</i>	
A-1	Letter dated December 18, 2007 and Order No. G-160-07 establishing a Procedural Conference and Regulatory Timetable
A-2	Letter dated January 9, 2008 clarifying the filing of Evidence prior to the Procedural Conference and the procedural process
A-3	Letter dated January 22, 2008 issuing Information Request No. 1 to FortisBC
A-4	Letter dated January 29, 2008 issuing response to Intervenor regarding redacted exhibit and reasons (Exhibit C1-2)
A-5	Letter No. L-3-08 dated February 12, 2008 issuing notification of time change for the February 27, 2008 Procedural Conference in Penticton, BC
A-6	Letter dated February 21, 2008 regarding the Procedural Conference format and issuing a Preliminary Issues List
A-7	Letter dated February 28, 2008 requesting notification when SOFAR and Wiltse Holdings Ltd. retain Counsel for proceeding
A-8	Letter dated March 7, 2008 responding to Mr. Harlingten’s (SOFAR) request for information on participant assistance/cost award budgets and correspondence filed prior to the Application being filed with the Commission
A-9	Letter dated March 7, 2008 issuing Order No. G-35-08 establishing the Regulatory Timetable and Issues List
A-10	Letter dated March 10, 2008 issuing an extension to the filing date for SOFAR’s Information Request No. 1

## APPENDIX C

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<b>Exhibit No.</b>	<b>Description</b>
A-11	Letter dated March 27, 2008 issuing Information Request No. 2 to FortisBC
A-12	Letter dated April 24, 2008 issuing Information Request No. 3 to FortisBC
A-13	Letter dated May 26, 2008 providing notice of the appointment of Mr. Michael R. Harle to the Commission Panel
A-14	Letter dated May 29, 2008 issuing Information Request No. 1 to SOFAR
A-15	Letter dated May 29, 2008 issuing Information Request No. 1 to Colin Harlinton
A-16	Letter dated May 29, 2008 issuing Information Request No. 1 to National Research Council of Canada
A-17	Letter dated June 3, 2008 providing procedural information to participants on the public hearing process
A-18	Letter dated June 16, 2008 response to FortisBC Inc. regarding Electric and Magnetic Fields at Oral Hearing
A-19	Letter dated July 23, 2007 and Order G-112-08 extending the filing dates for Intervenor Argument and FortisBC's Reply Argument
A-20	Letter dated August 11, 2008 granting Leave to File corrected Table 4-3-2A in Evidentiary Record

### *COMMISSION COUNSEL DOCUMENTS*

A2-1      **SUBMITTED AT HEARING** – Filing area map of the Heritage Hills area

### *APPLICANT DOCUMENTS*

B-1-1      FortisBC Inc. Application dated December 14, 2007 for a Certificate of Public Convenience and Necessity for the Okanagan Transmission Reinforcement Project

B-1-2      Appendices A to E as part of the FortisBC Inc.'s application for the Okanagan Transmission Reinforcement Project

B-1-3      Appendices F to K as part of the FortisBC Inc.'s application for the Okanagan Transmission Reinforcement Project

<b>Exhibit No.</b>	<b>Description</b>
B-2	Email dated January 8, 2008, filing the Capital Project Analysis NPV worksheet model as evidence for the Okanagan Transmission Reinforcement Project
B-3	Letter dated February 18, 2008, filing response to Commission's Information Request No. 1
B-4	Errata dated February 27, 2008 to Appendices B,C,G and Commission Information Request No. 1
B-5	Letter dated February 29, 2008 submission regarding SOFAR's Hearing Issues List
B-6	Letter dated March 19, 2008 filing response to the extension granted to SOFAR and Wiltse Holdings and subsequent Information Request responses
B-7	Letter dated April 17, 2008 filing Errata #2 to Information Request No. 1 (Exhibit B-3)
B-8	Letter dated April 17, 2008 filing responses to the Commission's Information Request No. 2 and Intervenors' Information Requests No. 1
B-9	Letter dated April 22, 2008 filing outstanding responses to the Commission's Information Request No. 2 and Intervenors' Information Requests No. 1
B-10	Letter dated May 13, 2008 filing Errata No. 3
B-11	Letter dated May 13, 2008 filing responses to the Commission's Information Request No. 3 and responses to Intervenors' Information Request No. 2
B-12	Letter dated May 29, 2008, filing response to the Commission's Information Request No. 2, Question 78.1 and filing Appendix R in response to the Commission's Information Request No. 1, Question 57.3
B-13	Letter dated June 4, 2008 filing response to the National Research Council of Canada's Information Request No. 1 (Exhibit C23-2)
B-14	Letter dated June 18, 2008 filing FortisBC's witnesses' Curricula Vitae
B-15	Letter dated June 18, 2008 from George Macintosh, Farris & Company, legal counsel, filing comments on proposed site tour
B-16	Letter dated June 19, 2008 filing Errata No. 4
B-17	Letter received June 19, 2008 filing FortisBC's Opening Statement

<b>Exhibit No.</b>	<b>Description</b>
B-18	Letter dated June 20, 2008 from FortisBC Counsel providing an outline of his Opening Statement
B-19	<b>SUBMITTED AT HEARING</b> – Filing Errata 5 for Exhibit B-1-3, Appendix 1 and Exhibit B-8
B-20	<b>SUBMITTED AT HEARING</b> – Filing copy of Section 13(1) of the Government Actions Regulations – Category of Species at Risk
B-21	<b>SUBMITTED AT HEARING</b> – Filing article “Myocardial Function Improved by Electromagnetic Field Induction of Stress Protein hsp70”
B-22	<b>SUBMITTED AT HEARING</b> – Filing photographs of line structure
B-23	<b>SUBMITTED AT HEARING</b> – Filing photographs of area
B-24	Filing of the Oral Hearing’s Undertaking #1 at Transcript Volume 2, Page 159; Undertaking #2 at Transcript Volume 2, Page 172; Undertaking #3 at Transcript Volume 2, Page 251; Undertaking #4 at Transcript Volume 3, Page 373
B-25	Letter dated July 23, 2008 filing request for extension to the filing date for the Reply Argument
B-26	Letter dated July 30, 2008 from George Macintosh, Farris & Company, legal counsel, filing comments and revised Table 4-3-2A
B-27	Letter dated July 30, 2008 from George Macintosh, Farris & Company, legal counsel, filing comments on amended Table 4-3-2A

*INTERVENOR DOCUMENTS*

C1-1	<b>ADVOCAAT, ROBERT / SOUTH OKANAGAN FOR ALTERNATE ROUTE (SOFAR)</b> – Online web registration received December 20, 2007 filing request for Intervenor Status
C1-2	Letter dated January 23, 2008, filing clarification on the purpose of the group, with response on procedural matters and submission of evidence (Exhibit A-2)
C1-3	Online web registration from Vaughn Denis, member of SOFAR, received January 31, 2007 filing request for Intervenor Status
C1-4	Online web registration from Matthew Hay, member of SOFAR, received January 31, 2007 filing request for Intervenor Status
C1-5	Submission of Hearing Issues List received February 28, 2008



Exhibit No.	Description
C1-6	Letter dated March 3, 2008 response to Exhibit A-7 will notify Commission when counsel is retained
C1-7	Letter dated March 14, 2008 filing notice of legal counsel and request for extension for filing Information Request
C1-8	Letter dated March 14, 2008 from Kelly A. Cairns, Thomas Butler, legal counsel filing notice to represent SOFAR
C1-9	Letter received March 28, 2008 filing Information Request No. 1 to FortisBC from Robert Advocaat on behalf of SOFAR
C1-10	Letter dated March 31, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, filing Information Request No. 1
C1-11	Letter dated April 24, 2008, filing Information Request No. 2 to FortisBC
C1-12	Letter dated May 20, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, notice to represent Intervenor Chris Danninger and filing written Evidence #1 of Wiltse Holdings, Chris Danninger & SOFAR
C1-13	Letter dated June 16, 2008 filing response to Commission Information Request No. 1
C1-13-1	Letter dated June 17, 2008 filing revised responses to Commission Information Request No. 1.4 and 4.2
C1-13-2	Letter dated June 19, 2008 filing Schedule B of the Penticton Official Community Plan with the Wiltse Holdings Ltd. lands superimposed on the map (ref. Exhibit C1-13)
C1-13-3	Power Line Realignment Onsite 2 (MAP) filed June 18, 2008
C1-14	<b>SUBMITTED AT PUBLIC HEARING</b> - Opening Statements from SOFAR and
C1-15	<b>SUBMITTED AT PUBLIC HEARING</b> – Assessment Estimate for relocation
C1-16	<b>SUBMITTED AT PUBLIC HEARING</b> - Copy of Powerline Realignment Submission Map – May 2008
C1-17	<b>SUBMITTED AT PUBLIC HEARING</b> - Copy of City of Penticton Map
C1-18	<b>SUBMITTED AT PUBLIC HEARING</b> - Copy of Powerline Realignment Submission Map – June 2008

<b>Exhibit No.</b>	<b>Description</b>
C1-19	<b>SUBMITTED AT PUBLIC HEARING</b> – Copy of City of Penticton Map
C1-20	<b>SUBMITTED AT PUBLIC HEARING</b> – Copy of the proposed powerline realignment of the Wiltse property
C1-21	<b>SUBMITTED AT PUBLIC HEARING</b> – Map of the Wiltse property as of June 20, 2008
C1-22	Letter dated July 15, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, filing Undertaking to BCOAPO at Transcript Volume 3, pages 512 to 516
C1-23	Letter dated July 25, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, filing comments on the procedural process
C1-24	Letter dated July 31, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, filing comments on the amendment to Table 4-3-2A (Exhibit B-26, Exhibit B-27)
C3-1	<b>HARLINGTON, COLIN</b> – Online web registration received December 20, 2007 filing request for Intervenor Status
C3-2	Letter dated March 2, 2008 response to Exhibit A-7 and questions regarding “Participants Guide”
C3-3	Letter dated March 17, 2008 filing comments on the procedural timetable
C3-4	Letter received March 26, 2008 filing Information Request No. 1 to FortisBC
C3-5	Letter received April 24, 2008 filing Information Request No. 2 to FortisBC
C3-6	Letter dated May 20, 2008 filing Evidence #1 – Protein and DNA reactions stimulated by electromagnetic fields report
C3-6a	Letter dated May 20, 2008 filing Evidence #1a – Scientific Papers on EMF issues
C3-7	Letter dated May 20, 2008 filing Evidence #2 – Occupational exposure to extremely low frequency electric and magnetic fields and Alzheimer Disease report
C3-8	Letter dated May 20, 2008 filing Evidence #3 – Altered blood chemistry and hippocampal histomorphology following prenatal exposure report
C3-9	Letter dated May 20, 2008 filing Evidence #4 – Fedrowitz Report on the Exposure of Fischer 344 rats to a weak power frequency magnetic field

<b>Exhibit No.</b>	<b>Description</b>
C3-10	Letter dated May 20, 2008 filing Evidence #5 – Bioinitiative Report – Summary for the Public
C3-11	Letter dated May 20, 2008 filing Evidence #6 – Lowenthal Report – Residential exposure to electric power transmissions lines
C3-12	Letter dated May 20, 2008 filing Evidence #7 – North of England/Pearce Report – Paternal occupational exposure to electro-magnetic fields
C3-13	Letter dated May 20, 2008 filing Evidence #8 – Budi Report – Effect of frequency on insulin response to electric field stress
C3-14	Letter dated May 20, 2008 filing Evidence #9 – Kabuto Case Study - Childhood leukemia and magnetic field in Japan
C3-15	Letter dated May 20, 2008 filing Evidence #10 – Juutilainen & Kumlin Report – Occupational magnetic field exposure and melatonin
C3-16	Letter dated May 20, 2008 filing Evidence #11 – Fadel Report – Growth assessment of children exposed to low frequency electromagnetic fields
C3-17	Letter dated May 20, 2008 filing Evidence #12 – Persinger Report – Potential multiple resonance mechanism by which weak magnetic fields affect molecules and medical problems
C3-18	Letter dated May 20, 2008 filing Evidence #13 – Don Maisch Case Study – Conflict of Interest & Bias in Health Advisory Committees
C3-19	Letter dated May 20, 2008 filing Evidence #14 – Blask Report – Melatonin-depleted blood from premenopausal women exposed to light at night study
C3-20	Letter dated May 20, 2008 filing Evidence #15 – Johansson Report – Electrohypersensitivity – State of the Art of a Functional Impairment
C3-21	Letter dated May 20, 2008 filing Evidence #16 – A Reproducible EMF Effect – Microwave News & Comment study
C3-22	Letter dated May 20, 2008 filing Evidence #17 – Press Release – Shiftwork that involves circadian disruption study
C3-23	Letter dated May 20, 2008 filing Evidence #18 – Stephen J. Genius Report – Fielding a current idea: exploring the public health impact of electromagnetic radiation

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<b>Exhibit No.</b>	<b>Description</b>
C3-24	Letter dated May 20, 2008 filing Evidence #19 – Robert J. Mairs et al Report – Microsatellite analysis for determination of the mutagenicity of extremely low frequency electromagnetic fields and ionising radiation
C3-25	Letter dated May 20, 2008 filing Evidence #20 – Michael Bevington Report – A review of the polarisation in attitudes towards research into the health dangers of non-thermal electromagnetic fields
C3-26	VOID
C3-27	Letter dated May 20, 2008 filing Evidence #22 – Public Health Officials urge precaution to limit cancer risk study
C3-28	Letter dated May 20, 2008 filing Evidence #23 – Blank & Goodman Study – BEMS, WHO and the Precautionary Principle
C3-29	Letter dated May 20, 2008 filing Evidence #24 – Henshaw Study – Corona ion emission from high voltage powerlines the key mechanisms governing the increased exposure to air pollution near high voltage powerlines
C3-30	Letter dated May 20, 2008 filing Evidence #25 – Henshaw Study – Powerline corona ions – their impact on human exposure to air pollution
C3-31	Letter dated June 16, 2008 filing response to Commission Information Request No. 1
C3-32	Received for filing June 18, 2008 the Curriculum Vitae of Dr. Martin Blank
C3-33	Email dated June 19, 2008 filing notice of Dr. Martin Blank attending as an expert witness
C4-1	<b>COALITION TO REDUCE ELECTROPOLLUTION (CORE)</b> - Letter dated December 29, 2007, from Hans Karow filing request for Intervenor status and comments
C4-2	Letter dated January 1, 2007, from Hans Karow filing revised cover letter request for Intervenor status
C4-3	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>
C4-4	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>
C4-5	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>
C4-6	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>
C4-7	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>
C4-8	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>

<b>Exhibit No.</b>	<b>Description</b>
C4-9	<b>REMOVED FROM THE RECORD – Please refer to Exhibit A-9</b>
C4-10	<b>NOT ISSUED</b>
C4-11	Email dated February 27, 2008 submitted at Procedural Conference
C4-12	Letter dated February 26, 2008 submitted at Procedural Conference
C4-13	Letter dated March 3, 2008 request to Mr. Paul Miller regarding Procedural Conference issues
C4-14	Letter dated March 27, 2008, filing Information Request No. 1 to FortisBC
C4-15	Letter dated April 24, 2008, filing Information Request No. 2 to FortisBC
C4-16	Letter dated April 24, 2008, filing supplemental Information Request No. 2a to FortisBC
C4-17	Letter dated May 29, 2008 filing Information Request No. 1 to SOFAR
C4-18	Letter dated June 19, 2008 filing comments on the EMF issues and proposed tour for the Commission Panel
C4-19	Letter dated June 20, 2008 noting that the values/numbers of the magnetic field in Figures A to E in FortisBC's responses to Karow IR-2, Attachment 4A (Exhibit B-11) are difficult to read
C4-20	<b>SUBMITTED AT PUBLIC HEARING</b> - Biography Resume of Hans Karow
C4-21	<b>SUBMITTED AT PUBLIC HEARING</b> – Opening Statement of Hans Karow
C5-1	<b>FEHR, DANIELA</b> – Online web registration received January 9, 2008 filing request for Intervenor Status
C5-2	<b>SUBMITTED AT HEARING</b> – Opening Statement of Daniela Fehr
C6-1	<b>DANNINGER, CHRIS</b> – Online web registration received January 10, 2008 filing request for Intervenor Status

**APPENDIX C**

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<b>Exhibit No.</b>	<b>Description</b>
C6-2	Email dated February 24, 2008, filing comments to FortisBC's response Information Request No. 1, Question 25
C6-3	Email received March 28, 2008 filing Information Request No. 1 to FortisBC
C6-4	Letter dated April 24, 2008 filing Information Request No. 2 to FortisBC
C6-5	Letter dated May 20, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, notice to represent Intervenor Chris Danninger and filing written Evidence #1 of Wiltse Holdings, Chris Danninger & SOFAR
C7-1	<b>GOODMAN-SLACK, BURL</b> - Fax dated January 11, 2008 filing request for Intervenor Status and Notice to Attend the Procedural Conference
C7-2	Letter dated February 26, 2008, unable to attend February 27, 2008 Workshop
C7-3	Letter dated June 19, 2008 advising cannot attend hearing, and providing comments to be entered into hearing record
C8-1	<b>McMANAMAN, TERRANCE</b> – Online web registration received January 22, 2008 filing request for Intervenor Status
C9-1	<b>REGIONAL DISTRICT OKANAGAN SIMILKAMEEN (RDOS)</b> - Online web registration received January 23, 2008 filing request for Intervenor Status
C9-2	Letter dated May 15, 2008 from Dan Ashton, Board Chair, confirming continuation of Intervenor Status
C9-3	Duplicate of C9-2
C9-4	<b>SUBMITTED AT PUBLIC HEARING</b> – Copy of powerpoint presentation entitled "Fortis Power Line Upgrade – An Alternative"
C10-1	<b>BRAESYDE FARM</b> - Online web registration received January 28, 2008 from Hugh Dunlop filing request for Intervenor Status

Exhibit No.	Description
C11-1	<b>WAIT, ALAN</b> - Online web registration received January 28, 2008 filing request for Intervenor Status
C11-2	Letter received March 27, 2008 filing Information Request No. 1 to FortisBC
C11-3	Letter received April 24, 2008 filing Information Request No. 2 to FortisBC
C11-4	<b>SUBMITTED AT HEARING</b> – Filing Appendix C of the Design Basis of May 2007
C12-1	<b>MASON, DAVID</b> - Online web registration received January 28, 2008 filing request for Intervenor Status
C13-1	<b>KREEFT, PAUL</b> - Fax received January 29, 2008 filing request for Registered Intervenor status
C13-2	Fax dated February 26, 2008 filing notice to address the route and private property impact
C14-1	<b>GOLDEN HILLS STRATA PLAN K268</b> – Letter dated January 28, 2008 filing request for Registered Intervenor status
C14-2	Letter dated May 21, 2008 filing evidence regarding water licenses for the watershed streams of Derenzy Creek, Matheson Creek and Harkin Creek
C15-1	<b>THE CORPORATION OF THE CITY OF PENTICTON</b> - Letter dated January 30, 2008 from Mayor Jake Kimberley, filing request for Registered Intervenor status for Leo den Boer, Chief Administrative Officer

**APPENDIX C**

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<b>Exhibit No.</b>	<b>Description</b>
C16-1	<b>WILTSE HOLDINGS LTD.</b> - Letter dated January 31, 2008 from Harold Wiltse, filing request for Registered Intervenor status
C16-2	Letter dated March 2, 2008, Wiltse Holdings retains Mr. Kelly Cairns of Thomas Butler Leclair Schauble as counsel.
C16-3	Email dated March 12, 2008 filing notice of change of email address
C16-4	Letter dated May 20, 2008 from Kelly Cairns, of Thomas Butler, legal counsel, notice to represent Intervenor Chris Danninger and filing written Evidence #1 of Wiltse Holdings, Chris Danninger & SOFAR
C16-5	Letter dated June 16, 2008 filing response to Commission Information Request No. 1 – WITHDRAWN Refiled as Exhibit C1-13
<b>See Intervenor C1 for subsequent filings</b>	
C17-1	<b>KOSTIC, ULRIKE</b> - Letter dated January 29, 2008 filing request for Registered Intervenor status
C18-1	<b>COLLINGWOOD, PAM</b> - Online web registration received January 25, 2008 filing request for Intervenor Status
C19-1	<b>KISTNER, VAL</b> - Online web registration received February 1, 2008 filing request for Intervenor Status
C20-1	<b>TOWNSEND, BRYAN</b> - Online web registration received February 1, 2008 filing request for Intervenor Status



Exhibit No.	Description
C21-1	<b>BRITISH COLUMBIA OLD AGE PENSIONERS' ORGANIZATION ET AL (BCOAPO)</b> - Letter dated February 1, 2008 requesting Intervenor Status for Sarah Khan, Counsel, and Bill Harper, Econalysis Consult
C21-2	Letter dated February 21, 2008 filing comments on the Procedural Conference and request for filing extension for Information Request and PACA budget estimate
C21-3	Letter dated March 27, 2008 filing Information Request No. 1 to FortisBC
C22-1	<b>JOST, HELMUT</b> – Online web registration received February 4, 2008 filing request for Intervenor Status
C23-1	<b>CASORO, RON - NATIONAL RESEARCH COUNCIL OF CANADA (NRC)</b> – Online web registration received May 21, 2008 filing request for Intervenor status
C23-2	Letter dated May 21, 2008 filing an Information Request regarding the Project
C23-3	Letter received June 16, 2008 filing comments on the route for the project

*INTERESTED PARTY DOCUMENTS*

D-1	Robson, Wishart & Scales, Kathy filing online web registration requesting Interested Party status
D-2	Graham, Paul filing online web registration received January 8, 2007 requesting Interested Party status
D-3	<b>KERR WOOD LEIDAL ASSOCIATES LTD.</b> – Online web registration received January 9, 2008 from Ron Monk filing request for Interested Party status
D-4	<b>ANTHONY, BRENDA</b> – Online web registration received January 16, 2008 filing request for Interested Party status

**APPENDIX C**

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<b>Exhibit No.</b>	<b>Description</b>
D-5	<b>MITCHELL, ADAM</b> - Email received January 24, 2008 filing request for Interested Party status
D-6	<b>DIRKS, RON &amp; BRENDA</b> – Online web registration received January 28, 2008 filing request for Interested Party status
D-7	<b>JACOBSON, DONNA</b> – Online web registration received January 28, 2008 filing request for Interested Party status
D-8	<b>KREEFT, ANNA</b> - Fax received January 29, 2008 filing request for Interested Party status
D-9	<b>OK IN HEALTH/ MARIA CARR</b> - Online web registration received February 25, 2008 filing request for Interested Party status
D-10	<b>CIMA+ ENGINEERING</b> - Online web registration from Jorge Lopez received April 15, 2008 filing request for Interested Party status

*LETTERS OF COMMENT*

E-1	Letter dated February 15, 2008, filing Letter of Comment faxed from Hildegard Spieldiener
E-1-1	Letter dated May 2, 2008 filing comments faxed from Hildegard Speildiener
E-2	Letter of Comment dated June 10, 2008 from Luke Thomson and Krunoslava Verhas, Okanagan Falls, BC
E-3	Letter of Comment dated June 11, 2008 from Howard Tracey, Okanagan Falls, BC
E-4	Letter of Comment dated June 16, 2008 from Dave Caughill