BEFORE THE

THE ALBERTA UTILITIES COMMISSION

Re: AltaLink Management Ltd.'s Application: Proposed Hanna Region Transmission Development – Hansman Lake	**Application 1606831 / Proceeding ID 979**

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Evidence of James R. Dauphinais

I. Introduction

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James R. Dauphinais. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017, USA.

Q WHAT IS YOUR OCCUPATION?

A I am a consultant in the field of public utility regulation and Principal of Brubaker & Associates, Inc., energy, economic and regulatory consultants.

Q PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A I have earned a Bachelor of Science in Electrical Engineering from the University of Hartford and have completed a number of graduate level courses in electric power systems through the Engineering Outreach Program of the University of Idaho. In the twelve and one-half years prior to the beginning of my current employment with BAI, I was employed in the Transmission Resource Planning Department of the Northeast Utilities Service Company. Since my employment with BAI in 1997, I have testified before the Federal Energy Regulatory Commission and many state commissions on a

wide variety of issues including, but not limited to, avoided cost calculations, certification of public convenience and necessity, fuel adjustment clauses, interruptible rates, market power, market structure, prudency, resource planning, standby rates, transmission rates, transmission line routing, transmission losses, and transmission planning. I have also assisted end-use customers with power procurement and assisted a variety of clients in regard to transmission access issues. My background is further detailed in Appendix A to my evidence.

Q PLEASE IDENTIFY THE MATTERS WHERE YOU IN THE PAST FILED EVIDENCE OR TESTIMONY REGARDING TRANSMISSION LINE ROUTING.

A I have in the past filed transmission line routing evidence or testimony in the following matters:

Jurisdiction	Applicant	Docket No.
PUCT[1]	Oncor Electric Delivery Company	37464
PUCT	LCRA Transmission Service Corporation	37778
PUCT	Oncor Electric Delivery Company	38140
PUCT	Lone Star Transmission, LLC	38230
PUCT	Sharyland Utilities, L.P.	38290
PUCT	Oncor Electric Delivery Company	38324
PUCT	LCRA Transmission Services Corporation	38354
PUCT	Oncor Electric Delivery Company	38597
MPSC[2]	International Transmission Company	U-16200

[1]Public Utility Commission of Texas
[2]Michigan Public Service Commission

Q ON WHOSE BEHALF ARE YOU PROVIDING EVIDENCE IN THIS PROCEEDING?

A I am providing evidence on behalf of Janine and Lee Boisvert, Amanda and Eldon Cook, Lana Fossen, Reany Laye, Bryon Mailer, Murray Masson and Tim McNalley (collectively, the "Hansman Lake Group"). A number of the members of the Hansman Lake Group own residences near AltaLink Management Ltd.'s ("AltaLink") Preferred Route from Node B11 to Node B35 and AltaLink's Connection Route from Node A20

to Node B20. In addition, one member of the Hansman Lake Group also owns and/or leases lands near: (i) AltaLink's Connection Route from Node A20 to Node B20 and (ii) AltaLink's Alternate Route from Node A10 to Node A22.[1]

Q WHAT IS THE SUBJECT MATTER OF YOUR EVIDENCE?

A My evidence addresses the application of AltaLink for a permit and license to construct and operate the AltaLink portion of a single-circuit, double-circuit capable[2] 240 kV transmission line that is proposed to be constructed between AltaLink's existing Hansman Lake substation (which is located just east of Metiskow, Alberta) and ATCO's existing Pemukan substation (which is located just west of Monitor, Alberta). The AltaLink portion of the proposed transmission line would run from Hansman Lake substation to AltaLink's boundary with the ATCO service area near the boundary between 37-5-W4 and 38-5-W4. AltaLink has proposed to construct the entire length of its portion of the transmission line on steel lattice tower structures.

At the request of the Hansman Lake Group's counsel, I evaluated: (i) the reasonableness of AltaLink's filed routes (Routes 1, 2, 3 and 4) and (ii) modifications to AltaLink's filed routes that yield alternate routes that in most respects have impacts substantially similar to AltaLink's filed routes, but also reasonably address the concerns of the Hansman Lake Group.

[1]In this evidence, I use the term "Preferred Route" for AltaLink's route from Node B0 to B35 (shown in red in the Application Appendix A maps), the term "Connection Route" for AltaLink's route from A20 to B20 (shown in orange in the Appendix A maps) and the term "Alternate Route" for AltaLink's route from Node A1 to Node A25 (shown in green in the Appendix A maps). AltaLink's filed preferred route, Route 1, would utilize AltaLink's Preferred Route in its entirety. AltaLink's filed alternate routes, Routes 2, 3 and 4, would use either AltaLink's Alternate Route in its entirety (Route 2) or various combinations of parts of AltaLink's Preferred, Connection and Alternate Routes (Routes 3 and 4). See Appendix A to AltaLink's Application and Figure 4-13 on page 52 of AltaLink's Application.

[2]The single-circuit line is proposed to be constructed on double-circuit transmission structures.

I would like to note that Mr. Cliff Wallis of Cottonwood Consultants Ltd. is separately sponsoring evidence on behalf of the Hansman Lake Group regarding the environmental impacts of AltaLink's proposed transmission line project.

Finally, my silence in regard to any issue should not be taken as an endorsement of any position taken by AltaLink with respect to that issue.

Q CAN YOU PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS?

A AltaLink has not adequately addressed the concerns of the Hansman Lake Group in consultation. Furthermore, my review of the available information shows that a viable route, that is in most respects substantially similar to AltaLink's filed preferred route, Route 1, can be developed by connecting AltaLink's Preferred Route from Node B0 to approximately 800 m north of Node B5 with AltaLink's Alternate Route from Node A20 to Node A25 via an approximately 8 km path that runs from just north of Node B5 to Node A20. This additional alternate route, which I will refer to as "Route BAI-1," reasonably addresses the concerns of the Hansman Lake Group while otherwise in most respects being substantially similar in impact to AltaLink's Route 1.

I recommend that the Alberta Utilities Commission ("AUC" or "Commission") not select a route for the proposed transmission line at this time and require AltaLink to complete development and analysis of an additional alternate route for the proposed transmission line that would generally follow the path of my recommended Route BAI-1, or, alternatively, my somewhat similar Route BAI-2.

If, despite my recommendation, the Commission chooses at this time to select a route from one of the four that have been filed by AltaLink, I recommend the Commission give serious consideration to selection of AltaLink's Route 2, which

utilizes AltaLink's Alternate Route from Node A1 to Node A25 in its entirety, over AltaLink's Routes 1, Route 3 and Route 4 because Route 2, like Routes BAI-1 and BAI-2, would address the concerns of the Hansman Lake Group by avoiding use of the Preferred Route from Node B11 to Node B35.

Finally, if, despite all these recommendations, the Commission selects for the proposed transmission line portions of AltaLink's Preferred Route that adversely affect the Hansman Lake Group (Node B11 to Node B35), I recommend the Commission require AltaLink to utilize steel monopole structures and minor route realignments in the immediate vicinity of the portions of the selected route that adversely affect the Hansman Lake Group in order to provide at least some limited degree of mitigation for those adverse impacts.

II. Route Selection Factors

Q WHAT FACTORS SHOULD BE CONSIDERED IN THE SELECTION OF A TRANSMISSION LINE ROUTE BY THE COMMISSION?

A Safety and health, cost, the impact on property owners, the impact on the environment, the impact on archeological and historic sites and the impact on aesthetics are all factors that should be considered. The transmission line route selection objectives and considerations presented in Alberta Environment's Environmental Protection Guidelines for Transmission Lines ("Alberta Environment R&R/11-03") should also be considered by the Commission. Finally, while they technically apply to ISO Needs Identification Applications rather than Transmission Line Applications, it is also appropriate to apply the agriculture impact, residential impact, environmental impact, cost, electrical consideration, visual impact and special constraints aspects of ND12 of Section 6.1 of AUC Rule 007.

Q SHOULD GREATER WEIGHT BE PLACED ON CERTAIN FACTORS VERSUS OTHERS?

A Yes. While all factors should be considered, some factors should be given more weight than others. For example, when practicable, it is desirable to route new transmission lines using existing linear developments such as road allowances, fence lines, quarter section and section lines, and existing transmission or utility corridors as outlined in Section 1.2 of Alberta Environment R&R/11-03. However, if two hypothetical alternative routes only differed in that one entirely ran along quarter lines and the other entirely ran along an existing transmission line corridor, it could not be said that the two routes have similar impacts as the existing transmission line corridor route is already impacted by existing transmission line infrastructure while the quarter line route is not likely to have been as significantly impacted by existing infrastructure. Thus, all else being equal, the route using the existing transmission line corridor would likely be a much better route for the proposed line than the one that utilized quarter lines.

As another example, if two hypothetical routes differed only in that one introduced significant health and safety concerns, but the other introduced significant aesthetic concerns, if a choice had to be made between the two lines, it is likely the route with greater aesthetic impact would be the better choice of the two routes.

Q WHEN WEIGHING THE FACTORS TO BE CONSIDERED, IS IT POSSIBLE THAT SUBSTANTIALLY BETTER PERFORMANCE WITH RESPECT TO ONE FACTOR CAN ULTIMATELY OUTWEIGH INFERIOR PERFORMANCE WITH RESPECT TO ANOTHER FACTOR?

A Yes. A hypothetical example of this would be when one route impacts a relatively small number of residences, but very little of its length runs along existing transmission line corridors. In such a circumstance, it may be appropriate to select a different route that impacts more residences if that route also significantly outperforms the other route in terms of minimizing the portion of its length that does not run along existing transmission line corridors.

III. AltaLink's Route Selection Analysis

Q PLEASE DESCRIBE THE METHODOLOGY ALTALINK UTILIZED TO DEVELOP ITS FILED PREFERRED AND ALTERNATE ROUTES IN THIS PROCEEDING.

A AltaLink used a process where it first developed preliminary routes and then vetted those preliminary routes through a stakeholder consultation process. To develop the detailed and final routes, AltaLink indicates adjustments were made to address specific local issues or take advantage of local opportunities (AltaLink's Application at page 35).

A. AltaLink's Preliminary Route Selection

Q PLEASE PROVIDE AN OVERVIEW OF THE PROCESS ALTALINK USED TO DEVELOP ITS PRELIMINARY ROUTES.

A AltaLink first identified a Study Area for the project. It then laid a grid corresponding the Alberta Township System ("ATS") quarter lines and road allowances over the

entire Study Area. Then, quarter line segments and road allowance segments were systematically eliminated as different constraints were considered. Segments were eliminated from the grid for the following specific reasons:

- The segment fell into one of the following "No Go" areas:
  - Registered urban municipal areas (cities, towns and villages);
  - Permanent lakes or other water features greater than four hectares in size;
  - Public road allowances;
  - Parks and protected areas; and
  - Historical Resource Value HRV-1 areas.
- The edge of the Right-of-Way ("R-O-W") of the segment was within 150 m of an identified existing residence (this ultimately did not eliminate any segments).
- The segment had three (3) or more existing residences within 800 M of the edge of the R-O-W.
- The segment is within 50 m of an active oil or gas well.
- The segment is within 800 m of Provincially-designated Environmentally Sensitive Areas ("ESA").
- The edge of the R-O-W of the segment was within 150 m of a school, hospital or daycare facility (this ultimately did not eliminate any segments).
- After applying the aforementioned constraints, the segment was left stranded from other segments that were connected with one another.

(AltaLink Application at pages 40 through 46)

Q WHAT REMAINED OF THE QUARTER LINE GRID IN THE STUDY AREA AFTER THIS SYSTEMATIC ELIMINATION OF SEGMENTS?

A As shown in Figure 4-9 of page 45 of AltaLink's Application, the majority of the grid was removed and the remaining grid provided no connectivity between AltaLink's Hansman Lake substation and the border between the AltaLink and ATCO service territories.

Q HOW DID ALTALINK RESOLVE THIS LACK OF CONNECTIVITY?

A AltaLink concluded that the majority of the quarter line segments that were eliminated in the west half of the Study Area were eliminated as a result of the large size and distribution of ESAs. It also determined the remaining contiguously connected quarter line segments restricted the development of straight route segments and would substantially increase the length of line and amount of turning structures required for potential transmission routes. This would increase the cost of the proposed line and, all else being equal, increase the adverse impacts of the proposed line.

As a result, AltaLink investigated the possibility of a more direct route from Hansman Lake substation to the border with ATCO utilizing previously eliminated quarter line segments. Specifically, after a detailed review of the ESA associated with Sunken Lake (ESA 345), AltaLink concluded that due to existing disturbances along the periphery of that ESA, a more direct route could be placed within 800 m of the edge of that ESA. Other ESAs were similarly reviewed by AltaLink. This resulted in the preliminary routes presented in Figure 4-11 on page 48 of AltaLink's Application, which consists of segments originally eliminated as a result of being: (i) within an ESA, (ii) 800 m from the edge of an ESA or (iii) isolated quarter lines that previously had no connectivity to segments that had not been removed in the initial screening (AltaLink's Application at pages 46 through 48).

Q WHAT IS YOUR OPINION OF ALTALINK'S PROCESS FOR DEVELOPING ITS PRELIMINARY PROPOSED ROUTES?

A AltaLink's process is biased toward the use of ATS quarter lines. It is true, as AltaLink notes on page 37 of its Application, that quarter lines sometimes demark

property or field boundaries. However, it is not always the case that quarter lines mark property boundaries (e.g., in the case of contiguously-owned quarter sections). Furthermore, most of the land in AltaLink's study area for the proposed transmission line (and all of it crossed by AltaLink's Preferred Route, Connection Route and Alternate Route) was identified as Aspen Woodland/Native Grassland or, to a limited degree, Disturbed Land for Forage, not Cropland (See Figure 8-2 of page 83 of AltaLink's Application). Thus, the reduction in adverse impact on cultivated lands benefit from using quarter lines that AltaLink notes on page 37 of the Application is not generally applicable for the transmission line proposed in this proceeding.

Considering all of the above, it is my opinion that the reasonableness of AltaLink's approach needs to be considered with a great deal of caution because it can overly emphasize the use of quarter lines and, as a result, exclude the possible use of diagonal routes that may in some cases have less net adverse impact than when following quarter lines.

B. AltaLink's Consultation Process and Final Selection of Proposed Routes

Q **PLEASE DESCRIBE HOW ALTALINK'S PRELIMINARY ROUTES EVOLVED DURING ITS STAKEHOLDER CONSULTATION PROCESS.**

A Figure 4-12 on Page 49 of AltaLink's Application shows the preliminary routes identified by AltaLink in the consultation materials it mailed to the public in March of 2010. AltaLink indicates in its Application that after the first round of its consultation with stakeholders, it made a number of adjustments (Application at pages 49-50). AltaLink notes that it considered the overall impact of each specific change on the entire route and the overall impact on local stakeholders (*Id.*).

By July 2010, the preliminary routes had been modified to as shown in Figure 4-14 of Page 54 AltaLink's Application. It is important to note that AltaLink at this stage had eliminated from further consideration any preliminary routes where existing residences fell within 400 m from the edge of the R-O-W (Attachment A to AltaLink's response to Information Request HLG.AML-001 at PDF Pages 45, 48 and 49). Stantec Consulting Ltd.'s September 2010 report to AltaLink titled "*Hanna Area Transmission Development: Hansman Lake 240 kV Project Preliminary Route Development*" specifically stated "[m]inimizing the number of residences within 400 m of the R-O-W edge is also a priority" (Attachment A to AltaLink's response to Information Request HLG.AML-001 at PDF Page 45). However, as I will discuss later, despite these route exclusions and the Stantec Consulting Ltd. Statement, AltaLink did not exclude from consideration routes whose edge of R-O-W is within 400 m of the currently under-construction residence of Tim McNalley.

Following further detailed development of its July 2010 proposed routes, AltaLink ended up with the four proposed routes it filed (Routes 1, 2 3 and 4) as shown in Figure 4-13 of Page 52 of AltaLink's Application. AltaLink's claimed assessment metrics for those four filed proposed routes are shown in Table 4-1 of Page 53 of AltaLink's Application. Largely based on those metrics, AltaLink selected Route 1 as its filed preferred route.

Q WERE THE CONCERNS OF MEMBERS OF THE HANSMAN LAKE GROUP ADEQUATELY ADDRESSED IN THE STAKEHOLDER CONSULTATION PROCESS?

A No. As detailed in the Evidence of Tim McNalley, the stakeholder concerns of the Hansman Lake Group members regarding use of all or some of AltaLink's Preferred

Route from Node B11 through Node B35 were not resolved in AltaLink's consultation with stakeholders. Of particular concern is that AltaLink has failed to count in its route assessment metrics the residences currently under construction by Mr. McNalley in NW-36-38-5-W4 and by Amanda & Eldon Cook in NE-36-38-5-W4. Mr. McNalley's residence is within 400 m of AltaLink's Preferred Route from Node B17 to Node B21, within 400 m of AltaLink's Connection Route from A20 to B20, and within 800 m of AltaLink's Preferred Route from Node B21 to Node B34.[3] The Cook's residence is located within 800 m of AltaLink's Preferred Route from B21 to B34.[4]

In addition to not counting the aforementioned under-construction residences, AltaLink has not been willing to seriously explore realignments that would ensure that its Preferred Route is at least 800 m from all of the residences of the members of the Hansman Lake Group.

Q PLEASE IDENTIFY THE LOCATION OF THE RESIDENCES OF THE HANSMAN LAKE GROUP THAT ARE WITHIN 800 M OF ALTALINK'S PREFERRED ROUTE.

A The location of the residences of the Hansman Lake Group that are within 800 m of AltaLink's Preferred Route are as follows:

[3]Mr. McNalley has estimated the location of his residence as being approximately 160 m due south of the south edge of Secondary Highway 600 and approximately 300 m due east of the east edge of AltaLink's Preferred Route from Node B20 to Node B21.

[4]Mr. McNalley has estimated the location of the Cook residence as approximately 480 m due south of the south edge of Secondary Highway 600 and approximately 1090 m due east of the east edge of AltaLink's Preferred Route from Node B20 to Node B21. This places Node B30 of AltaLink's Preferred Route at approximately 750 m from the Cook residence.

Member	Location of Residence	Closest Distance From AltaLink's Preferred Route	Sections of AltaLink's Preferred Route within 800 m
Boisvert[5]	SE-35-38-5-W4	< 800 m	B20-B21-B30
Cook	NE-36-38-5-W4	< 800 m	B21-B30-B34
McNalley	NW-36-38-5-W4	< 400 m	B17-B20-B21-B30-B34

For reference, I would note that two other members of the Hansman Lake Group, Fossen/Laye and Masson, also have residences near AltaLink's Preferred Route near sections B34-B35 and B11-B16-B17, respectively. The two residences are currently between 800 and 1600 m from the aforementioned AltaLink Preferred Route sections.

Q YOU INDICATED EARLIER THAT ONE OF THE MEMBERS OF THE HANSMAN LAKE GROUP OWNS OR LEASES OTHER LANDS IN OR NEAR ALTALINK'S FILED ROUTES FOR THE PROPOSED TRANSMISSION LINE. PLEASE PROVIDE MORE INFORMATION IN THIS REGARD AND INDICATE THE WILLINGNESS OF THIS MEMBER OF THE HANSMAN LAKE GROUP TO ACCEPT USE OF THOSE SECTIONS OF ALTALINK'S FILED ROUTES.

A Bryon Mailer, a member of the Hansman Lake Group and father of Hansman Lake Group member Janine Boisvert, owns or leases lands very near AltaLink's Connection Route from Node A20 to Node B20 and AltaLink's Alternate Route from Node A10 to Node A22.[6] While Mr. Mailer would prefer if these route segments were not used, he prefers selection of these route segments over those of AltaLink's Preferred Route from Node B11 to Node B35 because use of the former route

[5]The Boisvert residence is located in the northeastern portion of SE-35-38-5-W4. Map LP7 of Appendix L of AltaLink's Application places the Boisvert residence approximately 760 m from Node B21 of AltaLink's Preferred Route.

[6]Specifically, lands in NW-28-38-5-W4, SW-28-38-5-W4, SE-28-38-5-W4, NE-8-39-5-W4, SW-2-39-5-W4 and NW-8-39-5-W4.

segments would not adversely impact the residences of the Hansman Lake Group members.

IV. Proposed Route Realignments

Q HAVE YOU EXAMINED WHETHER THERE ARE ANY ROUTE REALIGNMENTS THAT COULD BE USED TO ADDRESS THE CONCERNS OF THE HANSMAN LAKE GROUP?

A Yes. I have identified two realignments that would utilize the portion of AltaLink's Preferred Route from B0 to approximately 800 m north of B5 and the portion of AltaLink's Alternate Route from A20 (or 800 m south of A20) to A25.

Route BAI-1, whose connection between segments of AltaLink's Preferred Route and segments of AltaLink's Alternate Route is shown in Blue in Exhibit JRD-1 would run as follows:

- On AltaLink's Preferred Route from Node B0 to approximately 800 m north of Node B5.
- From approximately 800 m north of Node B5 to approximately the southwest corner of NW-24-39-5-W4.
- From approximately the southwest corner of NW-24-39-5-W4 to approximately the northeast corner of SE-14-39-5-W4.
- From approximately the northeast corner of SE-14-39-5-W4 to approximately 800 m directly due north of Node A20 on AltaLink's Alternate Route roughly paralleling an existing diagonal linear disturbance.
- From approximately 800 m due north of Node A20 on AltaLink's Alternate Route to Node A20 on AltaLink's Alternate Route.
- On AltaLink's Alternate Route from Node A20 to Node A25.

Route BAI-2, whose connection between segments of AltaLink's Preferred Route and segments of AltaLink's Alternate Route is shown in Yellow in Exhibit JRD-1, would run as follows:

- On AltaLink's Preferred Route from Node B0 to approximately 800 m north of Node B5.
- From approximately 800 m north of Node B5 to approximately the southwest corner of NW-24-39-5-W4.
- From approximately the southwest corner of NW-24-39-5-W4 to approximately the northeast corner of NE-2-395-5-W4.
- From approximately the northeast corner of NE-2-39-5-W4 to approximately the northwest corner of NE-2-39-5-W4.
- From approximately the northwest corner of NE-2-39-5-W4 to approximately the southwest corner of NE-2-39-5-W4.
- From approximately the southwest corner of NE-2-39-5-W4 to AltaLink's Alternate Route approximately 800 m south of Node A20.
- On AltaLink's Alternate Route from approximately 800 m south of Node A20 to Node A25.

Q IN YOUR DESCRIPTION OF YOUR ROUTE BAI-1, YOU DESCRIBE A SECTION OF THE ROUTE THAT WOULD ROUGHLY PARALLEL AN EXISTING DIAGONAL LINEAR DISTURBANCE. CAN YOU PLEASE PROVIDE MORE INFORMATION IN THIS REGARD?

A Yes. As shown in my Exhibit JRD-2, the section of my proposed Route BAI-1 from the northeast corner of SE-14-39-5-W4 to 800 m due north of Node A20 on AltaLink's Preferred Route roughly parallels on existing diagonal linear disturbance (encircled in Purple on Exhibit JRD-2) which roughly runs from the water body which straddles the boundary between SE-14-39-5-W4 and SW-13-39-5-W4 to SE-4-39-5-W4. I have not been able to identify the exact nature of this existing linear disturbance. My understanding is Hansman Lake Group witness Cliff Wallis intends to examine the exact nature of this linear disturbance prior to the hearing in this proceeding. Regardless, the linear disturbance exists and rough paralleling of it should help to

reduce any adverse impacts that may be related to the diagonal nature of the relevant section of Route BAI-1.

Q PLEASE EXPLAIN WHY YOUR ROUTE BAI-2 MANEUVERS AROUND THE NORTH AND WEST EDGE OF NE-2-39-5-W4?

A Quarter NE-2-39-5-W4 contains an extensive number of oil and/or gas wellsites. It would be very difficult to navigate between them all in that quarter while maintaining a 50 m clearance between the transmission line and those wellsites. Based on the information available to me (Map LP6 of Appendix L of AltaLink's Application), it appears that running Route BAI-2 along the north and west periphery of NE-2-39-5-W4 will likely allow separation of approximately 50 m between the centerline of the transmission line and nearby oil and gas wellsites.

Q HAVE YOU DEVELOPED A TABLE OF ROUTE ASSESSMENT METRICS SIMILAR TO TABLE 4-1 ON PAGE 53 OF ALTALINK'S APPLICATION THAT COMPARES THE ATTRIBUTES OF YOUR ROUTES BAI-1 AND BAI-2 TO ALTALINK'S FILED ROUTES 1, 2, 3 AND 4?

A Yes. Based on the information provided by AltaLink in its Application and in response to Information Requests in this proceeding, I analyzed Routes BAI-1 and BAI-2 and developed Table JRD-1 below. Note that in this table I have added in the currently under construction residences of McNalley and Cook that should have been reflected in AltaLink's route analysis, but were not. In addition, I have added the additional metric of Residences within 400 m of R-O-W Edge to provide greater granularity to the analysis of residence proximity and to reflect the priority associated with

minimizing residences within 400 m of the edge of R-O-W as noted in the Stantec Consulting Ltd. September 2010 report to AltaLink that I have previously mentioned.

I would note that Mr. McNalley has the only residence located within 400 m from R-O-W edge. The next nearest residence to any of the routes in Table JRD-1 is approximately 700 m from R-O-W edge. The placement of the proposed transmission line at approximately 700 m from that residence is unavoidable for any of the routes in Table JRD-1 since the residence in question is located within approximately 700 m of Hansman Lake Substation (PDF Page 68 of Schedule A to AltaLink's response to Information Request HLG.AML-001).

Table JRD-1 – Hansman Lake Path Assessment Metrics as Adjusted and Expanded by BAI

Major Aspects and Considerations	Route 1	Route 2	Route 3	Route 4	Route BAI-1	Route BAI-2
Agriculture						
Cultivated Land Crossed (km)	0	0	0	0	0	0
Forage Land Crossed (km)	0	0	0	0	0	0
Residential						
Residences within 150 m of centreline	0	0	0	0	0	0
Residences within 400 m from R-O-W edge	1	0	1	1	0	0
Residences within 800 m from R-O-W edge	5	5	4	6	3	4
Environmental						
Surface Water in or within 800 m from R-O-W edge (ha)	53	32	64	46	TBD	TBD
Native Vegetation Crossed (km)	10	21	14	24	TBD	TBD
# of Designated Environmentally Significant Areas within R-O-W	2	3	2	3	2	2
Transmission line within ESA's (km)	7	14	8	11	7.5	9
Sensitive Wetland Areas in or within 800 m from R-O-W edge (ha)	53	322	64	324	TBD	TBD
R-O-W Length NOT Paralleling Existing Transmission Lines (km)	21	25	25	29	22	23
Technical						
Parallel Existing Transmission Lines >= 240 kV (km)	0	7	0	7	0	0
Visual						
Residences 0 - 150 m of centreline	See "Residences Within 150 m of R-O-W centreline"					
Residences within 400 m from R-O-W edge	See "Residences Within 400 m from R-O-W edge"					
Residences within 800 m from R-O-W edge	See "Residences Within 800 m from R-O-W edge"					
R-O-W Length NOT Paralleling Existing Transmission Lines (km)	See "R-O-W Length NOT Paralleling Existing Transmission Lines"					
R-O-W Length on Steel Lattice Towers (km)	21	32	25	36	22	23
Socio-Economic						
Historical Resources in or within 800 m from R-O-W edge	0	0	0	0	0	0
Airports in or within 800 m from R-O-W edge	0	0	0	0	0	0
Aggregate Areas in or within 800 m from R-O-W edge	0	0	0	0	0	0
DND Areas in or within 800 m from R-O-W edge	0	0	0	0	0	0
Additional Construction Metrics						
R-O-W Length (km)	21	32	25	36	22	23
A Towers <1 Degrees (#)	55	87	65	93	57	59
B Towers >=1 to <15 Degrees (#)	0	12	1	13	0	0
E Towers >=15 to <45 Degrees (#)	2	2	2	3	4	2
F Towers >=45 Degrees (#)	6	7	8	8	4	8
Cost						
Total Cost (Millions of $)	35.6	51.6	41.2	54.6	36.4	40.3

Notes:

1. The Residential impact metrics have been updated to include currently under-construction McNalley and Cook residences.
2. Visual impact metric expanded to capture distance of R-O-W not paralleling existing transmission lines and distance of R-O-W on steel lattice towers.
3. ESA metrics are based on AltaLink's identification of designated ESAs as detailed in AltaLink's Application including Figure 3 of Appendix R-2.
4. Route BAI-1 and BAI-2 cost estimates are based on R-O-W length and turning structure changes from Route 1.
5. If Route BAI-1 and BAI-2 cost estimates were instead based on changes to Route 3, which has a general path closer to Routes BAI-1 and BAI-2 than Route 1, the estimated total cost for Routes BAI-1 and BAI-2 would respectively be $34.4 million and $38.3 million.

V. Conclusions and Recommendations

Q WHAT DO YOU CONCLUDE BASED ON YOUR ANALYSIS SUMMARIZED IN TABLE JRD-1?

A Based on the information provided by AltaLink in its Application and in response to Information Requests in this proceeding, Route BAI-1, which addresses the Hansman Lake Group's concerns by placing the edge of the R-O-W of the proposed transmission line at least 800 m away from all of the Hansman Lake Group's residences, is otherwise in most respects substantially similar to AltaLink's Route 1 and superior to AltaLink's other filed routes (Routes 2, 3 and 4) and my Route BAI-2.

Route BAI-1 is estimated to be only approximately 1 km longer than Route 1. In addition, Route BAI-1 and Route 1 have a similar number of major turning structures[7] and Route BAI-1 is estimated to have only two more less than one degree towers than Route 1. As a result, I estimate the cost difference between Route BAI-1 and Route 1 will be less than $1 million. Routes 2, 3 and 4 are approximately 3 km to 14 km longer than Route BAI-1 and have one to three more major turning structures than Route BAI-1. As a result, these three filed routes have an estimated cost that is approximately $5 million to $18 million more than Route BAI-1.

Route BAI-1 has no residences within 400 m and only 3 residences within 800 m of the edge of R-O-W. Route 1 has one residence within 400 m and four other residences within 800 m of the edge of R-O-W. Route 2 avoids the concerns of the Hansman Lake Group, but has five residences along its length within 800 m of the edge of R-O-W. Route 3 has one residence within 400 m and three other residences within 800 m of the edge of R-O-W. Route 4 has one residence within 400 m and five other residences within 800 m of the edge of R-O-W.

[7] By "major turning structures," I mean towers with an angle of 15 degrees or more.

Based on AltaLink's identification of ESAs, only 0.5 km more of Route BAI-1 would lie within ESAs than Route 1. Routes 2, 3 and 4 would have 0.5 to 6.5 km more distance within ESAs identified by AltaLink than Route BAI-1.

Q HOW DOES YOUR ROUTE BAI-2 COMPARE TO ROUTE BAI-1?

A While it resolves the concerns of the Hansman Lake Group, it is a bit inferior than Route BAI-1. Its estimated cost is approximately $4 million higher than that of Route BAI-1 despite only being approximately 1 km longer than Route BAI-1 because it has two additional major turning structures. In addition, it has one additional residence within 800 m than Route BAI-1.[8] Finally, it has an additional 1.5 km of distance in AltaLink's identified ESAs than Route BAI-1. However, Route BAI-2 is still superior in most respects to AltaLink's filed Routes 2, 3 and 4, which makes Route BAI-2 a good alternative to Route BAI-1.

Q HAS MR. WALLIS COMMENTED ON ROUTE BAI-1 OR BAI-2 IN HIS EVIDENCE?

A Mr. Wallis has provided evidence on Route BAI-1. He has also provided some limited evidence, in the form of his Figures 10, 11 and 12, regarding Route BAI-2 as that route existed before I modified it to maneuver around the north and west edges of NE-2-39-5-W4 to avoid known oil and gas well sites.

Mr. Wallis estimates that Route BAI-1 impacts approximately 2.4 km more of the ESAs he has identified than Route 1 (Evidence of Wallis at Table 3). However, he notes much of diagonal distance of Route BAI-1 follows existing linear disturbances. In addition, Mr. Wallis estimates Route 2 and Route 3 impact 2.0 to 7.7 km more of the ESAs he has identified than Route BAI-1 (*Id.*).

[8]This additional residence would be approximately 710 m from Route BAI-2 based on my review of Map LP6 of Appendix L of AltaLink's Application.

In addition, Mr. Wallis focuses a significant portion of his evidence on sensitive sand dune environment impacts. He presented evidence showing that 3.0 km more of Eolian deposits[9] would be intersected by Route 1 than by Route BAI-1 (Evidence of Wallis at Table 4). While Routes 2 and 3 would intersect 0.2 to 1.4 km less of Eolian deposits than Route BAI-1, as I have noted, these two routes will impact 2.0 to 7.7 km more of the ESA identified by Mr. Wallis (Evidence of Mr. Wallis at Tables 3 and 4).

Mr. Wallis concludes by noting all the routes pose significant environmental problems and detailed evaluation is needed if terrain sensitivities and environmental significance of the area are to be properly addressed in routing mitigation. He also goes on to note that my Route BAI-1 and a more easterly route he has proposed (shown in Black in my Exhibit JRD-1) show that it is likely that significant improvements could be made to the various routes which would result in less fragmentation and impact on globally threatened aspen parkland habitants and environmentally significant areas and avoidance of the most sensitive sand dune terrain.

In short, Mr. Wallis' evidence supports Route BAI-1 as a viable alternative to Routes 1, 2, 3 and 4 from an environmental perspective.

Q HAVE YOU PERFORMED A DETAILED DEVELOPMENT OF YOUR ROUTES BAI-1 AND BAI-2?

A No. I have not obtained sufficient information from AltaLink to do so. However, based on the analysis that I have performed for Routes BAI-1 and BAI-2, it would be possible for AltaLink to perform a detailed development of routes that generally follow the path of my Routes BAI-1 and BAI-2.

[9]Areas of wind deposited sand.

Q HAVE YOU REVIEWED THE EASTERN REALIGNMENT LAID OUT BY MR. WALLIS IN HIS EVIDENCE?

A Yes. I show the eastern realignment in Black in my Exhibit JRD-1 just to the right of AltaLink's Preferred Route. While the eastern realignment has certain environmental benefits, it unfortunately creates more severe residence impact issues than even those faced by AltaLink's Routes 1, 3 and 4. Specifically, Mr. Wallis' eastern realignment would run well within 400 m of the Cook residence in NE-36-38-5-W4 and the Masson residence in SE-7-39-4-W4. As a result, from a residence impact perspective, this eastern realignment is not a viable alternative that would resolve the concerns of the Hansman Lake Group.

Q WHAT DO YOU RECOMMEND TO THE COMMISSION?

A I recommend that the Commission not select a route for the proposed transmission line at this time and require AltaLink to complete development and analysis of an additional alternate route for the proposed transmission line that would generally follow the path of my recommended Route BAI-1, or, alternatively, my somewhat similar Route BAI-2.

If despite my recommendation, the Commission chooses at this time to select a route from one of the four that have been filed by AltaLink (Routes 1, 2, 3 and 4), I recommend the Commission give serious consideration to selection of AltaLink's Route 2, which uses AltaLink's Alternate Route from Node A1 to Node A25 in its entirety, over AltaLink's Route 1, 3 and 4 because Route 2, like Route BAI-1 and BAI-2, would address the concerns of the Hansman Lake Group by avoiding use of AltaLink's Preferred Route from Node B11 to Node B35.

Finally, if despite my additional recommendation regarding Route 2, the Commission selects for the proposed transmission line portions of AltaLink's Preferred Route that adversely affect the Hansman Lake Group (Node B11 to Node B35), I recommend the Commission require AltaLink to utilize steel monopole structures[10] and minor route realignments in the immediate vicinity of the portions of the selected route that adversely affect the Hansman Lake Group in order to at least provide some limited degree of mitigation for those adverse impacts.

Q DOES THIS CONCLUDE YOUR EVIDENCE?

A Yes, it does.

[10]Steel monopole structures generally have a smaller footprint than steel lattice tower structures and in my experience are considered to have a less severe visual impact than steel lattice tower structures.

Qualifications of James R. Dauphinais

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James R. Dauphinais. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017, USA.

Q PLEASE STATE YOUR OCCUPATION.

A I am a consultant in the field of public utility regulation and a principal with the firm of Brubaker & Associates, Inc. ("BAI"), energy, economic and regulatory consultants.

Q PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A I graduated from Hartford State Technical College in 1983 with an Associate's Degree in Electrical Engineering Technology. Subsequent to graduation I was employed by the Transmission Planning Department of the Northeast Utilities Service Company as an Engineering Technician.

While employed as an Engineering Technician, I completed undergraduate studies at the University of Hartford. I graduated in 1990 with a Bachelor's Degree in Electrical Engineering. Subsequent to graduation, I was promoted to the position of Associate Engineer. Between 1993 and 1994, I completed graduate level courses in the study of power system transients and power system protection through the Engineering Outreach Program of the University of Idaho. By 1996 I had been promoted to the position of Senior Engineer.

In the employment of the Northeast Utilities Service Company, I was responsible for conducting thermal, voltage and stability analyses of the Northeast Utilities' transmission system to support planning and operating decisions. This

involved the use of load flow and power system stability computer simulations. Among the most notable achievements I had in this area include the solution of a transient stability problem near Millstone Nuclear Power Station, and the solution of a small signal (or dynamic) stability problem near Seabrook Nuclear Power Station. In 1993 I was awarded the Chairman's Award, Northeast Utilities' highest employee award, for my work involving stability analysis in the vicinity of Millstone Nuclear Power Station.

From 1990 to 1997 I represented Northeast Utilities on the New England Power Pool Stability Task Force. I also represented Northeast Utilities on several other technical working groups within the New England Power Pool ("NEPOOL") and the Northeast Power Coordinating Council ("NPCC"), including the 1992-1996 New York-New England Transmission Working Group, the Southeastern Massachusetts/Rhode Island Transmission Working Group, the NPCC CPSS-2 Working Group on Extreme Disturbances and the NPCC SS-38 Working Group on Interarea Dynamic Analysis. This latter working group also included participation from a number of ECAR, PJM and VACAR utilities.

In addition to my technical responsibilities, I was also responsible for oversight of the day-to-day administration of Northeast Utilities' Open Access Transmission Tariff. This included the creation of Northeast Utilities' pre-FERC Order No. 889 transmission electronic bulletin board and the coordination of Northeast Utilities' transmission tariff filings prior to and after the issuance of Federal Energy Regulatory Commission ("FERC" or "Commission") FERC Order No. 888. I was also responsible for spearheading the implementation of Northeast Utilities' Open Access Same-Time Information System and Northeast Utilities' Standard of Conduct under FERC Order No. 889. During this time I represented Northeast Utilities on the Federal Energy

Regulatory Commission's "What" Working Group on Real-Time Information Networks. Later I served as Vice Chairman of the NEPOOL OASIS Working Group and Co-Chair of the Joint Transmission Services Information Network Functional Process Committee. I also served for a brief time on the Electric Power Research Institute facilitated "How" Working Group on OASIS and the North American Electric Reliability Council facilitated Commercial Practices Working Group.

In 1997 I joined the firm of Brubaker & Associates, Inc. The firm includes consultants with backgrounds in accounting, engineering, economics, mathematics, computer science and business. Since my employment with the firm, I have filed or presented testimony before the Federal Energy Regulatory Commission in Consumers Energy Company, Docket No. OA96-77-000, Midwest Independent Transmission System Operator, Inc., Docket No. ER98-1438-000, Montana Power Company, Docket No. ER98-2382-000, Inquiry Concerning the Commission's Policy on Independent System Operators, Docket No. PL98-5-003, SkyGen Energy LLC v. Southern Company Services, Inc., Docket No. EL00-77-000, Alliance Companies, et al., Docket No. EL02-65-000, et al., Entergy Services, Inc., Docket No. ER01-2201-000, and Remedying Undue Discrimination through Open Access Transmission Service, Standard Electricity Market Design, Docket No. RM01-12-000 and NorthWestern Corporation, Docket No. ER10-1138-000. I have also filed or presented testimony before the Colorado Public Utilities Commission, Connecticut Department of Public Utility Control, Illinois Commerce Commission, the Indiana Utility Regulatory Commission, the Iowa Utilities Board, the Kentucky Public Service Commission, the Louisiana Public Service Commission, the Michigan Public Service Commission, the Missouri Public Service Commission, the Montana Public Service Commission, the Public Utility Commission of Texas, the Wisconsin Public Service

Commission and various committees of the Missouri State Legislature. This testimony has been given regarding a wide variety of issues including, but not limited to, avoided cost calculations, certification of public convenience and necessity, fuel adjustment clauses, interruptible rates, market power, market structure, prudency, resource planning, standby rates, transmission losses, transmission planning and transmission line routing.

I have also participated on behalf of clients in the Southwest Power Pool Congestion Management System Working Group, the Alliance Market Development Advisory Group and several working groups of the Midwest Independent Transmission System Operator, Inc. ("MISO"), including the Congestion Management Working Group. I am currently an alternate member of the MISO Advisory Committee in the end-use customer sector on behalf of a group of industrial end-use customers in Illinois. I am also the past Chairman of the Issues/Solutions Subgroup of the MISO Revenue Sufficiency Guarantee ("RSG") Task Force.

In 2009, I completed the University of Wisconsin-Madison High Voltage Direct Current ("HVDC") Transmission course for Planners that was sponsored by MISO. I am a member of the Power and Energy Society ("PES") of the Institute of Electrical and Electronics Engineers ("IEEE").

In addition to our main office in St. Louis, the firm also has branch offices in Phoenix, Arizona and Corpus Christi, Texas.

BEFORE THE

THE ALBERTA UTILITIES COMMISSION

Re: ATCO Electric's Application: Proposed Abee Transmission Project	**Application 1607597 / Proceeding ID 1363**

Evidence of

James R. Dauphinais

On behalf of

Raymond and Victoria Dodd

Project 9565
March 9, 2012

BRUBAKER & ASSOCIATES, INC.
CHESTERFIELD, MO 63017

BEFORE THE

THE ALBERTA UTILITIES COMMISSION

Re: ATCO Electric's Application: Proposed Abee Transmission Project	**Application 1607597 / Proceeding ID 1363**

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BEFORE THE

THE ALBERTA UTILITIES COMMISSION

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Evidence of James R. Dauphinais

I. Introduction

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A James R. Dauphinais. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017, USA.

Q WHAT IS YOUR OCCUPATION?

A I am a consultant in the field of public utility regulation and Principal of Brubaker & Associates, Inc., energy, economic and regulatory consultants.

Q PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A I have earned a Bachelor of Science in Electrical Engineering from the University of Hartford and have completed a number of graduate level courses in electric power systems through the Engineering Outreach Program of the University of Idaho. In the twelve and one-half years prior to the beginning of my current employment with BAI, I was employed in the Transmission Resource Planning Department of the Northeast Utilities Service Company. Since my employment with BAI in 1997, I have testified before the Federal Energy Regulatory Commission and many state commissions on a

wide variety of issues including, but not limited to, avoided cost calculations, certification of public convenience and necessity, fuel adjustment clauses, interruptible rates, market power, market structure, prudency, resource planning, standby rates, transmission rates, transmission line routing, transmission losses, and transmission planning. I have also assisted end-use customers with power procurement and assisted a variety of clients in regard to transmission access issues. My background is further detailed in Appendix A to my evidence.

Q PLEASE IDENTIFY THE MATTERS WHERE YOU IN THE PAST FILED EVIDENCE OR TESTIMONY REGARDING TRANSMISSION LINE ROUTING.

A I have in the past filed transmission line routing evidence or testimony in the following matters:

Jurisdiction	Applicant	Docket/Proceeding No.
PUCT[1]	Oncor Electric Delivery Company	37464
PUCT	LCRA Transmission Service Corporation	37778
PUCT	Oncor Electric Delivery Company	38140
PUCT	Lone Star Transmission, LLC	38230
PUCT	Sharyland Utilities, L.P.	38290
PUCT	Oncor Electric Delivery Company	38324
PUCT	LCRA Transmission Services Corporation	38354
PUCT	Oncor Electric Delivery Company	38597
MPSC[2]	International Transmission Company	U-16200
AUC[3]	AltaLink Management Ltd.	979

[1]Public Utility Commission of Texas
[2]Michigan Public Service Commission
[3]Alberta Utilities Commission

Q ON WHOSE BEHALF ARE YOU PROVIDING EVIDENCE IN THIS PROCEEDING?

A I am providing evidence to the Alberta Utilities Commission ("AUC" or "Commission") in this proceeding on behalf of Raymond and Victoria Dodd ("Dodds"). The Dodds own land at NW-17-60-19-W4M, NE-17-60-19-W4M and NE-5-60-19-W4M. Quarter

sections NW-17-60-19-W4M and NE-17-60-19-W4M are operated as a single integrated agricultural property. The Dodds' residence is located in NE-17-60-19-W4M near the southeast corner of that quarter section.

ATCO Electric's ("ATCO") preferred "East Route" in this proceeding (Weasel Creek Substation 947S-A1-A2-A4-A5-A5A-A5B-B7-B8-B8A) would bisect the Dodds' agricultural property in NE-17-60-19-W4M and NW-17-60-19-W45 from Node A5 to Node A5A. ATCO's alternate West Route (947S-A1-A2-A4-A5A-B5A-B7-B8-B8A) and rejected Route A (947S-A1-A2-A4-A5-A5A-A5B-A6-B8) similarly bisect this agricultural property of the Dodds. For this reason, the Dodds oppose selection of the East Route, the West Route or Route A for the proposed transmission line. The Dodds do not oppose selection of ATCO's rejected Route B (947S-A1-B3-B4-B5-B5A-B7-B8-B8A) or rejected Route C (947S-A1-A2-A4-B4-X4-X5-X6-X7-B7-B8-B8A). In addition, provided the route segment from Node A5 to Node Y5 is placed on the south side of the access road it parallels, the Dodds do not oppose selection of ATCO's alternate West Route 2 (947S-A1-A2-A4-A5-B5-B5A-B7-B8-B8A)[1] or rejected Route D (947S-A1-A2-A4-A5-B5-X5-X6-X7-B7-B8-B8A).

Q WHAT IS THE SUBJECT MATTER OF YOUR EVIDENCE?

A My evidence addresses the Application of ATCO for a permit and license to construct and operate the ATCO portion of a single-circuit 144 kV transmission line, with an initial nominal operating voltage of 138 kV, that is proposed to be constructed between ATCO's new Weasel Creek substation and AltaLink Management Ltd.'s

[1]ATCO introduced alternate West Route 2 in its November 2011 revision of Drawing RS-7L437-A-06 of Attachment 7 of its Application. ATCO filed this additional alternate route with the Commission on December 23, 2011 in Exhibit 0133.00.AE-1363. ATCO's alternate West Route 2 is the same as ATCO's alternate West Route except between Node A5 and Node B5A. Between those two nodes, ATCO's West Route 2 would run A5 to B5 to B5A while ATCO's West Route would run A5 to A5A to B5A. Node Y5 is halfway between Node A5 and Node B5.

("AltaLink") new Abee substation. The proposed transmission line is the northernmost link in a series of AltaLink and ATCO transmission line projects that will provide a radial transmission voltage level feed to the new Weasel Creek and Abee substations from a tap into AltaLink's existing Redwater to Deerland 138 kV transmission line (ATCO Application at Drawing RS-7L437-A-01 of Attachment 4 and Drawing RS-7L437-A-03 of Attachment 5). The ATCO portion of the proposed transmission line would run from Weasel Creek substation to ATCO's boundary with the AltaLink service area near the new Abee substation. ATCO has proposed to construct its portion of the transmission line on "Davit-Arm" wood-monopoles. (ATCO Application at page 10).

At the request of the Dodds' counsel, I evaluated: (i) the reasonableness of ATCO's filed routes (East Route, West Route, West Route 2, Route A, Route B, Route C and Route D) and (ii) other alternate routes in the area that in most respects have impacts similar to ATCO's filed routes, but also reasonably address the concerns of the Dodds through collocation of the proposed transmission line with existing ATCO distribution lines along Highway 831, Range Road 195, Township Road 602, Township Road 610 and/or Township Road 600/Highway 656.

My silence in regard to any issue should not be taken as an endorsement of any position taken by ATCO with respect to that issue.

Q CAN YOU PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS?

A I recommend that the Alberta Utilities Commission ("AUC" or "Commission") give serious consideration to the selection of either my Route BAI-1 or Route BAI-3 over

ATCO's preferred East Route, alternate West Route and rejected Route A. Upon exiting Weasel Creek substation, my Route BAI-1 would run:

- West from Node A1 for one quarter section along the north side of Highway 656 to the intersection with Range Road 195;
- North for six full sections along the east side of Range Road 195 to the intersection with Township Road 610; and
- West for one quarter section along the north side of Township Road 610 to Node B8.

Upon exiting Weasel Creek substation, my Route BAI-3 would run:

- West from Node A1 for one quarter section along the north side of Highway 656 to the intersection with Range Road 195;
- North for two full sections along the east side of Range Road 195 to the intersection with Township Road 602;
- East for one full section along the north side of Township Road 602 to the intersection with Highway 831;
- North for four full sections along the west side of Highway 831 to the intersection with Township Road 610; and
- West for one full and one quarter section along the north side of Township Road 610 to Node B8.

These two routes minimize adverse impacts through the collocation with existing distribution lines and the close paralleling of existing developed road allowances. For Route BAI-1, approximately all but 0.2 km of its length would closely parallel existing developed road allowances and approximately all but 4.0 km of its 11.7 km total length would be collocated with existing distribution lines. For Route BAI-3, approximately all but 0.2 km of its length would closely parallel existing developed road allowance and approximately all but 3.9 km of its total 15.0 km length would be collocated with existing distribution lines. By comparison, none of the length of ATCO's East Route, West Route or West Route 2 would closely parallel an

existing developed road allowance. Nor would any of the length of those three proposed ATCO routes be collocated with existing distribution lines.

Due to the relatively small physical size of the proposed transmission line, the very low power flows expected on the proposed transmission line, the extensive close paralleling of existing developed road allowances and the extensive use of collocation with existing distribution lines, my two recommended routes reasonably balance impacts on residences in the area against other land impacts. The edge of the right-of-way of neither of my two recommended routes would be closer than approximately 49 meters to the nearest residence.

If despite my recommendation, the Commission chooses not to select Route BAI-1 or BAI-3, I recommend it consider selection of Route BAI-4, ATCO's alternate West Route 2, or ATCO's rejected Routes B, C or D. All of these routes would also address the concerns of the Dodds, provided any use of Node A5 to Node Y5 runs south of the access road it parallels.

II. Route Selection Factors

Q WHAT FACTORS SHOULD BE CONSIDERED IN THE SELECTION OF A TRANSMISSION LINE ROUTE BY THE COMMISSION?

A Safety and health, cost, the impact on property owners, the impact on the environment, the impact on archeological and historic sites and the impact on aesthetics are all factors that should be considered. The transmission line route selection objectives and considerations presented in Alberta Environment's Environmental Protection Guidelines for Transmission Lines ("Alberta Environment R&R/11-03") should also be considered by the Commission. Finally, while they technically apply to ISO Needs Identification Applications rather than Transmission

Line Applications, it is also appropriate to apply the agriculture impact, residential impact, environmental impact, cost, electrical consideration, visual impact and special constraints aspects of ND12 of Section 6.1 of AUC Rule 007.

Q SHOULD GREATER WEIGHT BE PLACED ON CERTAIN FACTORS VERSUS OTHERS?

A Yes. While all factors should be considered, some factors should be given more weight than others. For example, when practicable, it is desirable to route new transmission lines using existing linear developments such as road allowances, fence lines, quarter section and section lines, and existing transmission or utility corridors as outlined in Section 1.2 of Alberta Environment R&R/11-03. However, if two hypothetical alternative routes only differed in that one entirely ran along quarter lines and the other entirely ran along an existing transmission line corridor, it could not be said that the two routes have similar impacts as the existing transmission line corridor route is already impacted by existing transmission line infrastructure while the quarter line route is not likely to have been as significantly impacted by existing infrastructure. Thus, all else being equal, the route using the existing transmission line corridor would likely be a much better route for the proposed line than the one that utilized quarter lines.

As another example, if two hypothetical routes differed only in that one introduced significant health and safety concerns, but the other introduced significant aesthetic concerns, if a choice had to be made between the two lines, it is likely the route with greater aesthetic impact would be the better choice of the two routes.

Q WHEN WEIGHING THE FACTORS TO BE CONSIDERED, IS IT POSSIBLE THAT SUBSTANTIALLY BETTER PERFORMANCE WITH RESPECT TO ONE FACTOR CAN ULTIMATELY OUTWEIGH INFERIOR PERFORMANCE WITH RESPECT TO ANOTHER FACTOR?

A Yes. A hypothetical example of this would be when one route impacts a relatively small number of residences, but very little of its length runs along existing transmission line corridors. In such a circumstance, it may be appropriate to select a different route that impacts more residences if that route also significantly outperforms the other route in terms of minimizing the portion of its length that does not run along existing transmission line corridors.

Q ARE THERE CIRCUMSTANCES IN THIS PROCEEDING THAT WARRANT SPECIAL CONSIDERATION WHEN APPLYING TRANSMISSION LINE ROUTE SELECTION OBJECTIVES AND CONSIDERATIONS?

A Yes. There are two circumstances that warrant special consideration in this proceeding. First, the proposed transmission line is a 144 kV line that will be placed on "Davit-Arm" wood-monopole structures. The wood-monopole structures that will be used will have "Davit Arms" and associated insulator strings attached near their upper part, but will otherwise simply be higher, and likely stronger, versions of the wood-monopoles currently used to support ATCO's single-phase 7 kV distribution lines currently found in the area along sections of Highway 831, Highway 656, Range Road 195, Range Road 200 and Township Roads 600, 602, 604 and 610.

The use of these structures has far less visual impact than steel lattice-tower transmission line structures and "H-Frame" wood-pole transmission line structures. They also have less visual impact than the larger steel and spun-concrete monopole

structures that are often used to reduce the visual impact of higher (i.e., 230+ kV) voltage transmission lines. Furthermore, they limit the scope of future expansion of the transmission line because these structures cannot be readily modified to later support a second transmission circuit. Finally, it should be noted that when located near existing distribution lines, the distribution circuits currently carried by those existing distribution lines can be relocated to the new transmission monopoles and strung under the transmission circuit on those monopoles. The existing distribution line can then be removed. Based on the existing number of poles along Highway 831 from Township Road 600 to Township Road 610, the span between poles for the existing single-phase distribution line along Highway 831 averages between approximately 92 and 104 meters. Based on information ATCO provided on page 6 of its Application for the Weasel Creek Transmission Project, the typical span length would increase to 100 to 135 meters with collocation of the existing distribution line with transmission line proposed in this proceeding. Thus, collocation of the proposed transmission line with existing distribution line could decrease the frequency of poles along the line versus the current distribution line.

Q WHAT IS THE OTHER CIRCUMSTANCE THAT WARRANTS SPECIAL CONSIDERATION IN THIS PROCEEDING?

A While the proposed transmission line will operate at a transmission level voltage, it is being proposed to be used to provide a distribution function rather than a transmission function. Specifically, the sole function of the proposed transmission line will be to provide a radial feed of electric power from Weasel Creek substation to Abee substation in order to serve the proposed Enbridge Pipeline Pump station near Abee substation (ATCO Application at pages 7 and 10 and ATCO Application at page

5 of AESO Functional Specification of Attachment 10). Furthermore, there are no firm plans to in the future either add a second transformer at Abee substation for Enbridge or construct additional transmission lines that would connect with the proposed transmission line in this proceeding at Abee substation (ATCO Application at page 5 of AESO Functional Specification of Attachment 10 and ATCO's Response to Information Requests Dodd-ATCO-002 e. through i.). The implication of this is that the proposed transmission line will perform a distribution function rather than a transmission function.[2] In addition, it will carry very little power (12 MVA) versus its normal winter thermal rating (138 MVA), even during emergency conditions, because, as a radial transmission line, the transmission line cannot serve as an alternate path for power for other transmission lines when those other transmission lines are experiencing outages (ATCO Application at page 11 and ATCO's Response to Information Requests Dodd-ATCO-002 b. and c.). As a result, the strength of magnetic fields introduced by the proposed transmission line will be very low relative to larger transmission projects such as the 240 kV transmission line projects being pursued by ATCO and AltaLink in the Hanna Region.

In summary, caution needs to be used when applying transmission line route selection objectives and considerations largely intended for much larger transmission

[2]It is not uncommon for transmission level voltage facilities to provide a distribution rather than transmission function. For example, in United States, facilities with an operating voltage as high as 345 kV have on occasion been classified as performing a distribution rather than transmission function under the Federal Energy Regulatory Commission's ("FERC") "7-Factor Test". Under the FERC "7-Factor Test", the FERC considers the following seven indicators of local distribution on a case-by-case basis: (i) Local distribution facilities are normally in close proximity to retail customers; (ii) Local distribution facilities are primarily radial in nature; (iii) Power flows into local distribution systems; it rarely, if ever, flows out; (iv) When power enters a local distribution system, it is not reconsigned or transported on to some other market; (v) Power entering a local distribution system is consumed in a comparatively restricted geographic area; (vi) Meters are based at the transmission/local distribution interface to measure flows into the local distribution system; and (vii) Local distribution systems will be of reduced voltage (FERC Order No. 888 at pages 401 and 402). Passing the majority of these seven tests has generally been considered a positive indication that a facility is providing a distribution rather than transmission function. The proposed transmission project passes the first five of these seven indicators of local distribution and even the seventh is met at least on a relative basis versus many other transmission lines in Alberta.

line projects to the small transmission line project proposed in this proceeding. The proposed transmission line will have substantially less visual impact and magnetic field impact than higher voltage transmission lines or even similar voltage transmission lines that perform a power transmission function rather than a power distribution function. These two impacts are typically the most important considered in determining the impact of a proposed transmission line on residences.

Q ATCO DID NOT PROVIDE ANY MAGNETIC FIELD CALCULATIONS IN ITS APPLICATION FOR ITS PROPOSED TRANSMISSION LINE AND INSTEAD SIMPLY STATED, BASED ON ITS PAST EXPERIENCE, THAT THE EXPECTED ELECTROMAGNETIC FIELD ("EMF") LEVELS FOR THE PROPOSED TRANSMISSION LINE ARE WELL BELOW THE PUBLIC EXPOSURE GUIDELINES AT THE EDGE OF THE RIGHT-OF-WAY (ATCO APPLICATION AT PAGE 32 AND ATCO RESPONSE TO INFORMATION REQUEST DODD.ATCO-002 a.). HAVE YOU PERFORMED ANY CALCULATIONS OF THE EXPECTED MAGNETIC FIELD LEVEL OF THE TRANSMISSION LINE PROPOSED IN THIS PROCEEDING VERSUS A TYPICAL HIGHER VOLTAGE TRANSMISSION LINE?

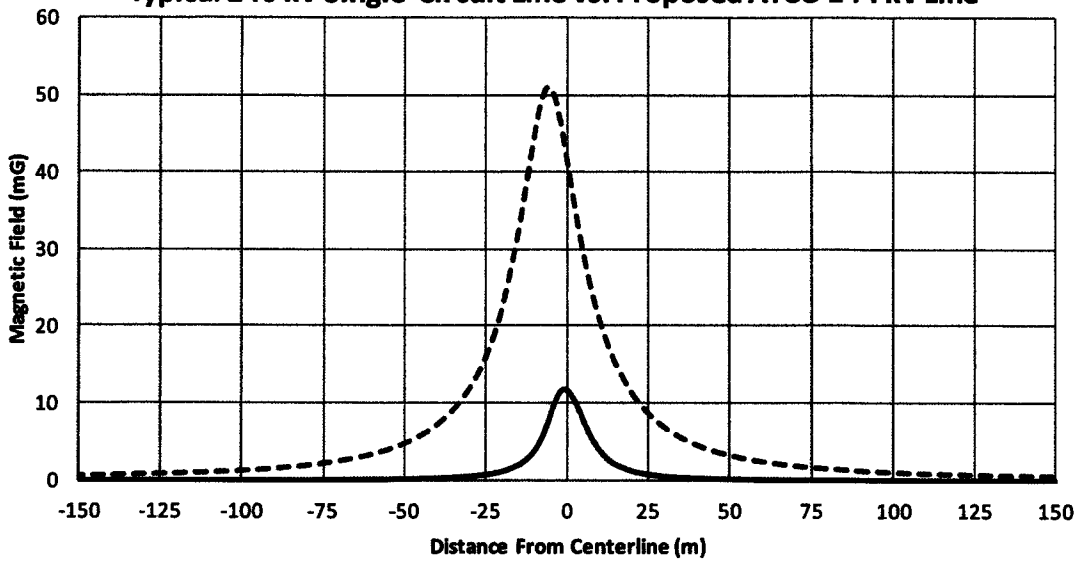
A Yes. While I do not disagree with ATCO's statement, I have performed my own calculations of the expected magnetic field levels of the proposed transmission line in this proceeding versus a typical higher voltage transmission line using the United States Department of Energy / Bonneville Power Administration Corona and Field Effects ("CAFÉ") Program. This is the same computer program that AltaLink used to calculate expected magnetic field levels for its portion of the proposed Hansman Lake to Pemukan 240 kV transmission line in Application 1606831 / Proceeding ID 979

(AltaLink Application 1606831 at Appendix T). The CAFÉ is also used by a number of electric utilities in the United States to calculate expected magnetic field levels for new and existing transmission lines.

First, using the CAFÉ program, I recreated AltaLink's magnetic field calculations for the Hansman Lake to Pemukan 240 kV transmission line using the data AltaLink provided for that transmission line in its Application to the Commission for its portion of that transmission line. I did so to both to provide a benchmark to AltaLink's calculations and to provide a proxy calculation for the expected magnetic field from a typical 240 kV single-circuit, double-circuit capable, transmission line. I was able to recreate AltaLink's results for this 240 kV line within +2.5% at the edge of the right-of-way. This is presented in Attachment A to this evidence. Then, using the data provided by ATCO for the transmission line proposed by ATCO in this proceeding (ATCO Application at pages 10 through 13, ATCO Application at Attachment 8, and ATCO Response to Information Requests Dodd-ATCO-002 b., c., d. and i, and Dodd.ATCO-005 a., b., c., d. and g).[3] The resulting estimated magnetic field levels at a standard 1 meter sensor height out to 150 meters from centerline are shown in Figure JRD-1 versus that of the aforementioned 240 kV transmission line.

[3]ATCO identified the radius of the overhead shield wire for the proposed transmission line to be 12.5 millimeters. It appears that ATCO in fact meant the diameter, rather than the radius, of the shield wire is 12.5 millimeters. I used the later in my magnetic field calculations. Regardless, the difference in values has no effect upon the magnetic field calculations.

Figure JRD-1
Magnetic Field Comparison
Typical 240 kV Single-Circuit Line vs. Proposed ATCO 144 kV Line



Note: Typical single-circuit 240kV line is based on configuration and loading of Altalink's Hansman Lake single-circuit, double-circuit capable, transmission line project as presented by Altalink in Application No. 1606831 / Proceeding ID. 979

As can be seen in Figure JRD-1 and my tabulated results in Attachment A to my evidence, the estimated magnetic field level for the proposed transmission line at approximately 30 to 35 meters from centerline falls to the same level as that for my proxy for a typical 240 kV transmission line at 150 meters from centerline. This illustrates my point that the transmission line proposed in this proceeding presents special circumstances that need to be considered especially in the context of evaluating the impact of the proposed transmission line on residences. Attachment A to my evidence provides more detail regarding my magnetic field calculations.

III. ATCO's Route Selection Analysis

Q PLEASE DESCRIBE THE METHODOLOGY ATCO UTILIZED TO DEVELOP ITS FILED PREFERRED AND ALTERNATE ROUTES IN THIS PROCEEDING.

A ATCO first developed preliminary route options based on the following transmission line routing criteria:

- Minimize impact to other land uses such as residences, built-up areas, and oil & gas facilities;
- Utilize exiting linear disturbances to minimize new disturbance and clearing;
- Follow quarter and section lines wherever possible to minimize impact to agriculture;
- Keep routes as straight as possible in order to reduce line length and cost corner structures;
- Minimize impact to environmentally sensitive areas such as watercourses, recreation areas, parks, campgrounds, and sensitive wildlife habitats;
- Avoid wet areas and steep slopes both for better access and to recue environmental impact; and
- Use feedback received from stakeholder input during consultation where practical.

(ATCO Application at page 21).

In applying these criteria to develop its preliminary route options, ATCO also evaluated a number of routing opportunities and routing constraints. Routing opportunities included: (i) blind lines and quarter section lines, (ii) parallel existing power lines and (iii) road allowances. Routing constraints included: (i) occupied residences within 150 meters, (ii) occupied residences within 800 meters, (iii) waterbodies greater than 150 meters at crossing location, (iv) parks and protected areas, (v) airports and airstrips, (vi) windbreaks and shelterbelts, (vii) churches and cemeteries, (viii) oil and gas wells within 40 meters, (ix) oil and gas pipelines parallel to the right-of-way, (x) communication towers, (xi) irrigation pivots and (xii) areas of

cross cultivation (*Id.* at page 22). ATCO's resulting preliminary routes are summarized in the mosaics contained in Attachment 6 to its Application.

Q DO YOU HAVE ANY CONCERNS WITH HOW ATCO DETERMINED ITS PRELIMINARY ROUTE OPTIONS?

A Yes. ATCO basically approached the routing of this transmission line from a residential impact perspective the same way it would for a much larger transmission line. In response to Information Request Dodd.ATCO-001 a., ATCO indicated that other than with the exception of Township Road 610 and Highway 656/Township Road 600, the remaining road allowance developments in the area were rejected early in the route development process due to the number of residences in close proximity to these roadways. Based on ATCO then citing the number of residences within 150 meters of these existing developed road allowances, it appears ATCO is defining within 150 meters to be "in close proximity."

As I have discussed, the transmission line proposed in this proceeding will have far less visual impact than larger transmission lines (especially to the extent the proposed transmission line in this proceeding can be collocated with existing distribution lines) and the expected magnetic field levels are much lower than would be expected for a larger transmission line. The result of ATCO's approach is that its preliminary route options make very little use of close paralleling of existing developed road allowances and collocation with existing distribution lines. In addition, the approach tended to overvalue the close paralleling of quarter line sections. Quarter section lines (and blind lines) do not always represent existing linear disturbances especially when contiguous quarter sections are under common ownership. For example, there is no significant existing linear disturbance between

the Dodds' quarter sections NW-17-60-19-W4M and NE-17-60-19-W4M, which would be bisected by ATCO's preferred East Route, alternate West Route and rejected Route A.

Q HOW DID ATCO PROCEED ONCE IT HAD DEVELOPED PRELIMINARY ROUTE OPTIONS?

A ATCO indicates it presented its preliminary route options to landowners, occupants, agencies, interested parties, and the general public during an initial round of consultation. ATCO indicates a number of stakeholders suggested alternatives to these routes (ATCO Application at page 22).

ATCO indicates it then evaluated the information it received from its initial consultation and the metrics for its route options. Once it completed this evaluation, ATCO then produced the additional and refined route options presented in Drawing A-01-R1 of Attachment 6 of its Application and Drawing A-06 of Attachment 7 of its Application (Attachment 7 of its Application at page 22).

ATCO then presented these additional and refined route options to directly affected landowners. ATCO indicates that, during this second consultation, ATCO identified its East Route and West Route options. Finally, ATCO indicates it provided a project update to all parties involved in its initial notification of the proposed project and conducted a follow-up consultation with all landowners and occupants within 800 meters of the East Route and West Route options.

Q HOW DID ATCO ARRIVE AT ITS FINAL CHOICE OF THE EAST ROUTE AS ITS PREFERRED ROUTE, THE WEST ROUTE AS ITS ALTERNATIVE ROUTE AND ROUTES A, B, C AND D AS REJECTED ROUTES?

A ATCO indicates that, generally speaking, there is a positive correlation between the number of objections to a route and the proximity of that route to residences. However, it admits that, in this case, impacts to agricultural lands are also a significant contributor to the number of objections (*Id.*).

ATCO notes that the number of residences within 500 meters does not differ significantly between the East Route and West Route and that they have the least impact to agricultural lands. ATCO indicates it selected the East Route over the West Route for its preferred route because it minimizes impact to residences (one less residence within 300 to 400 meters of the route) and it had the least number of landowner objections (*Id.*).

ATCO indicates Routes A, B, C and D were rejected for various reasons including impacts on residences, line length and stakeholder feedback (*Id.* and ATCO Application at page 28).

Q AT ANY POINT IN THE PROCESS DID ATCO PRESENT ROUTE OPTIONS TO STAKEHOLDERS THAT WOULD LARGELY CLOSELY PARALLEL EXISTING DEVELOPED ROAD ALLOWANCES AND BE COLLOCATED WITH EXISTING DISTRIBUTION LINES?

A No. ATCO on its own excluded the possibility of such route options. Stakeholders were never given the option to comment on such routes. For this reason, the results of ATCO's consultation process cannot be relied upon to gauge the acceptability of such routing options to stakeholders.

IV. Additional Route Options Which Better Leverage Existing Developed Road Allowance Opportunities and Distribution Line Collocation Opportunities

Q HAVE YOU DEVELOPED SOME ADDITIONAL ROUTE ALTERNATIVES THAT BETTER LEVERAGE EXISTING DEVELOPED ROAD ALLOWANCE OPPORTUNITIES AND DISTRIBUTION LINE COLLOCATION OPPORTUNITIES?

A Yes. I have identified four additional route options which better leverage existing developed road allowance and existing distribution line collocation opportunities. These run from Weasel Creek substation as follows:

Route BAI-1

- West from Node A1 for one quarter section along the north side of Highway 656 to the intersection with Range Road 195.
- North for six full sections along the east side of Range Road 195 to the intersection with Township Road 610.
- West for one quarter section along the north side of Township Road 610 to Node B8.

Route BAI-2

- East for one quarter section along the north side of Highway 656 to the intersection with Highway 831.
- North for six full sections along the west side of Highway 831 to the intersection with Township Road 610.
- West for two full sections and one quarter section along the north side of Township Road 610.

Route BAI-3

- West from Node A1 for one quarter section along the north side of Highway 656 to the intersection with Range Road 195.
- North for two full sections along the east side of Range Road 195 to the intersection with Township Road 602.
- East for one full section along the north side of Township Road 602 to the intersection with Highway 831.

- North for four full sections along the west side of Highway 831 to the intersection with Township Road 610.

- West for one full and one quarter section along the north side of Township Road 610 to Node B8.

Route BAI-4

- North from Node A1 for two full sections (through Nodes A2 and A4) to the intersection with Township Road 602.

- East for one quarter section along the north side of Township Route 602 to the intersection with Highway 831.

- North for four full sections along the west side of Highway 831 to the intersection with Township Road 610.

- West for one full and one quarter section along the north side of Township Road 610 to Node B8.

Whenever possible, these four routes have been collocated with existing single-phase 7 kV distribution lines along Highway 656, Highway 831, Range Road 195, Township Road 602 and Township Road 610. The distribution circuits on these existing distribution lines would be relocated to the new transmission line poles and then the existing distribution lines would be removed where the relocation has occurred.

Attachments B-1 through B-4 of my evidence overlay the four BAI routes onto ATCO's Drawing RS-7L437-A-06-R1. Attachment C contains a copy of ATCO's Drawing RS-7L437-IR-001b, which shows the existing ATCO single-phase 7 kV and three-phase 25 kV distribution lines in the area. This latter drawing was provided by ATCO in response to Information Request Dodd.ATCO-001 b. Note that the single-phase 7 kV distribution lines that fall within a box defined by Township Road 610, Highway 831, Highway 656 and Range Road 195 run as follows:

- On the north side of Township Road 602;

- On the north side of Township Road 610;

- On the west side of Highway 831;
- On the north side of Highway 656; and
- On the east side of Range Road 195.

Q DOES ATCO GENERALLY SUPPORT THE COLLOCATION OF DISTRIBUTION CIRCUITS ONTO ITS "DAVIT ARM" WOOD-MONOPOLE TRANSMISSION LINE STRUCTURE?

A Yes. While ATCO has not recommended a route in this proceeding for the proposed transmission line where such collocation could be utilized, ATCO generally supports such collocation when appropriate and has proposed to use such collocation for a significant portion of its preferred route for its Weasel Creek Transmission Project (ATCO Weasel Creek Transmission Project Application (Application No. 1607595) at Attachment 8).

V. Conclusions and Recommendations

Q HOW DO YOUR FOUR ADDITIONAL ROUTES COMPARE TO ATCO'S PREFERRED EAST ROUTE, ALTERNATE WEST ROUTE, ALTERNATE WEST ROUTE 2 AND REJECTED ROUTES A, B, C AND D?

A Except for Route BAI-2, they compare very well. Table JRD-1 below is an enhanced and expanded version of Table 9 of ATCO's Application. I have expanded ATCO's Table 9 to include ATCO's alternate West Route 2 and Routes BAI-1, BAI-2, BAI-3 and BAI-4.[4] I have enhanced Table 9 by adding a metric regarding distribution line

[4]The calculations for the distance of residences to the edge of the right-of-way in Table JRD-1 for the additional route options were based on review of aerial photos of the study area obtained from the Government of Alberta. Scaling of these aerial photos was accomplished by assuming the length of the side of one quarter-section to be equal to 0.8 km (one-half mile). This scaling factor was confirmed with the use of Google Maps.

collocation and expanding the detail level for residences within 50 meters of the centerline of each route. The details associated with my cost estimates for the BAI routes are provided in Attachment D to my evidence. Note that in these cost estimates, I have assumed the additional cost for any temporary distribution lines that might be needed during construction is roughly a wash with the reduction of costs associated with the easier road access and likely reduced vegetation clearing requirements of the BAI routes. Also, we assumed the new transmission wood-monopoles would be placed approximately 9 meters from the edge of road pavement.

Table JRD-1
Summary of 7L437 Options

Routing Factor	East	West	West - 2	A	B	C	D	BAI-1	BAI-2	BAI-3	BAI-4
Line Length (km)	11.7	11.7	11.7	11.7	11.7	15	15	11.7	13.3	15	13.3
Number of Turns >10 degrees	5	5	5	5	5	7	7	5	5	8	8
Adjacent Facility											
Road or Road Allowance (km)	0	0	0	1.6	1.6	0	0	11.5	13.1	14.8	9.9
Quarter/Section line (km)	11.7	11.7	11.7	10.1	10.1	15	15	0.2	0.2	0.2	3.4
Distribution Line Collocation											
Length Collocated with Distribution Line (km)	0	0	0	0	0	0	0	7.7	11.1	11.1	7.1
Length Not Collocated with Distribution Line (km)	11.7	11.7	11.7	11.7	11.7	15	15	4	2.2	3.9	6.2
Residence Occurrence											
Nearest Occupied Residence to ROW (km)	0.472	0.315	0.472	0.24	0.074	0.425	0.187	0.053	0.000	0.049	0.049
Number of Occupied Residences within ≤ 30m of ROW	0	0	0	0	0	0	0	0 (0)	2 (2)	0 (0)	0 (0)
Number of Occupied Residences within > 30m ≤ 40m of ROW	0	0	0	0	0	0	0	0 (0)	0 (2)	0 (0)	0 (0)
Number of Occupied Residences within > 40m ≤ 50m of ROW	0	0	0	0	0	0	0	0 (0)	1 (3)	1 (1)	1 (1)
Number of Occupied Residences within > 50m ≤ 100m of ROW	0	0	0	0	1	0	0	5 (5)	6 (9)	7 (8)	5 (6)
Number of Occupied Residences within > 100m ≤ 150m of ROW	0	0	0	0	1 (2)	0	0	3 (8)	1 (10)	4 (12)	1 (7)
Number of Occupied Residences within > 150m ≤ 200m of ROW	0	0	0	0	0 (2)	0	1	0 (8)	1 (11)	2 (14)	2 (9)
Number of Occupied Residences within > 200m ≤ 300m of ROW	0	0	0	1	0 (2)	0	0 (1)	2 (10)	1 (12)	1 (15)	1 (10)
Number of Occupied Residences within > 300m ≤ 400m of ROW	0	1	0	0 (1)	1 (3)	0	1 (2)	1 (11)	1 (13)	2 (17)	1 (11)
Number of Occupied Residences within > 400m ≤ 500m of ROW	3	2 (3)	2	3 (4)	0 (3)	3	2 (4)	0 (11)	2 (15)	1 (18)	3 (14)
Number of Occupied Residences within > 500m ≤ 800m of ROW	8 (11)	8 (11)	9 (11)	9 (13)	6 (9)	10 (13)	12 (16)	0 (11)	0 (15)	0 (18)	3 (17)
Land Use											
Cultivated (ha)	17.2	16.4	16.4	15.4	14.8	23.2	22.8	14.6	14.8	17.6	15.1
Pasture (ha)	1	0	0	1.6	1.3	0.6	0.7	0.8	2.4	2.4	2.4
Fragmented Lands (ha)	2.9	2.9	2.9	2.9	1.4	2.9	2.9	TBD	TBD	TBD	TBD
Tree Clearing (ha)	9.2	8.3	7.5	7.9	9.5	9.8	10.2	TBD	TBD	TBD	TBD
Wetlands (ha)	0.5	0.5	0.5	0.6	0	0	0.6	0.2	0.6	0.6	1.2
ROW Area (ha)	21.1	21.1	21.1	19.6	19.6	27	27	21.1	23.9	27.0	23.9
Costs											
Project Cost Estimate	1.8M	1.8M	1.8M	1.8M	1.8M	2.2M	2.2M	2.0M	2.3M	2.7M	2.4M

(Number) = Cumulative residence count with increasing distance from ROW.