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February 16, 2023

British Columbia Public Interest Advocacy Centre
Suite 803 470 Granville Street
Vancouver, B.C.
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Attention: Leigha Worth, Executive Director

Dear Leigh Worth:

Re: FortisBC Energy Inc. (FEI)

Application for a Certificate of Public Convenience and Necessity (CPCN) for Approval of the Interior Transmission System Transmission Integrity Management Capabilities Project (Application)

Response to the British Columbia Public Interest Advocacy Centre representing the British Columbia Old Age Pensioners' Organization, Active Support Against Poverty, Disability Alliance BC, Council of Senior Citizens' Organizations of BC, Tenant Resource and Advisory Centre, and Together Against Poverty Society (BCOAPO) Information Request (IR) No. 1

On September 20, 2022, FEI filed the Application referenced above. In accordance with British Columbia Utilities Commission Order G-18-23 amending the Regulatory Timetable for the review of the Application, FEI respectfully submits the attached response to BCOAPO IR No. 1.

For convenience and efficiency, if FEI has provided an internet address for referenced reports instead of attaching the documents to its IR responses, FEI intends for the referenced documents to form part of its IR responses and the evidentiary record in this proceeding.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Commission Secretary
Registered Parties

A. PROJECT NEED AND JUSTIFICATION

1.0 Reference: Exhibit B-1, Pages 30, 32, 34, 35, 36, 37, 39, 41 and 43

Coverage and scope of the FEI ITS TIMC Project

Preamble: FEI states:

"FEI estimates that the total amount of pipeline exposed to date as part of the Integrity Dig Program (and hence assessed for cracking) is approximately one percent of the total length of pipe in FEI's transmission systems." **(Exhibit B-1, Page 30)**

"EMAT ILI has been successful in detecting crack-like features, although discriminating SCC within these crack-like features has been challenging. This uncertainty warrants conservative initial assessments followed by filed verification digs in conjunction with laboratory material testing." **(Exhibit B-1, Page 32)**

"…FEI is completing a pilot of EMAT ILI evaluations on two CTS pipelines. The EMAT ILI tool runs on these pipelines are complete; however, FEI is in the process of validating potential cracking detected by the EMAT tool." **(Exhibit B-1, Page 32)**

"The 35 pipelines assessed by JANA are FEI's larger diameter pipelines that operate at hoop stress levels of greater than 30 percent SMYS and are in-line inspected. These pipelines were selected to optimize the scope of the assessment, by focusing on those diameters for which EMAT ILI tools are commercially available." **(Exhibit B-1, Page 34)**

"…JANA concluded that cracking threats (SCC and pipe seam) pose a credible integrity hazard that needs to be addressed through active integrity management…Dr. Chen of the University of Alberta indicate the potential for cracks to grow to failure and, with practical assumptions, in timeframes in the order of five years under the most aggressive condition." **(Exhibit B-1, Page 35)**

"JANA's high-level conclusion was as follows:

- Nine of the 12 ITS mainline transmission pipelines were identified as susceptible to cracking threats." **(Exhibit B-1, Page 36)**

"The analysis estimated a range of potential time until failure from 5 to 85 years, indicating that there is the potential for SCC cracks to grow to failure under the operating conditions of the FEI system. While the lower bound timeframe of five years is considered highly unlikely (reflecting a combination of the longest, deepest crack with the lowest toughness pipeline), the analysis does indicate that SCC is a credible integrity threat that needs to be managed in a timely manner." **(Exhibit B-1, Page 41)**

"The relative risk due to cracking is lower on the ITS, as compared to the CTS, primarily due to the lower population densities surrounding the ITS pipelines. In

particular, lower population in the Interior compared to the Lower Mainland reduces the estimate safety consequences of a rupture." **(Exhibit B-1, Page 43)**

FEI provided **Table 3-3** that summarizes the susceptibility to cracking threats of FEI's 12 ITS pipelines based on installation year, coating type and seam type and **Table 3-4** that summarizes the occurrences of cracking of FEI's 12 ITS pipelines through JANA's review of selected integrity digs and total integrity digs analyzed. **(Exhibit B-1, Pages 37 and 39)**

1.1 Please provide an estimate of the length and percentage of FEI's total ITS mainline that will be assessed for cracking as part of the proposed ITS TIMC Project, for each year of the common 7-year run frequency and in total.

Response:

The ITS TIMC Project will enable the adoption of EMAT ILI tools to mitigate the potential for rupture for all of FEI's remaining NPS 10 and greater transmission pipelines province-wide assessed as susceptible to cracking threats. In other words, 100 percent of FEI's total ITS that warrants adoption of available, proven, and commercialized EMAT ILI technology, are addressed by the ITS TIMC Project.

FEI currently estimates that the following percentages of FEI's total ITS will be assessed for cracking as part of the post-Project activities associated with the proposed ITS TIMC Project.

Year	Mainline	Pipeline	Approximate Schedule for EMAT Baseline Run	Approximate Length	% of ITS length*
1	Savona to Penticton 323	SAV VER 323	2026	143 km	7%
		VER PEN 323	2026	99 km	5%
3	Penticton to Trail 273	PEN OLI 273	2028	30 km	1%
		OLI GRF 273	2028	95 km	5%
		GRF TRA 273	2028	60 km	3%
5	East Kootenay Link 323	YAH TRA 323	2030	163 km	8%
7	Kingsvale to Oliver 323	KIN PRI 323	2032	67 km	3%
		PRI OLI 323	2032	95 km	5%
			Total	**752 km**	**36%**

** Total ITS length is approximately 2,072 km.*

The table below shows the estimated length of EMAT ILI inspected pipelines resulting from the ITS TIMC Project in kilometres on a per-year basis, also expressed as a percentage of ITS length. Please note that years 1 to 7 would be repeated in subsequent years, and could reflect the length of EMAT inspection in years 8 to 15 and subsequent 7-year periods if FEI's reinspection interval remains at 7 years for all pipelines.

Year	1*	2	3	4	5	6	7
Approximate Length of EMAT ILI Resulting from Proposed ITS TIMC Project	242 km	0 km	185 km	0 km	163 km	0 km	162 km
Approximate % of ITS Assessed by EMAT ILI	12%	0%	9%	0%	8%	0%	8%

**i.e., 2026, 2033, 2040, etc.*

1.2 Please provide a comparison of the length and percentage of the ITS mainline and CTS mainline that will be assessed for cracking as part of the ITS TIMC Project as compared to the CTS TIMC Project, for each year of the common 7-year run frequency and in total.

Response:

FEI estimates that the following percentages of FEI's total CTS will be assessed for cracking as part of the post-Project activities associated with the approved CTS TIMC Project:[1]

Year	Pipeline	Approximate Schedule for EMAT Baseline Run	Approximate Length	% of CTS Length*
1	HUN ROE 1066	2024	55 km	21%
2	HUN NIC 762	2025	56 km	21%
	NIC PMA 610	2025	5 km	2%
	NIC FRA 610	2025	24 km	9%
3	ROE TIL 914	2026	13 km	5%
	CPH NOO 508	2026	9 km	3%
	LIV PAT 457	2026 (Rerun)	30 km	11%

[1] This estimate is based on information provided in the response to CTS TIMC RCIA IR1 14.2 (preliminary approximate schedule for baseline EMAT run) and Table 5-4 of the CTS TIMC CPCN Application.

Year	Pipeline	Approximate Schedule for EMAT Baseline Run	Approximate Length	% of CTS Length*
4	TIL BEN 323	2027	6 km	2%
	TIL FRA 508	2027	10 km	4%
	TIL LNG 323	2027	2 km	1%
	LIV COQ 323	2027	35 km	13%
		Total	**245 km**	**92%**

** The total length of the CTS is approximately 267 km. This compares to the total length of the ITS of approximately 2,072 km.*

The table below shows the estimated length of EMAT ILI runs in kilometres on a per-year basis, including the estimated length expressed as a percentage of CTS length. Please note that runs undertaken in years 1 to 7 would be repeated in subsequent years, and therefore, could reflect the length of EMAT inspection in subsequent 7-year periods if FEI's reinspection remains 7 years for all pipelines.

Year	1*	2	3	4	5	6	7
Approximate Length of EMAT ILI Resulting from CTS TIMC Project	55 km	85 km	52 km	53 km	0 km	0 km	0 km
Approximate % of CTS Assessed by EMAT ILI	21%	32%	19%	20%	0%	0%	0%

**i.e., 2024, 2031, 2038, etc.*

For comparison purposes, FEI has combined the tables from the response to BCOAPO IR1 1.1 and the table above, both of which are on a per-year basis, as follows:

Year	2024	2025	2026, 2033, 2040, etc.	2027, 2034, 2041, etc.	2028, 2035, 2042, etc.	2029, 2036, 2043, etc.	2030, 2037, 2044, etc.	2031, 2038, 2045, etc.	2032, 2039, 2046, etc.
Approximate Length of EMAT ILI Resulting from CTS TIMC Project	55 km	85 km	52 km	53 km	0 km	0 km	0 km	55 km	85 km
Approximate % of CTS Assessed by EMAT ILI	21%	32%	19%	20%	0%	0%	0%	21%	32%
Approximate Length of EMAT ILI Resulting from Proposed ITS TIMC Project	0 km	0 km	242 km	0 km	185 km	0 km	163 km	0 km	162 km

Year	2024	2025	2026, 2033, 2040, etc.	2027, 2034, 2041, etc.	2028, 2035, 2042, etc.	2029, 2036, 2043, etc.	2030, 2037, 2044, etc.	2031, 2038, 2045, etc.	2032, 2039, 2046, etc.
Approximate % of ITS Assessed by EMAT ILI	0%	0%	12%	0%	9%	0%	8%	0%	8%
Total approximate length of EMAT ILI resulting from CTS and ITS Projects	55 km	85 km	294 km	53 km	185 km	0 km	163 km	55 km	247 km
Total approximate % of CTS and ITS assessed by EMAT	2%	4%	13%	2%	8%	0%	7%	2%	11%

1.3 Please explain and elaborate on the challenges of EMAT ILI to discriminate SCC within crack-like features and the potential impacts to the ITS TIMC Project as a result of these challenges, including what "conservative initial assessments" means and the costs and challenges associated with future digs and testing to remedy this uncertainty.

Response:

EMAT ILI is an established technology, but is not able to fully discriminate between crack and crack-like features, and other indications such as sharp sided corrosion, seam weld trim flaws, inclusions and laminations. FEI provides information gathered through validation to the vendor, which is then used to refine or improve feature discrimination capabilities. Until sufficient confidence is achieved with each EMAT tool run, a number of reported crack and crack-like features are excavated and examined.

Please refer to the response to BCUC IR1 9.5 for a discussion of the EMAT ILI data quality acceptance process FEI will establish with its ILI service providers. As explained in that response, interpretation of the EMAT ILI tool data is iterative and consists of a review of the data and then field validation.

CSA Z662:19 Clause 10.10.5 requires that all "Pipe body surface cracks shall be considered to be defects unless determined by an engineering assessment to be acceptable." In the initial stages of data interpretation, when there is no field validation data to support an engineering assessment, FEI cannot dismiss any reported cracking imperfections and must adopt "conservative initial assessments". In other words, the conservative initial assessment is that all

reported cracks from the EMAT ILI tool are defects that are not acceptable to leave as-is in-service. This is a resource-intensive approach. As such, FEI undertakes post-EMAT integrity digs to validate the tool and to assess the integrity of the pipeline, to enable it to perform an engineering assessment of any remaining cracks in the pipeline, and to reduce the degree of conservatism required during its initial assessments.

Recognizing the challenges associated with forecasting future digs and evaluation/testing to verify the tool-reported information, the BCUC approved flow-through treatment of integrity dig costs during the term of the 2020-2024 MRP.

1.4 Please explain why FEI choose to move forward with the CPCN application for the ITS TIMC Project in advance of validating and understanding lessons learned from the pilot project on two CTS pipelines rather than waiting for the results of the pilots and factoring these results into the scoping, scheduling and cost estimates of the ITS TIMC Project.

Response:

The premise of the question that FEI has not validated or understood the lessons learned from the pilot projects is incorrect. As described in Appendix D to the Application, FEI used the results and lessons learned from the EMAT ILI Pilot Project to inform the scope of the ITS TIMC Project.

The remaining activities associated with the EMAT ILI Pilot Project consist of ongoing, post-run integrity management activities which FEI is undertaking in response to the EMAT ILI data generated by the pilot project for specific CTS pipeline segments. These remaining activities would not inform scoping, scheduling, or cost estimating of alterations to ready the system for EMAT ILI as proposed in the ITS TIMC Project.

Please also refer to the response to CEC IR1 26.1 which outlines the downsides of delaying the ITS TIMC Project.

1.5 Please provide the specific diameters of FEI's ITS pipelines for which EMAT ILI tools are not commercially available and the total length and percentage that these pipelines represent as compared to the whole ITS mainline.

Response:

FEI's ITS pipelines for which EMAT ILI tools are not commercially available consist of pipe diameters NPS ¾, 1¼, 2, 3, 4, 6 and 8. The total length of these pipelines is approximately 970 km, which represent 47 percent of the ITS.

1.6 Please elaborate on and clarify what constitutes "active integrity management", including those types of testing and integrity digs that would be considered active as compared to those that would be considered as non-active or passive.

Response:

Active integrity management constitutes any activity or set of activities that enables an operator to demonstrate that it is meeting its regulatory obligations (e.g., procedures to monitor for conditions that can lead to failures, to eliminate or mitigate such conditions) and that allows an operator to align its practices with its industry peers. FEI also considers the BCOGC's expectation of operators "to remain committed and continue with improvement and advancement of their IMP" as a relevant factor in assessing whether an operator's actions are "active" versus "passive".

For transmission pipelines with a diameter of NPS 10 and greater, feasible active integrity management methods are EMAT ILI, pipeline replacement and pipeline exposure and recoat.

An example of non-active or passive integrity management would be an operator accepting the *status quo* for managing cracking threats on its transmission pipelines with a diameter of NPS 10 and greater and reactively responding to any pipeline failures.

1.7 Please explain if Dr. Chen's assessment that cracks could grow to failure in as short a time frame as five years is based on theoretical assumptions and considerations or specific characteristics with respect to the actual FEI ITS pipelines.

1.7.1 If this assessment is based on specific characteristics, please provide a list of the specific sections or sub-sections and total length of the FEI ITS mainline where failures could occur within a five-year timeframe.

Response:

Dr. Chen's assessment incorporates both theoretical assumptions and consideration of specific characteristics with respect to the actual FEI ITS pipelines.

As an example of a theoretical assumption, the assessment recognizes that the lower bound timeframe of five years is considered highly unlikely (reflecting a combination of the longest, deepest crack with the lowest toughness pipeline).

As an example of consideration of specific characteristics with respect to the actual FEI ITS pipelines, crack growth analysis "was applied to SCC crack features derived from FEI dig reports, actual FEI operating data and pipe material properties characteristic of the FEI system", including the ITS (as described in Section 3.2.2 of Appendix B-1 to the Application).

Dr. Chen's analysis was also informed by actual cracking that was found in FEI's transmission pipelines. All of this cracking has been repaired and no longer exists on FEI's pipelines.

However, in the absence of EMAT ILI data, FEI does not have an understanding of the extent, severity or location of further cracking that may exist on the FEI ITS mainline. Therefore, FEI cannot estimate where failures could occur within a five-year timeframe. As explained in Section 3.2.5 of the Application, SCC is a highly localized and often unpredictable phenomenon.

1.8 Please consolidate the various columns of information on Table 3-3 and Table 3-4 into one table and provide the resulting table for the record of this proceeding.

Response:

The table below consolidates the various columns of information from Tables 3-3 and 3-4 of the Application. The columns that were duplicated in those tables are included once in this consolidated version.

1 **Consolidated Version of Tables 3-3 and 3-4**

#	Pipeline Short Name	Pipeline Full Name	SCC Susceptibility*	Seam Weld Cracking Susceptibility*	Original Install Year(s)	Coating Types	Seam Type(s)	Integrity Digs with Cracking Threats	Total Integrity Digs Analyzed
1	SAV VER 323	Savona – Vernon 12"	Yes	Yes	1957	Asphalt, Polymer Tape	Unknown	50	92
2	VER PEN 323	Vernon – Penticton 12"	Yes	Yes	1957	Asphalt, Polymer Tape	ERW	38	67
3	GRF TRA 273	Grand Forks – Trail 10"	Yes	Yes	1957	Asphalt, Polymer Tape	ERW	138	228
4	OLI GRF 273	Oliver Y – Grand Forks 10"	Yes	Yes	1957	Asphalt, Polymer Tape	ERW	79	163
5	PEN OLI 273	Penticton – Oliver Y 10"	Yes	Yes	1957	Asphalt, Polymer Tape	ERW	13	23
6	TRA CAS 219	Trail – Castlegar 8"	Yes	Yes	1957	Asphalt, Polymer Tape	Unknown	11	76
7	KIN PRI 323	Kingsvale – Princeton 12"	Yes	Low	1971	Extruded PE, Shrink Sleeve on girth welds	ERW	0	3
8	PRI OLI 323	Princeton – Oliver 12"	Yes	Low	1971	Extruded PE, Shrink Sleeve on girth welds	ERW	2	12
9	YAH TRA 323	Yahk – Trail (EKL) 12"	Yes	Low	1974, 1975	Extruded PE, Polymer Tape on girth welds	Unknown	9	53
10	OLI PEN 406	Oliver – Penticton 16"	Low	Low	1994	Extruded PE	ERW	0	1
11	DUK SAV 508	Duke Tap – Savona C/S 20"	Low	Low	1997	Extruded PE - Multilayer	ERW	0	0
12	YAH OLI 610	Yahk – Rossland 24", Rossland – Oliver 24"	Low	Low	2000	Fusion Bonded Epoxy	SAW	0	6

2 ** A susceptibility rating of "Yes" indicates that the cracking type has been found on pipelines with similar attributes in the industry. A rating of "Low"*
3 *indicates that there are relatively limited or no cases of that cracking type found on pipelines with similar attributes in the industry.*

1.8.1 Please explain in detail which of the various risk considerations (SCC susceptibility, seam weld cracking susceptibility, installation year, coating type, seam type, integrity digs with cracking threats, total integrity digs) and/or criteria were used to propose a scope for the ITS TIMC Project that include pipelines #1, 2, 3, 4, 5 , 7, 8 and 9, but exclude pipelines # 6, 10, 11 and 12 from the ITS TIMC Project Scope.

Response:

All of the risk considerations listed in the question were used in FEI's inclusion of pipelines #1, 2, 3, 4, 5, 7, 8, and 9. As discussed in the response to CEC IR1 14.2, FEI used the following criteria to propose a scope for the ITS TIMC Project:

- Transmission pipelines that are susceptible to cracking threats;
- The outside diameters of these susceptible pipelines fall within the range for which there are proven and commercialized EMAT ILI tools; and
- The use of EMAT ILI has been adopted by industry as the most practical and cost effective method to address cracking threats.

As explained in Section 3.4.7 of the Application, FEI has excluded pipeline #6 on the basis that EMAT ILI tools are not commercialized and available for its pipelines with diameters smaller than NPS 10 and pipelines #10, 11, and 12 on the basis that they were not assessed as being susceptible to cracking threats.

1.9 The FEI SCC susceptibility and seam weld cracking susceptibility assessments were limited to "Yes" and "Low" on Table 3-3 and were based on pipelines with similar attributes in the industry. Please explain: (i) what is the probability of a pipeline rupture associated with a "Yes" assessment as compared to a "Low" assessment; and (ii) why FEI did not explore cracking susceptibility assessments that were more consistent with risk management ratings like low, moderate, high etc. that cover a broader spectrum, are more nuanced, and based on specific considerations of FEI's ITS pipelines - as compared to yes and low, that are more binary in nature and based on pipelines with similar attributes.

Response:

JANA did not define a numerical cutoff between a "Yes" assessment as compared to a "Low" assessment. The evaluation of susceptibility in Table 3-3 is a screening to identify pipelines with characteristics known to enable the occurrence of SCC. The source information for this table is Table 2 from Appendix B-1 to the Application. As explained in Section 3.0 of Appendix B-1 to the Application:

> A "yes" susceptible line is one where the characteristics of the line are consistent with lines where SCC or pipe seam cracking has been observed on multiple systems within the broader pipeline industry. A "low" susceptible line is one with characteristic where no or very limited failures have historically been observed in the industry.

FEI's methodology for assessing susceptibility aligns with guidance outlined by the Canadian Energy Pipeline Association (CEPA) in the "Recommended Practice for Managing Near neutral pH Stress Corrosion Cracking 3rd edition". The document's terms for SCC susceptibility are "Susceptible" and "Non-Susceptible", which FEI modified to "Yes" and "Low". FEI selected the term "low" instead of "non-susceptible" as it better reflects that pipelines do not have zero (or non-susceptibility), as demonstrated by the non-zero estimates of rupture probability due to SCC for those pipelines with "low" susceptibility.

FEI did not explore cracking susceptibility assessments that were more consistent with risk management ratings like low, moderate, high, as this is inconsistent with the above guidance document and there is no industry guidance with respect to the use of those terms.

1.10 Please explain how the lower relative cracking risk of the ITS as compared to the CTS was factored into the scope of the ITS TIMC Project, including the number of pipelines included in the scope and the pipeline and facility alterations included in the scope.

1.10.1 If the lower relative risk was not factored into the ITS TIMC Project scope, please explain why not.

Response:

FEI did not factor the lower relative cracking risk of the ITS as compared to the CTS into the scope of the ITS Project. Rather, as described in the response to BCUC IR1 5.3, FEI used the results of the QRA to inform the timing of the CTS TIMC Project relative to the ITS TIMC Project.

Please refer to the response to BCOAPO IR1 2.4 for discussion on how FEI identified the number of ITS pipelines and the proposed pipeline and facility alterations included in the scope of the Project.

1.11 Please provided an updated Table 3-5, that includes the length of each of the ITS mainline pipelines that are not included in the scope of the ITS TIMC Project, and the total length of the ITS mainline.

Response:

An updated version of Table 3-5 below includes the ITS mainline and lateral pipelines (collectively referred to as the ITS) that are not included in the scope of the ITS TIMC Project and their length (#9 to #114), as well as the total length of ITS pipelines included and excluded from the ITS TIMC Project.

#	Line Name	FEI Name	Approximate Length (km)
1	SAV VER 323	Savona Vernon 323	143
2	VER PEN 323	Vernon Penticton 323	99
3	GRF TRA 273	Grand Forks Trail 273	60
4	OLI GRF 273	Oliver Grand Forks 273	95
5	PEN OLI 273	Penticton Oliver 273	30
6	KIN PRI 323	Kingsvale Princeton 323	67
7	PRI OLI 323	Princeton Oliver 323	95
8	YAH TRA 323	Yahk Trail 323	163
Total Approximate Length of ITS pipelines included in ITS TIMC Project (#1 to #8)			**752**
9	108 LTL 60	108 Mile Lateral 60	0.1
10	150 MIL 60	150 Mile Lateral 60	0.1
11	AFT LTL 114	Afton Mines Lateral 114	0.8
12	ARM LTL 114	Armstrong Lateral 114	0.5
13	ASH LOP 88	Ashcroft Loop 88	9.1
14	ASH LTL 88	Ashcroft Lateral 60/88/168	37
15	BCF LTL 168	BC Forest Product Lateral 168	0.5
16	BRL LTL 60	Bear Lake Lateral 60	1.2
17	BRN LTL 114	Byron Creek Lateral 114	11.6
18	CAC LTL 60	Cache Creek Lateral 60	1.3

#	Line Name	FEI Name	Approximate Length (km)
19	CAR LTL 168	Cariboo Pulp Lateral 168	1.3
20	CAS NEL 168	Castlegar Nelson 168	37.4
21	CEL LTL 168	Celgar Lateral 168	5.8
22	CHA LTL 88	Chase Lateral 88	31.4
23	CHE LTL 60	Chetwynd Lateral 60	0.1
24	CHU LTL 88	Chute Lake Road 88	0.1
25	CLN LTL 60	Clinton Lateral 60	21.8
26	COL LOP 168	Coldstream Loop 168	3.8
27	COL LTL 114	Coldstream Lateral 114	4.1
28	COL LTL 219	Coldstream Lateral 219	1.8
29	COM LTL 114	Cominco Lateral 114	1
30	CRE LTL 114	Creston Lateral 114	6.9
31	CRK LOP 219	Cranbrook Loop 219	34
32	CRK LOP 273	Cranbrook Kimberley Loop 273	9.4
33	CRK LP2 219	Cranbrook Kimberley Loop 219	4
34	CRK LTL 168	Cranbrook Lateral 168	34
35	DAL LTL 60	Dallas Lateral 60	0.1
36	DED LTL 26	Deadman Creek Lateral 26	0.1
37	DUK SAV 508	Duke Savona 508	3.6
38	DUN LOP 114	Dunkley Mills Loop 114	4.2
39	DUN LTL 60	Dunkley Mills Lateral 60	5.6
40	EKO LTL 88	Elko Lateral 88	0.9
41	ELK LTL 168	Elkview Lateral 168	1.6
42	END LTL 114	Enderby Lateral 114	0.3
43	FER LOP 114	Fernie Lateral South Loop 114	7.3
44	FER LOP 88	Fernie Lateral North Loop 88	12
45	FER LTL 88.9	Fernie Lateral 88 / 168	23.8
46	FFI LOP 114	Finlay Forest Loop 114	4.2
47	FFI LTL 60	Finlay Forest Lateral 60	4.2
48	FRD LTL 219	Fording Lateral 168/219	76.5
49	FTN LOP 114	Fort Nelson Loop 114	0.8
50	FTN LTL 168	Fort Nelson Lateral 114/168	18.8
51	GAL LTL 60	Galloway Lateral 60	9.6
52	GIB LTL 60	Gibralter Mines Lateral 60	10.3
53	GRF LTL 114	Grand Forks Lateral 114	0.9

#	Line Name	FEI Name	Approximate Length (km)
54	HCE LTL 60	High Country Estates Lateral 60	0.6
55	HHP LTL 60	Hudson Hope Lateral 60	10
56	HMM LTL 60	Highmont Mines Lateral 60	3.6
57	HUS LTL 168	Husky Lateral 168	3
58	HV LTL 114	Highland Valley Lateral 114	16.7
59	KA1 LOP 168	Kamloops 1 Loop 168	3.1
60	KA1 LTL 168	Kamloops 1 Lateral 168/219	3.6
61	KA2 LTL 114	Kamloops 2 Lateral 114	1.1
62	KBY LTL 114	Kimberley Lateral 114	2.2
63	KBY LTL 168	Kimberley Lateral 168	20.6
64	KE1 LOP 219	Kelowna 1 Loop 219	2.1
65	KE1 LTL 114	Kelowna 1 Lateral 114	2.1
66	KNU LTL 60	Knutsford Lateral 60	4.3
67	LAC LTL 60	Lac La Hache Lateral 60	0.2
68	LAF LTL 114	Lafarge Cement Lateral 114	3.4
69	LGL LTL 60	Logan Lake Lateral 60	0.7
70	LNC LTL 114	Line Creek Lateral 114	2.8
71	LPC LTL 114	Louisiana Pacific Lateral 114	9.5
72	MAC LOP 168	Mackenzie Loop 168	14.7
73	MAC LTL 168	Mackenzie Lateral 168	31.8
74	MAR LTL 60	Marysville Lateral 60	2
75	MER LTL 114	Merritt Lateral 114	4.9
76	MON LTL 60	Moan Road Lateral 60	0.7
77	NWE LTL 114	North West Energy Lateral 114	6.6
78	NWP LOP 219	Northwood Pulp Loop 219	5.8
79	NWP LTL 168	Northwood Pulp Lateral 168	6
80	OLI LTL 114	Oliver Lateral 114	2
81	OLI PEN 406	Oliver Penticton 406	32.1
82	OSO LTL 114	Osoyoos Lateral 114	21.1
83	P&T LTL 60	Pope and Talbot Lateral 60	0.3
84	PCH LTL 114	Peachland Lateral 114	25.1
85	PG1 LTL 168	Prince George 1 Lateral 168	4.7
86	PG2 219 168	Prince George 2 Lateral 168/219	8.6
87	PG3 LTL 219	Prince George 3 Lateral 219	5.3
88	PGP LTL 168	Prince George Pulp Lateral 168	1

#	Line Name	FEI Name	Approximate Length (km)
89	PRI LTL 88	Princeton Lateral 88	67
90	QUE LTL 114	Quesnel 2 Lateral 114	2.8
91	ROS LTL 114	Rossland Lateral 114	1.1
92	SA3 LTL 168	Salmon Arm 3 Lateral 168	0.9
93	SAL LOP 168	Salmon Arm Loop 168	44.9
94	SAL LTL 114	Salmon Arm Lateral 114	44.7
95	SAV LTL 60	Savona Lateral 60	1.5
96	SHO LTL 114	Shoreacres Lateral 114	0.3
97	SIL LTL 60	Silver Creek Lateral 60	6.7
98	SKK LTL 219	Skookumchuck Lateral 219	35.9
99	SOR LTL 114	Sorrento Lateral 114	25.1
100	SPA LTL 114	Spallumcheen Lateral 114	3.5
101	SPR LTL 114	Sparwood Lateral 114	9.2
102	SUM LTL 114	Summerland Lateral 114	16
103	SWA LTL 60	Swan Lake Lateral 60	1.7
104	TRA CAS 219	Trail Castlegar 219	24.1
105	TRA LTL 168	Trail Lateral 168	4.2
106	VER LTL 114	Vernon Lateral 114	0.6
107	VER TEL 26	Versatile Telemetry Lateral 26	0.1
108	WES LTL 114	Westbank Lateral 114	4.2
109	WES LTL 60	Westar Timber Lateral 60	1
110	WHW LTL 42	Whispering Winds Lateral 42	0.1
111	WIL LOP 168	Williams Lake Loop 168	5.9
112	WIL LTL 114	Williams Lake Lateral 114	10
113	WLD LTL 60	Wildwood Lateral 60	0.5
114	YAH OLI 610	Yahk Oliver 610	302.5
Total Approximate Length of ITS pipelines <u>not included</u> in ITS TIMC Project (#9 to #114)			**1,320**
Total Approximate Length of ITS Pipelines			**2,072**

1

2

B. DESCRIPTION AND EVALUATION OF ALTERNATIVES

2.0 Reference: Exhibit B-1, Page 57

Identification & evaluation of credible/feasible alternatives

Preamble: FEI states:

> FEI indicates that it evaluated 6 alternatives to achieve the ITC TIMC Project Objective to enhance its integrity management capabilities to mitigate cracking threats on 8 ITS pipelines, as summarized in **Table 4-1**, including (1) **SCCDA** = Stress Corrosion Cracking Direct Assessment (2) **PRS** = Pressure Regulating Station (3) **HSTP** = Hydrostatic Test Program (4) **EMAT ILI** = Electro-Magnetic Acoustic Transducer In-Line Inspection Program (5) **PLR** = Pipeline Replacement and (6) **PLE** = Pipeline Exposure & Recoat. **(Exhibit B-1, Page 57)**
>
> "…FEI screened out three alternatives as not technically feasible…Two of the remaining three alternatives were then screened out using a financial criterion…EMAT ILI is therefore the only alternative that is both technically and financially feasible and is therefore the preferred alternative for the ITS TIMC Project." **(Exhibit B-1, Page 57)**

2.1 Please provide a detailed description of FEI's policy or approach with respect to the identification of alternatives for major capital projects that require BCUC approval of a CPCN.

Response:

FEI takes the following approach with respect to the identification of alternatives for major capital projects that require BCUC approval of a CPCN:

1. **Identify Alternatives:** Once FEI has established that a project is required to address an identified and validated need, it identifies and defines the objective(s) that the project will ultimately need to achieve. Based on these objective(s), FEI utilizes internal and/or qualified external expertise to generate alternatives that have the potential to meet the project objective(s). These alternatives are informed by industry standard and best practices, availability of new technology and innovations, and internal and external sustainability and provincial energy objectives.

2. **Screen Alternatives:** In the screening stage, FEI undertakes additional modeling, evaluation and/or studies to generate a high-level scope of work required for each of the alternatives identified. Based on the results of its analyses, FEI screens alternatives based on whether they can meet the project objective(s). Only those alternatives that can meet

the project objective(s) are taken forward for further development as feasible alternatives, which are then developed in alignment with the BCUC's CPCN Guidelines.[2]

2.2 Please explain how FEI considers that the PLR and PLE alternatives are meaningful alternatives to EMAT ILI, as they involve either the replacement or recoating of the ITS pipelines in their entirety, with high level NPV's from the CTS project in the order of $1.8 billion to $1.9 billion (without considering that the ITS project at 752 km is roughly 3 times the length of the CTS project at 254 km) or 6 times the NPV of the preferred alternative of $307 million.

Response:

As described in the response to BCOAPO IR1 2.1, FEI identifies alternatives that are available to achieve the objective(s) of a project. The objective of the ITS TIMC Project is to mitigate the threat of cracking on 8 pipelines in the ITS, which have been determined to be susceptible to cracking. Both pipeline replacement (PLR) and pipeline exposure and recoat (PLE) are considered highly effective methods for the mitigation of cracking threats as these alternatives provide near certainty that no cracking remains on the system after implementation.

PLR and PLE are two of the methods that FEI currently utilizes to manage instances of cracking that are found through opportunity digs, and thus, are technically feasible methods for crack mitigation. As discussed in Section 5.10 of the Application, a localized version of PLE and PLR are options that FEI is considering to manage sections of the pipeline with compromised data post-EMAT ILI run. As such, FEI considers it appropriate to have included them in the Application.

However, FEI agrees with BCOAPO that the cost associated with a global (system-wide) application of PLR and PLE meant they were ultimately not considered to be financially feasible, which factored into the decision to rely on an extrapolation of the CTS TIMC cost estimates instead of undertaking a specific study for the ITS, which would have incurred additional cost and time as discussed in the response to CEC IR1 22.1.

2.3 Please explain if FEI is concerned that it is proposing acceptance of a major capital project to the BCUC for which it was unable to identify any other alternatives that

[2] https://docs.bcuc.com/documents/Guidelines/2015/DOC_25326_G-20-15_BCUC-2015-CPCN-Guidelines.pdf.

were both technically and financially feasible, other than the preferred alternative of EMAT ILI.

Response:

FEI is not concerned that it was unable to identify any alternatives, other than EMAT ILI, that were both technically feasible and cost-effective. As explained below, FEI's alternative analysis was robust. Moreover, FEI does not consider it prudent, or necessary under the BCUC's CPCN Guidelines,[3] to leave the risk of cracking unmitigated until some future date when a *second* technically and financially feasible alternative might be available.

FEI used a two-step approach in its alternative evaluation process, first evaluating alternatives for technical feasibility and then if feasible, proceeding with evaluation against a financial criterion. FEI considered that alternatives that were technically feasible were capable of meeting the project objective, and thus, a financial evaluation would then allow FEI to distinguish between technically feasible alternatives to select a preferred alternative. Through this process, FEI identified three alternatives that were technically feasible, including EMAT ILI.

FEI's financial evaluation of these three technically feasible alternatives relied on its previous understanding of PLR and PLE alternative costs from its development of the CTS TIMC Project. In understanding that the ratio of costs between EMAT ILI and the PLR and PLE alternatives could be similar or larger for the ITS, FEI recognized that PLR and PLE would be significantly less cost-effective and rated them as not financially feasible. FEI considers that a technically feasible Project alternative that potentially has a cost that is one to two orders of magnitude greater than the lowest cost option is ultimately not in the public interest and thus, not feasible.

As discussed in Section 3 of the Application, eight pipelines on the ITS are susceptible to cracking that could lead to rupture, and FEI is obligated to prevent rupture events. FEI has identified a cost-effective approach to mitigating cracking on the proposed ITS pipelines in a manner that aligns with industry practice.

2.4 Given that the preliminary screening analysis determined that there were no other feasible alternatives from a technical or financial perspective, please explain if FEI identified or evaluated any sub-options to the EMAT ILI (ie: Options 4A, 4B, 4C, 4D etc.) - that involve various degrees of scope and timing than that contained in the proposed ITS TIMC Project scope. For example: (i) less or more than the

[3] BCUC CPCN Guidelines state that "the applicant should identify alternatives that it deemed to be not feasible at an early screening stage, and provide the reason(s) why it did not consider them further." https://docs.bcuc.com/documents/Guidelines/2015/DOC_25326_G-20-15_BCUC-2015-CPCN-Guidelines.pdf.

proposed 8 ITS pipeline segments; (ii) less or more than the proposed 3 pipeline alterations and 13 facility alternations; and (iii) a longer or shorter timeframe.

2.4.1 If yes, please provide a detailed description of the EMAT ILI sub-options that FEI identified and evaluated, an associated evaluation matrix including the non-financial and financial criteria used in the evaluation, the weighting of these criteria and the ultimate scoring of each sub-option, with supporting reasons.

2.4.2 If no, please explain why FEI did not consider alternate EMAT ILI sub-options as part of the ITS TIMC CPCN application that would both meet the broad project objective and inform the BCUC and registered intervenors with respect to options and alternate combinations of project parameters (differing number of pipelines, pipeline alterations and facility alterations) and corresponding risk, cost and rate profiles and impacts.

Response:

FEI did not identify or evaluate any sub-options to the EMAT ILI alternative for the reasons outlined below, which also address the examples provided in the question.

(i) Less or more than the proposed 8 ITS pipeline segments

Please refer to the response to CEC IR1 14.2 for the reasons why FEI has not considered less or more than the proposed 8 ITS pipeline segments.

(ii) Less or more than the proposed 3 pipeline alterations and 13 facility alterations

Please refer to the response to BCUC IR1 8.5 for the reasons why FEI has selected the proposed 3 pipeline alterations. As explained in Appendix D to the Application, FEI identified other heavy wall segments causing speed excursions in MFL tools which could have been included in the ITS TIMC Project. However, due to the length and/or severity of the observed MFL tool speed excursion, FEI chose to exclude alterations at these locations from the scope of the Project, thus avoiding potentially unnecessary and costly replacement work, until after it has reviewed data collected during the baseline ILI run. If speed excursions occur during the baseline EMAT run at locations other than those proposed for proactive replacement (including those excluded from the Project scope), FEI will perform a site-specific assessment to determine a cost-effective mitigation.

FEI identified the facility alteration scope of work to meet specific metrics for EMAT ILI tools and its response to ILI findings. Appendix F to the Application identifies typical specifications for it to run EMAT ILI tools. Without these modifications, FEI would not be able to successfully run EMAT ILI tools on its system and respond to EMAT findings.

(iii) A longer or shorter timeframe

Please refer to the response to BCUC IR1 5.3 which outlines why FEI did not consider a longer or shorter timeframe for the Project.

C. PROJECT DESCRIPTION AND PROJECT COST ESTIMATE

3.0 Reference: Exhibit B-1, Pages 87, 88, 96, 101, 110, 111, 114, 118 and 121

Priority ranking of 16 alternations & contingency/management reserves

Preamble: FEI states:

> **Table 5-2** provides a summary of the 3 proposed alternations to the pipelines and **Table 5-3** provides a summary of the 13 proposed facility alternations that are part of the ITS TIMC Project scope**. (Exhibit B-1, Pages 87 and 88)**
>
> "…the addition of a temporary PRS at SN-4 Valve Assembly near Kamloops and a permanent PRS at East Kootenay Exchange station." **(Exhibit B-1, Page 96)**
>
> "The location of worksites will range from agricultural fields to densely populated urban neighbourhoods, with each worksite presenting its own set of challenges for construction." **(Exhibit B-1, Page 101)**
>
> "The capital cost estimate…approximates a P50 confidence level and will form the Project capital budget." **(Exhibit B-1, Page 110)**
>
> **Table 5-5** provides a summary of the projected capital budget for the ITS TIMC Project, which includes a base cost estimate of $58.4 million, a contingency of $5.9 million (10.1% of base estimate), a management reserve of $5.0 million (8.6% of base estimate) and a total project cost estimate of $84.6 million. **(Exhibit B-1, Pages 110 and 111)**
>
> **Table 5-7** provides a summary of the ILI activities, the cost type (accounting treatment) and timing. **(Exhibit B-1, Page 114)**
>
> **Table 6-3** provides a summary of the financial analysis of the Project and Table 6-5 provides a summary of the delivery rate impact of the Project. **(Exhibit B-1, Pages 118 and 121)**

3.1 Please explain if FEI has undertaken an evaluation of the 3 proposed pipeline alternations and 13 proposed facility alternations that are part of the ITS TIMC Project scope, to stratify or rank them in order of priority with respect to project objectives and deliverables.

3.1.1 If yes, please provide the priority ranking, including the criteria to rank, the weighting of the criteria and the individual scoring for each of the 16 proposed alterations.

3.1.2 If no, please explain why not.

Response:

FEI has not undertaken an evaluation to rank the 3 proposed pipeline alterations and 13 proposed facility alterations in order of priority. All of the proposed alterations are necessary in order to meet the Project's objective to enhance FEI's integrity management capabilities to mitigate cracking threats on 8 ITS pipelines. In particular, these alterations will allow FEI to use EMAT ILI in the 8 ITS pipelines, collect quality data and respond to the findings of EMAT ILI tool runs.

As discussed in the response to BCUC IR1 4.2, FEI proposes to undertake EMAT inspection of the Savona to Penticton 323 mainline first. As a result, FEI is proposing to complete the pipeline and facility alterations associated with the SAV VER 323 and VER PEN 323 pipelines (Phase 1) before proceeding with the pipeline and facilities alterations associated with the remaining pipelines (Phase 2). Please refer to Section 5.5 of the Application for a detailed list of the alterations that will be completed in each phase.

3.2 Please amend Table 5-2 and Table 5-3 to provide the cost estimate for each of the 3 proposed pipeline alternations and 13 proposed facility alternations that are part of the ITS TIMC Project scope. If the response to this question would provide confidential or commercially sensitive information, please aggregate the requested cost estimate information as necessary such that it can be placed on the public record in an un-redacted form.

Response:

Please refer to amended Tables 5-2 and 5-3 below which include the estimated capital cost (including contingency) for each of the 3 proposed pipeline alterations and 13 proposed facility alterations in as-spent dollars. The total estimated capital cost in as-spent dollars is $71.894 million which aligns with Table 6-1, Line 6 of the Application. The cost estimates include escalation of $7.630 million to convert 2022 dollars to as-spent dollars and contingency of $6.621 million in as-spent dollars (as noted in Section 6.2 of the Application). The capital cost estimate shown in the tables below does not include the Project Development and Deferral costs, Management Reserve, AFUDC, and Income Tax Recovery as these items are not specific to the 3 proposed pipeline alterations or the 13 proposed facility alterations.

Amended Table 5-2: Pipelines Within Project Scope

Pipeline	Approximate Length (km)	Number of Alterations	Summary of Alterations	Capital Cost Estimate ($ millions)
Savona Vernon 323	143	1	Replacement of one approximately 80 metre heavy wall pipe segment and bends on either side of the crossing at Cherry Creek (kP 16.9).[4] Replacement pipe and fittings to match upstream and downstream line pipe wall thickness. **(Event 1)**	3.774
Vernon Penticton 323	99	N/A	No mitigations required.	
Penticton Oliver 273	30	N/A	No mitigations required.	
Oliver Grand Forks 273	95	N/A	No mitigations required.	
Grand Forks Trail 273	60	N/A	No mitigations required.	
Kingsvale Princeton 323	67	2	Replacement of two 2.5 metre heavy wall pipe segments at kP 39.4. Replacement pipe to match upstream and downstream line pipe wall thickness. **(Event 29)** Replacement of one heavy wall above ground valve assembly at block valve assembly KO-3[5] (kP 47.7). Replacement to match upstream and downstream line pipe wall thickness. This includes replacement of bends, fittings and other heavy wall features. **(Event 31)**	2.995 2.217
Princeton Oliver 323	95	N/A	No mitigations required.	
East Kootenay Link 323	163	N/A	No mitigations required.	
Total Pipeline Alterations Cost Estimate ($ millions)				**8.986**

Amended Table 5-3: Facilities Within Project Scope

Facility	Associated Pipelines	Summary of Alterations	Capital Cost Estimate ($ millions)
Savona Compressor Station	SAV VER 323	Modification to one pig barrel.	1.760
SN-3 (Kamloops)	SAV VER 323	Addition of clamp-on ultrasonic flowmeter, power and telemetry.	3.919
SN-4 (Kamloops)	SAV VER 323	Addition of temporary pressure regulating capability (PRS)	3.015

[4] kP is the annotation for the kilometre point measured from the start of the pipeline.
[5] KO-3 is the annotation for the third block valve on the Kingsvale to Oliver mainline.

Facility	Associated Pipelines	Summary of Alterations	Capital Cost Estimate ($ millions)
SN-6-1 (Vernon)	SAV VER 323	Replace existing insertion meter with clamp-on ultrasonic flowmeter, power and telemetry (by others).	2.515
Salmon Arm Tap	SAV VER 323	Replace existing insertion flowmeter with clamp-on ultrasonic flowmeter.	7.226
SN-7 (Vernon)	SAV VER 323 VER PEN 323	Modification on two pig barrels, addition of flow control station (FCS), including power and telemetry.	5.259
Penticton Gate Station	VER PEN 323 PEN OLI 273	Modification to two pig barrels, addition of flow control station (FCS).	5.673
Oliver Y Station	PEN OLI 273 PRI OLI 323 OLI GRF 273	Modification to three pig barrels.	8.253
Princeton Crossover Control Station	PRI OLI 323 KIN PRI 323	Modification to two pig barrels, addition of flow control capability (FCS), telemetry and power.	6.598
Kingsvale Control Station	KIN PRI 323	Modification to one pig barrel.	1.412
SN-15 (Grand Forks)	OLI GRF 273 GRF TRA 273	Modification to two pig barrels, addition of flow control capability (FCS), telemetry and power.	6.929
SN-17 (Trail)	GRF TRA 273 YAH TRA 323	Modification to two pig barrels.	3.721
East Kootenay Exchange	YAH TRA 323	Modification to one pig barrel and addition of permanent pressure regulating system (PRS).	6.629
Total Facility Alterations Cost Estimate ($ millions)			**62.908**

Total Pipeline and Facility Alterations Cost Estimate ($ millions)	**71.894**

3.3 Please explain why the addition of PRS at SN-4 Value Assembly near Kamloops is "temporary".

Response:

Please refer to the response to RCIA IR1 13.5.

3.4 Please provide a comparison and discuss the sufficiency of the 10.1% contingency for the proposed ITS TIMC Project with the level of contingency that was budgeted for the CTS TIMC Project and other similar FEI construction projects, including the considerations that the ITS TIMC Project is approximately 3 times the length of the CTS TIMC Project and will be constructed in a wide variety of worksites.

Response:

While the total length of the pipelines affected by the ITS TIMC Project is approximately three times the length of the pipelines affected by the CTS TIMC project, the *scope* of the ITS TIMC Project (3 pipeline and 13 facility alterations) is smaller than that of the CTS TIMC project (13 pipeline and 13 facility alterations). Furthermore, the amount of contingency is not a function of the size of the project, but rather, it is a function of the project's risk profile.

FEI followed the same process for determining contingency requirements for both the ITS TIMC and CTS TIMC projects, as discussed in Confidential Appendix H-3 to the Application (Validation Estimating Contingency Report) and Confidential Appendix E-3 from the CTS TIMC application.[6] The P50 value formed the basis for the contingency budget, which for both the CTS TIMC and ITS TIMC projects was approximately 10 percent.

With a 10 percent contingency, there is a 50 percent probability that the Project will end up costing less than the cost estimate. In other words, the 10 percent contingency is the amount needed to fund a project at a P50 level. A 10 percent contingency for the ITS Project is therefore adequate given the risk profile of the Project.

3.5 Please provide a detailed explanation of the rationale and use of the 8.6% Management Reserve for the proposed ITS TIMC Project, including: (i) the risks that the Management Reserve is designed to cover; (ii) the circumstances under which the Management Reserve can be used; and (iii) the level of the project team or FEI executive that can approve the use of the Management Reserve.

Response:

The purpose and intent of a management reserve is to cover project-specific risks with low probability but high impact that, if they occur, could consume a large amount of the project's contingency. The management reserve amount for the ITS TIMC Project was determined based on the contingency analysis provided in Confidential Appendix H-3 (Validation Estimating Contingency Report) to the Application. The rationale for the 8.6 percent management reserve

[6] Exhibit B-1-1 in the CTS TIMC Project CPCN proceeding.

is explained in the referenced report, under the section titled Management Reserves for Discrete Risks. To summarize, an expected value calculation is done for each risk to determine the likely outcomes, and expert judgment is then used to determine a monetary value to cover the uncertainty as a management reserve.

As outlined in the Report, there are three Project risks that the proposed management reserve is designed to cover. The management reserve can be used if any of the identified project-specific risks for the ITS TIMC Project materialize. Should this happen, the Project team would be required to submit a budget change request to the Project's Executive Sponsor. The approval would be expected to be granted after a review of the additional work and whether the project-specific risk or risks would be mitigated.

3.6 Please provide at the P75 and P90 confidence levels: (i) the total project cost estimate of the ITS TIMC Project (Table 5-5); (ii) the financial analysis of the Project (Table 6-3); (iii) the calculation of the delivery rate impacts of the Project (Table 6-5); and (iv) cumulative bill increase for a typical FEI residential customer.

Response:

Please refer to Table 1 below for (i) the P75 and P90 total project cost estimate of the ITS TIMC Project in the same format as Table 5-5 on pages 110 to 111 of the Application, and please refer to Table 2 below for (ii) the P75 and P90 financial analysis of the Project in the same format as Table 6-3 of the Application. FEI has also included the P50 (as-filed) total project cost estimate and financial analysis for both Tables 1 and 2 for comparison purposes. Please refer to Table 3 below for (iii) the calculation of the delivery rate impacts of the Project in the same format as Table 6-5 of the Application and (iv) cumulative bill increase for a typical FEI residential customer for P50 (as-filed), P75, and P90 confidence levels.

The following are the assumptions for the contingency, management reserve, and escalation for P50 (as-filed), P75 and P90 confidence levels.

- **Contingency:** The P50, P75, and P90 contingencies are $5.9 million, $11.7 million, and $17.4 million, respectively, derived from Table 4 of Appendix H-3 to the Application.
- **Management Reserve:** As described on page 14 of Appendix H-3 to the Application, the P50 management reserve is derived from the sum of the P50 market risk and wildfire risk (i.e., $2.4 million plus $2.3 million, rounded to $5 million from Table 7 of Appendix H-3). As such, for the P75 management reserve, FEI has assumed $7 million (i.e., $4.2 million plus $2.8 million) and for the P90 management reserve, FEI has assumed $8.9 million (i.e., $5.7 million plus $3.2 million) from Table 7 of Appendix H-3.

- **Escalation:** The P50, P75, and P90 escalations are $7.63 million, $11.66 million, and $15.07 million, respectively, derived from Table 1 of Appendix H-4 to the Application.

Table 1: Project Capital Budget at P50 (As-filed), P75, and P90 Confidence Levels

Line	Particular	P50 ($Millions)	P75 ($Millions)	P90 ($Millions)
1	Construction Cost Estimate (Contractor)	50.231	50.231	50.231
2	Owner's Costs (FEI)	8.133	8.133	8.133
3	**Sub-Total Construction Base Cost Estimate ($2022-Q2)**	**58.364**	**58.364**	**58.364**
4	CPCN Application Costs	0.400	0.400	0.400
5	Pre-Construction Development Costs	3.665	3.665	3.665
6	Contingency	5.900	11.700	17.400
7	**Sub-Total Cost Estimate ($2022-Q2)**	**68.328**	**74.128**	**79.828**
8	Cost Escalation (As-Spent)	7.630	11.660	15.070
9	**Sub-Total Cost Estimate (As-Spent)**	**75.958**	**85.788**	**94.898**
10	Management Reserve	5.000	7.000	8.900
11	**Sub-Total Cost Estimate w/ Management Reserve (As-Spent)**	**80.958**	**92.788**	**103.798**
12	AFUDC	4.513	4.979	5.415
13	Income Tax Recovery	(0.883)	(0.883)	(0.883)
14	**Total Project Cost Estimate (As-Spent)**	**84.588**	**96.884**	**108.330**

Table 2: Financial Analysis of the Project at P50 (As-filed), P75, and P90 Confidence Levels

Line	Particular	P50	P75	P90
1	Total Charged to Gas Plant in Service ($ millions)	85.161	97.457	108.903
2	Total Project Deferral Costs, Net of Tax	(0.574)	(0.574)	(0.574)
3	***Total Project Cost - Excl. Sustainment Capital ($ millions)***	***84.588***	***96.884***	***108.330***
4	Sustainment Capital	103.062	117.932	131.777
5	***Total Capital Cost over 70-year Analysis Period ($ millions)***	***187.650***	***214.815***	***240.107***
6				
7	Incremental Rate Base in 2028 ($ millions)	81.004	92.710	103.607
8	Incremental Revenue Requirement in 2028 ($ millions)	6.860	7.853	8.778
9	***PV of Incremental Revenue Requirement 70 years ($ millions)***	***93.621***	***107.024***	***119.502***
10	Net Cash Flow NPV 70 years ($ millions)	4.227	4.978	5.675
11				
12	Delivery Rate Impact in 2028 (%)	0.72%	0.82%	0.92%
13	***Levelized Delivery Rate Impact 70 years (%)***	***0.54%***	***0.62%***	***0.69%***
14	Levelized Delivery Rate Impact 70 years ($/GJ)	0.027	0.030	0.034

Table 3: Summary of Delivery Rate Impact at P50 (As-filed), P75, and P90 Confidence Levels

	2024	2025	2026	2027	2028
Summary of Delivery Rate Impact at P50 (As-filed) Confidence Level					
Annual Delivery Margin, Incremental to Approved, Non-Bypass ($ millions)	(0.195)	(0.173)	3.099	6.782	6.860
% Increase to Approved Delivery Margin, Non-bypass	***(0.02%)***	***(0.02%)***	***0.32%***	***0.71%***	***0.72%***
Incremental % Delivery Rate Impact (Year-over-Year)	***(0.02%)***	***0.00%***	***0.34%***	***0.38%***	***0.01%***
Average Annual % Delivery Rate Impact (5 years, 2024 - 2028)	0.14%				
Average Annual Delivery Rate Impact (5 years, 2024 - 2028), $/GJ	0.007				
Cumulative % Delivery Rate Impact (5 years, 2024 - 2028)	0.72%				
Cumulative Delivery Rate Impact (5 years, 2024 - 2028), $/GJ	0.035				
Cumulative Bill Increase (5 years, 2024 - 2028), $	3.15				

Summary of Delivery Rate Impact at P75 (As-filed) Confidence Level					
Annual Delivery Margin, Incremental to Approved, Non-Bypass ($ millions)	(0.195)	(0.173)	3.544	7.764	7.853
% Increase to Approved Delivery Margin, Non-bypass	***(0.02%)***	***(0.02%)***	***0.37%***	***0.81%***	***0.82%***
Incremental % Delivery Rate Impact (Year-over-Year)	***(0.02%)***	***0.00%***	***0.39%***	***0.44%***	***0.01%***
Average Annual % Delivery Rate Impact (5 years, 2024 - 2028)	0.16%				
Average Annual Delivery Rate Impact (5 years, 2024 - 2028), $/GJ	0.008				
Cumulative % Delivery Rate Impact (5 years, 2024 - 2028)	0.82%				
Cumulative Delivery Rate Impact (5 years, 2024 - 2028), $/GJ	0.040				
Cumulative Bill Increase (5 years, 2024 - 2028), $	3.60				

Summary of Delivery Rate Impact at P90 (As-filed) Confidence Level					
Annual Delivery Margin, Incremental to Approved, Non-Bypass ($ millions)	(0.195)	(0.173)	3.957	8.680	8.778
% Increase to Approved Delivery Margin, Non-bypass	***(0.02%)***	***(0.02%)***	***0.41%***	***0.91%***	***0.92%***
Incremental % Delivery Rate Impact (Year-over-Year)	***(0.02%)***	***0.00%***	***0.43%***	***0.49%***	***0.01%***
Average Annual % Delivery Rate Impact (5 years, 2024 - 2028)	0.18%				
Average Annual Delivery Rate Impact (5 years, 2024 - 2028), $/GJ	0.009				
Cumulative % Delivery Rate Impact (5 years, 2024 - 2028)	0.92%				
Cumulative Delivery Rate Impact (5 years, 2024 - 2028), $/GJ	0.045				
Cumulative Bill Increase (5 years, 2024 - 2028), $	4.02				

3.7 Please explain the basis for the cost type/accounting treatment for each of the ILI activities described in Table 5-7.

Response:

The basis for the cost type or accounting treatment for the ILI activities identified in Table 5-7 of the Application are consistent with the current approved practice (i.e., FEI is not proposing any changes to the accounting treatment in this Application) and are as follows:

- **Run EMAT ILI Tools in ITS:** As approved by Order G-141-09,[7] major pipeline inspection costs, including the costs of ILI tool runs, are capitalized, effective January 1, 2010.

[7] Appendix A to Decision and Order G-141-09, page 16.

- **Perform Integrity Digs and Repairs:** As approved in the MRP Decision and Order G-165-20, FEI is approved for flow-through treatment for costs associated with integrity digs and the resulting repair work for the integrity concerns. As such, FEI has been forecasting integrity digs and repair costs annually as part of flow-through O&M since 2020.
- **Addressing EMAT ILI Tool Blind Spots:** These activities are related to additional work that might be needed to address any deficiencies in the collected data (i.e., blind spots) and potentially projects to mitigate the risk at the blind spots. Depending on the nature and scope of the work, this work will be funded by FEI's O&M (formula or flow-through O&M under the current MRP) or sustainment capital.

D. CONSULTATION AND ENGAGEMENT

4.0 Reference: Exhibit B-1, Pages 137, 138, 139, 140, 146, 147 and 148

Consultation objectives and strategies

Preamble: FEI states:

> "Consistent with industry best practices, FEI plans to guide public consultation and solicit community feedback throughout the Project" **(Exhibit B-1, Page 137)**
>
> FEI indicates that it used the appropriate communication channels and materials to support consultation, including project webpage, mail notifications, email, phone line and other communication channels such as newsletters and various social media channels. **(Exhibit B-1, Pages 138 to 140)**
>
> **Table 8-3** summarizes questions, issues and concerns of Indigenous Groups with respect to the ITS TIMC Project. **(Exhibit B-1, Pages 146 to 148)**

4.1 Please explain if FEI has adopted a specific public consultation and engagement framework to inform industry best practices for the ITS TIMC Project.

Response:

FEI considers the International Association of Public Participation (IAP2) spectrum of public participation, and its own experience on other major projects to inform its engagement and consultation planning.

4.2 Please explain FEI's approach to public consultation and engagement for the ITS TIMC Project for the following stakeholder groups: (i) Indigenous Groups; (ii) permitting authorities; (iii) municipal and regional governments; (iv) residents and businesses directly impacted by FEI's rights of way; and (v) FEI's customers. Please use the International Association of Public Participation (IAP2) – public participation spectrum that specifies five levels of participation: (1) Inform (2) Consult (3) Involve (4) Collaborate and (5) Empower. As part of the response, please identify which of the five levels of participation is appropriate for the above noted stakeholder groups and explain why.

Response:

As defined by the International Association of Public Participation (IAP2) spectrum, FEI considers its engagement level for Indigenous Groups as "Involve" because FEI works directly with potentially affected groups throughout the process to ensure that the concerns and aspirations are consistently understood and considered.

FEI considers the remaining audiences as a "Consult" on the IAP2 spectrum because it is obtaining feedback on analysis, alternatives and/or decision.

4.3 Please summarize the number of two-way meetings held with the 35 identified Indigenous Groups on the ITS TIMC Project to date from Table 8-3.

Response:

Two separate letters were sent to each of the 35 Indigenous Groups offering to have a meeting. To date, FEI has held two, two-way meetings with Indigenous Groups: Skeetchestn Indian Band and with the Tk'emlups te Secwepemc, as outlined in Table 8-3 of the Application. FEI will continue to provide Project information throughout the Project lifecycle, including planning, procurement, construction and restoration.

4.3.1 Considering the level of participation that is planned for Indigenous Groups as outlined in the response to BCOAPO IR 4.2, please provide FEI's plans with respect to active two-way meetings with Indigenous Groups on a go-forward basis as compared to more passive communication channels such as emails etc.

Response:

FEI's goal is to continue engagement activities throughout the Project lifecycle in alignment with each Indigenous group's preferred method(s) of communication and level of interest. FEI will continue to meet with Indigenous Groups as requested to share information regarding Project timelines and scopes of work, to identify procurement and participation opportunities, and to solicit feedback on mitigation and restoration plans.

E. COMPLIANCE FRAMEWORK AND REPORTING

5.0 Reference: BCUC Order C-3-22, Appendix A

ITS TIMC Project compliance framework and reporting

Preamble:

BCUC Order C-3-22 with respect to the FEI CTS TIMC Project specifies semi-annual, material change and final report parameters (BCUC Order C-3-22, Appendix A)

5.1 Please provide the key parameters of a compliance framework and regulatory reporting that FEI would recommend to the BCUC for the ITS TIMC Project.

Response:

FEI considers that the key parameters of compliance and regulatory reporting that were directed and outlined by the BCUC in its Decision on the CTS TIMC Project CPCN Application (Appendix A to Order C-3-22) are reasonable and consistent with other similar decisions. Therefore, FEI recommends that the BCUC adopt similar parameters for the ITS TIMC Project.

For reference, Appendix A to Order C-3-22 is as follows:

The Panel directs FEI to file the following reports:

1. Semi-annual Progress Reports

Each report is required to detail:

- Actual costs incurred to date compared to the CPCN estimate highlighting variances with an explanation and justification of significant variances;
- Updated forecast of costs, highlighting the reasons for significant changes in Project costs anticipated to be incurred; and
- The status of Project risks, highlighting the status of identified risks, changes in and additions to risks, the options available to address the risks, the actions that FEI is taking to deal with the risks and the likely impact on the Project's schedule and cost.

FEI must file semi-annual progress reports within 30 days of the end of each semi-annual reporting period, with the first report covering the period ending June 30th, 2022. Each report must provide the information set out in Appendix A to this Decision.

2. Material Change Reports

A material change is a change in FEI's plan that would reasonably be expected to have a significant effect on the schedule, cost or scope of that particular plan, such that:

- there is a schedule delay of greater than six months compared to the CPCN construction schedule for the lateral;
- there is a cost variance of greater than 10 percent of the CPCN capital estimate for the Project; or
- there is a change to the project alternative selected for a given pipeline modification.

In the event of a material change, FEI must file a material change report with the BCUC, explaining the reasons for the material change, FEI's consideration of the Project risk and the options available and actions FEI is taking to address the material change. FEI must file the material change report as soon as practicable and in any event within 30 days of the date on which the material change occurs. If the material change occurs within 30 days of the date for filing a semi-annual progress report, FEI may include the material change information in the progress report.

3. Final Report

The Final Report must include a breakdown of the final costs of the Project compared to the cost estimates included in Table 6-2 in the Exhibit B-1-2 and provide an explanation and justification of any material cost variances of 10 percent or more.

The Final Report must be filed within six months of substantial completion or the in-service date of the Project, whichever is earlier.

5.2 Please provide FEI's views as to whether any semi-annual or material change reporting that is directed by the BCUC for the ITS TIMC Project should include environmental and archeological impacts that are assessed as moderate to high based on go-forward assessments.

Response:

Consistent with other CPCN projects, FEI considers environmental and archeological impacts as project risks, and FEI plans to report on these potential impacts in the project risks section of its semi-annual progress reports to the BCUC.

F. VALUE OF INCREMENTAL IMPROVEMENT IN RISK

6.0 Reference: Exhibit B-1, Page 2 and Appendix R, Pages 1 to 5

FEI response to BCUC directive re: assess the value of incremental improvement in risk

Preamble: FEI states:

"In its Decision and Order C-3-22 approving the CTS TIMC CPCN, the BCUC Panel requested FEI to provide a suggestion in terms of timing for the preparation and review of a proposal to develop a robust process to assess the value of incremental improvement in risk to fully assess the costs and benefits to ratepayers of a proposed project." **(Exhibit B-1, Page 2)**

"FEI provides its current response to this issue, but considers that fully assessing the value of incremental improvements in risk is more appropriately considered to be an ongoing conversation that can occur over future filings and, in particular, as part of CPCN applications[…]The remainder of this appendix is organized around the following points:

- Risk mitigation is only one of a number of potential project drivers.
- FEI is continually investigating new processes to analyze and evaluate risk mitigation.
- In some areas, industry is moving from a qualitative to quantitative assessment of risks.
- Assessing incremental improvement in risks will vary by project.
- CPCN proceedings should remain open and flexible to different approaches to analyzing risk."

(Exhibit B-1, Appendix R: CTS Compliance Filing Considerations, Page 1)

6.1 FEI indicates that risk mitigation is only one of a number of potential drivers of a project, with other potential drivers including: (1) compliance with standards and industry regulations; (2) alignment to industry practices; (3) provision of adequate and reliable service to customers; and (4) response to third-party projects - and that the word "risk" can have many connotations and definitions. Please confirm that the four other potential project drivers that FEI has listed would all involve various elements of risk management (for instance, standards, regulations and industry practices). If not confirmed, please explain FEI's views that these four other potential project drivers do not involve elements of risk management.

Response:

Confirmed.

6.2 FEI indicates: (i) it is continually investigating new processes to analyze and evaluate risk mitigation and (ii) in some areas, the industry is moving towards more quantitative assessments of risk improvement. Please clarify whether FEI views its efforts, or industry efforts, to continuously improve risk management as impeding or facilitating its ability to assess the value of incremental improvement in risk in future CPCN applications.

Response:

FEI views its efforts, and those of industry, to continuously improve risk management as facilitating its ability to assess the value of incremental improvement in risk in future CPCN applications.

6.3 FEI indicates that the need and method to assess the value of incremental risk improvement will vary by project and that for some projects data is low quality and assumptions must be made for risk estimation purposes. Please clarify whether FEI views the variability of risk assessments for different projects as impeding or facilitating its ability to assess the value of incremental improvement in risk in future CPCN applications.

Response:

FEI does not consider that the variability of risk assessments between different projects will impede its ability to assess the value of incremental improvement in risk in future CPCN applications as the regulatory process is sufficiently flexible such that the assessments of risk and benefits can be varied to the circumstances of individual projects.

6.4 FEI indicates that CPCN processes should remain open and flexible to different approaches to analyzing risk and that the CPCN regulatory process remains the

best opportunity to assess the costs and benefits of projects, but concludes that there is no "silver bullet" answer to the question of how to assess incremental improvement in risks. Please provide FEI's views on whether the development of a risk management framework for CPCN regulatory processes to assist with assessing the value of incremental improvement in risk could incorporate the necessary flexibility to deal with the variability in different types of capital projects.

Response:

As discussed in Appendix R (CTS Compliance Filing Considerations) to the Application, FEI considers that the existing CPCN regulatory process, which includes processes to assess the risks associated with a project and the potential costs and benefits for ratepayers if a project is approved, remains the best opportunity to analyze and assist with assessing the incremental value of risk mitigation. Further, these CPCN processes benefit from inherent flexibility to adapt to the circumstances of each project driven by unique risk mitigation characteristics. Therefore, in FEI's view, there is no need to develop a separate risk management framework for CPCN regulatory processes as the relevant risk elements are assessed through the process that exists.

6.5 Please provide a summary of FEI's corporate risk management framework (including risk identification, assessment of impact of risks, risk treatment, residual risk tolerance and risk reporting and monitoring etc.) and discuss FEI's views on whether its corporate risk management framework could be used to assess the value of incremental improvements in risk for future CPCN projects.

Response:

FEI's corporate risk management framework is not an appropriate tool for assessing the value of incremental improvements in risk for future CPCN projects.

This framework is used to evaluate identified corporate risks, on an annual basis, over a 12 to 18 month period (i.e., near-term risks). Emerging risks, based on review of strategic and business plan initiatives, and industry trends, may give rise to new corporate risks. Risks reviewed as part of this framework are qualitatively assessed for likelihood of occurrence and impact to the organization from an operational, people, strategic, financial and compliance perspective, using a 5-point rating scale, on a net risk basis. Ultimately, however, FEI's corporate risk management framework is not intended to assess the value of incremental improvements in risk related to the operation of FEI's infrastructure as a result of CPCN projects.

As explained in Appendix R to the Application, and as noted in the preamble, FEI considers that the CPCN regulatory process remains the best opportunity to assess and test the costs and benefits of a project for customers, including the incremental value of risk mitigation as applicable.

6.6 Please provide FEI's recommendations on the next steps and associated timing to respond to the BCUC directive with respect to the development of an approach to assess the value of incremental improvements in risk as part of future CPCN applications.

Response:

Please refer to the response to BCOAPO IR1 6.4 and Appendix R to the Application which provides a discussion of FEI's view and recommendation that existing CPCN regulatory processes remain the best forum for the BCUC to analyze the incremental value of risk mitigation aspects specific to a project.