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~~**CONFIDENTIAL**~~

May 22, 2025

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, B.C.
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Dear Commission Secretary:

Re: FortisBC Energy Inc. (FEI)

Application for a Certificate of Public Convenience and Necessity (CPCN) for the Tilbury Liquefied Natural Gas Storage Expansion (TLSE) Project (Application)

Response to the British Columbia Utilities Commission (BCUC) ~~CONFIDENTIAL~~ Information Request (IR) No. 3

On December 29, 2020, FEI filed the Application referenced above and on October 24, 2024, FEI filed its Supplemental Evidence to the Application. In accordance with the regulatory timetable established in BCUC Order G-324-24 for the review of the Application, FEI respectfully submits the attached response to BCUC Confidential IR No. 3.

As requested in the letter submitted with BCUC Confidential IR No. 3, FEI has reviewed and identified that none of the information in the question preambles or responses requires Restricted Confidential treatment. Certain of the information requires Confidential treatment, consistent with its treatment in other BCUC filings, but will be provided to interveners who have signed and filed a confidentiality declaration and undertaking in this proceeding. FEI has prepared and filed a redacted version of BCUC Confidential IR No. 3 for the public record.

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

23.0 Reference: PROJECT NEED

Exhibit B-63, BCUC IR 116.4; Coastal Transmission System Transmission Integrity Management Capabilities Project CPCN proceeding, Exhibit B-1-1, Appendix B-2, pp. 13, 24, 27-28

AV-1, AV-2, AV-3 and AV-54 Probability of Failure

In response to British Columbia Utilities Commission (BCUC) information request (IR) 116.4, FortisBC Energy Inc. (FEI) stated:

> While the 2021 JANA Pipeline QRA was completed before EMAT ILI was in place on FEI's system, it would be incorrect to characterize the internal failure rate as "unmitigated".
>
> The 2021 JANA Pipeline QRA assessed the general failure potential of the lines based on their specific characteristics and historical industry failure rates of comparable lines. As such, the internal failure rate of 6.51e-5 /km/year includes consideration of FEI's integrity management mitigations for the relevant threats. FEI recognizes that this failure rate estimate was developed prior to the adoption of an EMAT ILI program, and that the cracking failure rate estimate could not be informed by data on the actual cracks present on the line such as their location and sizing (i.e., depth and length). However, in the absence of EMAT ILI data on FEI's system, the JANA QRA leveraged other data such as historical industry failure rates. Historical industry failure rates are derived from pipelines with a range of hazard management (mitigation) practices applied to them, and therefore do not represent an "unmitigated internal failure rate" as part of the JANA QRA or as part of Exponent's analysis.

On page 24 of Appendix B-2 of Exhibit B-1-1 from the Coastal Transmission System Transmission Integrity Management Capabilities Project CPCN proceeding (CTS TIMC CPCN proceeding), JANA Corporation (JANA) states:

> This section provides a high-level attribute summary and an overview of the Quantitative Safety Risk Assessment results for each pipeline. A detailed view of the inputs and results are available in the Risk Results Database.
>
> Each pipeline summary in this section includes threat breakdowns for safety risk and rupture rate. Additionally, a safety risk strip chart is presented for each pipeline. This chart is a plot of safety risk per unit length (i.e., SRU per km per year) versus distance along the pipeline. <u>The plot includes two series showing the baseline risk (with no additional risk mitigation) and a "mitigated cracking threats" risk scenario.</u>

[redacted]

[redacted]

On page 13 of Appendix B-2 of Exhibit B-1-1 from the CTS TIMC CPCN proceeding, JANA states:

> This baseline system-level QRA provides a granular assessment of safety risk to aid decision making. The analysis used fully quantitative risk measures.
>
> The analysis used currently available integrity data and where data was missing, default values based on best estimations available were used to provide reasonably conservative estimation of failure frequencies. The data assumptions are detailed in the MS Excel viewer provided with the Risk Results Database.

The assessment was to conducted [sic] to evaluate the frequency of failure and associated level of safety risk for each of the threats, to allow comparison and ranking (prioritization) of these frequency of failure (rupture) and risk, and to evaluate the potential impact of risk mitigation such as the use of EMAT. The model outputs should be used with caution outside their intended purpose. [Emphasis added]

23.1 Please confirm, or explain otherwise, that the estimated rupture rate of 6.5E-05 /km/year provided in Table 25 for the SCC threat represents the estimated rupture rate for the [redacted] pipeline segment assuming "no additional risk mitigation."

Response:

As noted in the response to BCUC IR5 116.4, the failure rates from the 2021 JANA Pipeline QRA that were used by Exponent to support the 2024 Resiliency Plan, one of which was the 6.5E-05/km/year rupture rate due to SCC from the [redacted] pipeline, account for the mitigation provided by FEI's Integrity Management Program that was in place at the time the QRA was conducted. As noted in the excerpt from the JANA Pipeline QRA in the preamble, the failure rates do not include or account for additional mitigation, such as the additional mitigation provided through the addition of EMAT ILI in FEI's Integrity Management Program.

23.2 Please confirm, or explain otherwise, that the safety risk associated with the "Mitigated Cracking Threats" scenario is less than or equal to the safety risk associated with the "Baseline" scenario along the length of the HUN NIC 762 pipeline segment.

Response:

Confirmed. The *estimated* safety risk associated with the "Mitigated Cracking Threats" scenario is less than or equal to the safety risk associated with the "Baseline" scenario; however, the *actual* failure rate from cracking in the "Mitigated Cracking Threats" scenario will be higher than the rates estimated by JANA. Please refer to the response to BCUC Confidential IR3 23.3 which distinguishes between estimated and actual risk mitigation.

23.3 Please confirm, or explain otherwise, that the difference between the safety risk associated with the "Baseline" scenario and the safety risk associated with the

"Mitigated Cracking Threats" scenario is due to the fact that the "Mitigated Cracking Threats" scenario includes "risk mitigation such as the use of EMAT."

23.3.1 If confirmed, please provide the estimated rupture rate (rupture/km/year) for the SCC threat that was used to determine the "Mitigated Cracking Threats" scenario risk profile in Figure 5 above.

Response:

[redacted] It is noted that in JANA's analysis, "other pipeline threats" did not include failure rates from cyberattack. Similarly, Exponent's values do not account for such deliberate action.

Please refer to the responses to BCUC Confidential IR3 23.4.1 and 23.4.2 for a discussion of why FEI and Exponent believe that the use of the "Baseline" value, and not the "Mitigated Cracking Threats" value, is appropriate.

Exponent provides the following response to BCUC Confidential IR3 23.3.1:

Exponent has calculated the rupture rate for the SCC threat under the "Mitigated Cracking Threats" scenario to be: 1.3 E -06 ruptures per kilometer per year.

23.4 Please confirm, or explain otherwise, that the internal failure rate of 6.51e-5 /km/year for nine of eleven AVs shown in Table R.1 in Appendix R of the Exponent Report is based on the estimated rupture rate of 6.5E-05 /km/year provided in Table 25 above.

Response:

Exponent provides the following response:

[redacted]

23.4.1 If confirmed, please explain why FEI did not instruct Exponent to base its internal failure rates for T-South AVs on JANA's "Mitigated Cracking Threats" scenario estimated rupture rate (rupture/km/year) for the SCC threat.

23.4.2 If confirmed, please explain why FEI did not instruct Exponent to base its internal failure rates for T-South AVs on an assumed mid-point estimated rupture rate for the SCC threat that lies between the "Baseline" and Mitigated Cracking Threats" estimated rupture rates for the SCC threat.

Response:

FEI provides the following response to BCUC Confidential IR3 23.4.1 and 23.4.2:

FEI provided Exponent with the 2021 JANA QRA which contained both the "Baseline" scenario and the "Mitigated Cracking Threats" scenario, and Exponent used the information from the 2021 JANA QRA that it considered appropriate for its analysis. FEI agrees with Exponent's use of the "Baseline" rate, as opposed to the "Mitigated Cracking Threats" rate, to inform the T-South rupture rate. Using the estimated "Mitigated Cracking Threats" scenario in Exponent's risk analysis would have understated the post-EMAT ILI risk, for the reasons described below.

The values in JANA's analysis for "Mitigated Cracking Threats" were idealized in the sense that they assumed that not only was EMAT ILI in place, but also that all other actions necessary to maximize the effectiveness of EMAT ILI were in place. That is, in practice, the mere adoption of EMAT ILI would not reduce failure rates due to cracking to the levels set out in the "Mitigated Cracking Threats" scenario, and in practice an operator must make an assessment regarding factors such as the frequency of its run cycles and when and how to address issues identified. These assessments are made based on considerations such as cost and risk tolerance. All of the following would also need to occur to achieve the mitigation contemplated in the 2021 JANA Pipeline QRA:

1. The EMAT tool must be run at an adequate inspection frequency through the length of the pipeline;
2. The raw EMAT tool signal interpretation and tool vendor reporting must identify and size (e.g., depth and length) cracks with sufficient accuracy and completeness such that all cracks that could cause pipeline failure are adequately identified and characterized;
3. The vendor-reported cracking must be analyzed by the operator to identify the actions, including their associated timing, to assess and respond to cracking (e.g., tool validation and other integrity digs); and
4. Cracks requiring repair must be repaired in a timely manner before failure occurs.

As explained in the response to BCUC IR5 116.4, Westcoast already had EMAT ILI in place before the 2018 T-South Incident, and yet the Transportation Safety Board (TSB) concluded the

Incident was caused by stress corrosion cracking (SCC).[1] Even if a pipeline operator incorporates EMAT ILI into its integrity management program (like Enbridge had done on T-South before 2018),[2] there will still be a residual risk of failure due to cracking. This is supported by JANA's opinion that, "it is not possible to reduce risk to zero for any activity or pipeline operation."[3]

Ultimately, the internal failure rate input in Exponent's risk calculation should be viewed in conjunction with other inputs, and both the failure probability and the consequence inputs incorporate considerable conservatism. For instance:

1. Exponent excluded deliberate action (i.e., cyberattack and vandalism) from the calculated probabilities which may significantly understate the probability of a winter T-South no-flow event given the information provided in Section 5.2 of the 2024 Resiliency Plan.

2. The GDP consequence metric of a winter T-South no-flow event, as calculated by PwC, is conservative due to the following:

    - PwC used typical winter temperatures in the affected areas, rather than cold temperatures that would increase the damage from freezing and further affect productivity.

    - PwC assumed there would be no direct economic impact to an economic sector unless it had conducted interviews with sector participants, thus excluding approximately 40 percent of BC's economy from its consequence metric.

    - PwC was asked to assume that the gas outages being modelled do not trigger outages on the electric system. As FEI described in previous evidence, a Lower Mainland outage may require rotating electric feeder outages (rolling brown-outs).

Exponent provides the following response to BCUC Confidential IR3 23.4.2:

Exponent considers the values it used originally are appropriate but have conducted further sensitivity studies using the "Midpoint" rate. The expected GDP losses under this scenario are still large.

Assuming that the "Mitigated Cracking Threats" include EMAT only, the midpoint estimate rupture rate is 3.3 E-05 ruptures per kilometer per year (49% reduction compared to the Baseline). In response to BCUC IR5 116.4, Exponent performed a sensitivity analysis on the internal failure rate, discounting the rate used in its report by 20%, to 5.2 E-05. This change modestly decreased the expected GDP loss reduction from Supplemental Alternative 9 on T-South by 9%. Here, GDP

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1 Pipeline transportation safety investigation report P18H0088, Section 1.9, para 4.

2 Pipeline transportation safety investigation report P18H0088, Section 1.13.1, para 1.

3 FEI CTS TIMC CPCN Project proceeding, Exhibit B-6, BCOAPO IR1 5.2: https://docs.bcuc.com/documents/proceedings/2021/doc_63628_b-6-fei-response-to-bcoapo-ir1.pdf.

loss reduction is the potential benefit of Supplemental Alternative 9, defined as the difference between expected GDP loss from Supplemental Alternative 1 and Supplemental Alternative 9. Thus, there is still a large risk. Indeed, the majority of the risk is associated with other hazards such as non-earthquake induced landslides. With the midpoint internal failure rate, the annual GDP loss reduction for T-South under Supplemental Alternative 9 is $131.1 million CAD, which is an approximately 21% decrease from the loss reduction provided by Supplemental Alternative 9 from the original analysis in Exponent's report. The expected GDP losses for Supplemental Alternatives 1 and 9, and the corresponding GDP loss reduction for Supplemental Alternative 9, are reported in the tables below for each failure rate scenario over 20-year and 60-year lifetimes.

Table 11: 20 years – Expected Annual GDP Loss on T-South

Analysis	Alt. 1 GDP Loss [million CAD]	Alt. 9 Loss [million CAD]	Loss Reduction with Alt. 9 (risk mitigated by TLSE, Alt. 1 Loss - Alt. 9 Loss) [million CAD]
Original report	5554.8	2243.6	3311.3
20% reduction on internal failure rate	5274.1	2242.0	3032.0
Midpoint analysis	4862.3	2239.8	2622.5

Table 2: 60 years – Expected Annual GDP Loss on T-South

Analysis	Alt. 1 GDP Loss [million CAD]	Alt. 9 Loss [million CAD]	Loss Reduction with Alt. 9 (risk mitigated by TLSE, Alt. 1 Loss - Alt. 9 Loss) [million CAD]
Original report	16664.5	6730.7	9933.8
20% reduction on internal failure rate	15822.2	6726.1	9096.1
Midpoint analysis	14586.9	6719.3	7867.6

Exponent still believes its original number is reasonable and would advise against using a probability number that is any less than the 20% discount on the Baseline value. While the specific wording in JANA's report might be interpreted on its face in the way implied by the question, we question that interpretation because it would imply that the risk is reduced to near zero simply by introducing EMAT. This is unrealistic, based on our knowledge of EMAT, and the fact that the industry data being used in the unmitigated calculations already included pipelines with EMAT. It is optimistic to assume that the "Mitigated Cracking Threats" rate reduces the risk to near zero (1.3 E -06 ruptures per kilometer per year).

The JANA internal pipeline failure rates are based on composite pipeline industry experience that already accounts for industry standard pigging operations, inline inspections and implementation of appropriate mitigation measures like the EMAT proposed mitigation measures. A 20% reduction of JANA's internal pipeline failure rate implicitly assumes that the EMAT

proposed/implementation measures are much better than the pipeline industry standard ILI tools and associated risk mitigation measures. A 49% (midpoint) reduction of JANA's internal pipeline failure rate based on EMAT proposed/implementation measures is likely to be optimistic and thus not conservative.

Internal failure risk is never zero in engineered systems such as pipelines. Internal pipeline failure risk can be reduced but not eliminated due to uncertainties, unknown defects, human errors, and environmental factors. Even with EMAT proposed/implemented mitigation measures, there can still be unmitigated internal pipeline failure risk from undetected flaws, tool limitations, or future threats. Effectiveness of mitigation of failure risk has limits. Mitigation efforts are based on assumptions and probabilities, not certainties. For example, inline inspection tools (ILI) have detection thresholds and possible sizing errors. Small or unusual cracks may still escape detection. Stress corrosion cracking (SCC) threats are time-dependent and can re-initiate even after previous mitigation.

Risk management is about reduction, not elimination: Industry standards promote risk-informed decision making, aiming to reduce risk to ALARP (As Low As Reasonably Practicable), not to zero. EMAT's internal pipeline failure "Mitigated Threat Rate" is part of the risk calculation to show improvement, but it is not an absolute guarantee. Changing operating conditions, third-party damage, or unexpected material behavior can still cause internal pipeline failures despite mitigations. Long-term degradation mechanisms might continue or re-activate if conditions allow. It would be optimistic, and not technically rigorous, to assume internal pipeline failure rate risk is near zero after mitigation of cracking threats. Instead, best practice is to treat mitigation as risk reduction, accompanied by ongoing monitoring, inspection, and reassessment cycles to manage the residual and evolving risks.

24.0 Reference: PROJECT NEED

Exhibit B-63, BCUC IR 118.1; 2024/2025 FEI Annual Contracting Plan, p. 27

Peaking Supply Requirements

In response to BCUC IR 118.1, FEI stated:

> While the optimal resource requirements are not static, and the required capacity for pipeline and storage will be different as the model captures changes in demand and supply inputs over time, the 39 Bcf annual demand increase supports the need for additional pipeline and storage capacity to meet ACP demand growth. Similarly, the 129 MMcf/d peak day increase supports the need for additional peaking resources.
>
> Despite the reduced operating capacity of the Tilbury Base Plant, FEI has retained the same Tilbury LNG capacity (0.6 Bcf and 150 MMcf/d) in the ACP portfolio and, to date, has temporarily contracted pipeline and storage resources to meet the increasing ACP demand.

On page 27 of the 2024/2025 ACP, FEI provided the following table.

[redacted]

24.1 Please provide data for the past ten years on the additional peaking resources that FEI has had to contract to meet the 129 MMcf/day peak day increase.

Response:

FEI clarifies the following regarding the 129 MMcf/day peak day increase noted in the question:

- The 10-year comparison discussed in the response to BCUC IR5 118.1 illustrates a 129 MMcf/day peak day increase between the 2016/2017 and 2025/2026 gas years. The table in the preamble above from the 2024/2025 ACP shows a year-over-year comparison between the 2023/2024 and 2024/2025 gas years.
- The table in the preamble above from the 2024/2025 ACP illustrates the resources required for FEI to meet the forecast peak day only, and does not fully depict how these resources are needed to meet the forecast winter design and annual load of its Core customers. This is important because the 129 MMcf/day increase in the peak day is coupled with an increase in Core customers' winter design and annual load requirements, which may require different resources (i.e., pipeline capacity and market area storage).

Taking the above points into consideration, the table below shows the additional resources that FEI used to meet the 129 MMcf/day peak day increase between the 2016/2017 and 2025/2026 gas years, broken out into three key categories (pipeline capacity, market area storage, and peaking resources).

Peak Day Portfolio	2025/2026 (MMcf/day)	2016/2017 (MMcf/day)	Change (MMcf/day)
Pipeline Capacity	776	672	104
Market Area Storage (Mist & Jackson Prairie)	214	187	27
Peaking Resources (Ind Curtailement, Mt Hayes & Tilbury)	314	316	-2
Peak Day Demand (MMcf/day)	**1,304**	**1,175**	**129**

FEI notes that the pipeline capacity illustrated in the table above combines all of the Station 2, AECO/NIT and East Kootenay supply (spot, seasonal and baseload) together, as FEI requires pipeline capacity to move the supply to its service regions. [redacted] The peaking resources remained relatively the same over the 10-year period because Mt. Hayes and Tilbury are the only peaking assets available to meet peak demand.

The table also demonstrates that the majority of FEI's Core customer demand growth has been served by pipeline capacity. As discussed in Section 3.3.4.2 of the Supplemental Evidence, the resources available in the ACP portfolio are currently suboptimal as FEI is holding pipeline

[redacted]

capacity to meet its load requirements that would be more cost-effectively served by peaking resources, such as the TLSE Project.

24.2 Please explain why seasonal supply (Dec-Feb) and East Kootenay spot supply decreased in the 2024/2025 ACP compared to the 2023/2024 ACP. Additionally, please discuss whether FEI has experienced a similar declining trend in seasonal supply and spot supplies over the past ten years.

24.2.1 If there has been a decrease in seasonal supply, spot supply, and curtailment, and FEI has not experienced any actual supply shortages on peak day or during winter season as stated, please explain the need for increasing Tilbury Base Plant capacity from 150 MMcf/day to 200 MMcf/day.

Response:

The year-over-year changes to the seasonal and spot supply requirements, as illustrated in the preamble above, are the result of optimizing FEI's gas supply portfolio on an annual basis considering the following factors:

- Updated load forecast;
- Short-term transportation and storage resources that become available; and
- The availability of term supply transactions[5], as well as the forecast commodity price sourced from the GLJ price forecast.

While the year-over-year changes to these requirements have not been significant, the cumulative changes between the 2016/2017 and 2025/2026 peak day portfolio support increasing on-system LNG peaking supply. As noted in the table in the response to BCUC Confidential IR3 24.1:

- The ACP portfolio has experienced a 104 MMcf/day increase in the supplies sourced from Station 2, AECO/NIT, and East Kootenay, which all require pipeline capacity to move the supply to its service region.
- [redacted]

[5] FEI has had difficulty transacting 90-day seasonal supply at Station 2, as counterparties in the region are only willing to transact 151-day (November to March) arrangements.

- There has been no change to on-system LNG peaking resources and a slight decrease in industrial curtailment (-2 Mcf/day).

Although FEI has not experienced any supply shortages, the costs of the ACP portfolio have increased significantly. The increase to the demand growth over the past 10 years has been served mostly by pipeline capacity, resulting in a suboptimal ACP portfolio. Increasing Tilbury peaking gas supply from 150 to 200 MMcf/day in the ACP portfolio will improve FEI's utilization of pipeline capacity.