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February 16, 2023

Residential Consumer Intervener Association
c/o Midgard Consulting Inc.
Suite 828 – 1130 W Pender Street
Vancouver, B.C.
V6E 4A4

Attention: Peter Helland, Director

Dear Peter Helland:

**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 Residential Consumer Intervener Association (RCIA) Information Request (IR) No. 1**

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

FEI requests that a portion of the responses to RCIA IR1 8.4 and 8.5, which are redacted in the public version, be filed on a confidential basis pursuant to section 19 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-178-22. The confidential information identifies vulnerable points on FEI's gas transmission system and areas of risk to FEI's assets. Disclosure of the detailed information could impede FEI's ability to work safely and to reliably operate its gas system assets and could risk the safety of both its workers and the public. A confidential version of the responses has been provided to the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

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

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## A. Project Need and Justification

**1.0 Reference Exhibit B-1 p.3; Okanagan Capacity Upgrade CPCN Application, Exhibit B-1, p.12**

**Configuration of the ITS**

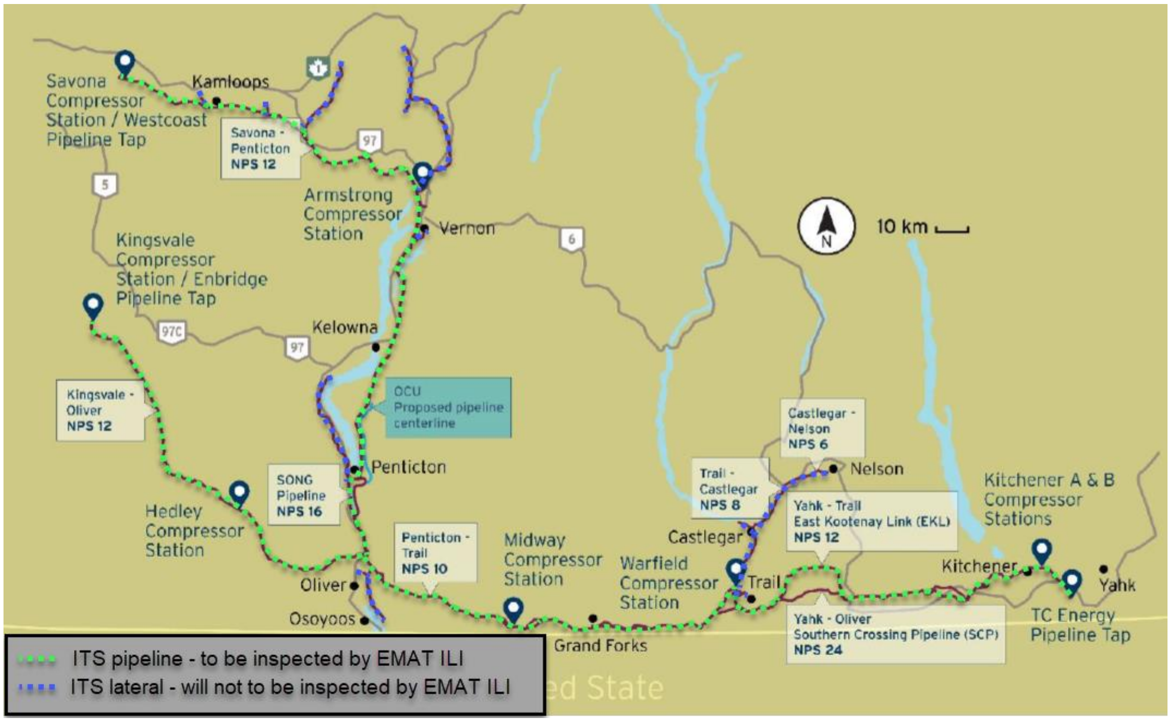
At page 3 of the Application, FEI provides maps showing pipeline and facilities alteration locations on the ITS (Figures 1-1 and 1-2).

At page 12 of the Okanagan Capacity Upgrade proceeding, FEI provides a schematic of the ITS (Figure 3-1).

1.1 Provide a schematic of the Interior Transmission System similar to the schematic provided as Figure 3-1 in the Okanagan Capacity Upgrade CPCN Application, highlighting the pipelines that are intended to be inspected by EMAT ILI but also showing the pipelines that will not be inspected, including laterals.

**<u>Response:</u>**

Figure 3-1 from the Okanagan Capacity Upgrade (OCU) Project CPCN Application is reproduced below and has been amended to show the ITS pipelines that FEI intends to inspect using EMAT ILI, in addition to the ITS laterals that will not be inspected using EMAT ILI. Given the size of the ITS, this map does not show all of FEI's ITS laterals, but does show all of the ITS pipelines that FEI intends to inspect. Please refer to the response to BCOAPO IR1 1.11 for a complete list of ITS laterals and their lengths.



Savona Compressor Station / Westcoast Pipeline Tap
Kamloops
Savona - Penticton NPS 12
Armstrong Compressor Station
Vernon
Kingsvale Compressor Station / Enbridge Pipeline Tap
Kelowna
Kingsvale - Oliver NPS 12
OCU Proposed pipeline centerline
SONG Pipeline NPS 16
Penticton
Hedley Compressor Station
Oliver
Osoyoos
Penticton - Trail NPS 10
Midway Compressor Station
Grand Forks
10 km
N
Castlegar - Nelson NPS 6
Nelson
Trail - Castlegar NPS 8
Yahk - Trail East Kootenay Link (EKL) NPS 12
Castlegar
Warfield Compressor Station
Trail
Yahk - Oliver Southern Crossing Pipeline (SCP) NPS 24
Kitchener A & B Compressor Stations
Kitchener
Yahk
TC Energy Pipeline Tap
ITS pipeline - to be inspected by EMAT ILI
ITS lateral - will not to be inspected by EMAT ILI

**2.0 Reference Exhibit B-1 p.23; Rosen Group website https://www.rosen-group.com/global/solutions/services/service/rocorr-mfl-c.html**

**MFL-C ILI Tool Capabilities**

On page 23 of the Application, FEI states: "FEI has been conducting baseline surveys of its pipeline system using CMFL tools since 2014."

Rosen Group explains the capabilities of its MFL-C tool on its website, including: "A precise and detailed identification of metal loss and in particular axial oriented anomalies like narrow corrosion, gouging, channeling, crack like features and preferential seam weld corrosion is a basic element for the integrity management of oil and gas pipelines. Our RoCorr MFL-C service is a reliable and effective means of managing your pipeline integrity especially for concerns related to the long seam (e.g. pre-1970 ERW)." and "Precise long seam categorization and assessment using magnetic saturation in circumferential direction."

2.1 Has FEI previously run circumferential magnetic flux leakage tools through ITS pipelines? If so, for each ITS pipeline that has been inspected with a MFL-C tool, indicate the date that the most recent ILI occurred, summarize the findings of the ILI, and describe any defects that were required to be repaired related to SCC or the seam weld.

**Response:**

Yes, FEI has previously run circumferential magnetic flux leakage tools through ITS pipelines. Please refer to Attachment 2.1 for a summary of the findings from the most recent MFL-C tool runs. Please note that there is some variation in the presentation of results based on vendor and timing.

2.2 What are the limitations of MFL-C technology when assessing axial cracks and seam weld features?

**Response:**

MFL-C technology is not able to assess axial cracks and is only able to assess narrow seam weld features, such as preferential long seam corrosion, if the width of the seam weld feature is greater than 1 mm.

2.3 While EMAT may be a superior technology to assess axial cracking in pipelines, does FEI expect that its prior MFL-C ILI runs will generally inform the presence of severe cracking and seam weld features, or indicate the likelihood of finding severe cracking and seam weld features with EMAT tools? If not, explain why not.

**Response:**

FEI does not expect that its prior MFL-C runs will generally inform the presence of severe cracking or indicate the likelihood of finding severe cracking with EMAT ILI tools.

As explained in the response to RCIA IR1 2.2, MFL-C runs can only indicate the presence of seam weld features with a width greater than 1 mm, which reflects the limitations of the technology.

2.4 Are MFL-C tools available for NPS 6 or NPS 8 pipelines? If so, has FEI used MFL-C tools in the ITS for pipelines of this size?

**Response:**

Yes, MFL-C tools are available for NPS 6 and NPS 8 pipelines. FEI has used MFL-C tools in the ITS for pipelines of this size; however, as explained in the response to RCIA IR1 2.2, there are inherent limitations to this technology as compared to EMAT ILI.

2.4.1 If MFL-C tools have been used on NPS 6 and NPS 8 pipelines within the ITS, please tabulate and summarize the findings.

**Response:**

FEI provides the findings for each of the MFL-C runs on NPS 6 and NPS 8 pipelines in the ITS in the tables below. FEI has excerpted this information from reports provided by two different vendors, which has resulted in variation in the presented material.

| Pipeline | Year of MFL-C run | Tabulated, Summarized Findings, as excerpted from vendor reports |
| --- | --- | --- |
| **Trail Castlegar 219 mm** | 2021 | |

| Anomaly | Anomaly Classification | Internal | External | Totals |
| --- | --- | --- | --- | --- |
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 6 | 6 |
| | 60-69% | 0 | 50 | 50 |
| | 50-59% | 0 | 78 | 78 |
| | 40-49% | 1 | 169 | 170 |
| | 30-39% | 1 | 521 | 522 |
| | 20-29% | 3 | 2935 | 2938 |
| | 10-19% | 110 | 34521 | 34631 |
| | Totals | 115 | 38280 | 38395 |

| Pipeline | Year of MFL-C run | Tabulated, Summarized Findings, as excerpted from vendor reports |
| --- | --- | --- |
| **Mackenzie Loop 168 mm** | 2022 | |

| Anomaly | Anomaly Classification | Internal | External | Totals |
| --- | --- | --- | --- | --- |
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 0 | 0 |
| | 60-69% | 0 | 0 | 0 |
| | 50-59% | 0 | 0 | 0 |
| | 40-49% | 1 | 0 | 1 |
| | 30-39% | 1 | 1 | 2 |
| | 20-29% | 8 | 1 | 9 |
| | 10-19% | 225 | 106 | 331 |
| | Totals | 235 | 108 | 343 |

| Pipeline | Year of MFL-C run | Tabulated, Summarized Findings, as excerpted from vendor reports |
| --- | --- | --- |
| **Mackenzie Lateral 168 mm** | 2022 | |

| Anomaly | Anomaly Classification | Internal | External | Totals |
| --- | --- | --- | --- | --- |
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 0 | 0 |
| | 60-69% | 0 | 0 | 0 |
| | 50-59% | 0 | 0 | 0 |
| | 40-49% | 0 | 3 | 3 |
| | 30-39% | 7 | 8 | 15 |
| | 20-29% | 12 | 101 | 113 |
| | 10-19% | 58 | 1212 | 1270 |
| | Totals | 77 | 1324 | 1401 |

<table>
<tr><th>Pipeline</th><th>Year of MFL-C run</th><th>Tabulated, Summarized Findings, as excerpted from vendor reports</th></tr>
<tr><td>Mackenzie Loop 219 mm</td><td>2022</td><td>
<table>
<tr><th>Anomaly</th><th>Anomaly Classification</th><th>Internal</th><th>External</th><th>Totals</th></tr>
<tr><td rowspan="9">Metal Loss</td><td>≥80%</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>70-79%</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>60-69%</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>50-59%</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>40-49%</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>30-39%</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>20-29%</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>10-19%</td><td>15</td><td>36</td><td>51</td></tr>
<tr><td>Totals</td><td>16</td><td>36</td><td>52</td></tr>
</table>
</td></tr>
<tr><td>Cranbrook Loop 219 mm</td><td>2022</td><td>
Anomalies Affecting the Parent Pipe Material
<table>
<tr><th rowspan="2">Metal Loss Depth</th><th rowspan="2">All Anomalies</th><th colspan="2">Corrosion at Internal Pipe Wall</th><th colspan="3">Non-Corrosion at Internal Pipe Wall</th></tr>
<tr><th>Yes</th><th>No</th><th>Yes</th><th>No</th><th>N/A</th></tr>
<tr><td>≥ 60%</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>40 - 59%</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>20 - 39%</td><td>16</td><td>0</td><td>14</td><td>2</td><td>0</td><td>0</td></tr>
<tr><td>10 - 19%</td><td>259</td><td>0</td><td>222</td><td>16</td><td>21</td><td>0</td></tr>
<tr><td>Total</td><td>276</td><td>0</td><td>237</td><td>18</td><td>21</td><td>0</td></tr>
</table>
Anomalies Affecting the Longitudinal Weld Seam
<table>
<tr><th rowspan="2">Metal Loss Depth</th><th rowspan="2">All Anomalies</th><th colspan="2">Corrosion at Internal Pipe Wall</th><th colspan="2">Non-Corrosion at Internal Pipe Wall</th></tr>
<tr><th>Yes</th><th>No</th><th>Yes</th><th>No</th></tr>
<tr><td>≥ 60%</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>40 - 59%</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>20 - 39%</td><td>2</td><td>0</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td>10 - 19%</td><td>53</td><td>0</td><td>0</td><td>1</td><td>52</td></tr>
<tr><td>Total</td><td>55</td><td>0</td><td>0</td><td>1</td><td>54</td></tr>
</table>
</td></tr>
</table>

**3.0 Reference Exhibit B-1 pp.25,26**

**EMAT ILI Capabilities**

Table 3-1 summarizes the primary ILI tools adopted by industry and their respective capabilities.

| | Geometry | Magnetic Flux Leakage (MFL) | Circumferential MFL (CMFL) | Electro-Magnetic Acoustic Transducer (EMAT) |
|---|---|---|---|---|
| Dents | ✓ | | | |
| Wrinkles / Buckles | ✓ | | | |
| Metal loss | | ✓ (circumferentially-oriented features) | ✓ (narrow longitudinally-oriented features) | |
| Long seam weld location | | | ✓ | |
| Girth weld location | ✓ | ✓ | ✓ | ✓ |
| SCC and crack-like features | | | | ✓ |
| Longitudinal seam weld flaws | | | | ✓ |

3.1 Please confirm whether EMAT ILI is able to discriminate between cracks in the seam weld versus SCC cracking.

**<u>Response:</u>**

An EMAT ILI tool cannot determine if the cracking is a seam weld anomaly or individual SCC feature; however, it can determine if a colony of SCC cracks overlaps a longitudinal seam weld. As such, MFL-C tools are run in conjunction with EMAT ILI tools as they are able to identify the longitudinal seam weld o'clock position. This seam weld position information is then overlayed onto the EMAT ILI tool run data and used to determine if cracking is located in the pipe body or seam weld.

**4.0 Reference Exhibit B-1 p.25**

**Speed Control of EMAT ILI Tools**

At page 25 of the Application, FEI states: "Given the widely varying flow rates in FEI's system that result from the end-use customers' daily and seasonal consumption, FEI is interested in tool speed control capabilities such as to potentially expand the seasonal windows during which inspections can be scheduled. However, where tools with speed control are unavailable either due to a lack of technology or scheduling conflicts, FEI may use ILI tools without speed control capability and thus, FEI's system must be capable of meeting those tool requirements."

4.1 Confirm whether EMAT ILI tools with speed control are available for all sizes of pipeline within the scope of the ITS TIMC CPCN. If confirmed, identify the number of vendors for each size of EMAT ILI tool proposed for the ITS TIMC project.

**Response:**

Speed control is not yet commercially available for any sizes of pipeline within the scope of the ITS TIMC Project (i.e., NPS 10 and NPS 12).

FEI is aware that a speed control unit for NPS 12 ILI tools is under development by one vendor. As described on page 6 of Appendix F to the Application, FEI participated in a pilot project for the commercial development of this speed control unit in 2021. The development process is ongoing.

**5.0 Reference Exhibit B-1 pp.29, 39 Table 3-4**

**Circumferential Stress Corrosion Cracking**

At page 29 of the Application, FEI states: "FEI addresses any cracking through pipeline repairs or replacement, as necessary, and records any SCC-related findings for future tracking. Through these digs FEI is aware of the existence of cracking threats on its system and has been monitoring such threats on its transmission pipeline system as part of its IMP-P."

At page 39 of the Application, FEI provides "Table 3-4: FEI ITS Pipelines: Occurrences of Cracking on FEI Pipe Identified Through JANA's Review of Selected Integrity Digs and Total Integrity Digs Analyzed".

5.1 Explain whether circumferential stress corrosion cracking ("CSCC") is a threat to FEI's ITS pipelines.

5.1.1 If CSCC is a threat to FEI's ITS pipelines, explain how FEI is addressing this threat.

**<u>Response:</u>**

Yes, circumferential stress corrosion cracking (CSCC) is a threat to FEI's ITS pipelines, and can occur in circumstances where the predominant stress is an axial stress (e.g., stresses developed in response to pipe resistance of soil movement). FEI currently addresses this threat through its existing crack management activities (i.e., primarily opportunity digs), its geohazard monitoring program and assessment of bending strain information collected by geometry/mapping ILI tools.

5.2 Has FEI conducted hydrotests of its ITS pipelines in the past in order to verify their integrity?

5.2.1 If so, provide details of each hydrotest including the integrity concerns that each hydrotest was addressing.

**<u>Response:</u>**

FEI has records of the following hydrotests conducted in the years following the initial pre-commissioning hydrostatic test, related to integrity verification.

| Pipeline | Year(s) of Hydrostatic Re-test | Approximate Length of Hydrostatic Re-test (km) | Reason |
|---|---|---|---|
| **Grand Forks to Trail 273 mm segment** | 1979 | 1.5 km | Class location upgrade |
| **Kamloops 2 Lateral 114 mm** | 1968 | 1.2 km | Class location upgrade |
| **Oliver to Grand Forks 273 mm segments** | 1981, 1981, 1994 | 1.7 km and 9.0 km (1981), 3.8 km (1994) | Class location upgrades |
| **Penticton to Oliver 273 mm segment** | 1973 | 1.9 km | Class location upgrade |
| **Rossland Lateral 114 mm** | 1983 | 1.1 km | Class location upgrade |

When the population density surrounding a pipeline (or pipeline segment) increases, the safety factor of the pipeline is required to be increased. This can be achieved by various actions, including:

- If the specifications are suitable and a hydrotest is feasible and cost-effective, an existing pipeline or pipeline segment can be requalified to the appropriate safety factor through a hydrostatic re-test;
- If the specifications are not suitable, the pipeline or pipeline segment can be replaced with new pipe; or
- If there is sufficient capacity to accommodate a permanent pressure reduction, the pipeline or pipeline segment can achieve an increased safety factor by operating with a reduced Maximum Operating Pressure.

**6.0 Reference Exhibit B-1 pp. 30, 39, 44;**

**Need For and Timing of the ITS TIMC Project**

At page 30 of the Application, FEI states: "A primary driver for the Project is the evolution of industry knowledge about cracking threats and industry practice on how to manage those threats. Other operators have found cracking on pipelines with characteristics similar to those in the FEI system and are moving towards using EMAT ILI tools to monitor cracking threats on pipelines for which suitable tools exist."

At page 44 of the Application, FEI states: "Given factors including industry knowledge about cracking threats, FEI's identification of cracking on its own pipelines and the understanding that FEI's existing integrity management practices do not, and cannot, identify all cracking, it is necessary for FEI to initiate this project in a timely manner."

At page 39 of the Application, FEI provides "Table 3-4: FEI ITS Pipelines: Occurrences of Cracking on FEI Pipe Identified Through JANA's Review of Selected Integrity Digs and Total Integrity Digs Analyzed"

| # | Line Name | FEI Name | SCC Susceptibility | Seam Weld Cracking Susceptibility | Integrity Digs with Cracking Threats | Total Integrity Digs Analyzed |
|---|---|---|---|---|---|---|
| 1 | SAV VER 323 | Savona – Vernon 12" | Yes | Yes | 50 | 92 |
| 2 | VER PEN 323 | Vernon – Penticton 12" | Yes | Yes | 38 | 67 |
| 3 | GRF TRA 273 | Grand Forks – Trail 10" | Yes | Yes | 138 | 228 |
| 4 | OLI GRF 273 | Oliver Y – Grand Forks 10" | Yes | Yes | 79 | 163 |
| 5 | PEN OLI 273 | Penticton – Oliver Y 10" | Yes | Yes | 13 | 23 |
| 6 | TRA CAS 219 | Trail – Castlegar 8" | Yes | Yes | 11 | 76 |
| 7 | KIN PRI 323 | Kingsvale – Princeton 12" | Yes | Low | 0 | 3 |
| 8 | PRI OLI 323 | Princeton – Oliver 12" | Yes | Low | 2 | 12 |
| 9 | YAH TRA 323 | Yahk – Trail (ELK) 12" | Yes | Low | 9 | 53 |
| 10 | OLI PEN 406 | Oliver – Penticton 16" | Low | Low | 0 | 1 |
| 11 | DUK SAV 508 | Duke Tap – Savona C/S 20" | Low | Low | 0 | 0 |
| 12 | YAH OLI 610 | Yahk – Rossland 24", Rossland – Oliver 24" | Low | Low | 0 | 6 |

6.1 Explain why the project must be initiated immediately. What is the driver for the urgency of the project?

**Response:**

Please refer to response to BCUC IR1 5.3.

6.2 Explain how FEI managed (and continues to manage) the existence of these cracking threats, in addition to monitoring through opportunity digs, prior to the ability to perform EMAT ILIs. For example, has FEI implemented any SCCDA methodologies to address the SCC threats?

**Response:**

FEI currently manages cracking threats of the ITS pipelines through opportunity digs, with development of a line specific mitigation plan if significant cracking[1] is discovered. As further discussed in the response to BCUC IR1 6.4, to date, FEI has not identified any transmission pipeline where a line specific mitigation plan was warranted or implemented to manage cracking discovered during an opportunity dig.

Please refer to the response to CEC IR1 18.1 which explains why FEI has not implemented any SCCDA methodologies to address SCC threats.

6.3 For each of the pipelines with cracking found by FEI shown in Table 3-4, provide the date when the cracking was first discovered. As well, distinguish whether the cracking was SCC or related to the seam weld (that is, indicate the year of the first instance of finding a SCC crack and the year when the first seam weld crack was found for each pipeline).

**Response:**

For each of the eight pipelines with cracking found for the 12 pipelines shown in Table 3-4, FEI has provided the year when the cracking was first discovered and, where applicable, FEI has distinguished between the year for SCC cracking and the year for seam weld cracking.

| # | Line Name | FEI Name | First Finding of SCC | First Finding of Seam Weld Cracking |
|---|---|---|---|---|
| **1** | SAV VER 323 | Savona – Vernon 12” | 2002 | 2002 |
| **2** | VER PEN 323 | Vernon – Penticton 12” | 2003 | 2002 |
| **3** | GRF TRA 273 | Grand Forks – Trail 10” | 2005 | 2001 |
| **4** | OLI GRF 273 | Oliver Y – Grand Forks 10” | 2016 | 2001 |

[1] Significant cracking is referred to in the Application as cracking that is “most likely to fail”. Significant cracking warrants incremental mitigation.

| # | Line Name | FEI Name | First Finding of SCC | First Finding of Seam Weld Cracking |
|---|---|---|---|---|
| **5** | PEN OLI 273 | Penticton – Oliver Y 10” | 2004 | 2004 |
| **6** | TRA CAS 219 | Trail – Castlegar 8” | 2022 | 2003 |
| **7** | KIN PRI 323 | Kingsvale – Princeton 12” | - | - |
| **8** | PRI OLI 323 | Princeton – Oliver 12” | - | 2004 |
| **9** | YAH TRA 323 | Yahk – Trail (ELK) 12” | - | 2010 |
| **10** | OLI PEN 406 | Oliver – Penticton 16” | - | - |
| **11** | DUK SAV 508 | Duke Tap – Savona C/S 20” | - | - |
| **12** | YAH OLI 610 | Yahk – Rossland 24”<br>Rossland – Oliver 24” | - | - |

**7.0 Reference Reference: Exhibit B-1 p.32**

**Final Results of EMAT ILI Pilot Project**

At page 32 of the Application, FEI states: "As part of FEI's project development work, 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. These instances of potential cracking on FEI's pipelines were not previously detected through opportunistic digs."

7.1 Confirm whether FEI has received the vendor's final report of the pilot EMAT inline inspections. If confirmed, provide the vendor's final report.

**Response:**

FEI has not received the final reports. FEI is reviewing recently obtained destructive testing results from pipe cut-outs, and will be providing this information to the EMAT ILI vendor. FEI anticipates that final EMAT vendor reports will be available before year-end.

7.2 Confirm whether the validation digs on each of the LIV PAT 457 and CPH BUR 508 lines have now been completed.

**Response:**

Confirmed, all currently identified validation digs on these lines have been completed.

7.3 Provide details of the validation dig findings including descriptions of features investigated, comparison of the in-ditch measurements with ILI measurements, and an assessment of the EMAT tool's performance.

**Response:**

The following tables provide FEI's validation dig findings including descriptions of features investigated and comparisons of the in-ditch measurements with ILI measurements (i.e., depth, length, and width). Please note that the ILI vendor uses the following feature identifiers ("ILI Identifier"):

- CRAC = axial crack within base pipe material

- CRAC-GRP = axial crack colonies within base pipe material
- LS-CRAC = axial crack in longitudinal weld area
- LIN = linear feature within base pipe material
- LS-LIN = linear feature in longitudinal weld area

**Table 1: Livingston Pattullo 457 mm Pipeline**

| CTS Livingston to Patullo 457 mm | | | | | |
|---|---|---|---|---|---|
| Descriptions of features reported and investigated | | | Comparison in-ditch measurements with ILI measurements | | |
| ILI Identifier | ILI-reported Comments | Field-reported Comments | ILI-reported depth minus Field-reported depth (%) | ILI-reported length minus Field-reported length (mm) | ILI-reported width minus Field-reported width (mm) |
| CRAC 1 | Axial crack within base pipe material | Mechanical damage; present since construction | -17% | -17 | -66 |
| CRAC 2 | Axial crack within base pipe material | Metal loss manufacturing indication (rolled in slug); present since construction | -12% | -43 | -31 |
| CRAC 3 | Axial crack within base pipe material | Mechanical damage; present since construction | -14% | 12 | -60 |
| LS-CRAC 1 | Axial crack in longitudinal weld area | Suspected centerline lack of fusion in the ERW | 4% | 13 | -35 |
| LS-CRAC 2 | Axial crack in longitudinal weld area | Suspected centerline lack of fusion in the ERW | 5% | 6 | -35 |
| CRAC-GRP 1 | Axial crack-colony within base pipe material | Lamination/lap; manufacturuing rolling indication | -21% | -467 | -64 |
| CRAC 4 | Axial crack within base pipe material | Nothing found at the time of inspection | -34% | -64 | -72 |
| CRAC 5 | Axial crack within base pipe material | Mechanical damage; present since construction | -28% | 29 | -31 |
| LS-CRAC 3 | Axial crack in longitudinal weld area | Suspected centerline lack of fusion in the ERW | 8% | 17 | -71 |
| LS-CRAC 4 | Axial crack in longitudinal weld area | Suspected centerline lack of fusion in the ERW | 16% | 4 | -71 |
| CRAC 6 | Axial crack within base pipe material | Nothing found at the time of inspection | -24% | -99 | -36 |
| CRAC 7 | Axial crack within base pipe material | Narrow axial corrosion | -28% | -21 | -27 |
| LS-CRAC 5 | Axial crack in longitudinal weld area | Suspected centerline lack of fusion in the ERW | 11% | 17 | -71 |
| LS-CRAC 6 | Axial crack in longitudinal weld area | Suspected centerline lack of fusion in the ERW | 15% | 49 | -35 |
| CRAC 8 | Axial crack within base pipe material | Mid-wall lamination | 18% | -33 | -65 |

**Table 2: Coquitlam to Noons Creek 508 mm**

| CTS Coquitlam to Noons Creek 508 mm | | | | | |
|---|---|---|---|---|---|
| Descriptions of features reported and investigated | | | Comparison in-ditch measurements with ILI measurements | | |
| ILI Identifier | ILI-reported Comments | Field-reported Comments | ILI-reported depth minus Field-reported depth (%) | ILI-reported length minus Field-reported length (mm) | ILI-reported width minus Field-reported width (mm) |
| LIN 1 | with metal loss | External metal loss manufacturing indication (rolled-in slug) | -20% | 0 | -17 |
| LIN 2 | with metal loss | SCC within external corrosion | -2% | -5 | -86 |
| LIN 3 | possible manufacturing anomaly | Internal manufacturing indication | -12% | 15 | -36 |
| LIN 4 | with metal loss, close to long seam | Axially oriented external corrosion | -16% | -12 | -18 |
| CRAC-GRP 1 | with metal loss | SCC within external corrosion feature | -2% | -299 | -179 |

FEI's observations of the EMAT tool's performance for the Livingston Pattullo 457 mm pipeline are:

- **LS CRAC features:** All 6 LS CRAC features reported by the EMAT tool were validated.
- **CRAC features:** 6 of the 8 CRAC features reported by the EMAT tool were validated. 2 of the 8 CRAC features reported by the EMAT tool were deemed to be false positives, as there was no feature found during the integrity dig corresponding to the ILI-reported feature.
- **CRAC-GRP:** The 1 CRAC-GRP feature reported by the EMAT tool was validated.

FEI's observations of the EMAT tool's performance for the Coquitlam to Noons Creek 508 mm pipeline segment are:

- **LIN features:** All 4 LIN features reported by the EMAT tool were validated.
- **CRAC-GRP features:** The 1 CRAC-GRP feature reported by the EMAT tool was validated.

There are no remaining in-service features reported by the EMAT ILI tool runs requiring an integrity management response prior to EMAT re-inspection.

7.4 What was the total length of pipelines inspected by EMAT ILI in the pilot project, and what was this as a proportion of the total CTS pipeline length?

**Response:**

Approximately 34 km of pipeline was inspected as part of the EMAT ILI Pilot Project. This is approximately 13 percent of the total CTS pipeline length.

7.5 For each pipeline in the pilot project, for what percentage of its length did FEI obtain high quality data?

**Response:**

FEI considers high quality data to be data that can be relied upon for integrity management decision-making. This includes degraded data, as long as that degraded data has a quality specification[2] from the vendor (which is the case for both pipelines in the EMAT ILI Pilot Project).

| Pipeline in EMAT Pilot Project | High Quality Data – Percentage |
|---|---|
| **Livingston-Pattullo 457 mm** | 99.8% |
| **Coquitlam-Noons Creek 508 mm** | 99.45% |

[2] ILI tool vendors provide specifications for the detection and sizing of imperfections, which are commonly referred to as "data quality specifications". Please refer to the response to BCUC IR1 9.2 for further discussion regarding these specifications.

7.6 For each pipeline in the pilot project, what was the maximum length of missing EMAT ILI data as well as the total length of missing data?

**Response:**

In the table below, FEI provides the maximum length of missing EMAT ILI data as well as the total length of missing data for each pipeline in the pilot project. Consistent with its practice where data is missing, FEI will follow the Steps 2 through 4 provided in the response to BCUC IR1 8.4.

| Pipeline in EMAT Pilot Project | Missing Data – Maximum Segment Length (km) | Missing Data – Total Length (km), Sum of All Segments |
|---|---|---|
| **Livingston-Pattullo 457 mm** | 0.024 | 0.060 |
| **Coquitlam-Noons Creek 508 mm** | 0.018 | 0.022 |

7.7 For each pipeline in the pilot project, what was the maximum length of degraded EMAT ILI data as well as the total length of degraded data?

**Response:**

In the table below, FEI provides the maximum length of degraded EMAT ILI data as well as the total length of degraded data for each pipeline in the pilot project. As discussed in the response to RCIA IR1 7.5, degraded data from the EMAT Pilot Project has a quality specification from the vendor and, as such, can be relied upon for integrity management decision-making.

| Pipeline in EMAT Pilot Project | Degraded Data – Maximum Segment Length (km) | Degraded Data – Total Length (km), Sum of All Segments |
|---|---|---|
| **Livingston-Pattullo 457 mm** | 0.120 | 2.579 |
| **Coquitlam-Noons Creek 508 mm** | 0.048 | 0.096 |

7.8 When are the re-inspections scheduled of the two pipelines that were the subject of the pilot project EMAT ILIs?

**Response:**

The LIV PAT 457, which was run in 2019, is scheduled for re-run in 2026.

FEI will re-run the COQ NOO 508 segment, which was run in 2020, in 2026 as part of its planned inspection of the full CPH NOO 508 pipeline. The COQ NOO 508 segment represents approximately 4.4 km of the total 9 km length of the CPH NOO 508 pipeline.

7.9. Confirm whether FEI intends to make modifications to the two pipelines that were the subject of the pilot project EMAT ILIs in advance of the next EMAT ILI runs. If confirmed, identify the modifications.

**Response:**

FEI confirms that it will be making modifications to one of the two pipelines that were the subject of the Pilot Project EMAT ILIs in advance of the next EMAT ILI runs.

As summarized in the table below, FEI will be modifying five heavy-wall segments on the CPH NOO 508 transmission pipeline to reduce future speed excursions as part of its CTS TIMC Project. One of these alterations (Event 20) will occur on the Coquitlam to Noons Creek (COQ NOO 508) section of the CPH NOO 508 pipeline where FEI predicted a speed excursion would occur based on past MFL ILI tool data, and subsequently observed a speed excursion during the EMAT ILI Pilot Project run. The other four speed excursion events were identified through analysis of MFL ILI tool data and will not take place on the COQ NOO 508 pipeline segment.

| Pipeline | CTS TIMC Event ID | Facility or Location | Heavy Wall Features to be Removed |
|---|---|---|---|
| CPH NOO 508 | 1 | Cape Horn Valve Station; City of Coquitlam | Station pipe |
| | 4/5 | Lougheed Highway; City of Coquitlam | Crossing pipe |
| | 9 | Cape Horn Avenue; City of Coquitlam | Forged elbow |
| | 14 | Coquitlam Gate Station; City of Coquitlam | Valve assembly |
| | 20 | Westwood Regulating Station; City of Coquitlam | Valve assembly & crossing pipe |

**8.0 Reference FEI's CTS TIMC CPCN Exhibit B-5 BCUC IR1 1.2; Exhibit B-1, pp. 13, 46; Exhibit B-1 Appendix B-2 JANA QRA; Exhibit A-3 BCUC IR1 6.2**

**Smaller Diameter Pipelines – JANA's Reports**

The response to CTS TIMC Exhibit B-5 BCUC IR1 1.2 provides a table of FEI's transmission pipelines outside of the scope of JANA's risk assessment studies.

8.1. Provide the table of transmission pipelines that were not within the scope of JANA's studies, as provided in response to CTS TIMC CPCN proceeding BCUC IR1 1.2, highlighting the pipelines that are part of the ITS.

**Response:**

FEI has reproduced the table provided in response to CTS TIMC BCUC IR1 1.2 below. Pipelines not part of the ITS are indicated by a strikethrough (e.g., ~~Campbell River Lateral 219~~). All other pipelines listed in the table are part of the ITS.

| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures |
|---|---|---|---|---|---|---|---|---|---|---|
| Mackenzie Lateral 168 | 28.6 | 241/290 | 4.8 | 1996 | 23 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 1 | No | 0 |
| Mackenzie Loop 168 | 14.2 | 290 | 4.8 | 1972 | 47 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| BC Forest Products Lateral 168 | 0.5 | 290 | 4.8 | 1996 | 23 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Prince George 3 Lateral 219 | 5.3 | 317 | 4.8 | 1970 | 49 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Northwood Pulp Lateral 168 | 6.0 | 290 | 4.8 | 1965 | 54 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Northwood Pulp Loop 219 | 5.8 | 359 | 4.8 | 1995 | 24 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Prince George 1 Lateral 168 | 4.7 | 241 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 1 |
| Prince George Pulp Lateral 168 | 1.0 | 241/290 | 4.8 | 1964 | 55 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Husky Oil Lateral 168 | 1.1 | 290 | 4.8 | 1965 | 54 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Prince George 2 Lateral 168 | 8.6 | 241 | 4.8 | 1972 | 47 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Cariboo Pulp Lateral 168 | 1.3 | 241 | 4.8 | 1993 | 26 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Williams Lake Loop 1/Loop 2 168 | 5.9 | 241/359 | 4.8 | 1993 | 26 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Kamloops 1 Lateral/Loop 168 | 6.7 | 290 | 4.8 | 1965/1979 | 40/54 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 27/31 | No | 0 |
| Salmon Arm Loop 168 | 44.9 | 290 | 4.8 | 1976 | 43 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 12 | No | 1 |
| Salmon Arm 3 Lateral 168 | 0.8 | 290 | 4.8 | 1981 | 38 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Coldstream Lateral 219 | 1.8 | 290 | 4.8 | 1998 | 21 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 49 | No | 0 |

| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures |
|---|---|---|---|---|---|---|---|---|---|---|
| Coldstream Loop 168 | 3.8 | 290 | 4.8 | 1989 | 30 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 16 | No | 0 |
| Kelowna 1 Loop 219 | 2.1 | 317 | 4.8 | 1976 | 43 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 33 | No | 0 |
| Celgar Lateral 168 | 5.8 | 241 | 4.8 | 1960 | 59 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 4 | No | 0 |
| Castlegar Nelson 168 | 37.4 | 241/290 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 21 | No | 3 |
| Trail Lateral 168 | 4.2 | 241 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 1 |
| Fording Lateral 219/168 | 79.6 | 241/290 | 4.8 | 1971 | 48 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 6 | No | 3 |
| Elkview Lateral 168 | 1.6 | 290 | 4.8 | 1970 | 49 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 19 | No | 0 |
| Cranbrook Lateral 168 | 34.0 | 290 | 4.8 | 1990 | 29 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 9 | No | 0 |
| Cranbrook Loop 219 | 34.0 | 290 | 4.0 | 1968 | 51 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 9 | No | 0 |
| Cranbrook Kimberley Loop 219 | 4.0 | 290 | 4.8 | 1992 | 27 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Cranbrook Kimberley Loop 273 | 9.4 | 359 | 4.8 | 1992 | 27 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 21 | No | 0 |
| Kimberley Lateral 168 | 20.6 | 241/290 | 4.8 | 1962 | 57 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 2 | No | 0 |
| Skookumchuck Lateral 219 | 35.9 | 290 | 4.0 | 1968 | 51 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |

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| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures Caused by Other than External Corrosion |
|---|---|---|---|---|---|---|---|---|---|---|
| ~~Campbell River Lateral 219~~ | ~~49.5~~ | ~~414~~ | ~~5.5~~ | ~~1990~~ | ~~29~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeves~~ | ~~0~~ | ~~Yes~~ | ~~0~~ |
| ~~Crofton Lateral 168~~ | ~~5.1~~ | ~~359~~ | ~~7.0~~ | ~~1990~~ | ~~29~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeves~~ | ~~0~~ | ~~Yes~~ | ~~0~~ |
| ~~Harmac Lateral 168~~ | ~~9.7~~ | ~~360~~ | ~~7.0~~ | ~~1990~~ | ~~29~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeves~~ | ~~37~~ | ~~Yes~~ | ~~0~~ |
| ~~Mt Hayes Lateral 273~~ | ~~5.4~~ | ~~483~~ | ~~8.4~~ | ~~2010~~ | ~~9~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeve, or Cold Applied Polymer Tape~~ | ~~0~~ | ~~Yes~~ | ~~0~~ |
| ~~Port Alberni Lateral 168~~ | ~~21.7~~ | ~~240~~ | ~~4.9~~ | ~~1990~~ | ~~29~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeve, or Cold Applied Polymer Tape~~ | ~~15~~ | ~~Yes~~ | ~~0~~ |
| 108 Mile Lateral 60 | 0.1 | 240 | 3.9 | 1998 | 21 | Unknown | Unknown | 0 | No | 0 |
| 150 Mile House 60 | 0.1 | 240 | 3.9 | 1995 | 24 | Unknown | Unknown | 0 | No | 0 |
| Afton Mines Lateral 114 | 0.7 | 240 | 4.0 | 1976 | 43 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Armstrong Lateral 114 | 0.4 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 100 | No | 0 |
| Ashcroft Lateral 60/88/168 | 9.1 | 240 | 3.9 | 1993 | 26 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 2 | No | 0 |
| Bear Lake Lateral 60 | 1.2 | 205 | 3.9 | 1964 | 55 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Byron Creek Lateral 114 | 11.6 | 240 | 3.2 | 1985 | 34 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Cache Creek Lateral 60 | 1.4 | 240 | 4.0 | 1971 | 48 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Chase Lateral 88 | 30.3 | 290 | 3.2 | 1985 | 34 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 1 |
| Chute Lake Lateral 88 | 0.1 | 240 | 5.5 | 2002 | 17 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 100 | No | 0 |
| Clinton Lateral 60 | 21.7 | 240 | 3.2 | 1969 | 50 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Coldstream Lateral 114 | 4.1 | 240 | 4.8 | 1969 | 50 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 11 | No | 0 |

| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures Caused by Other than External Corrosion |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cominco Lateral 114 | 1.0 | 240 | 4.8 | 1958 | 61 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Creston Lateral 114 | 6.9 | 240 | 3.2 | 1962 | 57 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 14 | No | 0 |
| Dallas Lateral 60 | 0.1 | 240 | 3.9 | 1972 | 47 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 100 | No | 0 |
| Deadman Creek Lateral 26 | 0.1 | 205 | 2.9 | 1990 | 29 | Unknown | Unknown | 0 | No | 0 |
| Dunkley Mills Loop 114 | 4.2 | 240 | 3.2 | 2004 | 15 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Dunkley Mills Lateral 60 | 5.7 | 240 | 3.2 | 1980 | 39 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Elko Lateral 88 | 0.9 | 240 | 4.0 | 1969 | 50 | Unknown | Unknown | 0 | No | 1 |
| Enderby Lateral 114 | 0.2 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 100 | No | 0 |
| Fernie Lateral South Loop 114 | 7.9 | 290 | 4.8 | 1998 | 21 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Fernie Lateral North Loop 88 | 12.0 | 290 | 4.0 | 1991 | 28 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Fernie Lateral 88.9/168 | 23.1 | 240 | 3.2 | 1962 | 57 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 5 |
| Finlay Forest Industries Loop 114 | 4.2 | 205 | 3.9 | 1981 | 38 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Finlay Forest Industries Lateral 60 | 4.3 | 205 | 3.9 | 1966 | 53 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Fort Nelson Loop 114 | 0.7 | 240 | 4.0 | 1985 | 34 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Galloway Lateral 60 | 9.6 | 240 | 3.2 | 1981 | 38 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 1 |

| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures Caused by Other than External Corrosion |
|---|---|---|---|---|---|---|---|---|---|---|
| Gibralter Mines Lateral 60 | 10.2 | 240 | 3.9 | 1971 | 48 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Grand Forks Lateral 114 | 0.9 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Green Lake Lateral 33 | 0.0 | 240 | 4.5 | 1993 | 26 | Unknown | Unknown | 0 | No | 0 |
| High Country Estates Lateral 60 | 0.6 | 240 | 3.2 | 1975 | 44 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Hudson Hope Lateral 60 | 10.0 | 205 | 3.9 | 1965 | 54 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Highmont Mine Lateral 60 | 2.9 | 290 | 3.2 | 1979 | 40 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 1 |
| Horse Lake Lateral 60 | 0.0 | 240 | 5.5 | 1993 | 26 | Unknown | Unknown | 100 | No | 0 |
| Highland Valley Lateral 114 | 16.3 | 240 | 3.9 | 1971 | 48 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Kamloops 2 Lateral 114 | 1.1 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 68 | No | 0 |
| Kimberley Lateral 114 | 2.2 | 240 | 3.2 | 1962 | 57 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 24 | No | 0 |
| Kelowna 1 Lateral 114 | 2.1 | 240 | 4.8 | 1957 | 62 | Polyethylene Tape | Coal Tar, Heat Shrink Sleeve, or Cold Applied Polymer Tape | 31 | No | 0 |
| Knutsford Lateral 60 | 4.2 | 290 | 3.2 | 1984 | 35 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Lac La Hache Lateral 60 | 0.2 | 240 | 3.9 | 2002 | 17 | Unknown | Unknown | 0 | No | 0 |
| ~~Ladysmith Lateral 114~~ | ~~1.0~~ | ~~360~~ | ~~4.9~~ | ~~2008~~ | ~~11~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeve, or Cold Applied Polymer Tape~~ | 44 | ~~No~~ | ~~0~~ |
| Lafarge Cement Lateral 114 | 3.3 | 240 | 4.8 | 1969 | 50 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Logan Lake Lateral 60 | 0.7 | 205 | 3.9 | 1971 | 48 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |

| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures Caused by Other than External Corrosion |
|---|---|---|---|---|---|---|---|---|---|---|
| Line Creek Lateral 114 | 2.8 | 240 | 4.0 | 1981 | 38 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Louisiana Pacific Lateral 114 | 9.4 | 205 | 4.0 | 1995 | 24 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Marysville Lateral 60 | 0.9 | 240 | 3.9 | 1962 | 57 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 100 | No | 0 |
| Merritt Lateral 114 | 4.9 | 240 | 3.9 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 13 | No | 0 |
| Moan Road Lateral 60 | 0.7 | 240 | 3.9 | 1995 | 24 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| ~~Mt Hayes Lateral 114~~ | ~~5.4~~ | ~~360~~ | ~~4.5~~ | ~~2010~~ | ~~9~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeve, or Cold Applied Polymer Tape~~ | ~~0~~ | ~~No~~ | ~~0~~ |
| North West Energy Lateral 114 | 6.4 | 240 | 3.9 | 1993 | 26 | Fusion Bond Epoxy | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Oliver Lateral 114 | 2.0 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 87 | No | 0 |
| Osoyoos Lateral 114 | 20.9 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 3 | No | 0 |
| ~~Port Mellon Lateral 114~~ | ~~0.7~~ | ~~359~~ | ~~4.0~~ | ~~1990~~ | ~~29~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeves~~ | ~~0~~ | ~~No~~ | ~~0~~ |
| Princeton Lateral 88 | 67.0 | 240 | 4.8 | 1968 | 51 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| ~~Powell River 114~~ | ~~1.1~~ | ~~360~~ | ~~5.5~~ | ~~1991~~ | ~~28~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeves~~ | ~~90~~ | ~~No~~ | ~~0~~ |
| Quesnel 2 Lateral 114 | 2.8 | 290 | 4.0 | 1982 | 37 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Rossland Lateral 114 | 1.1 | 290 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 45 | No | 0 |
| Salmon Arm Lateral 114 | 44.3 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 14 | No | 2 |
| Savona Lateral 60 | 1.5 | 240 | 3.9 | 1958 | 61 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 58 | No | 0 |

| Pipeline Name | Line Length (kilometres) | Steel Grade (MPa) | Wall Thickness (mm) | Year Installed | Age | Pipe Coating Type | Joint Coating Type | % in Class 3 Location | In-line Inspection Capable? | Number of Recorded Failures Caused by Other than External Corrosion |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Shoreacres Lateral 114 | 0.3 | 290 | 4.8 | 1993 | 26 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Silver Creek Lateral 60 | 6.7 | 290 | 3.2 | 1985 | 34 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Sorrento Lateral 114 | 24.7 | 290 | 3.2 | 1985 | 34 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 7 | No | 0 |
| Spallumcheen Lateral 114 | 3.4 | 240 | 4.8 | 1995 | 24 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Sparwood Lateral 114 | 8.8 | 240 | 4.8 | 1969 | 50 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Summerland Lateral 114 | 16.0 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 45 | No | 1 |
| Swan Lake Lateral 60 | 1.6 | 240 | 3.9 | 1967 | 52 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Fort Nelson Tackama Forest Lateral 60 | 1.6 | 240 | 3.9 | 1975 | 44 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| ~~Tilbury Lng Plant 168~~ | ~~1.7~~ | ~~205~~ | ~~4.8~~ | ~~1971~~ | ~~48~~ | ~~Extruded Polyethylene~~ | ~~Heat Shrink Sleeves~~ | ~~100~~ | ~~No~~ | ~~0~~ |
| Vernon 1 Lateral 114 | 0.6 | 240 | 4.8 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 100 | No | 0 |
| Westar Timber Lateral 60 | 1.0 | 290 | 3.2 | 1988 | 31 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |
| Williams Lake Lateral 114 | 10.0 | 240 | 4.0 | 1957 | 62 | Asphalt Enamel | Asphalt Enamel, Coal Tar, or Cold Applied Polymer Tape | 0 | No | 0 |
| Wildwood Lateral 60 | 0.5 | 290 | 3.2 | 1982 | 37 | Extruded Polyethylene | Heat Shrink Sleeve, or Cold Applied Polymer Tape | 0 | No | 0 |

8.2 Explain why FEI did not request JANA to assess pipelines in the ITS other than the mainline pipelines in its Analysis Of Cracking Threats Report (Appendix B-1).

**Response:**

FEI optimized the scope of work of the Analysis of Cracking Threats Report (Appendix B-1) and Quantitative Safety Risk Assessment (Appendix B-2), which address the CTS and ITS, by generally including transmission pipelines of NPS 10 or larger that have previous geometry and MFL ILI data and for which EMAT ILI tools are commercially available. ILI information provides additional value in undertaking a quantitative risk assessment versus otherwise relying on historical models and more general risk estimation methods. For these reasons, FEI did not request JANA to assess pipelines in the ITS other than the mainline pipelines identified in Appendix B-1 and B-2.

8.3 Explain why FEI did not request JANA to assess pipelines in the ITS other than the mainline pipelines in its Quantitative Safety Risk Assessment (Appendix B-2).

**Response:**

Please refer to the response to RCIA IR1 8.2.

8.4 Provide a table similar to Table 3-8 from the CTS TIMC CPCN Application showing the safety risk per ITS pipeline.

**Response:**

A portion of this response is redacted pursuant to Section 19 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-178-22. The redaction has been made as it identifies vulnerable points on the Company's gas transmission system and areas of risk to FEI's assets. Disclosure of the detailed information could impede FEI's ability to work safely and to reliably operate its gas system assets and could risk the safety of both its workers and the public. A confidential version of this response is being filed with the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

FEI provides the requested table below.

[redacted]

[redacted]

8.5 Provide a figure similar to Figure 3-13 from the CTS TIMC CPCN Application showing the threat contribution to safety risk for ITS pipelines.

**Response:**

A portion of this response is redacted pursuant to Section 19 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-178-22. The redaction has been made as it identifies vulnerable points on the Company's gas transmission system and areas of risk to FEI's assets. Disclosure of the detailed information could impede FEI's ability to work safely and to reliably operate its gas system assets and could risk the safety of both its workers and the public. A confidential version of this response is being filed with the BCUC and Interveners who have signed a Confidentiality Declaration and Undertaking.

FEI provides the threat contribution to safety risk for ITS pipelines in the table below.

[redacted]

On page 13 of the Application, FEI states: "JANA's assessment shows that 9 pipelines on the ITS, of which 8 are large enough diameter for EMAT ILI tools4, and 11 on the CTS are susceptible to cracking…Given FEI's obligations to ensure safe and reliable operation of its assets, the credibility of cracking threats to the ITS identified by JANA, the potential safety and reliability consequences of not addressing these threats, and emerging changes in industry practices, FEI, as a prudent operator, needs to enhance its transmission integrity management capabilities to mitigate cracking threats on 8 ITS pipelines."

8.6 Explain why FEI is not intending to enhance or otherwise change its integrity management capabilities for the 9th ITS pipeline (Trail to Castlegar) which JANA concludes is susceptible to cracking and for which EMAT ILI tools are not commercially available.

**Response:**

FEI is not proposing to enhance or otherwise change its integrity management capabilities for the Trail-Castlegar 8" pipeline (TRA CAS 219) because:

- FEI's practices for transmission pipelines smaller than NPS 10 currently align with industry practice; and
- EMAT tools are not yet proven and commercialized for transmission pipelines smaller than NPS 10 in diameter.

**9.0 Reference FEI's CTS TIMC CPCN Exhibit B-5 BCUC IR1 1.2; Exhibit B-1, pp. 13, 46; Exhibit B-1 Appendix B-2 JANA QRA; Exhibit A-3 BCUC IR1 6.2**

**Smaller Diameter Pipelines**

On page 46 of the Application, FEI states: "FEI currently operates approximately 100 transmission pipelines with diameters NPS [nominal pipe size] 8 or smaller, which operate at a hoop stress level greater than 30 percent SMYS. Since EMAT tools are currently only commercialized and available for pipelines of diameter NPS 10 and larger, FEI did not include transmission pipelines with diameters smaller than NPS 10 in the scope of its TIMC projects. FEI will continue to inspect these pipelines for cracking during opportunity digs and, if significant cracking is discovered, it will develop a line specific mitigation plan."

9.1 Identify the line-specific mitigation actions that FEI would include, or potentially include, in its mitigation plan if significant cracking is discovered on a transmission pipeline smaller than NPS 10.

**Response:**

Please refer to the response to BCUC IR1 6.4.1.

9.2 Under what circumstances would FEI proceed with hydrostatic testing, exposure and recoating, or pipeline replacement for these smaller diameter pipelines if significant SCC or seam weld cracking was identified during opportunity digs.

**Response:**

If significant SCC or seam weld cracking (i.e., cracking that can result in failure, and that requires incremental mitigation) were identified during an opportunity dig, FEI expects that it would undertake an evaluation of the potential line specific mitigation plan alternatives using the Alternatives Evaluation Methodology described in Section 4.3 of the Application. Please refer to the response to BCUC IR1 6.4, which explains that, to date, FEI has not identified any transmission pipeline where a line specific mitigation plan was warranted or implemented to manage cracking discovered during an opportunity dig.

Although FEI cannot foresee all of the circumstances that might drive its future asset decision-making, in the table below, FEI has provided examples of circumstances that might contribute to the selection of hydrostatic testing, exposure and recoating and pipeline replacement for smaller diameter pipelines (i.e., those outside the scope of the TIMC projects). For completeness, FEI has also included "pressure regulating station" as an option.

| Potential alternative | Examples of circumstances that might drive FEI to adopt this alternative |
|---|---|
| Hydrostatic testing | This method has implementation complexity (see Table 4-3 in the Application). While possible, it is highly unlikely that this method would be adopted in any circumstances. |
| Exposure and recoating | This method is typically only cost-effective on shorter lengths of pipeline. It is possible that this method would be adopted if it were deemed cost effective for the applicable length of pipeline requiring mitigation.<br><br>This method could likely be completed over a shorter timeframe than pipeline replacement, which may be a factor in its selection. Further, FEI may be able to mitigate the potential for significant life safety consequences by prioritizing exposure and recoating in areas in proximity to people. |
| Pipeline replacement | FEI may adopt pipeline replacement if it is considered cost-effective relative to other methods, and if the timeline for implementation is considered acceptable.<br><br>Further, FEI may adopt pipeline replacement if there are other compelling reasons to undertake this alternative in addition to a line specific mitigation for cracking. |
| Pressure regulating station | Where FEI can operate a pipeline with hoop stresses below 30 percent of SMYS, while maintaining reliable gas supply to customers, this alternative can be a timely and cost-effective mitigation option. |

In its IR 6.2, the BCUC requests:

*"6.2 Please discuss any assessments (either qualitative, semi-quantitative, or quantitative) to determine the risk of cracking on FEI's transmission pipelines with diameters smaller than NPS 10 and provide the result of these assessments.*

*6.2.1 Please compare the risk of cracking on FEI's transmission pipelines with diameters smaller than NPS 10 to the risk of cracking on FEI's transmission pipelines with diameters NPS 10 or greater."*

9.3 Compare and characterize the <u>probability</u> of cracking on FEI's transmission pipelines with diameters smaller than NPS 10 to the probability of cracking on FEI's transmission pipelines with diameters NPS 10 or greater.

**<u>Response:</u>**

The response to BCUC IR1 6.2.1 includes a comparison of the probability of cracking (expressed as "Ruptures per km per year") on a pipeline with diameter smaller than NPS 10 to one with a diameter of NPS 10 or greater.

The results of this comparison show that the estimated probability of cracking on these pipelines, as expressed as "Ruptures per km per year", is similar. However, there are many factors involved in estimating the probability of cracking failure, including pipeline age, coating and cathodic protection, in addition to operating stress. As such, FEI cannot estimate whether a QRA would, in general, estimate a higher, lower, or similar probability of cracking for transmission pipelines not included in the baseline system-level QRA. Nor can FEI estimate whether any potential trends may be visible on the basis of pipeline outside diameter.

## B. Project Description

**10.0 Reference BCUC Decision C-3-22 p.60; Exhibit A-3 BCUC IR1 9 Successful EMAT ILI Run Criteria**

In its Decision on the Coastal Transmission System TIMC CPCN, the BCUC stated: "In an effort to improve regulatory efficiency and to allow for transparent testing of the assumptions made in developing project scope, the Panel expects FEI to provide, in its forthcoming ITS CPCN application, the criteria and metrics which it considers would define an acceptable EMAT ILI tool run and the basis for selecting these criteria and metrics. As an example of a criterion which could define an acceptable EMAT ILI tool run, FEI should provide its selected metrics for the acceptable pipeline length of discontinuous or continuous loss of pipeline integrity data for each pipeline segment undergoing an EMAT ILI run."

10.1 Confirm whether FEI would promptly repeat the EMAT ILI if FEI's criteria for a successful EMAT ILI were not met (subject to tool availability and any modifications to FEI's pipeline and facilities required to improve the likelihood of a successful re-inspection).

**<u>Response:</u>**

In the event that FEI does not accept an EMAT ILI tool run, FEI expects that it would take either of the following actions:

- If the tool run is rejected based on a vendor-related issue, such as tool performance (e.g., battery failure), that causes a loss of data or significant degradation of data, FEI expects that it would promptly pursue a re-run of the same EMAT tool or perhaps an alternate EMAT tool depending on the specific circumstances.
- If the tool run is rejected based on an FEI-related issue, such as speed excursions that causes a loss of data or degradation, FEI expects that it would follow Steps 1 through 4 set out in the response to BCUC IR1 8.4. If replacement of a heavy-wall segment causing a speed excursion is selected as the preferred integrity management method, FEI would pursue a re-run of the tool following replacement work.

Please also refer to the response to CEC IR1 24.3, where FEI explains that a repeat ILI run would not be expected to produce a significantly different result in the absence of addressing a controllable factor (e.g., addressing heavy-wall pipe to minimize the potential for speed excursions).

**11.0 Reference Exhibit B-1 pp.5,90**

**EMAT ILI Tool Speed Excursions**

At page 5 of the Application, FEI states: "The EMAT ILI data collected during the pilot project run also confirmed that while EMAT ILI tools with speed control returned back to their optimal velocity range more quickly than MFL-C tools, speed excursions still occurred with the EMAT ILI tool."

At page 90 of the Application, FEI states: "One phenomenon that affects the tools' data collection capabilities is known as 'speed excursion'. Speed excursions are localized increases in tool velocity where the tool travels beyond the maximum allowable velocity at which it can collect quality data. The effect of speed excursion ranges from degradation of data quality to a complete inability for the tool to collect data, resulting in blind spots."

At page 90 of the Application, FEI states: "The above strategies are not appropriate on a permanent basis for managing time dependent threats on an aging pipeline system, especially with respect to cracking threats. In particular, there are no complementary technologies that can be fully relied upon for crack analysis (MFL-C and EMAT are both required), and because FEI is running EMAT tools for the first time, there are no prior runs available from which data can be obtained."

11.1 Provide a table of pipeline component alterations that have been deferred, and provide an estimate of the avoided costs, similar to FEI's response to CTS TIMC CPCN Exhibit B-5 BCUC IR1 13.1.

**<u>Response:</u>**

Please refer to page 7 of Appendix D to the Application (EMAT ILI Pilot Project) for a list of pipeline alterations that have been deferred.

As discussed in the response to CEC IR1 10.1, FEI did not proceed with preparing cost estimates for the replacement of these heavy-wall pipe segments as they were not included in the Project scope; therefore, FEI cannot quantify the associated costs.

11.2 Does FEI expect the EMAT tool to successfully capture data at these locations despite the minor or moderate effects on tool speed?

11.2.1 Are FEI's expectations predicated on the EMAT ILI tool having speed control?

**Response:**

FEI observed minor or moderate effects on MFL tool speed at these locations; however, FEI cannot determine, with high confidence, what magnitude of EMAT speed excursion will occur at these locations, and thus, whether the tool will successfully capture data. Therefore, FEI has deferred treatment of these heavy-wall segments until after the baseline EMAT ILI run to determine what effect these speed excursions have on tool data.

As described on page 6 of Appendix F to the Application (System Readiness Criteria), speed control is not yet commercially available for the NPS 10 and NPS 12 pipeline diameters of the ITS pipelines. However, as described on page 5 of Appendix D to the Application (EMAT ILI Pilot Project), FEI expects that while speed control units, when commercially available, could help reduce the impacted length of a speed excursion, they may not eliminate a speed excursion altogether.

11.2.2 If FEI is unable to collect complete or high quality data at these or other locations, explain how FEI would confirm the integrity of these locations.

**Response:**

Please refer to the response to BCUC IR1 8.4.

11.3 If FEI does not expect the tool to successfully capture data at these locations, for each of the instances (identified by location and pipeline) provide the distance that FEI expects the EMAT tool to be unable to capture data or to capture degraded data.

**Response:**

Please refer to the response to RCIA IR1 11.2. If a speed excursion occurs resulting in degraded or no reliable data being captured, the length of downstream pipe impacted will be similar to what was observed in previous MFL tool runs on the ITS pipelines.

FEI identified the speed excursion events in Table 1 in Appendix D to the Application through a pipeline-level assessment of MFL ILI tool velocities (i.e., where the tool exceeded velocity specifications). FEI has not undertaken a site-specific review of these events to determine information such as geographic location or which type of heavy wall feature is causing the speed excursion (e.g., valve assembly, elbow, pipe). This is because proactive replacement of these heavy-wall segments was not proposed for inclusion in the Project scope. Thus, FEI provides the total expected impacted length by pipeline in Table 1 as a best estimate of where the EMAT tool may capture degraded or unreliable data.

Dynamic Risk accepted FEI's approach as part of the CTS TIMC proceeding in its response to BCUC IR 1.1.3, included in Appendix O-2 to the Application, which states: "The performance of the EMAT tool used during the FEI pilot project inspections was analyzed and found to behave similar to the MFL-C with regards to tool velocity. Using this assessment approach gives greater confidence in capturing the highest priority restrictions that could result in a velocity excursion."

11.4 Explain how FEI determined that some pipeline components were acceptable to leave in situ, while three heavy wall segments require replacement. What distinguishes the three segments proposed for replacement from other segments that have caused speed excursions?

**Response:**

FEI generally deferred the replacement of heavy-wall segments based on the severity and/or length of the speed excursion event observed in MFL-C tools. For the deferred speed excursion events, the velocity of the MFL-C tool typically did not exceed its maximum velocity for data collection, meaning that data collected may be usable if a reduced data specification is available from the ILI vendor. Additionally, the length of pipe affected by each speed excursion event was relatively short, meaning that it may be more cost-effective to directly inspect and mitigate cracking on the affected pipe following the EMAT ILI run, if required.

However, as described on page 91 of the Application, the three heavy-wall segments proposed for replacement represent locations where the MFL-C tool travelled above its maximum velocity for data collection, meaning there were areas where reliable data was not collected.[3] Additionally, the length of pipe affected by the speed excursion was greater than the length of heavy-wall segment causing the speed excursion, making proactive replacement of these three heavy-wall segments the most cost-effective choice.

3 As per Appendix F, the typical maximum velocity for data collection in the MFL-C tool is 7 m/s, whereas the typical maximum velocity for data collection in the EMAT tool is 5 m/s.

11.5 If the three modifications are not completed, what length and percentage of each pipeline will not be expected to have valid inspection data due to speed excursions?

**Response:**

FEI cannot be certain of the exact length of downstream pipe that will be impacted from an EMAT tool speed excursion as it has not run an EMAT tool through these pipelines yet.

However, if the lengths of impacted downstream pipe are taken to be similar to those observed in the MFL-C tool run (as provided in Table 5-4 of the Application and replicated in the table below), then the following percentages of pipeline are expected to be impacted. These percentages do not include any other locations where the EMAT ILI tool may experience a speed excursion.

| Pipeline | Approx. Length (km) | Event ID | Length of Downstream Pipe Impacted by Speed Excursion (m) | % of Pipeline Impacted by Speed Excursion |
|---|---|---|---|---|
| SAV VER 323 | 143 | 1 | 193 | 0.13% |
| KIN PRI 323 | 67 | 29 | 112 | 0.5% |
| | | 31 | 223 | |

11.5.1 What length and percentage of each pipeline will not be expected to have valid inspection data (for any reason) even if the three modifications <u>are</u> completed?

**Response:**

Other than at the three proposed locations, FEI cannot determine with high confidence where the EMAT ILI tool may experience a speed excursion prior to the baseline EMAT run. Further, minor speed excursions may not result in invalid inspection data.

However, given that MFL tool speed excursions can provide a reasonable indication of where EMAT tool speed excursions may occur and impact the inspection data collected, FEI provides the lengths and percentages of each pipeline affected by speed excursions during historical MFL tool runs in the table below. FEI has bolded the pipelines where it proposes to proactively modify heavy wall segments (one on SAV VER 323 and two on KIN PRI 323 pipeline) under the ITS TIMC Project to remove speed excursions.

| Pipeline ID | Approx. length of pipeline (km) | Including speed excursions caused by 3 heavy wall locations | | Excluding speed excursions caused by 3 heavy wall locations | |
|---|---|---|---|---|---|
| | | No. of speed excursion events | Approx. total length of pipe affected by speed excursions (m) / % of total pipeline length | No. of speed excursion events | Approx. total length of pipe affected by speed excursions (m) / % of total pipeline length |
| **SAV VER 323** | **143** | **9** | **576 / 0.40%** | **8** | **383 / 0.27%** |
| **VER PEN 323** | 99 | 3 | 103 / 0.10% | 3 | 103 / 0.10% |
| **GRF TRA 273** | 60 | 9 | 640 / 1.07% | 9 | 640 / 1.07% |
| **OLI GRF 273** | 95 | 5 | 218 / 0.23% | 5 | 218 / 0.23% |
| **PEN OLI 273** | 30 | 3 | 391 / 1.30% | 3 | 391 / 1.30% |
| **KIN PRI 323** | **67** | **23** | **1152 / 1.72%** | **21** | **817 / 1.22%** |
| **PRI OLI 323** | 95 | 9 | 221 / 0.23% | 9 | 221 / 0.23% |
| **YAH TRA 323** | 163 | 4 | 94 / 0.06% | 4 | 94 / 0.06% |

FEI notes that the extent to which data is compromised depends on the actual tool velocities observed. If the EMAT ILI tool travels between 2 and 5 metres per second, data will be degraded. Degraded data can be relied upon for integrity management decision-making if a degraded data specification is available from the ILI vendor. If the EMAT ILI tool travels above 5 metres per second, reliable inspection data is not collected, meaning the integrity of the pipeline at these locations cannot be determined. As such, FEI cannot provide with high confidence a length/percentage for each pipeline where inspection data may be compromised for any reason during the EMAT ILI run.

11.6 For each of the 3 instances of heavy wall piping that FEI proposes to remove, but assuming that they are not removed, estimate the distance after the existing heavy wall section that FEI expects the EMAT tool to be unable to capture data or have degraded data.

**Response:**

Please refer to the response to RCIA IR1 11.5.

11.7 What is the class location designation for each of the three heavy wall segments according to CSA Z662-19?

**Response:**

According to CSA Z662-19, the class location designation for each of the three heavy-wall segments is Class 1.

11.8 For each of FEI's MFL and geometry ILI tool runs conducted over the past five years on the ITS, provide the distances inspected, the distances for which valid ILI data were not obtained, the percentages of each pipeline that were successfully inspected, and whether the ILI tool had speed control.

**Response:**

The following table provides the requested information for each of FEI's geometry, MFL-A (MFL), and MFL-C (CMFL) ILI tool runs conducted over the past five years on the ITS.

| Year | Size | Segment | Tool technology | Length (km) | Data loss (km)[4] | % Successful inspection[5] | Speed control |
|---|---|---|---|---|---|---|---|
| **2018** | 273 mm / 10" | Oliver Y-Penticton | COMBO GEO/MFL-A | 31 | 0.00 | 100% | No |
| **2018** | 273 mm / 10" | Oliver Y-Penticton | MFL-C | 31 | 0.00 | 100% | No |
| **2018** | 273 mm / 10" | Oliver Y - Grand Forks | COMBO GEO/MFL-A | 95 | 0.00 | 100% | No |
| **2018** | 273 mm / 10" | Oliver Y - Grand Forks | MFL-C | 95 | 2.13 | 97.8% | No |
| **2018** | 273 mm / 10" | Grand Forks-Trail | COMBO GEO/MFL-A | 60 | 0.00 | 100% | No |
| **2018** | 273 mm / 10" | Grand Forks-Trail | MFL-C | 60 | 0.00 | 100% | No |
| **2019** | 508 mm / 20" | Duke Tap - Savona C/S | COMBO GEO/MFL-A | 3.5 | 0.00 | 100% | No |
| **2019** | 323 mm / 12" | Kingsvale - Princeton | COMBO GEO/MFL-A | 67.8 | 0.00 | 100% | No |
| **2019** | 323 mm / 12" | Princeton-Oliver | COMBO GEO/MFL-A | 95.858 | 0.00 | 100% | No |
| **2019** | 273 mm / 10" | Oliver Y - Grand Forks | MFL-C | 95 | 0.00 | 100% | No |
| **2020** | 323 mm / 12" | Savona - Vernon | COMBO GEO/MFL-A | 143.5 | 0.00 | 100% | No |

4 Data loss (km) is an indication of the length of pipe that is in a blind spot, or where the data is unusable due to not having a quality specification from the ILI vendor.

5 Successful inspection (%) is the percentage of the total length for which there is no data loss (blind spots).

| Year | Size | Segment | Tool technology | Length (km) | Data loss (km)[4] | % Successful inspection[5] | Speed control |
|---|---|---|---|---|---|---|---|
| **2020** | 323 mm / 12" | Penticton-Vernon | COMBO GEO/MFL-A | 99.6 | 0.00 | 100% | No |
| **2020** | 323 mm / 12" | Yahk - Trail (EKL) | COMBO GEO/MFL-A | 164.4 | 0.00 | 100% | No |
| **2020** | 323 mm / 12" | Savona - Vernon | MFL-C | 143.5 | 0.67 | 99.53% | No |
| **2020** | 323 mm / 12" | Penticton-Vernon | MFL-C | 99.6 | 0.46 | 99.54% | No |
| **2020** | 323 mm / 12" | Yahk - Trail (EKL) | MFL-C | 164.4 | 0 | 100% | No |
| **2021** | 219 mm/ 8" | Trail - Castlegar | COMBO GEO/MFL-A | 24 | 0.00 | 100% | No |
| **2021** | 219 mm/ 8" | Trail - Castlegar | MFL-C | 24 | 0.00 | 100% | No |
| **2022** | 406 mm / 16" | SONG | COMBO GEO/MFL-A | 32.1 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Cranbrook lateral | GEO | 34.6 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Cranbrook lateral | MFL-A | 34.6 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Cranbrook lateral | MFL-C | 34.6 | 1.66 | 95.20% | No |
| **2022** | 219 mm/ 8" | Cranbrook loop | GEO | 34.6 | 0.00 | 100% | No |
| **2022** | 219 mm/ 8" | Cranbrook loop | MFL-A | 34.6 | 0.00 | 100% | No |
| **2022** | 219 mm/ 8" | Cranbrook loop | MFL-C | 34.6 | 0.09 | 99.74% | No |
| **2022** | 168 mm/ 6" | Mackenzie lateral | GEO | 31.83 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Mackenzie lateral | COMBO GEO/MFL-A | 31.83 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Mackenzie lateral | MFL-C | 31.83 | 0.00 | 100% | No |
| **2022** | 219 mm/ 8" | Mackenzie loop | COMBO GEO/MFL-A | 2 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Mackenzie loop | COMBO GEO/MFL-A | 12.8 | 0.00 | 100% | No |
| **2022** | 219 mm/ 8" | Mackenzie loop | MFL-C | 2 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | Mackenzie loop | MFL-C | 12.8 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | PG#1 lateral | GEO | 5.9 | 0.00 | 100% | No |
| **2022** | 168 mm/ 6" | PG#1 lateral | GEO | 5.9 | 0.00 | 100% | No |

11.9 Please clarify what is meant by the statement: “there are no complementary technologies that can be fully relied upon for crack analysis (MFL-C and EMAT are both required)”[emphasis added]. Is FEI stating that MFL-C is also required for crack analysis, or is MFL-C required for other reasons in order to manage the integrity of the pipeline? If the former, explain why MFL-C is required for crack analysis and what cracks or features it is expected to locate and size which EMAT is incapable of locating and sizing.

**Response:**

MFL-C is required by vendors for crack analysis primarily to properly classify imperfections as cracks or non-cracks (e.g., false positives). Vendors can use the MFL-C data to evaluate whether imperfections are associated with volumetric metal loss and avoid potential over-reporting of cracks.

Another use of MFL-C for crack analysis, as discussed in the response to RCIA IR1 3.1, is that MFL-C identifies the longitudinal seam weld o-clock position. This seam weld position information is overlayed onto the EMAT ILI tool run data and used to determine if cracking is located in the pipe body or seam weld.

**12.0 Reference Exhibit B-1 p.94; CTS TIMC CPCN Application Exhibit B-1 p.98**

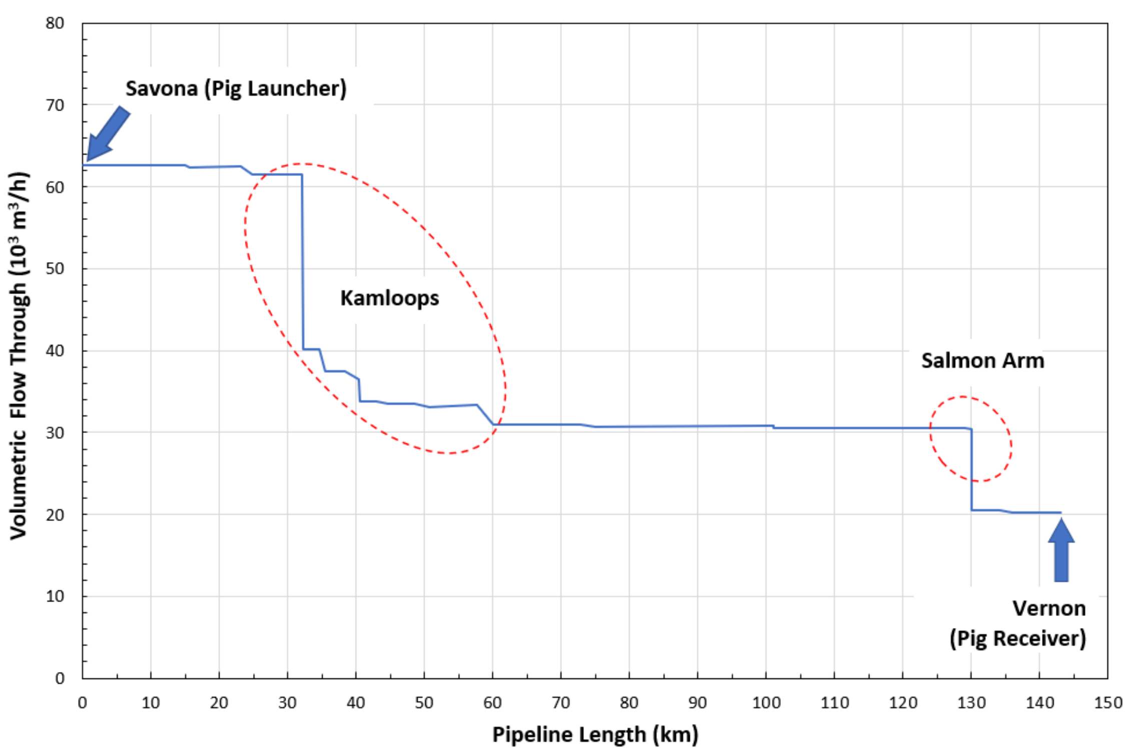
**Flow Control Stations**

At page 94, of the Application, FEI states: "Based on current analysis of the ITS, control over gas flowrate is required to control the velocity of tools, regardless of whether the ILI tool contains a velocity control mechanism because there are segments of the system where flow exceeds the tool speed control ability (typically at the feed to major urban centers)."

12.1 Explain how the flow control stations will operate on the ITS at each of the four proposed locations.

**Response:**

As explained in Appendix F to the Application (System Readiness Criteria), ILI tools have typical optimal velocity ranges that best allow for the collection of quality inspection data. However, maintaining the ILI tool within this optimal velocity range along the entirety of a pipeline can be challenging due to changing flow rates in the pipeline that result from large load demand centres. The figure below provides an example of flow through SAV VER 323 pipeline on a cool summer day (13°C). Please note the step change in the flow rate at each of the major urban centres (Kamloops and Salmon Arm) where pipeline laterals served by the SAV VER 323 feed major gate stations supplying gas to these communities.



The proposed flow control stations (FCS) at each of the four locations will be used individually or collectively with other existing pressure control facilities on the pipelines to control the flow in the pipeline such that when the ILI tool passes by major urban centres, the ILI tool remains within its optimal velocity range. The FCS will be utilized in a bi-directional manner over the course of the ILI tool run, in coordination with controlling the upstream and downstream pressures, to either pack[6] (flow into) or unpack (flow out of) the pipeline.

With the optimal travel velocities of EMAT ILI tools being more constrained than other ILI tools, relying on existing control infrastructure (which is typically located at the very start and/or very end of a pipeline) for maintaining tool velocity through lengthy pipelines is challenging, less efficient and leads to a higher potential for speed excursions that could inhibit successful data collection. Ultimately, the flow control stations will provide a more accurate and responsive control mechanism to support a successful tool run.

12.2 For each size of EMAT ILI tool proposed for the ITS TIMC project, please provide the ILI tool vendors' specifications for maximum flow for which the tool can control its speed in order to maintain the tool speed within the optimum range.

**Response:**

As noted on page 6 of Appendix F to the Application (System Readiness Criteria), speed or velocity control on ILI tools is not yet commercially available for the pipeline diameters within the scope of the ITS TIMC Project.

However, FEI obtained a preliminary maximum velocity specification for a tool with speed control from the ILI vendor that participated in the EMAT ILI Pilot Project for the development of an NPS 12 speed control unit. The maximum velocity of an NPS 12 ILI tool with a speed control mechanism was 3 m/s, which FEI used to provide input into its assessment for the need for additional flow control. FEI notes that maximum inspection flow rates change based on pressure during in-line inspection and the maximum velocity specification is a more appropriate metric.

Please note that the final specification may differ once speed control mechanisms for NPS 10 and NPS 12 tools are fully developed and commercially available.

[6] Packing or unpacking refers to increasing or decreasing the amount of linepack within a pipe. Linepack is defined as the total amount of gas contained within a pipe segment. Higher linepack corresponds to higher gas pressure within the pipe.

12.3 Provide a graph of the summer-period flow rates for each ITS pipeline which FEI proposes to install a flow control station.

**Response:**

FEI intends to install a flow control station at locations where two pipelines connect to form a longer mainline. While each pipeline is in-line inspected independently, the bidirectional flow control station can be used to control the tool speed during ILI runs on both pipelines.

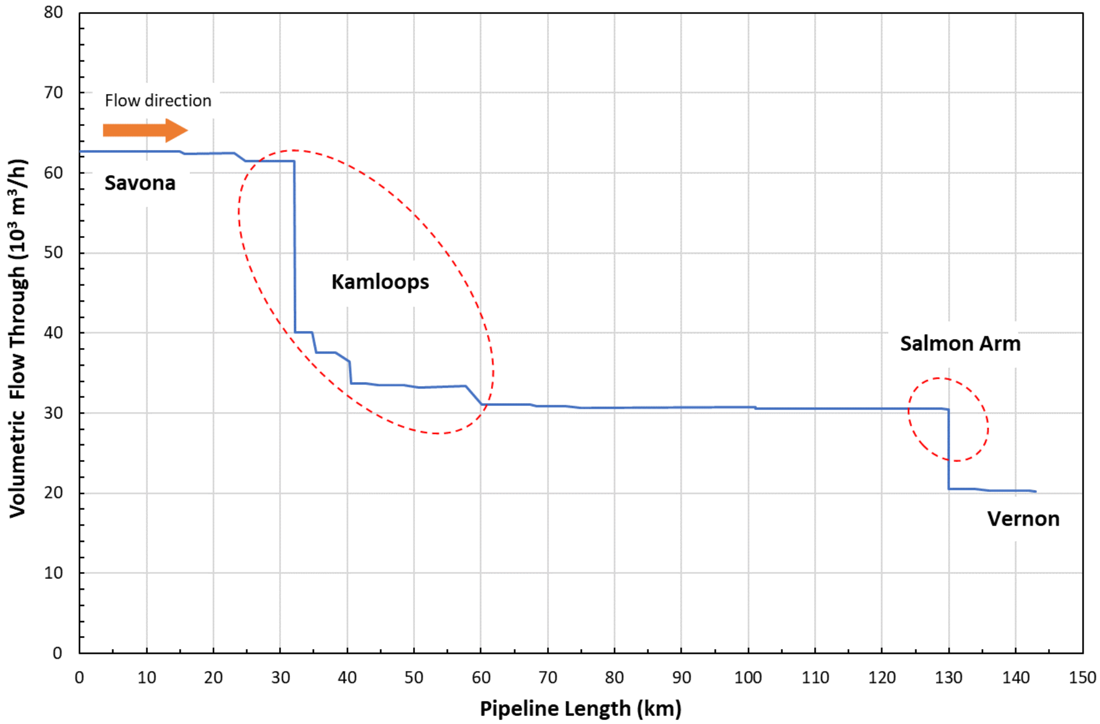
| Mainline | Pipeline | FCS Location |
|---|---|---|
| **Savona to Penticton 323** | SAV VER 323 | SN-7 (Vernon) |
| | VER PEN 323 | |
| **Penticton to Trail 273** | PEN OLI 273 | SN-11 (Penticton Gate)* |
| | OLI GRF 273 | SN-15 (Grand Forks) |
| | GRF TRA 273 | |
| **East Kootenay Link 323** | YAH TRA 323 | N/A |
| **Kingsvale to Oliver 323** | KIN PRI 323 | KO-4 (Princeton Crossover) |
| | PRI OLI 323 | |

**Also supports ILI runs on the VER PEN 323 pipeline.*

The figures below provide an example of flow through ITS pipelines that can be supported by a proposed flow control station on a cool summer day.[7] Since FEI's existing SCADA system is not able to provide historic flow rates across the entire pipeline, the figures have been generated through hydraulic simulations for a typical cool summer day.

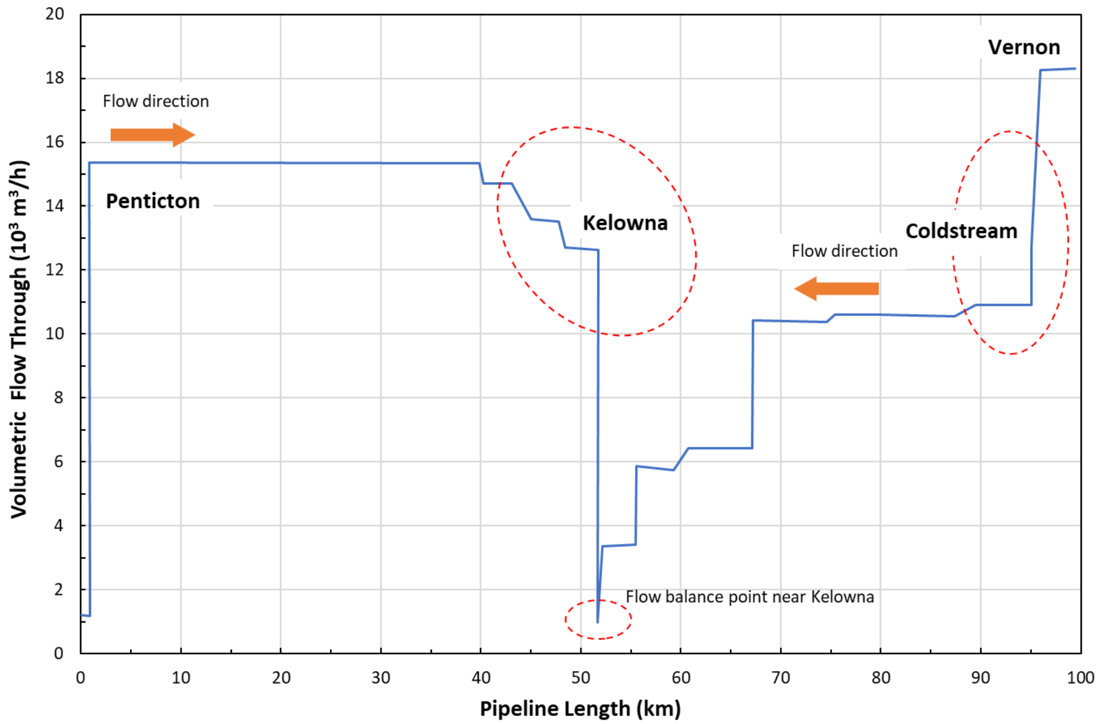
[7] FEI considered a 5 degree day (DD), corresponding to a daily average temperature of 13°C.

1 **(i) SAV VER 323**



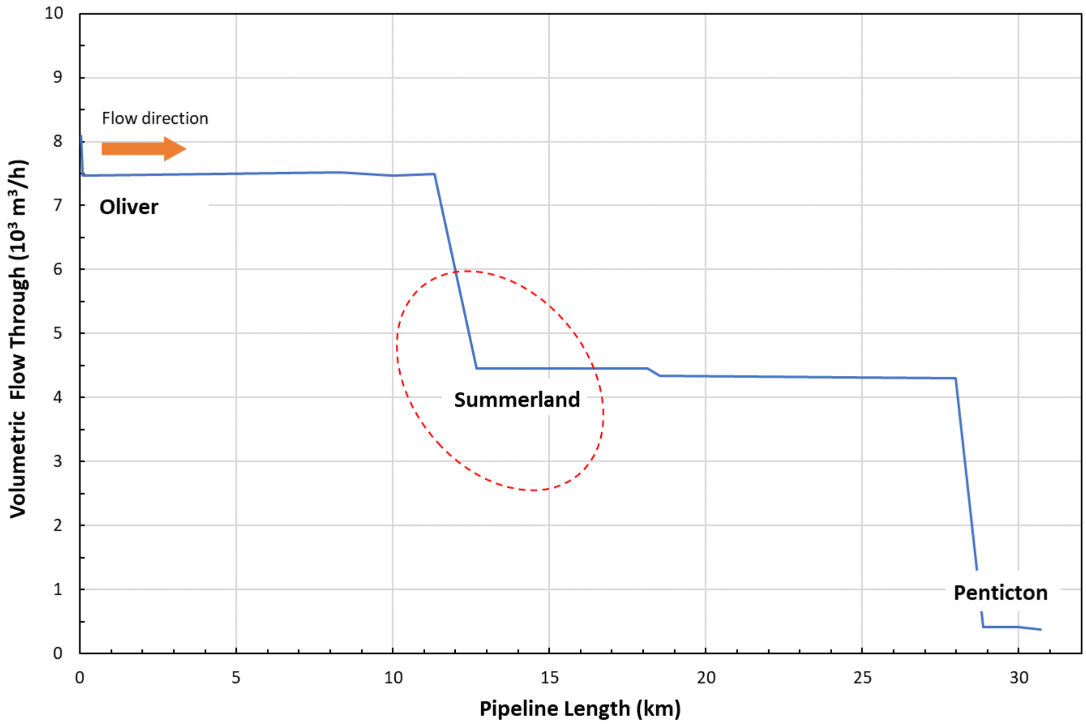

2

**(ii) VER PEN 323**

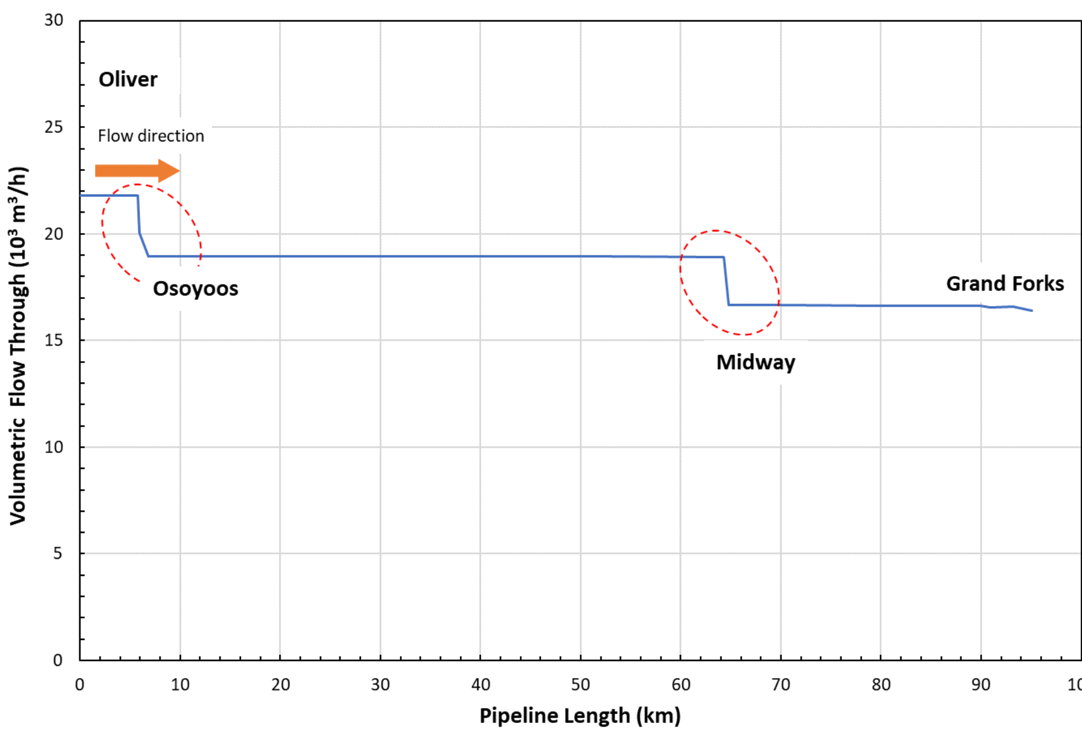



**Note:** A flow balance point is a location where two feeds meet, creating a null flow point.

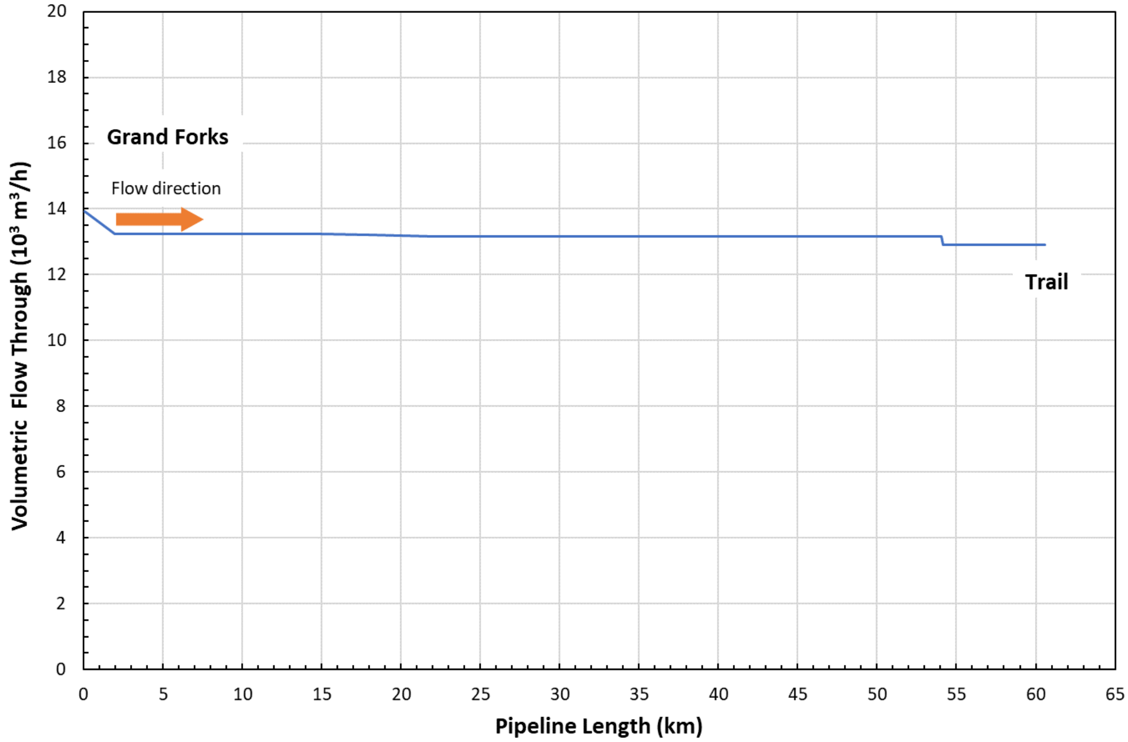
**(iii) PEN OLI 273**



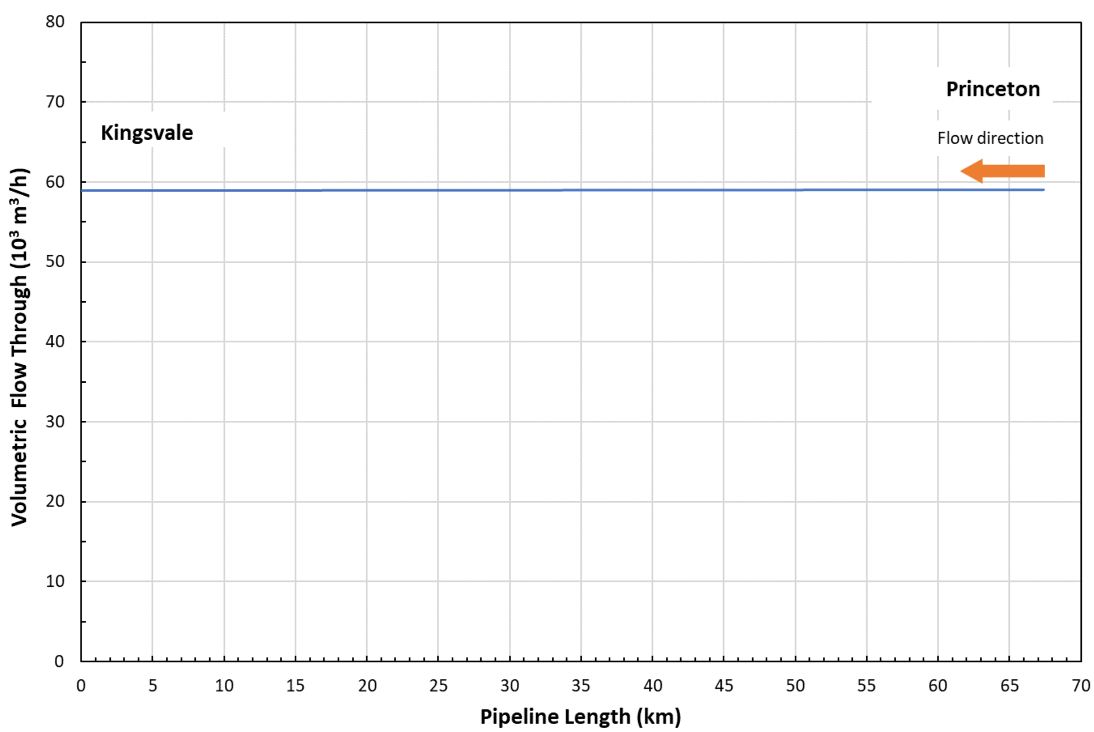

**(iv) OLI GRF 273**



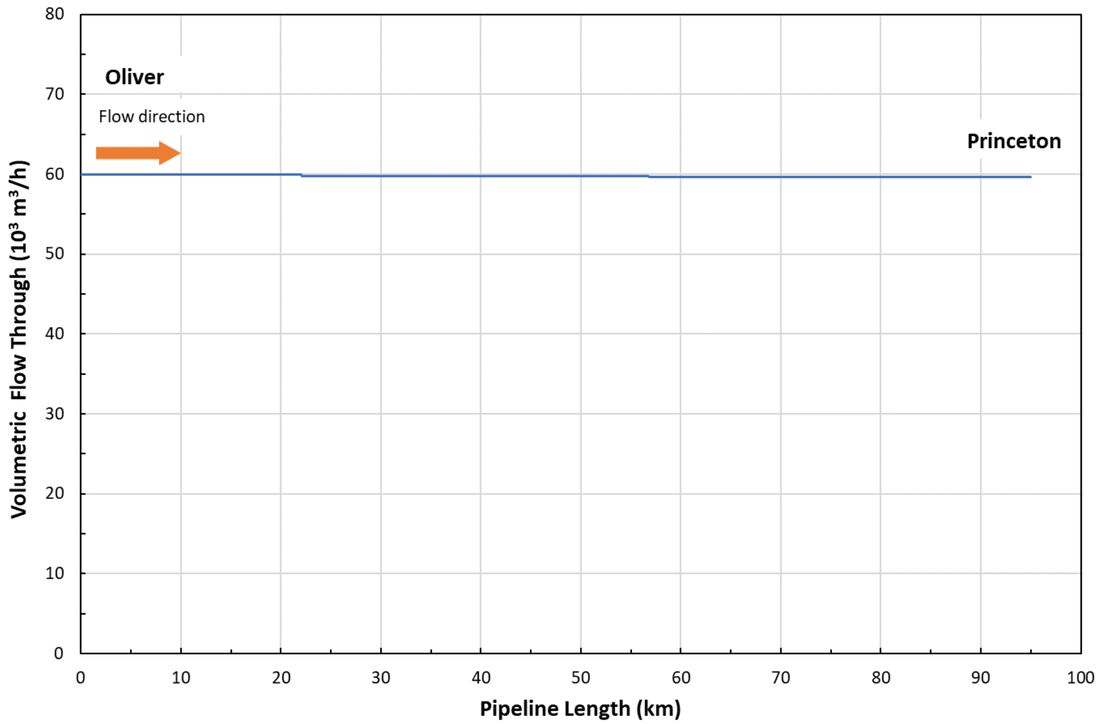
**(v) GRF TRA 273**




**(vi) KIN PRI 323**



**(vii) PRI OLI 323**




In the CTS TIMC Application at page 98, FEI stated: “For EMAT ILI tools that come with built-in speed control, enabling them to manage their travel velocity, FEI found that such tools perform better when they are subjected to higher gas flowrates. Since current flowrates in the Project’s pipelines allow for higher tool travel velocity, it was determined that a FCS [flow control station] will not be required for situations when an ILI tool with built-in speed control is utilized.”

12.4 Please confirm whether the ITS pipelines (in areas where flow control is proposed) have significantly higher gas velocities than the CTS pipelines.

**<u>Response:</u>**

The ITS pipelines have a wide range of gas velocities and can have a much larger variation in flow along the full length of the ILI runs as compared to the CTS pipelines. In particular, some ITS pipeline locations can have higher gas velocities, while other locations can have lower gas velocities than the CTS pipelines during the same seasonal window. However, comparing the velocities in ITS pipelines relative to CTS pipelines in isolation from other factors does not change the need for flow control stations (FCS) on the ITS. FEI's objective in both ITS and CTS pipelines is to achieve the target tool velocities though a reasonable seasonal window.

As described in the response to RCIA IR1 12.1, the ITS is more challenging to configure to achieve desirable ILI tool velocities than the CTS and would be even more so without flow control stations installed.

12.5 Please confirm whether the proposed flow control stations are able to increase the gas flows compared to the flows absent the flow control station.

**Response:**

The proposed flow control stations (FCS) operate by creating a restriction to the flow of gas through a discrete section of pipe, thereby reducing the amount of gas moving through that pipe to the desired level.

It is possible, however, to create conditions in a pipeline system using FCS where the gas flow could be higher than a circumstance without FCS. When considering a pipeline system with multiple connected flow paths and sources of supply and demand, an FCS can reduce the flow of gas through one pipe feeding an area which can result in an increase in the amount of gas flowing through another.

In addition, an FCS can be used to “pack” a section of pipe whereby the flow out of the pipeline section is restricted for a period of time and the total amount of gas contained within the pipe (and therefore the pressure) increases, with a lower pressure region created downstream of the FCS. When the FCS is later opened, the flow out of the higher pressure section of pipe will result in a higher flow rate for a period of time.

In general, all available facilities in a pipeline system will be used to create optimal conditions for the inline inspection of any given pipeline segment within that system.

12.6 Explain why it was desirable to have higher flow rates when inspecting the CTS pipelines (in order for the EMAT ILI tool to perform better), but FEI now states that even when using ILI tools with flow control, flow control stations are required on the ITS to slow the gas flow.

**Response:**

As explained below, the CTS and ITS have distinct characteristics which differentiate the operation of each system, and therefore, the operational requirements of each project are unique. As explained in Section 5.4.3 of the Application, control over gas flowrate is required to control the velocity of the EMAT ILI tools, regardless of whether the ILI tool contains a built-in speed (or velocity) control mechanism.

EMAT ILI tools need to operate within a specific velocity range to obtain reliable inspection data. A tool with built-in speed control can reduce its velocity relative to that of the gas by allowing some of the gas to bypass the tool as it travels in the pipe. However, the degree to which the tool can reduce its velocity is limited such that, for a given gas velocity, there is a minimum controllable tool velocity. For example:

> The optimal travel velocity of an EMAT ILI tool is 1 to 2 m/s. If, for example, the gas velocity is 5 m/s and the speed control mechanism is capable of reducing tool velocity by 3 m/s, then an ILI tool velocity of 2 m/s can be achieved and the tool would travel within its optimal range. However, if the gas velocity is 0.5 m/s, the tool will travel outside its optimal velocity range despite having a speed control mechanism. As such, when a tool with a built-in speed control mechanism is being used, it is desirable to have gas flow rates that are higher than the tool's optimal velocity range as opposed to lower.

While FEI's objective in both the CTS and ITS is to achieve target tool velocities through a reasonable seasonal window, the two systems have differing pipeline connectivity, driving differences in how flow control stations (FCS) will be used on the ITS versus the CTS. In particular, the CTS is a transmission system "network" with significant pipeline looping and interconnectivity, and therefore, is much more capable of being configured to permit speed control tools to operate within the target ranges without supplemental FCS being required. In contrast, the ITS pipelines are primarily linear in nature and the gas velocity can vary considerably along the length without the configuration flexibility that the CTS possesses. As explained on page 94 of the Application, there are segments of the ITS where the gas velocity is such that tools, including those with a speed control mechanism,[8] would still travel too fast to obtain reliable inspection data.

Therefore, flow control stations as proposed in the Application are necessary to further control the velocity of the gas in those sections of the ITS during inspection runs.

[8] As explained in the response to RCIA IR1 12.2, speed control is not yet commercially available for any sizes of pipeline within the scope of the ITS TIMC Project. However, FEI's analysis used a preliminary maximum velocity specification for an EMAT ILI tool with speed control on an NPS 12 pipeline to validate the need for FCS to maintain the EMAT ILI tool speed within the required range.

**13.0 Reference Exhibit B-1 pp.95,96; FEI CTS TIMC CPCN Application Exhibit B-8 RCIA IR1 12.6**

**Pressure Reducing Stations**

At page 95 of the Application, FEI states: "FEI's statutory and regulatory obligations align with FEI's efforts to take additional measures to mitigate the risk of failure on the 8 ITS pipelines due to cracking threats. As the extent of the threats is unknown until after the successful EMAT ILI run and initial data analysis, FEI must consider and be ready to implement additional operational changes to safeguard the system through pressure reduction. Pressure reduction will be achieved across the 8 ITS pipelines through the existing pressure control points listed in Table 5-5 and two new pressure regulating stations."

At page 96 of the Application, FEI states: "New PRSs have been designed for installation at two facilities across the ITS in order to expand FEI's operational and maintenance capabilities. The two facilities that will require a PRS to meet the Project objectives are:

1. East Kootenay Exchange Station; and
2. SN-4 Valve Assembly."

At page 96 of the Application, FEI states: "As described in Section 5.4.4, pressure reduction will be achieved across the 8 ITS pipelines through existing control points as well as the addition of a temporary PRS at SN-4 Valve Assembly near Kamloops and a permanent PRS at East Kootenay Exchange Station."

At page 75 of the Application, FEI states: "As shown in Figure 4-4, the 8 pipelines comprise three bi- directional sub-systems66 within the ITS, operating between the following FEI facilities (indicated by yellow stars):

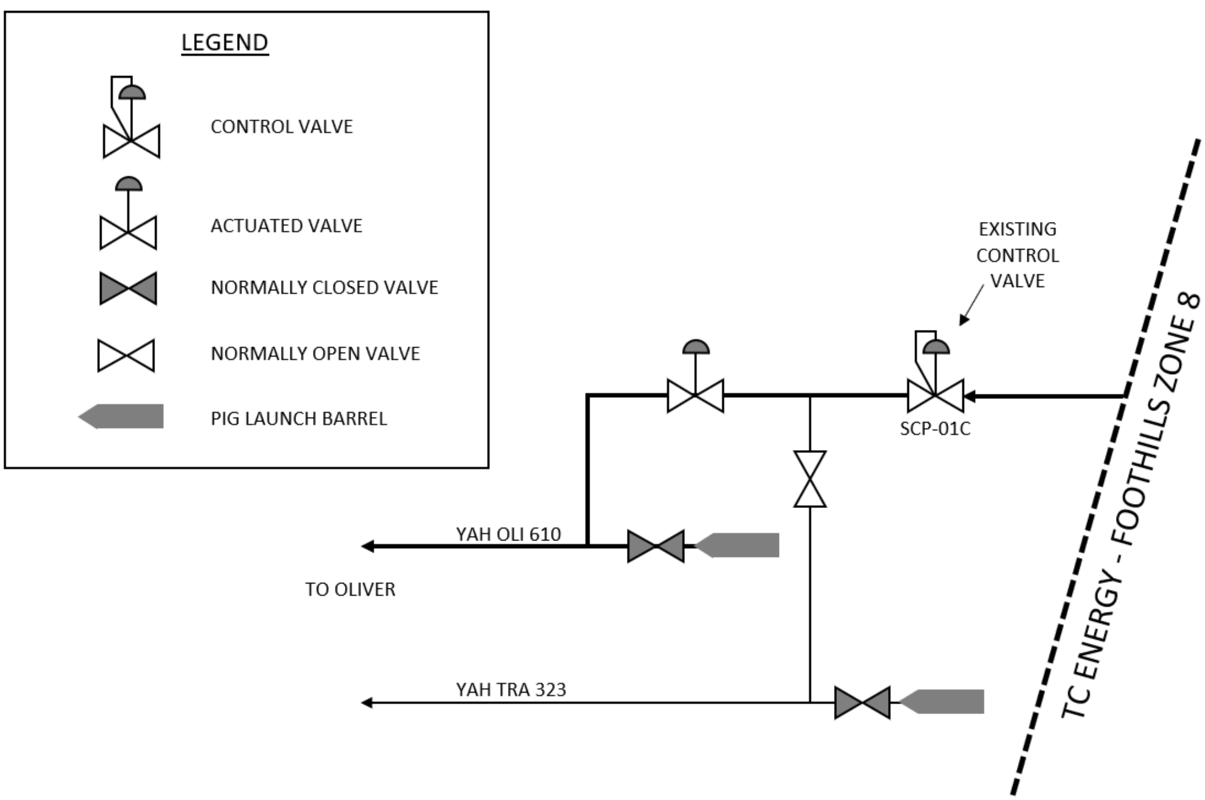
1. Kingsvale Control Station and Oliver Y Control Station;
2. Savona Control Station and Oliver Y Control Station; and
3. East Kootenay Exchange Control Station and Oliver Y Control Station.

Each control station is a pressure control point, whereby the pressure in the sub-system pipelines is currently controlled within its operating pressure. These stations could be used to reduce pressure further if the systems had sufficient capacity."

13.1 Please explain why the pressure reducing (control) equipment currently installed at the East Kootenay Exchange station cannot be adjusted to reduce pressure in the event that a pressure reduction is required.

**Response:**

As shown in the schematic below, gas flows from TC Energy through the existing control valve (SCP-01C), after which the gas is fed to both the YAH OLI 610 (Southern Crossing) pipeline and the YAH TRA 323 pipeline. The SCP-01C control valve provides the only pressure regulating capability at the East Kootenay Control Station and is located on the common feed to the YAH OLI 610 and YAH TRA 323 pipelines. As such, using this control valve to implement a pressure reduction on the YAH TRA 323 pipeline would also reduce pressure on the YAH OLI 610 pipeline, causing an otherwise unnecessary capacity shortfall on the YAH OLI 610 pipeline. In peak winter conditions, if the YAH OLI 610 is operated with a pressure reduction, it would not be capable of delivering the gas projected to be needed to the Oliver Y Control Station to support demand in the Okanagan or delivering gas to Kingsvale and via the Enbridge's pipeline to support customers in the Lower Mainland.




13.2 Please describe the arrangement or configuration of the East Kootenay Exchange station in terms of supply from TC Energy and the ability to control the flow of gas into the Southern Crossing Pipeline and the Yahk-Trail 323 pipeline.

**Response:**

Please refer to the response to RCIA IR1 13.1.

13.3 Please explain whether FEI considers proactive installation of pressure reducing stations in advance of ILIs to be a typical industry practice.

**Response:**

FEI confirms that:

1. Establishing pressure reduction capability for integrity management, including for EMAT ILI runs, is industry standard practice;
2. Establishing this capability proactively for integrity management (e.g., in advance of EMAT ILI runs) is typical industry practice; and
3. The method by which an operator achieves this capability could vary between operators. In linear transmission systems, the operator may rely on Compressor Station set points to achieve a pressure reduction. FEI's system characteristics requires that this capability be achieved by pressure reducing stations at the locations identified in Section 5.4.4.1 of the Application.

It is industry standard practice to reduce the operating pressure in a pipeline while conducting an integrity-related excavation or in response to integrity concerns (such as ILI-reported defects). There is demonstration of this in the CSA Z662-19 excerpts in Section 4 of Appendix F and in the operator/regulator examples included in the response to CTS TIMC, BCUC IR2 34.3, a copy of which is reproduced as Attachment 13.3.

When the need for pressure reduction arises, timeliness of response can be important. As such, operators establish the capability for pressure reductions proactively.

13.4 Please list and provide details (pipeline name, ILI tool type, most significant features identified) of each instance in the past five years where FEI reduced the pressure of one of its ITS pipelines in response to findings from ILI runs.

**Response:**

FEI implemented a pressure reduction on the Fording Lateral 219 mm in response to an ILI tool run in spring 2022. The details of which are listed in table below:

| Instance # (in ITS, over the past 5 years) | Pipeline Name | ILI Tool Type | Most Significant Features Identified |
|---|---|---|---|
| **1.** | Fording Lateral 219 mm | Post-construction caliper, following IGU construction activities | • 2 inside-diameter restrictions of greater than 10% inside diameter |

Further, FEI implemented pressure reduction for all integrity digs conducted on its transmission pipelines, including on all ILI-related integrity digs in the ITS in the past five years.

13.5 Please explain why one of the new pressure reducing stations will be permanent (East Kootenay Exchange station) while the other will be temporary (SN-4 Kamloops).

13.5.1. Explain why the East Kootenay Exchange pressure control station is required to be a permanent installation, as opposed to installing a temporary station and relocating it to SN-4 (or vice versa) for the initial EMAT ILI runs

**Response:**

As described in Section 5.4.4 of the Application, FEI is proposing to install pressure regulating stations (PRS) where pressure control capabilities do not currently exist and/or additional capabilities are needed. Pressure control capabilities at these locations are typically needed on a year-round and ongoing basis for the following reasons:

- To provide the maintenance flexibility required to complete an increased number of integrity digs and repairs resulting from ILI runs;
- To allow for implementation of a pressure reduction of up to 20 percent of the Established Operating Pressure (EOP), which could be required following initial or subsequent EMAT ILI runs; and
- To provide the operational flexibility to sustain gas supply to customers.

As discussed in the response to RCIA IR1 13.1, while FEI has an existing control valve at the East Kootenay Exchange (EKE) Control Station, its operation affects pressure simultaneously on the YAH OLI 610 pipeline and the YAH TRA 323 pipeline. As such, FEI requires independent pressure control on the YAH TRA 323 pipeline and has proposed a permanent PRS at EKE.

The PRS at the SN-4 Valve Assembly supports pressure control on the SAV VER 323 pipeline. FEI has existing pressure control capabilities on the SAV VER 323 pipeline that allow for operational and maintenance flexibility. However, due to the existing capacity constraints on the

Savona to Penticton 323 mainline,[9] FEI cannot implement a pressure reduction on this mainline using these existing control points. As such, FEI must use the operational strategy outlined in the response to BCUC IR1 1.2.1 to implement and manage a potential pressure reduction following the baseline EMAT ILI run on the SAV VER 323 planned for 2026.

The SN-4 Valve Assembly corresponds to the terminus of the 64 km segment of the SAV VER 323 pipeline requiring prioritized repairs. FEI plans to operate the repaired segment of pipeline west of the SN-4 Valve Assembly without a pressure reduction while maintaining a pressure reduction on the unrepaired pipeline east of the valve assembly. The PRS is only required for the planned response in 2026 and 2027, after which, the pressure in the entire mainline is to be restored and the PRS will no longer be required. As such, FEI has proposed the PRS at the SN-4 Valve Assembly as temporary.

FEI assumes that the OCU Project, or an equivalent capacity improvement, will be installed and in-service by the next EMAT inspection of the Savona to Penticton 323 mainline. Therefore, in the future, FEI would be able to use existing pressure control points on the SAV VER 323 to implement a pressure reduction. FEI will assess its capacity management strategy for the Savona to Penticton 323 mainline in advance of subsequent EMAT ILI inspections.

For the reasons discussed above, FEI requires a permanent PRS installation and did not consider using a temporary station at the East Kootenay Exchange Control Station.

13.5.2 Explain whether the temporary pressure reducing station to be installed at SN-4 was previously used and is being re-located as part of the ITS TIMC project, or whether it is a new station that is planned to be used elsewhere.

**Response:**

Yes, the temporary PRS to reduce pressure at SN-4 Valve Assembly was previously used and is being re-located as part of the ITS TIMC Project. FEI determined that this approach would result in approximately $340 thousand in cost savings when compared to constructing a new PRS.

FEI evaluated three different PRS alternatives for SN-4: (1) constructing a new PRS that is similar to Cary Rd PRS; (2) re-locating Bypass Station 12 which FEI previously used at Cape Horn Station for the CTS TIMC Project; and (3) re-locating Bypass Station 7 which FEI previously used at Coquitlam Gate Station for the Lower Mainland Intermediate Pressure System Upgrade

[9] The Savona to Penticton 323 mainline is comprised of the SAV VER 323 and VER PEN 323 transmission pipelines.

(LMIPSU) project. FEI determined that constructing a new PRS or re-locating Bypass Station 7 were the only feasible alternatives.

FEI ultimately selected the Bypass Station 7 alternative as it was the most cost-effective feasible alternative. Please refer to Section 2.0 of Appendix G-4 to the Application for the design conditions for the proposed PRS at SN-4 and Section 3.2 of Appendix G-4 to the Application for the required modifications to Bypass Station 7.

13.6 Explain why FEI expects or considers it probable for the EMAT ILI to identify so many features requiring remediation that it could not complete repairs prior to the winter peak season.

**Response:**

FEI has stated on page 95 of the Application that it "will not know how many features will be found on any of the 8 ITS pipelines until after each of their respective baseline EMAT ILI runs and resulting data analysis is complete." Further, as discussed in the response to BCOAPO IR1 1.3, 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. Section E.7.3 of Dynamic Risk's Independent Review of the CTS TIMC Project, included as Appendix O-1 to the Application, also confirms that "large variability can be found in the number of anomalies reported by EMAT survey."

It is possible that the number of features identified by the EMAT ILI on the lengthy ITS pipelines could exceed FEI's ability to complete the necessary integrity digs and repairs prior to winter, when access to the pipeline becomes limited due to snow and inclement weather. As such, FEI must be ready for this scenario and have pressure regulating capabilities to safeguard the system through pressure reduction or other mitigating measures in place in the event it is needed.

13.7 Approximately how many anomalies could FEI excavate and remediate prior to the date when there is a need to return the ITS to full pressure, assuming the ILI is completed and the vendor report is received in the spring or early summer?

**Response:**

Historically, FEI has performed approximately 100 digs on the ITS in a single year, noting that EMAT ILI driven digs will be incremental to integrity digs required as part of FEI's existing integrity management activities.

FEI has not yet completed its detailed resource planning and may increase its resources and/or use contracted resources to support the addition of EMAT to its existing ILI program and meet the required timelines. As such, FEI is unable to quantify at this time the future number of digs it could perform including those from EMAT and current ILI activities.

As noted in the response to BCUC IR1 4.2, FEI has scheduled two years between each of the baseline EMAT ILI runs on the ITS mainlines. This two-year window is to allow FEI the time to excavate, inspect and if necessary, remediate, those indications provided in the vendor ILI report and to maintain a pressure reduction on the mainline without capacity impacts, if required.

In its response to RCIA IR1 12.6 in the CTS TIMC CPCN proceeding, FEI stated: "FEI did consider relocating the PRS used in the pilot program at Cape Horn Valve Station to another station, but it was determined to be not feasible. FEI evaluated the use of the Cape Horn Valve Station PRS at Coquitlam Gate Station and Noons Creek Valve Station for the CTS TIMC Project requirements and determined that the PRS was too small and too large for these locations, respectively."

13.8 Now that the pilot EMAT ILI has been completed and a pressure reduction was not required, please explain whether FEI considered relocating the pressure control station from the Cape Horn station used in pilot program to the ITS at one of the two locations proposed for a pressure control station for the EMAT ILI. If not, why not?

13.8.1 Explain whether relocating the new Cape Horn pressure control station could result in cost savings for the ITS TIMC project by avoiding the cost of new facilities at one of the two proposed new installations.

13.8.2 Estimate the cost savings that could be achieved by relocating the new Cape Horn pressure control station used for the pilot to avoid the cost of another of the proposed new pressure control stations.

**Response:**

Yes, FEI considered relocating the pressure control station (PRS) from Cape Horn Station to either the SN-4 Valve Assembly or the East Kootenay Exchange Station. However, in both cases, the PRS is significantly oversized for the ITS TIMC capacity requirements and therefore this approach is not feasible. As such, FEI did not complete a cost estimate to install the Cape Horn station for the ITS TIMC Project.

**14.0 Reference Exhibit B-1 p.96**

**Modifications to Control and Safety Systems**

At page 96 of the Application, FEI states: "FEI will be required to modify control and safety systems at five existing facilities in order to prevent unintended overpressure situations prior to a pressure reduction. These modifications include the installation of pressure safety valves pre-set and tested to the new reduced operating pressure, replacement of pressure switches that will function at the new pressure ranges and modifications to existing control systems. Additional valves and instrumentation may be required to manage the operational impacts as a result of the pressure reduction activation."

14.1 Please confirm whether the new pressure safety valves, pressure transmitters, and control system modifications are only required in order to reduce the pipeline pressure, which in turn is only required if the EMAT ILI identifies severe crack indications.

**Response:**

Confirmed, the new pressure safety valves, pressure transmitters, and control system modifications are only required to reduce the pipeline pressure. FEI has identified that pressure reduction capability should be established in the event that EMAT ILI identifies severe crack indications; however, a future pressure reduction could be driven by any significant integrity driver (e.g., failure) over the lifecycle of these ITS pipelines.

14.2 Explain why the existing pressure safety valves must be replaced, and what the implications are if instead the existing valves continue to be used following the pressure reduction.

**Response:**

Pressure safety valves are sized for specific operating conditions, and therefore, must be replaced when a pressure reduction is activated due to severe crack indications discovered following an EMAT ILI run in order to protect the ITS from overpressure situations during compressor operations. FEI would schedule the replacement of the existing pressure safety valves to allow for uninterrupted transition in compressor station operation.

If FEI did not plan for the replacement of these pressure safety valves concurrent with a pressure reduction, the compressor stations would not be able to provide sufficient overpressure protection for the new operating conditions, resulting in the compressor station being taken offline and further limiting capacity to the ITS.

14.3 Explain whether control system modifications, such as automatic shutdowns due to high- pressure situations, would be sufficient to enable safe operation following a pressure reduction.

**Response:**

No, modifications to the control system alone would not meet CSA Z662 requirements for safe operation of pressure control and overpressure protection systems. Clause 4.18.1.2 of CSA Z662:19 Oil and Gas Pipeline Systems requires independent pressure control and overpressure protection systems so that a failure in either system cannot cause the other system to become inoperative.

Therefore, if a pressure reduction is required due to severe crack indications discovered following an EMAT ILI run, pressure control at the new operating pressures will be accomplished with the support of the new pressure switches (installed to function at the new pressure ranges), in conjunction with the overpressure protection provided by new pressure safety valves.

14.4 Please confirm whether the new pressure safety valves, pressure switches, and control system modifications will be completed prior to the EMAT ILI runs. If confirmed, explain how the new pressure safety valves will be incorporated into the stations, since prior to initiating a pressure reduction FEI will need the output from the station to be at the prevailing pressures which in turn require the existing pressure safety valves. Will the new pressure safety valves will be installed in a parallel path?

**Response:**

Not confirmed. Installation of the new pressure safety valves and pressure switches and modifications to the control systems will be completed after an EMAT ILI run identifies severe crack indications requiring sustained pressure reduction. However, the new pressure safety valves will need to be procured ahead of time so that they can be installed concurrently with the planned pressure reduction, thus avoiding a significant delay to the mitigation strategy.

14.5 Explain whether FEI would be able to defer installation of the pressure safety valves and pressure switches and modification of the control systems until after receipt of the EMAT ILI results, since these modifications are only needed if FEI is required to reduce the operating pressure of the pipeline.

**Response:**

Please refer to the response to RCIA IR1 14.4.

14.6 Confirm whether the “additional valves and instrumentation” that may be required are included in the proposed cost of the ITS TIMC project. If not confirmed, please identify the potential additional costs.

**Response:**

Confirmed. FEI included the additional valves and instrumentation that may be required to manage the operational impacts as a result of the pressure reduction in the total Project cost estimate. Please refer to the response to RCIA IR1 16.4 for the cost, including AFUDC, for each of the five modifications to the compressor stations.

## C. Project Cost Estimate and Schedule

### 15.0 Reference Exhibit B-1 pp. 37, 98, 99 Table 5-1 Project Schedule

At page 99 of the Application FEI provides "Table 5-1: Project Schedule":

| Activity | Date |
|---|---|
| **CPCN Preparation** | Sep 2021 to Aug 2022 |
| **CPCN Filing** | Sep 2022 |
| **CPCN Approval** | Q3 2023 |
| **Contractor Selection and Award** | |
| Engineering Services Contractor Selection and Contractor Negotiation | Sep 2023 to Nov 2023 |
| Construction Contractor Selection and Contract Negotiation | Jul 2024 to Jan 2025 |
| **Permitting for ITS TIMC** | |
| Municipal and Community Consultation | Aug 2022 to May 2025 |
| Indigenous Communities Consultation | Aug 2022 to Apr 2025 |
| Landowner Consultation & Communication | Mar 2023 to Feb 2024 |
| Federal Permits (Department of Fisheries and Oceans) | May to Dec 2024 (Phase 1)<br>Mar to Sep 2025 (Phase 2) |
| OGC Permits | Oct 2023 to Feb 2024 (Early Works)<br>Feb 2024 to Mar 2025 (Phase 1)<br>Mar 2025 to Mar 2026 (Phase 2) |
| ALC Permits | Feb 2024 to Mar 2025 (Phase 1)<br>Mar 2025 to Mar 2026 (Phase 2) |
| MFLNRORD Permits | Sep 2023 to Feb 2025 (Phase 1)<br>Sep 2024 to Jan 2026(Phase 2) |
| Ministry of Transportation and Infrastructure Permits | Mar 2024 to Aug 2025 |
| Municipal and Regional District Permits | Aug 2024 to Jan 2025 (Phase 1)<br>Jun 2025 to Oct 2025 (Phase 2) |
| Utility Permits & Approvals | Aug 2024 to Jan 2025 (Phase 1)<br>Jun 2025 to Feb 2026 (Phase 2) |
| Environmental and Archaeological Permits | Nov 2023 to Apr 2025 (Phase 1)<br>Feb 2025 to Apr 2026 (Phase 2) |
| **Activity** | **Date** |
| **ITS TIMC CONSTRUCTION** | |
| Engineering Detailed Design | Nov 2023 to Aug 2024 (Phase 1)<br>Sep 2024 to Apr 2025 (Phase 2) |
| Procurement and Manufacturing | |
| Long Lead Items | Apr 2024 (both Phases) |
| Facilities, Electrical, and Instrumentation | Jan 2025 (Phase 1)<br>Aug 2025 (Phase 2) |
| Fabrication | Mar 2025 to Apr 2025 (Phase 1)<br>Mar 2026 to Apr 2026 (Phase 2) |
| Mobilization to Site | April 2025 (Phase 1)<br>April 2026 (Phase 2) |
| Site Installation | |
| Construction | Apr 2025 to Sep 2025 (Phase 1)<br>Apr 2026 to Sep 2026 (Phase 2) |
| Restoration and Demobilization | Sep 2025 (Phase 1)<br>Sep 2026 (Phase 2) |
| Project Close Out | Sept 2026 to Mar 2027 |

On page 98 of the Application, FEI states: "The Project execution will be subdivided into two phases, completing activities as follows:

- Phase 1 will consist of activities on the SAV VER 323 and VER PEN 323 pipeline systems, including pipeline alteration Event 1, as well as facility alterations at Savona Compressor Station, SN-3, SN-4, SN6-1, Salmon Arm Tap, SN-7, and Penticton Gate Station.
- Phase 2 will consist of pipeline alteration Events 29 and 31, as well as facility alterations at Kingsvale Control Station, Princeton Crossover Control Station, Oliver Y Control Station, SN- 15, SN-17 and East Kootenay Exchange."

On page 37 of the Application, FEI provides Table 3-3 which shows the coating types for each ITS pipeline.

15.1 Provide the approximate schedule for EMAT ILI tool runs following completion of the construction works.

**Response:**

Please refer to the response to BCUC IR1 4.2.

15.2 Provide the anticipated re-inspection period for subsequent EMAT ILI runs.

**Response:**

Please refer to the response to BCOAPO IR1 1.1.

15.3 Considering the pipelines from Kingsvale to Oliver and from Yahk to Trail are coated with extruded polyethylene as opposed to asphalt, explain why these pipelines are prioritized lower and will be modified in Phase 2, compared to the asphalt-coated pipelines which will be modified in Phase 1.

**Response:**

Please refer to the response to BCUC IR1 4.2. The run schedule was developed based on the relative risk of cracking (i.e., segments with the highest estimated cracking safety risk have been scheduled for EMAT ILI runs first). As such, pipeline and facility alterations to support EMAT ILI on the asphalt-coated SAV VER 323 and VER PEN 323 pipelines will be completed first in Phase 1, followed by pipeline and facility alterations on the remainder of pipelines in Phase 2.

As described in Section 3.0 of the baseline system-level QRA, filed as Confidential Appendix B-2 to the Application, threat rankings represent a summarized view of the risk calculations for 23 different threats. There are numerous factors in each of these calculations contributing to differences in the risk estimates on a threat-by-threat basis between specific pipelines and between the various transmission systems (i.e., the CTS, ITS and VITS). This includes, but is not limited to, coating.

The primary reasons for the extruded polyethylene pipelines being ranked with a lower relative risk of cracking than asphalt pipelines are:

- Cracking is a time-dependent threat, and FEI's asphalt coated pipelines tend to have a longer in-service history than extruded polyethylene pipelines; and
- Pipelines with extruded polyethylene coating are estimated in the JANA risk model to have a lower relative potential for SCC than asphalt coated lines.

**16.0 Reference Exhibit B-1 pp.91, 95-97, 110 Tables 5-4, 5-5 (p.97), 5-5 (p.110) Costs of Project Elements**

At page 91 of the Application, FE provides Table 5-4, in which it identifies the heavy wall modifications.

At page 95 of the Application FEI identifies the four flow control stations. At page 96 of the Application FEI identifies the two pressure reducing stations.

At page 97 of the Application FEI provides Table 5-5, in which it identifies the modifications to the compressor stations.

At page 110 of the Application FEI provides Table 5-5, in which it provides the total project costs.

**"Table 5-5 (p.110) Project Capital Budget"**

| Line | Item | Amount ($millions) |
|---|---|---|
| 1 | Construction Cost Estimate (Contractor + FEI) | $50.231 |
| 2 | Owners Costs (FEI) | $8.133 |
| **3** | **Subtotal Construction Base Cost Estimate ($2022-Q2)** | **$58.364** |
| 4 | CPCN Application Costs | $0.400 |
| 5 | Pre-Construction Development Costs | $3.665 |
| 6 | Contingency | $5.900 |
| **7** | **Subtotal Project Cost Estimate ($2021-Q4)** | **$68.328** |
| 8 | Cost Escalation Estimate | $7.630 |
| 9 | Management Reserve | $5.000 |
| 10 | **Sub-Total Project Cost Estimate (As-Spent)** | **$80.958** |
| 11 | AFUDC | $4.513 |
| 12 | Income Tax Recovery[84] | $(0.883) |
| **13** | **Total Project Cost Estimate (As-Spent)** | **$84.588** |

16.1 Provide the cost including AFUDC of each of the three heavy wall segment replacements.

16.2 Provide the cost including AFUDC of each of the two new pressure reducing stations.

16.3 Provide the cost including AFUDC of each of the four new flow control stations.

16.4 Provide the cost including AFUDC of each of the five modifications to the compressor stations (pressure safety valves, pressure transmitters, and control system modifications).

**Response:**

Please refer to Table 1 for the capital costs of the three heavy wall segment replacements, Table 2 for the capital costs of the two new pressure reducing stations, Table 3 for the capital costs of the four flow control stations, and Table 4 for the capital costs of the five modifications to the compressor stations. FEI notes the costs shown in the tables below are in as-spent dollars and include the associated contingency, escalation, and AFUDC.

**Table 1: Capital Cost (as-spent $) for the Three Heavy Wall Segment Replacements ($000s)**

| Line | Particular | As-Spent$ | AFUDC | Total |
|---|---|---|---|---|
| 1 | **Heavy wall pipe segments** | | | |
| 2 | Cherry Creek (Event 1) | 2,945 | 110 | 3,055 |
| 3 | KIN PRI 323 kP 39.4 (Event 29) | 2,306 | 86 | 2,393 |
| 4 | KIN PRI 323 kP 47.7 (Event 31) | 1,714 | 64 | 1,778 |
| 5 | **Total** | **6,965** | **261** | **7,226** |

**Table 2: Capital Cost (as-spent $) for the Two New Pressure Reducing Stations ($000s)**

| Line | Particular | As-Spent$ | AFUDC | Total |
|---|---|---|---|---|
| 1 | **Pressure Reducing Stations** | | | |
| 2 | SN-4 Valve Assembly | 3,755 | 162 | 3,917 |
| 3 | East Kootenay Exchange Station | 3,782 | 164 | 3,945 |
| 4 | **Total** | **7,536** | **326** | **7,862** |

**Table 3: Capital Cost (as-spent $) for the Four New Flow Control Stations ($000s)**

| Line | Particular | As-Spent$ | AFUDC | Total |
|---|---|---|---|---|
| 1 | **Flow Control Stations** | | | |
| 2 | SN-7 | 953 | 41 | 995 |
| 3 | Penticton Gate Station | 780 | 34 | 813 |
| 4 | Princeton Crossover Control Station | 906 | 39 | 946 |
| 5 | SN-15 | 723 | 31 | 754 |
| 6 | **Total** | **1,733** | **75** | **1,808** |

**Table 4: Capital Cost (as-spent $) for the Five Modifications to Compressor Stations ($000s)**

| Line | Particular | As-Spent$ | AFUDC | Total |
|---|---|---|---|---|
| 1 | **Compressor Stations modifications** | | | |
| 2 | Armstrong | 102 | 4 | 107 |
| 3 | Hedley | 95 | 4 | 99 |
| 4 | Kingsvale | 126 | 5 | 131 |
| 5 | Kitchener A | 135 | 6 | 140 |
| 6 | Warfield | 182 | 8 | 190 |
| 7 | **Total** | **640** | **27** | **667** |

FEI notes that the scope of work in its entirety, including the heavy wall segment replacement, new pressure regulating stations, new flow control stations, and the modifications to the compressor stations, as defined for the ITS TIMC Project, are required to ensure FEI can prudently manage the significant safety risk to the public and reliability risk to customers posed by cracking threats. The work required for the ITS TIMC Project is similar to the work described for the approved CTS TIMC Project. Specifically, in the CTS TIMC Project CPCN Decision and Order C-3-22 (page 30 of the Decision), the BCUC stated:

> While we share RCIA's concern about the large amount of capital costs associated with the size and various components of this Project ($137.8 million), we are not persuaded that RCIA's recommendation for FEI to forego specific elements of the Project (<u>i.e., the removal of heavy wall segments of the pipelines, installation of pressure reducing facilities at four stations, and installation of flow control capabilities</u>) is reasonable, notwithstanding that this would reduce total Project costs approximately by half, down to $60.8 million. While costs are a valid consideration in the determination of project scope of any capital project, they must be weighed against the risk, which the Project seeks to mitigate, namely, pipeline rupture due to undetected transmission pipeline cracking. [Emphasis Added]

16.5 Provide the expected costs, or estimate the range of costs, to conduct each EMAT ILI for each ITS pipeline.

**<u>Response:</u>**

Please refer to the response to BCUC IR1 13.2.

**17.0 Reference Exhibit B-1 p.151**

**FEI's Decarbonization Goals and Hydrogen Blending**

On page 151 of its Application, FEI states: "The information gathered through EMAT ILI runs will factor into FEI's analysis regarding the concentration of hydrogen each pipeline can safely accommodate in the future. In turn, this will allow FEI to determine a safe and cost-effective plan for transitioning to increased hydrogen distribution, further enabling FEI to meet its Clean Growth Pathway."

17.1 Please explain how the information that FEI expects to gather from the EMAT ILI runs that will inform the concentration of hydrogen that may be blended.

**Response:**

As discussed in the response to CTS TIMC BCUC IR1 1.1, FEI will undertake an Engineering Critical Assessment (ECA) of each pipeline segment to determine the fitness of each pipeline asset for hydrogen service. This analysis will include metallurgical considerations and examine the compatibility of the pipeline materials with hydrogen to define the safe hydrogen concentration limit of each of these assets.

A primary concern for assessing compatibility of a given steel with hydrogen is its susceptibility of hydrogen degradation. In particular, hydrogen can affect steel mechanical properties when atomic hydrogen is able to diffuse into the steel. While molecular hydrogen is not small enough to enter the steel, gaseous hydrogen molecules can, under certain conditions, dissociate at the steel surface into hydrogen atoms which are small enough to enter and diffuse through the steel. This could result in reduced fracture toughness, decreased ductility and increased fatigue crack growth rate. Therefore, material compatibility and pipeline integrity are dominant considerations in assessing the concentration of hydrogen that could be blended into the system.

Where data about a pipeline is unknown, EMAT ILI data will improve FEI's ability to characterize pipe segments in addition to material testing and review of pipeline records. Ultimately, EMAT ILI data will play an important role in informing the ECA, thus enabling FEI to better understand the effects of hydrogen concentrations on the material compatibility and integrity of its pipeline assets and informing its decisions on what concentration to introduce into its system.

# Attachment 2.1

**Savona – Vernon 12”**

Date of the most recent MFL-C ILI: 2020-05-22

Summary of ILI Findings:

In total, 1,790 metal loss indications anomalies along the pipe body, and 85 metal loss anomalies in the long seam area reported in this line. There are 10 anomalies and 3 clusters with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 85% at ROSEN log. distance 139,295.754 m with comment ‘under Clock Spring’ .

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for clusters, 7 clusters and 3 anomalies have been reported where $RPR_{Eff.Area}$ is less than or equal 1.0. The most severe anomaly is an external metal loss corrosion cluster on the pipe body with a calculated depth of 84% at ROSEN log. distance 139,121.053 m with $RPR_{Eff.Area}$ equal to 0.75 and comment ’ under Clock Spring’.

In addition, there are 65 manufacturing anomalies affecting the long seam, 58 manufacturing anomalies identified in this pipeline section.

Over the complete line length, a total of 120 deformation anomalies along the pipe body and 76 deformation anomalies along the seam weld have been identified in this line segment.

Furthermore, there are 2 Seam weld Anomalies ‘B’ and 4 Linear Anomalies ‘B’ which exhibit some linear-like characteristics reported in the line segment.

**Repairs related to SCC or the seam weld:**
As of the end of 2022, no SCC or seam weld defect has been found on this pipeline from the integrity digs driven by the MFL-C inspection.

**Vernon – Penticton 12”**

Date of the most recent MFL-C ILI: 2020-05-28

Summary of ILI Findings:

In total, 977 metal loss indications along the pipe body, and 72 metal loss anomalies in the long seam area reported in this line. There no anomalies with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 53% at ROSEN log. distance 63,847.135 m .

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for one (1) anomaly has been reported where $RPR_{Eff.Area}$ is less than or equal 1.0. The anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 45% at ROSEN log. distance 45,572.870 m. with $RPR_{Eff.Area}$ equal to 0.960.

In addition, there are 59 manufacturing anomalies affecting the long seam, as well as 51 manufacturing anomalies and 1 girth weld anomaly along the pipe body have been identified in this pipeline section.

Over the complete line length, a total of 220 deformation anomalies along the pipe body have been identified in this line segment.

**Repairs related to SCC or the seam weld:**
There was one integrity dig driven by the MFL-C inspection where an ID connected crack like indication overlapped with inclusion in the mid wall near the seam weld was found. The pipe section containing this feature was replaced as a result.

**Grand Forks – Trail 10”**

Date of the most recent MFL-C ILI: 2018-05-16

Summary of ILI Findings:

In total, 22,602 metal loss indications anomalies along the pipe body, and 1,340 metal loss anomalies in the long seam area reported in this line. There are 145 anomalies with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss manufacturing anomaly on the pipe body with a calculated depth of 89% at ROSEN log distance 27,960.397m.

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for clusters, 30 clusters and 7 anomalies have been reported where $RPR_{Eff.Area}$ calculation and and $RPR_{0.85dL}$ (based on Modified B31G (0.85dL) is less than or equal 1.0. The most severe reported anomaly is an external metal loss corrosion cluster with a calculated depth of 74% at ROSEN log distance 43,881.794 m with $RPR_{Eff.Area}$ equal to 0.82 and $RPR_{0.85d}$ equal to 0.74. In Addition, the most severe reported anomaly is an external metal loss corrosion cluster with a calculated depth of 71% at ROSEN log distance 54,672.504 m with $RPR_{Eff.Area}$ equal to 0.91 and $RPR_{0.85d}$ equal to 0.55.

In addition, there are 9 manufacturing anomalies affecting the long seam, 7 manufacturing anomalies identified in this pipeline section.

Over the complete line length, a total of 70 deformation anomalies have been identified along the pipe body and 1 deformation anomaly have been identified along the long seam area.

There are 9 external ‘ANOM-B’ anomalies which shows linear characteristics reported in this line segment. The most severe reported anomaly is an external ‘ANOM-B’ with a depth of 59% at ROSEN log distance of 52,004.83 m. Furthermore, there are 5 external seam weld anomalies ‘B’ (LWFE- B) which shows crack-like characteristic. The most severe reported anomaly is an external ‘LWFE-B’ with a depth of 33% at ROSEN log distance of 35,302.43 m.

**Repairs related to SCC or the seam weld:**

There was one integrity dig driven by the MFL-C inspection where SCC indications were found within a corrosion pitting. There was another integrity dig where selective seam weld corrosion (SSWC) was found. The features were removed by grinding in both instances.

**<u>Oliver Y – Grand Forks 10"</u>**

Date of the most recent MFL-C ILI: 2019-05-30

Summary of ILI Findings:

In total, 12,083 metal loss indications anomalies along the pipe body, and 314 metal loss anomalies in the long seam area reported in this line. There are 54 anomalies with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 75% at ROSEN log. distance 42,230.18 m.

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for clusters, 14 clusters and 3 anomalies have been reported where $RPR_{Eff.Area}$ is less than or equal 1.0. The most severe anomaly is an external metal loss corrosion cluster on the pipe body with a calculated depth of 72% at ROSEN log. distance 76,625.93 m with $RPR_{Eff.Area}$ equal to 0.76.

In addition, there are 82 manufacturing anomalies affecting the long seam, 72 manufacturing anomalies and 19 girth weld anomalies identified in this pipeline section.

Over the complete line length, a total of 175 deformation anomalies along the pipe body and 33 deformation anomalies along the seam weld have been identified in this line segment.

**Repairs related to SCC or the seam weld:**
There have been three integrity digs driven by the MFL-C inspection where SCC colonies were found. The colonies were removed by grinding in all instances.

**<u>Penticton – Oliver Y 10”</u>**

Date of the most recent MFL-C ILI: 2018-08-21

Summary of ILI Findings:

In total, two thousand and three metal loss indications anomalies along the pipe body, and one hundred ninety five (195) metal loss anomalies in the long seam area reported in this line. Three (3) anomalies with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 95% at ROSEN log distance 10,542.427 m.

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for clusters, one (1) metal loss corrosion have been reported where $RPR_{Eff.Area}$ calculation is less than or equal 1.0. Furthermore, there are two (2) metal loss anomalies with $RPR_{0.85dL}$ (based on Modified B31G (0.85dL)) less than or equal to 1.0. The most severe anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 95% at ROSEN log distance 10,542.427 m with $RPR_{Eff.Area}$ equal to 0.50 and $RPR_{0.85d}$ equal to 0.62

In addition, there are thirty (30) manufacturing anomalies affecting the long seam, fourteen(14) manufacturing anomalies identified in this pipeline section.

Over the complete line length, a total of forty seven (47) deformation anomalies have been identified along the pipe body and two (2) deformation anomalies close to the long seam.

There are two (2) external metal loss anomalies and two (2) internal metal loss anomalies ‘B’ (ANOM-B) which show possible linear-like characteristic. Furthermore, there are four (4) external seam weld anomaly ‘B’ (LWFE- B) which show possible crack-like characteristic.

**Repairs related to SCC or the seam weld:**
As of the end of 2022, no SCC or seam weld defect has been found on this pipeline from the integrity digs driven by the MFL-C inspection.

**Trail - Castlegar 8"**

Date of the most recent MFL-C ILI: 2021-04-15

Summary of ILI Findings:

The ILI tool identified a total of 38395 metal loss defects.

The following table breaks down the metal loss defects into depth categories based on the surface of the pipe where they occur. This table includes metal loss, manufacturing related metal loss, seam weld metal loss, girth weld metal loss, narrow axial defects (SWF-A, SWF-B) and narrow circumferential features (NCF-A, NCF-B). The table includes both the clustered metal loss and the individual metal loss within clusters.

| Anomaly | Anomaly Classification | Internal | External | Totals |
|---|---|---|---|---|
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 6 | 6 |
| | 60-69% | 0 | 50 | 50 |
| | 50-59% | 0 | 78 | 78 |
| | 40-49% | 1 | 169 | 170 |
| | 30-39% | 1 | 521 | 522 |
| | 20-29% | 3 | 2935 | 2938 |
| | 10-19% | 110 | 34521 | 34631 |
| | Totals | 115 | 38280 | 38395 |

**Repairs related to SCC or the seam weld:**
There was one integrity dig driven by the MFL-C inspection where colonies of circumferentially oriented SCC were found on the pipe body. The pipe segment containing the features was replaced as a result.

**Kingsvale - Princeton 12”**

Date of the most recent MFL-C ILI: 2017-09-29

Summary of ILI Findings:

In total, five hundred and twenty-nine (529) metal loss indications anomalies along the pipe body, and sixty-five (65) metal loss anomalies in the long seam area reported in this line. The results of the inspection activities indicate that this line segment is affected primarily by external metal loss corrosion anomalies. One anomaly with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion calculated wall loss of 68% at ROSEN log distance 55,147.299 m.

In total, five (5) anomalies with an RPR Effective area less than or equal to 1.0 have been reported. The most severe anomaly based on RPR Effective area is an external metal loss corrosion cluster with a depth of 44%,and RPR Effective area of 0.885 located at ROSEN log dist. 56,287.297 m. In total, seven (7) anomalies with an RPR 0.85 dL less than or equal to 1.0 have been reported. The most severe is an external metal loss corrosion cluster that has an RPR 0.85 dL of 0.788 located at ROSEN log dist. 56,287.297 m.

There is one (1) external metal loss corrosion anomaly with linear characteristics reported with comment “possible linear anomaly” with a depth of 11% at ROSEN log distance of 35,840.170 m. Furthermore, There are two (2) external seam weld anomalies ‘A’ (LWFE- A) which show crack-like characteristics.

In addition, there are four (4) manufacturing anomalies affecting the pipe body. Over the complete line length, a total of ninety nine (99) deformation anomalies have been identified along the pipe body and eight (8) deformation anomalies affecting the long seam.

**Repairs related to SCC or the seam weld:**

As of the end of 2022, no SCC or seam weld defect has been found on this pipeline from the integrity digs driven by the MFL-C inspection.

**Princeton - Oliver 12”**

Date of the most recent MFL-C ILI: 2017-09-27

Summary of ILI Findings:

In total, five hundred and sixty (560) metal loss indications anomalies along the pipe body, and ninety one (91) metal loss anomalies in the long seam area reported in this line. One anomaly with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 63% at ROSEN log distance 65,293.339 m.

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for clusters, one (1) metal loss corrosion have been reported where $RPR_{Eff.Area}$ calculation is less than or equal 1.0 and $RPR_{0.85dL}$ (based on Modified B31G (0.85dL)) less than or equal to 1.0. This anomaly is an external metal loss corrosion on the pipe body with a calculated depth of 63% at ROSEN log distance 65,293.339 m with $RPR_{Eff.Area}$ equal to 0.97 and $RPR_{0.85d}$ equal to 0.93.

In addition, there are seventeen (17) manufacturing anomalies affecting the long seam, twenty seven (27) manufacturing anomalies identified in this pipeline section.

Over the complete line length, a total of one hundred thirty nine (139) deformation anomalies have been identified along the pipe body and nine (9) deformation anomalies affecting the long seam.

There are two (2) anomalies with linear characteristics reported with comment “possible linear anomaly”, one with a depth of 63% at ROSEN log distance of 65,293.339 m and other with a depth of 33% at ROSEN log distance of 27,633.737 m. Furthermore, there is one (1) external seam weld anomaly ‘A’ (LWFE- A) which shows crack-like characteristic.

**Repairs related to SCC or the seam weld:**

There was one integrity dig driven by the MFL-C inspection where a crack-like indication was found within a metal loss feature close to the seam weld. A pressure containment sleeve was applied as a permanent repair.

**Yahk – Trail (ELK) 12"**

Date of the most recent MFL-C ILI: 2020-05-08

Summary of ILI Findings:

In total, 252 metal loss indications along the pipe body, and five (5) metal loss anomalies in the long seam area reported in this line. No anomalies with a calculated wall loss of 60% or greater have been reported. The deepest reported metal loss anomaly is an external metal loss corrosion anomaly on the pipe body with a calculated depth of 57% at ROSEN log. distance 82,642.536 m .

After applying the corrosion assessment criteria Rstreng (Effective Area) RPR (based on 100% SMYS) method and 6t x 6t interaction method for clusters, three (3) anomalies have been reported where $RPR_{Eff.Area}$ is less than or equal 1.0. The most severe anomaly is an external metal loss corrosion cluster on the pipe body with a calculated depth of 53% at ROSEN log. distance 152,260.946 m with $RPR_{Eff.Area}$ equal to 0.844.

In addition, there are 14 manufacturing anomalies affecting the long seam, and 48 manufacturing anomalies along the pipe body identified in this pipeline section.

Over the complete line length, a total of 215 deformation anomalies along the pipe body have been identified in this line segment, the six (6) of which have a comment "possible dent with meta loss".

**Repairs related to SCC or the seam weld:**
As of the end of 2022, no SCC or seam weld defect has been found on this pipeline from the integrity digs driven by the MFL-C inspection.

**<u>Mackenzie Lateral 6”</u>**

Date of the most recent MFL-C ILI: 2022-10-26

Summary of ILI Findings:

The ILI tool identified a total of 1401 metal loss defects.

The following table breaks down the metal loss defects into depth categories based on the surface of the pipe where they occur. This table includes metal loss, manufacturing related metal loss, seam weld metal loss, girth weld metal loss, and narrow axial defects (SWF-A, SWF-B). The table includes both the clustered metal loss and the individual metal loss within clusters.

| Anomaly | Anomaly Classification | Internal | External | Totals |
|---|---|---|---|---|
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 0 | 0 |
| | 60-69% | 0 | 0 | 0 |
| | 50-59% | 0 | 0 | 0 |
| | 40-49% | 0 | 3 | 3 |
| | 30-39% | 7 | 8 | 15 |
| | 20-29% | 12 | 101 | 113 |
| | 10-19% | 58 | 1212 | 1270 |
| | Totals | 77 | 1324 | 1401 |

**Repairs related to SCC or the seam weld:**
As of the end of 2022, no integrity digs have been performed on this pipeline based on results from the MFL-C inspection.

**Mackenzie Loop 6"**

Date of the most recent MFL-C ILI: 2022-10-28

Summary of ILI Findings:

The ILI tool identified a total of 343 metal loss defects.

The following table breaks down the metal loss defects into depth categories based on the surface of the pipe where they occur. This table includes metal loss, manufacturing related metal loss, seam weld metal loss, girth weld metal loss, and narrow axial defects (SWF-A, SWF-B, NCF-A, NCF-B). The table includes both the clustered metal loss and the individual metal loss within clusters.

| Anomaly | Anomaly Classification | Internal | External | Totals |
|---|---|---|---|---|
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 0 | 0 |
| | 60-69% | 0 | 0 | 0 |
| | 50-59% | 0 | 0 | 0 |
| | 40-49% | 1 | 0 | 1 |
| | 30-39% | 1 | 1 | 2 |
| | 20-29% | 8 | 1 | 9 |
| | 10-19% | 225 | 106 | 331 |
| | Totals | 235 | 108 | 343 |

**Repairs related to SCC or the seam weld:**
As of the end of 2022, no integrity digs have been performed on this pipeline based on results from the MFL-C inspection.

**Mackenzie Loop 8"**

Date of the most recent MFL-C ILI: 2022-10-28

Summary of ILI Findings:

The ILI tool identified a total of 52 metal loss defects.

The following table breaks down the metal loss defects into depth categories based on the surface of the pipe where they occur. This table includes metal loss, manufacturing related metal loss, seam weld metal loss, girth weld metal loss, and narrow axial defects (SWF-A, SWF-B, NCF-A, NCF-B). The table includes both the clustered metal loss and the individual metal loss within clusters.

| Anomaly | Anomaly Classification | Internal | External | Totals |
|---|---|---|---|---|
| Metal Loss | ≥80% | 0 | 0 | 0 |
| | 70-79% | 0 | 0 | 0 |
| | 60-69% | 0 | 0 | 0 |
| | 50-59% | 0 | 0 | 0 |
| | 40-49% | 0 | 0 | 0 |
| | 30-39% | 0 | 0 | 0 |
| | 20-29% | 1 | 0 | 1 |
| | 10-19% | 15 | 36 | 51 |
| | Totals | 16 | 36 | 52 |

**Repairs related to SCC or the seam weld:**
As of the end of 2022, no integrity digs have been performed on this pipeline based on results from the MFL-C inspection.

**<u>Cranbrook Loop 8”</u>**

Date of the most recent MFL-C ILI: 2022-06-20

Summary of ILI Findings:

In total, 448 deformation anomalies to report throughout the entire pipeline:

- There are 423 dents, the deepest of which has a reported dent depth of 7.3% and having a comment “associated with 6.7% ovality” located at ROSEN log distance 15,016.56 m.
- There are 24 wrinkles the most severe of which has a wrinkle height of 1.6% with a comment “on bend” located at ROSEN log distance 16,959.89 m.
- There is one (1) bulge with a reported depth of 1.9% located at ROSEN log distance 16,631.041 m.

In total, 276 metal loss indications along the pipe body, and 55 metal loss anomalies in the long seam area have been reported over the total pipeline length. The results of the inspection activities indicate that this line segment is mainly affected by external metal loss corrosion. No anomalies with a calculated wall loss of 80% or greater have been reported. The deepest reported metal loss anomaly is an external corrosion anomaly with a depth of 58% at ROSEN log distance 17,342.323 m.

After applying the corrosion assessment criteria based on RSTRENG0.85dL method and 3t x 3t interaction method for clusters, no anomalies with an RPR0.85dL less than or equal to 1.0 have been reported. The most severe feature based on RPR0.85dL is an internal metal loss manufacturing anomaly with an RPR0.85dL value of 1.039, and a reported depth of 41% located at ROSEN log distance 9,904.334 m.

In addition, there are 14 manufacturing anomalies on the pipe body and 20 manufacturing anomalies affecting the long seam identified in this pipeline section. There are 3 girth weld anomalies throughout the pipeline length.

**Repairs related to SCC or the seam weld:**

As of the end of 2022, no integrity digs have been performed on this pipeline based on results from the MFL-C inspection.

# Attachment 13.3

34.2 Please explain the extent to which inclusion of higher risk ITS pipelines would have delayed CPCN development.

**Response:**

If the higher risk ITS pipelines were included in this Application it is likely that submission of the CPCN application would have been delayed by a year or more.

FEI has been developing the ITS TIMC Project in parallel with the CTS TIMC Project to address the risk cracking threats pose to the ITS pipelines. The results of the QRA demonstrated that the CTS pipelines posed the highest overall safety risk at the system level, and based on this risk assessment, FEI has prioritized work on the CTS with this Application. Moreover, due to capacity constraints (as discussed in the response to BCUC IR1 4.3), there are more complexities and challenges associated with implementing EMAT ILI on the ITS pipelines. As including the higher risk ITS pipelines would have delayed the CPCN application by a year or more, limiting the scope of the Application to only the CTS pipelines was appropriate and allows FEI to address the highest safety risk pipelines in a timely manner.

34.3 Please quantify the pressure reduction that may be required after the ITS EMAT ILI runs, detailing any relevant government regulations or technical standards.

**Response:**

Following completion of the ITS TIMC Project, FEI will have the capability to reduce the operating pressure of the ITS pipelines by 20 percent following the initial EMAT ILI runs. This pressure reduction is a reasonable and accepted industry standard practice.

The Canadian Standards Association (CSA) Z662:19 *Oil and Gas Pipeline Systems* standard includes the following requirement for operating pipelines (Clause 10.3.2.2):

> Where an engineering assessment, the company's integrity management program, or observation indicates that portions of the pipeline system are susceptible to failures, the operating company shall either implement measures preventing such failures or operate the system under conditions that are determined by an engineering assessment to be acceptable.

If the crack defects identified by the EMAT tool run could not be addressed in a timely manner, FEI would conduct an engineering assessment in accordance with CSA Z662 and implement measures for preventing failures or operate the system under conditions that are determined by an engineering assessment to be acceptable.

In the case of a 20 percent pressure reduction, the pipeline, operating at its new restricted pressure, would have the same safety factor as a pipeline subject to a hydrostatic pressure test with a test factor of 1.25. This is the minimum safety factor adopted in CSA Z662, when verifying the pressure-containing capacity of a pipeline by hydrostatic testing, and has become the industry standard safety factor for integrity decision-making as illustrated by the examples below. This new operating pressure could be relied upon for a finite period until FEI completes all required defect assessments and repairs.

An example of the adoption of the 20 percent reduction in operating pressure by industry (operators and regulators) is illustrated by the Westcoast Energy Inc. (Enbridge) and the National Energy Board (now known as the Canada Energy Regulator) response to the October 2018 cracking-related failure of a transmission pipeline in the Prince George area.[1] In that instance, Westcoast's two pipelines in the vicinity were operated with a 20 percent reduction until such time as the integrity of the lines could be confirmed.

Other gas transmission pipeline incident reports published on the Transportation Safety Board of Canada's website[2] also support this integrity response, including the TransCanada PipeLines Ltd. (NOVA Gas Transmission Ltd.) failure near Fort McMurray, Alberta[3] (Incident date: 2013-10-17, Report release date: 2015-11-03). The failed pipeline, when it was returned to service approximately one month after the incident, had a restricted operating pressure of 80 percent (7168 kPa) of its pre-failure operating pressure (8960 kPa). Another pipeline operating in the vicinity of the failure site was also temporarily reduced to 80 percent of the discovery pressure as a precaution.

34.4 Please elaborate on what FEI means by "FEI does not face the same challenges with the CTS pipelines…"

**Response:**

The challenges referred to by FEI in the preamble above relate to the capacity constraints that can result if a pipeline is required to operate at a reduced pressure in response to the findings from an EMAT ILI run.

With their current system configurations, the CTS and ITS both face capacity constraints when a pipeline is required to operate at reduced pressures. The CTS does not have sufficient capacity when a pressure reduction is required on any individual CTS pipeline because the inlet to the CTS has only a single pressure control point (the Huntingdon Control Station), which means that the pressure reduction must be applied to the entire CTS (not just the pipeline where an anomaly

[1] https://www.tsb.gc.ca/eng/rapports-reports/pipeline/2018/p18h0088/p18h0088.html.
[2] https://www.tsb.gc.ca/eng/rapports-reports/pipeline/index.html.
[3] https://www.tsb.gc.ca/eng/rapports-reports/pipeline/2013/p13h0107/p13h0107.html.