File 3427016
31 January 2024

REASONS FOR DECISION

Trans Mountain Pipeline ULC
Trans Mountain Expansion Project
Certificate of Public Convenience and Necessity OC-065
Application for Variance and Condition Relief under the Certificate
Mountain 3 Horizontal Directional Drill

Before: K. Penney, Presiding Commissioner; T. Grimoldby, Commissioner; S. Sajnovics, Commissioner

1. DECISION

On 14 December 2023, Trans Mountain Pipeline ULC (**Trans Mountain**) filed an application with the Commission of the Canada Energy Regulator under section 190 of the *Canadian Energy Regulator Act* (**CER Act**). The application seeks to vary Schedule A of Certificate of Public Convenience and Necessity OC-065 (**Certificate**) with respect to the diameter, wall thickness and coating of pipe for the Mountain 3 horizontal directional drill (**HDD**) crossing for the Trans Mountain Expansion Project (**TMEP**), and associated facilities (**December Variance**).

Through the December Variance application, Trans Mountain also applied, pursuant to Condition 1 of the Certificate, for relief from the requirement to adhere to the Quality Management Plan (**QMP**) filed under Condition 9 of the Certificate with respect to the pipe and other related materials to be used for the Mountain 3 HDD crossing, if the Commission determines such materials do not comply with the QMP (C27678).

On 12 January 2024, the Commission approved the December Variance application, and issued the associated Amending Order including conditions. The Commission issued its decision with reasons to follow with a view to providing scheduling and practical certainty to Trans Mountain. Below are the Commission's reasons.

2. BACKGROUND

- On 18 June 2019, the Governor in Council approved the TMEP, subject to 156 conditions. Subsequently, on 21 June 2019, the National Energy Board (**NEB**) issued Certificate OC-065 (C00061).

- On 15 March 2022, the Commission approved Trans Mountain's Mountain 3 crossing route, under Amending Order AO-012-OPL-004-2020 (C18157).

- On 31 October 2023, Trans Mountain filed an application, pursuant to subsection 69(1) of the CER Act, requesting a variance to Schedule A Certificate OC-065 with respect to the diameter, wall thickness and coating of pipe in an approximately 2,300 metre segment in the Black Pines to Burnaby Tank Terminal segment of the TMEP, from approximately kilometre post (**KP**) 1064.4 to KP 1066.7 (**October Variance**).

…/2

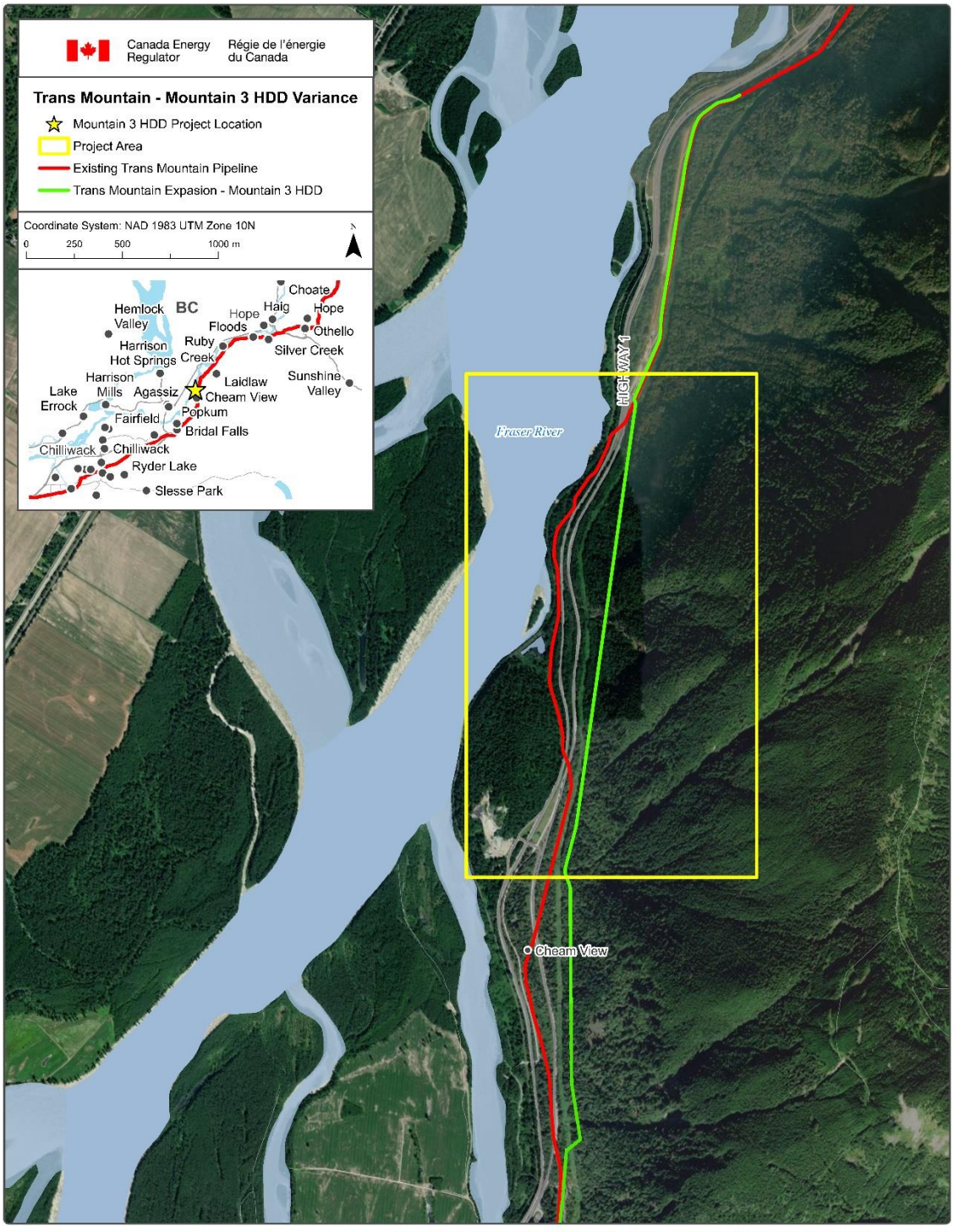
- On 5 December 2023, the Commission denied the October Variance application (C27543).

- On 20 December 2023, the Commission issued its Reasons for Decision for the October Variance application (C27768).

- Trans Mountain filed its December Variance application on 14 December 2023.

Figure 1 provides a map of the Mountain 3 HDD crossing located in the Fraser Valley between Hope and Chilliwack, British Columbia.

Figure 1 – Mountain 3 HDD December Variance location



3. APPLICATION OVERVIEW

Trans Mountain submitted that during construction of the Mountain 3 HDD crossing, it has encountered several complex challenges, including hard rock conditions (which have caused premature tooling wear) and the presence of multiple fractured areas within the bedrock (which have allowed high rates of water ingress). These features have already caused

complications for the HDD and Trans Mountain expects these complications to get materially worse if it continues with the 48-inch ream pass that is required to install NPS 36 pipe.

Trans Mountain further submitted that if it proceeds with its current plan to install NPS 36 pipe, there is a significant risk that the borehole will become compromised, or the HDD will fail altogether. If the HDD fails and Trans Mountain is required to implement an alternative installation plan, its TMEP schedule will likely be delayed by approximately two years, and Trans Mountain will suffer billions of dollars in losses.

Trans Mountain requested to modify its current HDD execution plan for the Mountain 3 HDD crossing to avoid what it characterized as catastrophic impacts to the TMEP execution and schedule. The December Variance would permit Trans Mountain to install NPS 30 pipe within the already completed 42-inch ream pass for the Mountain 3 HDD crossing, avoiding the need to continue with the 48-inch ream pass and the associated risks. Trans Mountain stated that the NPS 30 pipe that would be installed has been confirmed to comply with CSA Z662 and TMEP specifications, and Trans Mountain considers it to be safe and fit for purpose (meeting the intention of the QMP). Trans Mountain committed to installing permanent trap facilities on the north and south ends of the Mountain 3 HDD prior to the TMEP in-service date, which it stated would provide the capability to conduct all the inspections required under Condition 143 of the Certificate.

4. APPLICATION PROCESS AND FILINGS

Trans Mountain requested a decision from the Commission by no later than 9 January 2024 to avoid delays to the TMEP and the significant consequences to Trans Mountain and third parties that would result from such delay.

The process involved two rounds of Commission information requests (**IR**) and an oral hearing process to ask questions of Trans Mountain and hear argument on 12 January 2024.

The Commission received letters of support for the December Variance from Canadian Natural Resources Limited, MEG Energy Corp., the Alberta Department of Energy and Minerals, and Cenovus Energy Inc.

On 12 January 2024, the Commission issued its decision to approve the December Variance, subject to four conditions, and with reasons to follow (C28001).

The table below identifies all written and oral submissions received and considered by the Commission in this proceeding:

Date	Participant	Submission(s)	Filing ID
14 December 2023	**Trans Mountain**	Request for Variance application	C27678
22 December 2023	**Canadian Natural Resources Limited**	Letter of support for Mountain 3 HDD Variance application	C27822
22 December 2023	**MEG Energy Corp.**	Letter of support for Mountain 3 HDD Variance application	C27830
24 December 2023	**Tim Takaro**	Notice of motion and concerns over TMEP variance request	C27836

Date	Participant	Submission(s)	Filing ID
2 January 2024	**David Huntley**	Letter of Support for Notice of Motion by Dr. Tim Takaro and Notices of Further Motions	C27869
3 January 2024	**Trans Mountain**	Response to Commission IR No. 1	C27873
3 January 2024	**Alberta Department of Energy and Minerals**	Letter of support for Mountain 3 HDD Variance application	C27881
3 January 2024	**Cenovus Energy Inc.**	Letter of support for Mountain 3 HDD Variance application	C27882
4 January 2024	**Trans Mountain**	Response to Motions from Dr. Tim Takaro and David Huntley	C27888
5 January 2024	**Tim Takaro**	Response to Trans Mountain's comments on Motions	C27910
5 January 2024	**David Huntley**	Response to Trans Mountain's comments on Motions	C27911
11 January 2024	**Trans Mountain**	Response to Commission IR No. 2	C27965
12 January 2024	**Trans Mountain**	• Oral cross-examination • Oral argument	C28000

5. VIEWS OF TRANS MOUNTAIN

5.1. Technical challenges with HDD – water ingress and hard rock

Trans Mountain stated that during construction of the Mountain 3 HDD crossing, it encountered several complex challenges, including hard rock conditions (which have caused premature tooling wear) and the presence of multiple fractured areas within the bedrock (which have allowed high rates of water ingress). These complications are expected to get materially worse if Trans Mountain continues with the 48-inch ream pass that is required to install NPS 36 pipe.

During the geotechnical HDD pilot hole, three fractured zones within the bedrock were noted that produced water inflow into the HDD borehole. The water inflow was variable and measured above 30 cubic metres per hour at its peak. Trans Mountain completed a series of grouting applications to mitigate the inflow to facilitate the HDD installation. At the time the geotechnical HDD pilot hole and grouting program were executed, there was no indication that the rate of inflow on successive reaming passes would not be feasibly mitigated through the initial grouting program. However, Trans Mountain's experience has been that the rate of water ingress has increased with each ream pass indicating that the grouting is becoming less effective.

Trans Mountain indicated that it has not reamed to 48 inches through the water-producing zones and therefore it does not know how continuing with the 48-inch ream pass would impact the grout mitigation that was carried out. Additionally, if the reaming did further reduce the effectiveness of the grouting, then water inflow could increase to 20 cubic metres per hour or higher and dilute the drilling fluid, reducing the effectiveness of the reaming.

Currently, the water ingress has not increased past 20 cubic metres per hour for any of the ream passes up to and including the 48-inch ream.

Trans Mountain stated that a definitive quantitative risk assessment of a successful completion of the 48-inch borehole and subsequent pullback is not possible as there is not sufficient data to calculate the specific risks and likelihood of the rate of water inflow increases associated with further reaming. Trans Mountain has undertaken a qualitative assessment of the various integrity, safety, and technical risks associated with continuing with a 48-inch pass and has concluded that they are significant.

Based on the geotechnical evaluations that were carried out prior to the HDD, including boreholes and the pilot hole, Trans Mountain knew that it was dealing with very hard rock over a long distance, and that there was a potential for water ingress. Trans Mountain did not find anything that wasn't expected, and there were no technical challenges encountered that weren't previously identified in the feasibility study. Trans Mountain did note that, although they did not find anything that wasn't expected, they did find that the rates of penetration were lower than what they expected and that there was more water than they expected.

Tooling wear rates at the Mountain 3 crossing are not typical. Complete reamer failures are rare occurrences for any HDD crossing, and it would not normally be reasonable to plan for single, or multiple, failures of the tooling. It would be reasonable to plan for more frequent trips and changes to the downhole tooling to address normal wear and tear on the equipment which would be expected on a crossing of this significant length and in this geological setting. However, Trans Mountain's experience at Mountain 3 has been that it has had to further increase trips due to the reamers cracking and failing far quicker than their expected service life. Trans Mountain has also noted that every stage of the HDD from the initial pilot hole to the 48-inch ream pass has taken significantly longer than the original design schedule. Trans Mountain considered the following alternatives related to the Mountain 3 HDD:

- additional pressure grouting;
- different reamers;
- attempting to pull back the NPS 36 pipe in the existing hole;
- reattempt HDD;
- alternative tunnel crossing;
- rerouting options; and
- temporary pipeline options.

Trans Mountain stated that after weighing the above options, as well as continuing with the 48-inch ream, it was determined that the proposed variance is the most prudent option in the circumstances because it can be executed quickly and safely, with minimal technical risk, and no impact on the capacity of the expanded system.

Trans Mountain calculated that should it need to abandon the Mountain 3 HDD and start over with a new installation approach, the time required to fulfill regulatory requirements and complete construction would be roughly 24 to 30 months.

5.2. Impact on design and operation

Trans Mountain stated that installing the NPS 30 segment at Mountain 3 HDD would maintain the previously designated maximum allowable operating pressure of 9 930 kilopascals. Trans Mountain confirmed that the nominal capacity of the pipeline would remain unchanged at 890,000 barrels per day.

Trans Mountain stated that, as the Mountain 3 HDD is located downstream of the Hope pressure-reduction station, it can reduce the pressure less at the Hope station to compensate for the minor pressure drop due to the 2.3 kilometre (**km**) of NPS 30 pipe; this is part of the reason the pipeline capacity would not be impacted by the reduction in pipe diameter. The Mountain 3 HDD is a short section of pipeline; therefore, the incremental pressure drop due to the reduction in pipe diameter is small.

Trans Mountain stated that all required pipe calculations have been performed for the NPS 30 pipe section. All stress levels in the pipe at all points including normal operating stresses, combined bending stress, pullback stress, and hydrostatic test pressure have been assessed and are within the acceptable limits of CSA Z662.

5.3. Impact on material quality

Trans Mountain submitted that it has complied with its QMP in respect of the materials required for the December Variance. Each of the pipe manufacturers has been carefully vetted by Trans Mountain based on technical, quality, safety, and commercial factors, in accordance with the requirements of the TMEP vendor pre-qualification procedure.

Trans Mountain purchased NPS 30 pipe for the Variance from distributors and not from manufacturers on its Approved Manufacturer's List (**AML**) as the quantity required was too small and the timeline too short for a dedicated mill run. Trans Mountain carried out the following additional measures to ensure the pipe was suitable for use:

- visual inspection;
- review for mill traceability;
- review of material test reports;
- additional Charpy V-notch[1] (**CVN**) testing to comply with TMEP specification of -6°C where required; and
- newly coating or stripping and coating the pipe to TMEP specifications.

Trans Mountain's Engineer of Record confirmed pipe conformance to CSA Z662 and TMEP specifications and reviewed inspection reports of a qualified third-party inspector to assess the suitability of the pipe. The Engineer of Record determined the pipe is safe and fit for purpose. In response to IR No. 1, Trans Mountain provided copies of material test reports, third-party inspection reports, CVN test reports, and demonstration of acceptance of manufacturers' QMP documents.

Trans Mountain explained that its inspection of the purchased NPS 30 pipe was an exclusionary process. As there were a large number of pipe joints available, any pipes identified with defects such as dents, gouges or out-of-roundness were excluded and further assessment of defects was not deemed necessary.

[1] The Charpy V-notch test, also known as Charpy impact testing, is a test that involves striking a standard notched specimen with a controlled weight pendulum swung from a set height. The test helps measure the amount of energy absorbed by the specimen during fracture, which gives an indication of the toughness of the material.

For the proposed trap facilities, the pipe, fittings, and flanges required will be new and manufactured to TMEP specifications and QMP requirements, or surplus materials sourced from vendors included in the AML and manufactured in accordance with the QMP.

Valves for the trap facilities will be fully inspected, tested, and reconditioned according to the TMEP Project valve program, or valves that have been sourced as unused surplus, fully reconditioned, and re-tested according to the TMEP Project valve program.

5.4. Impact on in-line inspection capability

Trans Mountain committed to installing trap facilities capable of providing full in-line inspection of the pipeline from Hope station to Burnaby Terminal. Trans Mountain has stated that mechanical completion and leave to open of the trap facilities will be complete before the TMEP in-service date. Permanent launcher and receiver spools for the trap facilities will be a bolted flanged connection and will be available for use prior to the in-service date.

6. COMMISSION ANALYSIS AND FINDINGS

The Commission notes that, with respect to economics, environmental and socio-economic effects, rights and interests of Indigenous Peoples, and engagement, there are no material changes between the information contained in the October Variance application and in the December Variance application. As such, the Commission adopts the analysis and findings related to these matters as stated in the Reasons for Decision for the October Variance.

The Commission considered Trans Mountain's evidence regarding the technical challenges associated with the Mountain 3 HDD and their impacts on the TMEP construction schedule. The Commission also considered the impact of the December Variance request on the design and operation of the rest of the TMEP, on material quality, and on the ability to conduct in-line inspection.

6.1. Technical challenges with Mountain 3 HDD – hard rock and water ingress

The Commission acknowledges that Mountain 3 HDD is a challenging HDD due to the hardness of the rock encountered which has resulted in a lower-than-expected production rate, accelerated tool wear and tool failures. Equally, the Commission understands that an ingress of water is reducing reaming efficiency and that there is a potential risk that continuing with 48-inch reaming may impact grouting in water-producing zones resulting in further increases to the water ingress rates. However, the Commission finds that Trans Mountain has not encountered any technical challenges that were not identified by the feasibility study and geotechnical assessments carried out for this HDD. In addition, Trans Mountain has confirmed that the 48-inch ream is technically feasible, but with a greater risk and extended timeline compared to the proposed December Variance.

The Commission acknowledges the risks associated with completing the 48-inch ream pass of the Mountain 3 HDD to install the 36-inch pipeline. The Commission also acknowledges Trans Mountain's choice to make a risk-based decision to stop the 48-inch ream in November 2023 in order to install the 30-inch pipeline and avoid those risks.

6.2. Impact on design and operation

The Commission accepts that the installation of NPS 30 pipe at the Mountain 3 HDD would not have a significant effect on the design and operation of the rest of the TMEP. Trans Mountain confirmed that the maximum operating pressure and nominal capacity of the pipeline will not be affected.

The Commission does not agree with portions of Trans Mountain's analysis related to the analysis of pipe stresses in the Mountain 3 HDD section and provided in response to IR Nos. 1.11 and 2.1 and finds that they may contain errors related to unsupported span lengths, boundary conditions, and reaction loadings on the spans. While the Commission accepts Trans Mountain's decision to proceed with the installation of the NPS 30 pipe, the Commission is of the view that, in light of the errors noted above, it is prudent for Trans Mountain to review the analysis of pipe stresses, particularly the accuracy of unsupported lengths, boundary conditions, reaction loads on the span, and acceptance criteria and inform the Canada Energy Regulator of any resulting clarifications or corrections.

6.3. Impact on material quality and Condition 9 request for relief

Trans Mountain’s QMP was developed specifically for the TMEP as a pre-construction requirement and was assessed and accepted by the NEB under Condition 9. As a pre-construction requirement, Condition 9 was intended to apply to all materials procured, stored, and used in TMEP construction, and deviation procedures were included to handle unforeseen circumstances. Condition 9 requires Trans Mountain to ensure that it has appropriate oversight of the quality of pipe and major components specific to the TMEP.

In the October Variance application, the Commission found that Trans Mountain did not demonstrate conformance to its QMP processes. Trans Mountain’s evidence lacked the documentation required to demonstrate that the steps it took in procuring the materials for the proposed October Variance were equivalent to the measures required by its own QMP. Trans Mountain failed to demonstrate that the quality of materials acquired for the October Variance was equivalent to those procured for the balance of the TMEP.

The Commission finds that, although Trans Mountain provided additional documentation in the December Variance application, Trans Mountain still did not demonstrate that it fully conformed to its QMP processes, specifically in the areas of vendor quality inspection activities and oversight.

Similar to the finding in the October Variance application, much of the documentation provided by Trans Mountain in the December Variance application to demonstrate that certain measures were taken, was signed after the 27 November 2023 hearing held for the October Variance application or was not yet fully approved and signed by Trans Mountain. In the December Variance application, Trans Mountain explained that, while work is done and results are provided to and reviewed by the experts in real time, the task of documentation and signoff confirming that work often lags behind. Therefore, for the December Variance application, the Commission accepts Trans Mountain’s assertions that the Engineer of Record, UniversalPegasus International, has carried out review and approval of the documents, while the process of signing all records by Trans Mountain was carried out later or is still ongoing.

Considering the above, the Commission imposes **Condition 3 (Pipe material testing)** requiring Trans Mountain to provide a letter signed by its Accountable Officer confirming that chemical and mechanical testing of a sufficient sample size of the procured NPS 30 pipe has

been conducted and that the pipe and components conform to TMEP pipe and component specifications.

The Commission granted Trans Mountain relief from Certificate Condition 9, for the purposes of materials procured and installed to construct the December Variance. The Commission is of the view that, in combination with the quality management processes that Trans Mountain has carried out and will carry out, including its exclusionary process for accepting pipe joints, and assessment of material test reports, the imposition of Condition 3 will provide demonstration of an equivalent level of material quality as for that of materials procured for the remainder of the TMEP in conformance with the QMP.

6.4. Impact on in-line inspection capability

The Commission is of the view that the pig trap facilities proposed by Trans Mountain in the December Variance will provide full in-line inspection capability for the section of pipeline between Hope station and Burnaby Terminal. Trans Mountain has stated that the construction of pig trap facilities will be completed after the start of line fill and before the in-service date. The pig trap facilities will be available for use after mechanical completion and after leave to open is granted by the Commission.

Having full in-line inspection capability is essential to having Trans Mountain maintain the integrity of the pipeline and ensure acceptable performance of the pipeline segment in terms of safety and environmental protection, especially during unpredictable events such as floods and seismic activity. Notwithstanding the inspection timelines specified in Certificate Condition 143, Certificate conditions for the TMEP overall and Trans Mountain's own integrity management plan both rely on Trans Mountain's ability to perform a full suite of in-line inspections from the in-service date of the TMEP.

In light of the above, the Commission imposes **Condition 2 (In-line inspection)** requiring Trans Mountain to provide confirmation of mechanical completion of the trap facilities at the north and south ends of the Mountain 3 HDD segment prior to the completion of Line 2 line fill. Condition 2 also requires Trans Mountain to file for leave to open those pig trap facilities within three weeks of providing confirmation of mechanical completion as described above. Trans Mountain's proposal for in-line inspection in the December Variance, along with Condition 2, addresses the Commission's concerns about in-line inspection from the October Variance.

7. CONCLUSION

During construction of the Mountain 3 HDD crossing, Trans Mountain has encountered several challenges, including hard rock conditions and the presence of multiple fractured areas within the bedrock which has led to water ingress. In the December Variance application, Trans Mountain argued that there was significant risk that the borehole would become compromised, or the HDD would fail, should it continue with the 48-inch ream pass. In the event the HDD did fail, Trans Mountain would be required to implement an alternative installation plan which could delay its TMEP schedule by approximately two years and result in billions of dollars in losses to Trans Mountain.

In its Reasons for Decision for the October Variance application, the Commission found that:

- Trans Mountain did not demonstrate adherence to its QMP as filed under Condition 9 and could not demonstrate that the measures it did take assured that the quality of materials procured for the Variance is equivalent to those procured for the balance of the TMEP; and

- Trans Mountain did not demonstrate that without any proposed method to provide full in-line inspection capability at the start of operation it could ensure a level of safety and integrity for the 138.4 km section of pipeline between the Hope station and Burnaby Terminal, that is equivalent to the rest of the TMEP.

For the December Variance application, the Commission considered all submissions made by Trans Mountain and other filings received as listed above. The Commission found that the December Variance application and subsequent submissions satisfactorily addressed the Commission's concerns around in-line inspection capability. Trans Mountain committed to installing permanent trap facilities on the north and south ends of the Mountain 3 HDD prior to the TMEP in-service date, which will provide the capability to inspect the pipeline for all threats. Further, the Commission imposes **Condition 2 (in-line inspection)** requiring Trans Mountain to confirm when this commitment has been fulfilled.

With respect to Trans Mountain's request for relief from the requirements of its QMP, the Commission found that in this particular circumstance with these particular facts, it is in the public interest to grant the requested relief to Trans Mountain as it pertains to the 2.3 km section of pipeline and associated trap facilities that are the subject of the December Variance application as the level of material quality achieved will be equivalent to that provided by the QMP. The Commission reached this conclusion after considering the additional information provided in the December Variance application. The Commission further imposes **Condition 3 (Pipe material testing)**, requiring Trans Mountain to file a letter signed by its Accountable Officer confirming that chemical and mechanical testing of pipe has been completed and that materials conform to TMEP specifications. The Commission was satisfied that the additional information relating to material quality, quality management, and testing provided by Trans Mountain in the December Variance and the imposition of Condition 3 will, together, result in an equivalent level of material quality as provided by the QMP on the remainder of the TMEP.

Based on Trans Mountain's in-line inspection commitments, its clarification around its quality management processes, and considering the Conditions imposed, the Commission found granting the December Variance with conditions to be in the public interest and approved the application.

THE COMMISSION OF THE CANADA ENERGY REGULATOR

Signed by

Ramona Sladic
Secretary of the Commission