

**Spectra Energy Midstream Canada Partner Corporation, as general partner for Spectra Energy Midstream Canada L.P. (SEMC) Application for Approval to Reactivate the Pesh Creek Pipeline and Pesh Creek Loop (Pipelines) pursuant to section 45 of the National Energy Board Onshore Pipeline Regulations (Reactivation Application)**

**NEB File No.: OF-Fac-Gas-S383-2016-01**

**Filed 15 November 2016**

**Response to Information Request No. 2**

**Engineering Matters**

**2.1 Coating condition and external corrosion**

- Reference:**
- i) SEMC, Reactivation Application, IR 1 Response, PDF page 2 of 3 (A81502-2)
  - ii) CSA Z662.15 clause 3.4

**Preamble:** Reference i) states that:

- The introduction of hot gas exceeding pipeline specifications would result in damaged coating;
- Extruded polyethylene coating will be damaged when above its service temperature rating which will result in coating becoming disbonded from the pipe, and once the gas has cooled below the coating's maximum service temperature it will be found to be well bonded and in good condition;
- External corrosion is not deemed a concern due to cathodic protection being maintained within acceptable levels on the pipelines,
- No in-line inspections (ILIs) have been conducted on the Pipelines.

The Board notes that disbonded polyethylene coatings may impede the effectiveness of cathodic protection systems, exposing the pipeline to external corrosion. Additional information is required supporting Spectra's assertions that there are no coating issues beyond the segments replaced after the 1998 failure, and that external corrosion is not a concern considering the absence of ILI information since construction.

Reference ii) requires the company to have a risk management process that identifies, assesses, and manages the hazards and associated risks for the life cycle of the pipeline system.

**Request:** Please provide the following:

- a) Assessments demonstrating that the pipe coating is in satisfactory condition along its entire length; and
- b) Spectra's ILI program for the Pesh Creek Pipeline and Pesh Creek Loop following the proposed reactivation, considering that ILI has never been conducted in spite of the existence of launchers and receivers.

**Response:**

- a) For operating pipelines, Canadian Natural Resources (CNR) uses a risk assessment tool which relates the probability of pipeline failure due to various factors such as internal and external corrosion to the CNR Corporate Risk Matrix. To assess the likelihood of external corrosion, the risk assessment tool considers information on pipeline age, external coating system, pipeline operating conditions, and historical failures in the pipeline system. When an extruded polyethylene external coating system is used and proper construction practices are followed, the external coating is not likely to degrade without outside factors that would impact the quality of the coating. Factors that could impact the quality of the coating after installation include exceeding the operating limits for the coating system (eg: high temperatures), ground disturbance activities around the pipeline, and geotechnical activity near the pipeline.

With respect to the Pipelines specifically, the likelihood of damage due to ground disturbance activities and geotechnical activities is low given the location of the Pipelines. Limited ground disturbance activities will have occurred around the Pipelines due to their isolated location, and any ground disturbance activity would have followed the operating company's damage prevention plan and notifications. Additionally, the Pipelines cross relatively flat terrain and the Shekilie River crossing was completed through the use of a directionally drilled bore, which greatly decreases the risk of a geotechnical event impacting the pipeline.

The ability for high temperatures to damage the external coating on a pipeline is limited to the service fluid temperature that is passing through the pipeline. Operational upsets may result in temperatures exceeding the threshold of the external coating. There have been no recorded upsets at the Peggo facility resulting in gas exceeding this temperature limit since the 1998 temperature excursion. As the Pesh Creek Loop Pipeline was built in 2005, the likelihood of external coating damage due to a temperature excursion has been assessed to be very low. The Pesh Creek Pipeline experienced a temperature excursion in 1998 but the gas would have cooled once below ground and, without any further inputs along the pipeline, the temperature of the gas would have continued to decrease along the length of the pipeline. The repair conducted on the Pesh Creek Pipeline after the temperature excursion consisted of excavating the pipeline from the inlet riser until well-bonded coating was found, which would be an indicator that the gas temperature had decreased below the maximum allowable temperature. Figure 1 shows the connection where the pipe with the damaged coating was replaced with new pipe (yellow-jacket) and the original pipeline coating (white-jacket) was kept. This figure shows the original pipe body coating at this connection to be in good condition and adhered to the pipe wall (the shrink sleeve over the weld was removed for analysis). This picture was obtained as part of the failure analysis from the hot-cracking failure that occurred in 1999. Once the temperature had decreased beyond this value, the remaining external coating has

been assessed to have a low likelihood of failure leading to external corrosion as there are no other factors that would have impacted the integrity of the coating.



Figure 1: External coating condition of original pipe (white-jacket) at point of repair from temperature excursion failure.

Of note, CNR has also evaluated the Pipelines for gross external wall loss. Based on typical girth-weld exposure areas, in the event that the girth-weld coating system has failed and is shielding the pipe from cathodic protection, the following Modified B31G assessment indicates that the pipeline would require ~65% wall loss over the entire (~300 mm) girth-weld area to cause rupture (see Figure 2). Based on this assessment, there is a low likelihood of failure due to pipeline rupture.

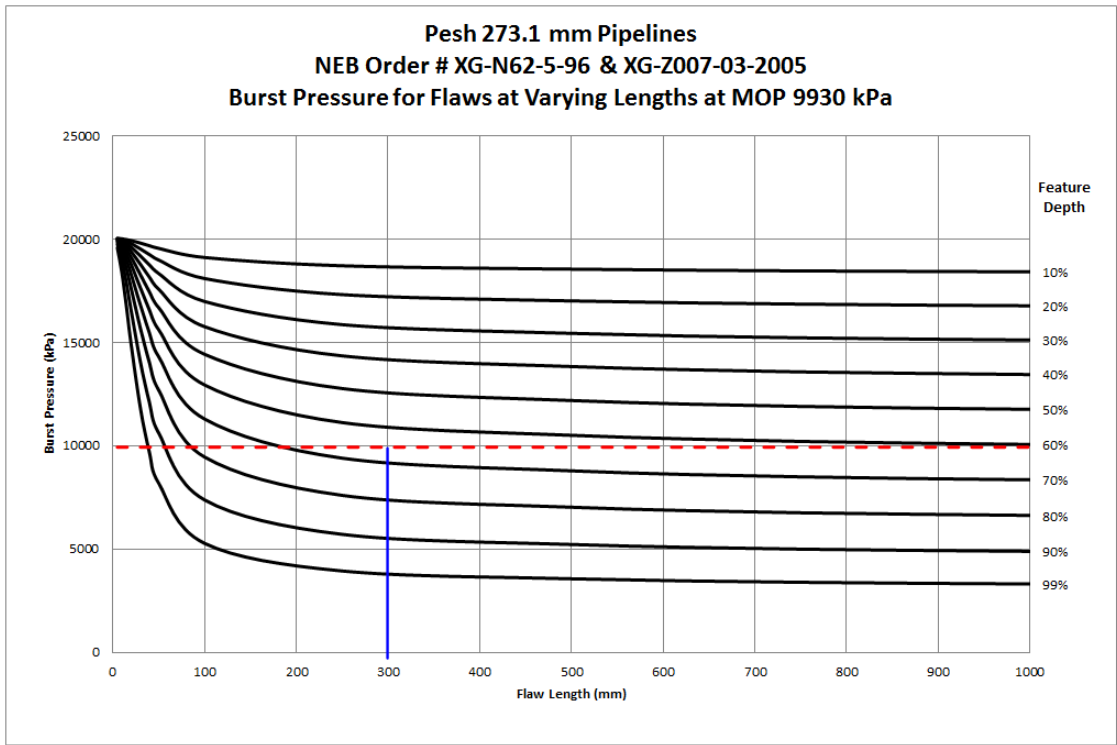


Figure 2: Modified B31G calculation assuming failed coating on girth weld

- b) Following acquisition of the Pipelines, future ILI programs will be managed by CNR. Upon reactivation of the Pipelines, CNR will manage the Pipelines as part of its Pipeline Integrity Management System. As part of the system, the Pipelines will be risk assessed annually to determine whether any ILIs or other integrity work is required. The use of risk to drive work helps CNR appropriately manage and assess the risk for all pipelines CNR operates. Based on the assessment completed for the Pipelines to date, CNR does not consider the Pipelines to be reasonable candidates for ILI at this time due to their low inherent likelihood of failure and the absence of foreseeable adverse-effect.