

ENBRIDGE GAS DISTRIBUTION INC. RESPONSE TO
BOMA INTERROGATORY #15

INTERROGATORY

Issue: A.1

- (a) Please explain the relationship between the additional pipeline capacity, provided by Segment B, and the ability to reduce the NPS 26 and NPS 30 Don Valley lines to below 30% SMYS. Please explain the amount of additional capacity required to lower the current percentage SMYS to thirty percent instead of thirty-seven percent and thirty-six percent, respectively. Please describe and show the calculation required to reduce the yield stress/operating pressures of the two lines to the point where the SMYS ratio is thirty percent or less.
- (b) Please show how each one percent reduction in pressure decreases the SMYS ratio. Please explain how a one percent increase in capacity reduces the pressure in the line. Please show the relevant equations and describe the relationships in detail.
- (c) Please describe in detail the relationship between decreasing the flow in the line and the pressure in that line. Is the same effect achieved by looping a segment of line between two stations?
- (d) Will the Don Valley pipeline achieve a reduction to thirty percent SMYS over its entire length?
- (e) Are all the segments of the Don Valley line (Victoria Station to proposed Buttonville, proposed Buttonville to Jonesville, Jonesville to Station B), all at thirty-six percent SMYS? If not, what are the SMYS ratios for each of the segments?
- (f) If pressure in the southernmost portion of the Don Valley line (Jonesville to Station B) is reduced to achieve a SMYS ratio of thirty percent (or less), what is the impact on the gas flow to Station B? What increase in "capacity of the line(s)" north of Jonesville is required to reduce the pressure to achieve percentage SMYS below thirty percent, and maintain the inlet pressure at Station B at 225 psi? Will the pressure in the Jonesville/Station B segment be reduced to a thirty percent SMYS, and how will that be done? Please explain fully.

Witnesses: E. Naczynski
N. Thalassinos

- (g) What are the current inlet and outlet pressures at Station B (for both the Portlands line and the line feeding the Downtown Toronto grid)? Are the outlet pressures at Station B for the Portlands line and the feeder pipeline(s) the same? Please discuss.
- (h) What is the pressure in the thirty-six inch line from Station B to Portlands? Are any compression facilities provided by Enbridge or TCPL in that line?
- (i) What impact did the provision of service from Station B to Portlands in 2008 have on the ability of Station B to meet its required inlet pressure to serve Downtown Toronto?
- (j) Schedule 6, Page 7, Paragraph 18 – How will the pressure of the NPS26 line be reduced to 275 psi so as to meet the percentage of SMYS of thirty percent? How much additional capacity will be required to flow through the east-west segment of Project B to achieve the required reduction? What percentage of the capacity of the east-west part of Project B? What will be the proposed capacity of the eastwest segment of Project B?

RESPONSE

- a) The lowering of the maximum pressure in a pipeline lowers the amount of gas that can be transported over a given distance or capacity. The reduction of the Don Valley line would reduce the capacity in the pipeline by approximately 165 TJ/d. Segment B increases the capacity in the system and compensates for the lost capacity due to the pressure drop in the NPS 26 and Don Valley lines. The SMYS ratio is a function of the operating pressure, diameter, wall thickness and material specification of the steel.

The hoop stress can be calculated according to the Canadian Standard Association - Oil and Gas Pipeline Systems Z662-07 in Section 4.6.5.

$$S_h = \frac{PD}{2t_n}$$

S_h = hoop stress, MPa

P = design pressure, MPa

D = outside diameter of pipe, mm

t_n = pipe nominal wall thickness, mm

Witnesses: E. Naczynski
N. Thalassinos

The pipe grade for the NPS 26 and Don Valley lines are 290 MPa and 414 MPa respectively. Therefore, the calculation of the operating pressure corresponding to 30% SMYS for each of these lines is as follows:

$$\text{NPS 26} \quad P = (2 \times 87,000 \times 7.92)/660 = 2,088 \text{ kPa}$$

$$\text{NPS 30 DV} \quad P = (2 \times 124,200 \times 7.92)/762 = 2,581 \text{ kPa}$$

- b) The SMYS ratio is directly proportional to the maximum operating pressure, i.e., a 15% reduction in the maximum operating pressure results in a 15% reduction in the SMYS ratio.
- c) Pressure and flow through a pipe are inversely related. That is, as the flow increases, the pressure drop along the pipeline increases, resulting in a lower pressure at the end of the pipeline. By looping a pipeline, the flow has more than one path; this effectively reduces the flow in the pipe segment. With less flow there is less pressure drop and higher pressures are observed at the end of the pipeline.
- d) Yes, once all sources to a line are lowered to a specific pressure, no part of the line can exceed this pressure, as there is no compression within the system.
- e) Yes, all segments of the existing Don Valley line have the same maximum operating pressure and therefore the same SMYS.
- f) The NPS 26 has existing regulation stations located at Keele and CNR to the west and at Alden Road to the east. At peak conditions, the NPS 26 supplies the Don Valley Line with a relatively small quantity of flow. With the proposed facilities, the Don Valley line will have the pressure lowered, but Segment B will supply the line at Buttonville and at Jonesville stations. The lower pressure is compensated by having more sources and reducing the distances that gas must travel to Station B, allowing for the minimum system pressure to be maintained. The Buttonville and Jonesville stations will provide pressure regulation, taking higher pressure gas from Segment B and regulating it down to the new operating pressure in the Don Valley line. Victoria Square will also have a lower operating set point so that all supply points on the Don Valley line will have a lower set point than under current operation.

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- g) Please see the response to BOMA # 23 at Exhibit I.A1.EGD.BOMA.23.
- h) The Pipeline that runs from Station B to PEC is an NPS 20 pipeline and runs at a common pressure with the Don Valley Pipeline. There are no compression facilities along the pipeline.
- i) None. The facilities constructed in 2008 as a part of EB-2006-0305 were constructed to replace the capacity on the Don Valley line due to the additional load from PEC.
- j) The pressure in the NPS 26 will be controlled with existing regulation facilities. These facilities are described in response to BOMA #10 at Exhibit I.A1.EGD.BOMA.10. As noted in part e) of this response above, at peak conditions the NPS 26 flows a relatively small amount of gas to the Don Valley line. Less than 10% of the flow on Segment B will be replacing the capacity of this line.

Witnesses: E. Naczynski
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