

National Energy  
Board



Office national  
de l'énergie

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18 June 2010

To: All Companies under National Energy Board Jurisdiction  
Canadian Energy Pipeline Association  
Canadian Association of Petroleum Producers and Provincial Regulators

**Subject: National Energy Board Safety Advisory 2010-01  
Fatigue Crack Failure Associated with Shallow Dents on Pipelines**

Following two incidents that were a result of fatigue crack failure within shallow dents, the National Energy Board has issued the following safety advisory regarding the evaluation of hazards associated with shallow dents on pipelines.

The Board directs your attention to the attached safety advisory and expects that it will be given wide circulation to company personnel and contractors involved in pipeline construction, integrity, maintenance and operation on your pipeline.

If you have any questions regarding this advisory please contact Mr. Joe Paviglianiti, [joe.paviglianiti@neb-one.gc.ca](mailto:joe.paviglianiti@neb-one.gc.ca), 403-299-3864 or Mr. Kyle Sherwin, [kyle.sherwin@neb-one.gc.ca](mailto:kyle.sherwin@neb-one.gc.ca), 403-299-3925 of the Board's Operations Business Unit.

Yours truly,

A handwritten signature in black ink, appearing to read 'Anne-Marie Erickson'.

Anne-Marie Erickson  
Secretary of the Board

Attachment

c.c. Mr. Larry Gales, Transportation Safety Board of Canada, facsimile 819-953-7876

444 Seventh Avenue SW  
Calgary, Alberta T2P 0X8

444, Septième Avenue S.-O.  
Calgary (Alberta) T2P 0X8

The word 'Canada' in a stylized font with a red maple leaf above the 'a'.

Telephone/Téléphone : 403-292-4800  
Facsimile/Télocopieur : 403-292-5503  
<http://www.neb-one.gc.ca>  
Telephone/Téléphone : 1-800-899-1265  
Facsimile/Télocopieur : 1-877-288-8803



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## Fatigue Crack Failure Associated With Shallow Dents on Pipelines

### Purpose of the Safety Advisory

CSA Standards Z662-07 Oil and Gas Pipeline Systems, sections 6.3.3 and 10.9.4 provide requirements for inspecting, assessing and repairing dents greater than 6% of outside diameter (OD). In the following described incidents, the pipeline failures occurred within dents much shallower than the 6% of OD.

Pipeline in-line inspection tools have been known to identify dents as small as 0.5% of the pipe OD, however they have not been shown to be completely reliable in characterizing dent shape nor identifying the presence of gouges, stress concentrators or cracks within dents. Given the recent failures associated with very shallow dents, integrity management programs should be reviewed and updated where appropriate to consider these incidents.

The Board directs your attention to this safety advisory and expects that it will be given wide circulation to company personnel and contractors involved in pipeline integrity, maintenance and operation on your pipeline.

### Incident Descriptions

Two incidents are currently under investigation by both the National Energy Board (Board) and the Transportation Safety Board of Canada (TSB). TSB Pipeline Safety Advisory 01/10 reports the following:

On 29 September 2009, a leak occurred on Enbridge Pipelines Inc. (Enbridge) Line 2 near Odessa, Saskatchewan (TSB Occurrence No. P09H0084). The leak occurred at a crack within a dent at the 6 o'clock position. There was some gouging associated with the dent. The maximum depth of the dent was 0.51% of the pipe OD. A metallurgical analysis of the pipe indicated that the crack had propagated by fatigue. In 2008, an in-line inspection (ILI) tool had been run in this section of line. Although the dent had been detected by the ILI tool, it had not been included in the ILI vendor's report to Enbridge. The gouging, however, had not been detected by the ILI tool.

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On 5 October 2009, a leak occurred on Trans-Northern Pipelines Inc. (TNPI) Ottawa Lateral near Farran's Point, Ontario (TSB Occurrence No. P09H0086). The leak occurred at a crack within a dent at the 6 o'clock position. The maximum depth of the dent was 2.7% of the pipe OD. A metallurgical analysis of the pipe indicated that the crack had propagated by fatigue. In 1988, a rock had been removed from this location but no cracking had been observed at that time. In 2007 and 2009, ILI tools had been run in this section of line. The dent had been included in both the 2007 and the 2009 vendors' ILI reports to TNPI as having depths of 3% and 2%, respectively, of the pipe OD, but had not been identified as needing attention.

### **Preventative Actions**

Regulated companies should review and update their integrity management programs. Reviews should include:

- A review of procedures employed during construction for identifying and recording the characteristics and location of dents and the assessment of acceptability of dents with depths less than 6% of OD, including dents without known stress concentrators (gouges, grooves, arc burns, or cracks);
- Consideration of inspection tool limitations to identify dent geometry and stress concentrators (gouges, grooves, arc burns, or cracks) associated with dents;
- Review records to identify shallow dents and assess their susceptibility to the presence of gouges, stress concentrators or cracks and determine whether validation is required;
- Revision of dent assessment and management models as appropriate to consider the potential for fatigue crack initiation and propagation within very shallow dents (*i.e.* < 6% OD) including those without known stress concentrators (gouges, grooves, arc burns, or cracks) in the pipe body and/or seam and girth welds; and
- Re-examine previous in-line and field inspections and assessments of existing shallow dents in operating pipelines to confirm that all hazards and conditions (e.g. proximity to seam and girth welds, pressure cycling and pipe material properties) that could affect the integrity of the pipeline have been identified and effectively managed.

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