

National Energy
Board



Office national
de l'énergie

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To: All companies under National Energy Board jurisdiction,
Canadian Energy Pipeline Association
Canadian Association of Petroleum Producers, and
Provincial and Territorial Regulators

**National Energy Board Safety Advisory
NEB SA 2016-01
Potential for Substandard Properties of Pipeline Fitting Materials**

Please find attached Safety Advisory SA 2016-01.

The National Energy Board (NEB or the Board) expects regulated companies to demonstrate a proactive commitment to continual improvement in safety, security and environmental protection, and to promote a positive safety culture as part of their management systems.

Safety Advisories are issued periodically in order to improve the oil and gas industry's awareness of an identified safety or environmental concern with the goal of preventing incidents from occurring in the first place. A Safety Advisory also serves to further highlight NEB requirements, and conveys the Board's expectation that regulated companies take appropriate action to mitigate any potential impacts to people or the environment.

If you have any questions regarding this advisory please contact Integrity Management personnel at the Board through our toll free number at 1-800-899-1265.

Yours truly,

Original signed by

Sheri Young
Secretary of the Board

Attachment

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Standards for Manufactured Pipe & Fittings and the Potential for Substandard Material Properties

Background

The National Energy Board (NEB or the Board) is aware of instances of pipe and components having substandard material properties installed on pipelines under NEB or other regulatory bodies' jurisdiction. In the cases examined, documentation from the manufacturers indicated that the materials provided met the required specifications. Subsequent testing indicated that some of the pipe and fittings¹ did not meet all of the required material specifications. In some instances, the substandard materials were determined to have been a contributing factor to pipeline failure during pressure testing or during operation.

Although some of the substandard materials cases described below appeared to have been isolated, the Board subsequently identified additional cases on pipelines in Canada and the United States (US). The issue of pipe and fittings having substandard material properties entering the market place, and subsequently being installed on pipelines, is an industry wide concern.

US Advisory on Substandard Pipe Materials

In 2008, the US Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) observed hydrostatic test failures and excessive expansions on a number of pipelines under construction in the US. Upon investigation, PHMSA attributed the cause of the incidents to the installation of pipe with substandard material properties.

In 2009, PHMSA issued an advisory bulletin (ADB-09-01) warning of the potential for micro-alloyed high strength line pipe to exhibit inconsistent chemical and mechanical properties, with yield strengths as much as 15% below specified requirements. The advisory also warns that in some cases, the pipe materials may successfully pass a hydrostatic test but still present a future concern.

Canadoil Asia Fitting Case

In December 2010, the NEB was notified of a steel fitting (elbow) that had expanded following a hydrostatic test at a pipeline facility in the US. PHMSA attributed the cause of the elbow expansion to the fitting having a yield strength lower than the specified minimum yield strength. The pipeline operator removed a number of other fittings at the facility for mechanical testing and identified additional fittings with substandard material properties.

¹ Fittings are manufactured components such as elbows, reducers, and tees that connect sections of pipeline.



The substandard fittings were traced to a manufacturer identified as Canadoil Asia² with production originating from Thailand. The fittings were manufactured to the Manufacturers Standard Society (MSS) SP-75 Specification for High-Test, Wrought, Butt-Welding Fittings and were indicated as having met the specified material requirements on the Material Test Report (MTR). However, due to inadequacies in some processes at the manufacturing plant, not all fittings met the specified material requirements.

EZEflow Fitting Case

In 2013, a pipeline rupture occurred on a sweet natural gas pipeline in Alberta. An estimated 16.5 million cubic meters of natural gas was released. The Transportation Safety Board of Canada (TSB) released its Pipeline Investigation Report on the incident (P13H0107) on 3 November 2015.

Investigations by the TSB, the NEB, as well as the pipeline operator, indicated substandard materials were present in the manufactured elbow where the failure initiated. Fitness for service testing was conducted on the pipeline fittings prior to their installation in 2008, after two fittings failed during the pressure test. Although hardness testing indicated the elbow in question had lower mechanical properties, the operator determined that the elbow was acceptable for use, as the wall thickness would compensate for the lower mechanical properties. Neither the manufacturer nor the pipeline operator physically verified the wall thickness of this specific fitting. The investigation determined that the wall thickness was less than that indicated on the MTR.

Since this incident, the pipeline operating company has increased its manufactured fitting specifications beyond the manufacturing standards acceptable under the current Canadian Standards Association (CSA) Z662-15 *Oil and Gas Pipeline Systems* to prevent a similar incident from occurring. The fitting manufacturer, EZEflow, has made improvements to both its manufacturing procedures and its quality assurance (QA) programs. The quality issue appears to be limited to Grade 550 elbows manufactured for a single customer.

Preventive Actions

The Board holds companies wholly responsible for assuring that the pipe and fittings they purchase meet the specifications requested and required for the intended project.

As part of the NEB's mandate to promote safety and security of pipelines, a more widespread and proactive approach is being taken.

Existing industry-accepted standards such as CSA Z245.11, CSA Z245.1, and MSS SP-75 have appeared to be insufficient in preventing the manufacture of pipe and fittings with substandard

² The Canadoil Asia facility in Thailand is no longer in operation. Canadoil Asia is no longer affiliated with Canadoil Forge and CFC Canadoil.



material properties. The CSA and MSS standards are living documents that are updated as needed. Both CSA and MSS are receptive to making any required updates to the standards, and the Board will continue to communicate with them on this issue.

As the changes necessary to identify substandard material properties have not yet been made in the standards, the Board expects companies to develop or enhance their own fitting specifications beyond the current standards to ensure that the fittings they acquire and install meet the material property requirements.

Pipeline companies regulated by the NEB must develop specifications for the pipe and components to be used in a pipeline and shall submit them to the Board when required to do so, as per section 14 of the *National Energy Board Onshore Pipeline Regulations (OPR)*. Companies shall have QA programs in place to ensure that the pipe and components meet the specifications developed by the company, as required by section 15 of the OPR. Reviewing MTRs, without independent onsite verification, may not provide sufficient protection against the introduction of substandard components. Companies should exert greater oversight in the manufacturing process directly and/or indirectly through third party QA.

The NEB may issue additional guidance to companies on what changes are expected to be made to companies' internal specifications and QA programs.

Further Information

If you have any questions regarding this advisory please contact Integrity Management personnel at the Board through our toll free number at 1-800-899-1265.