

Information Bulletin IB10-006

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DIRECTIVE
ABSA Requirements for Steam Pipelines

I INTRODUCTION

Steam pipelines used in the recovery of hydrocarbons from a reservoir or oil sands deposit are regulated under the *Pipeline Act*, R.S.A. 2000, c. P-15. These steam pipelines are exempt from the Safety Codes Act and Pressure Equipment Safety Regulation by section 2(1)(e) of the Pressure Equipment Exemption Order (AR 56/2006), but they require design registration by ABSA as a condition of licensing under the Pipeline Regulation AR 91/2005.

The Energy Resources and Conservation Board (ERCB) issued Directive 077 on May 19, 2010. ERCB Directive 077 explains the ERCB legislative requirements and clarifies the responsibilities of the ERCB and ABSA with respect to steam pipelines. In general, design registration, construction, operation, and maintenance of steam pipelines is under ABSA's jurisdiction.

This Directive specifies the Administrator's requirements for steam pipelines that are regulated under the Pipeline Act in accordance with Directive 077. This Directive is intended to supplement, and should be reviewed with, ERCB Directive 077.

II SCOPE

This Directive applies to steam pipelines within the scope of ERCB Directive 077, Part B, Section 3.1. Steam pipelines used in the recovery of hydrocarbons from a reservoir or oil sands deposit are a "pipeline" under the Pipeline Act, R.S.A. 2000, c. P-15. This includes pipelines intended to carry steam, steam and produced fluids, or recovered steam. There may be situations in which produced fluids (emulsion) meet the definition of expansible fluid and require steam pipeline design.

A schematic of criteria for registration of design and license application is provided in figure 3.1 of ERCB Directive 077, Part B (page B-30). It is the responsibility of the owner and the designer to determine which pipelines require design registration and compliance with this Directive. Acceptable pipeline designs are registered with the condition that the pipelines will comply with all requirements (construction, inspection, operations, etc.) specified in this Directive.

The requirements of this Directive do not apply to steam pipelines of internal aggregate capacity less than 0.5 m³. Treatment of exemptions is described under Section IV of this Directive.

III REQUIREMENTS

1) Registration of Design

Registration of design with ABSA shall be in accordance with Section 16(1) of the *Pressure Equipment Safety Regulation, AR 49/2006 (PESR)*, and all the provisions therein.

The design must also satisfy the requirements of *Canadian Standards Association (CSA) Z662: Oil and Gas Pipeline Systems*, Clause 14.

2) Design Submission Requirements

The design must be submitted to ABSA for review and registration. The submission must include all information required by Section 16(1) of the PESR, and shall include a completed Design Registration Application Form AB-31 together with other documentation and applicable forms (available on the ABSA Web site www.absa.ca). The submission must clearly identify and distinguish the pipelines for which design registration is being sought from those which do not require registration. The submitted documentation shall be stamped by a Professional Engineer.

All pipeline design registration submissions must address overpressure protection. As stated in ERCB Directive 077, Part B, Section 3.3, pressure control and overpressure protection must satisfy the requirements of CSA Z662, Clause 4.18, and overpressure protection must be acceptable in accordance with Section 38 of the PESR.

In accordance with Section 38(1)(a) of the PESR, a pressure relief valve (PRV) that meets the requirements of the ASME Code is required for protection of pressure equipment unless the Administrator gives written permission for another means of overpressure protection under Section 38(1)(b) of the PESR. If Overpressure Protection by System Design (OPPSD) is proposed for pipelines, the submission needs to address all requirements specified in Annex A of this Directive.

Design submissions of steam pipelines with PRVs need to show that each PRV set pressure is equal or lower than the maximum allowable working pressure of the pipeline protected with this PRV according to Section 38(2) of the PESR.

If the use of CSA Z662, Annex I is proposed, design submissions must clearly identify and distinguish the steam pipelines or sections of steam pipelines to which Annex I was applied. Design submissions need to include documentation to demonstrate compliance with the Annex I and, if applicable, address specific

Annex I requirements (thermal stress limits, fatigue evaluation considerations, etc.).

If the use of unlisted materials according to CSA Z662, Clause 14.3.2 or Annex I, Clause I.3.2.1 is proposed, the owner or owner's agent needs to develop project-specific material specifications and must include them with the design submission. As a minimum, project-specific material specifications must be numbered documents with revision numbers and need to specify material chemical properties, mechanical properties at the maximum design temperatures and room temperatures, material testing requirements according to CSA Z662, Clause 14.3.2 or Annex I, Clause I.3.2, and allowable stress values established as specified in Paragraph 302.3.2(d) of ASME B31.3.

The design registration will be approved following a review to determine that the design meets the requirements of this Directive, the PESR and relevant codes and standards. The applicant will be notified in writing that the design has been registered in accordance with this Directive.

3) **Field Construction and Inspection**

Construction shall be by an organization that holds a quality system certificate of authorization permit issued under section 11 of the PESR. The scope of the certificate of authorization permit must include "Z662 steam pipeline construction".

Welding procedure specifications shall be registered with ABSA per section 18 of the PESR. Welding procedures specifications shall be in accordance with the requirements of CSA Z662 Clause 14.4.2 or when specified in accordance with CSA Z662 Annex I, Clause I.4.1. Welder certification and performance qualification testing shall be in accordance with the Pressure Welders Regulation and CSA Z662 Annex I Clause I.4.1 when applicable.

Construction documentation, including completed AB-83 forms, must be maintained and distributed in accordance with the construction organization's quality management system. Construction inspections must be completed by a competent owner's inspector, and documented by the inspector's certification of the completed AB-83 forms. The completion of construction declaration (ABSA form AB-81) must be submitted to ABSA in accordance with Section 32 of the PESR. Construction may be subject to inspection by an ABSA Safety Codes Officer.

4) **Pressure Testing**

The pressure test requirements are specified in CSA Z662, Clause 14.5. Test pressures, mediums, and procedures must be approved by ABSA, in accordance with Sections 16(1) and 30 of the PESR before the test is conducted. Testing must be conducted in a manner that satisfies CSA Z662 and Section 30 of the PESR. Records of the successful pressure test must be

in accordance with the construction organization's quality management system, the Pipeline Regulation and Sections 31 and 32 of the PESR.

5) Operations

In-service inspections and integrity management for the pipelines must be addressed in the company's pressure equipment integrity management system in a manner acceptable to ABSA. The integrity management system must address steam pipelines inventory, inspection plans, operating procedures, operator training and change management.

As required under the Safety Codes Act, unsafe conditions and incidents not associated with a failure (as defined below) must be reported to ABSA.

6) Failure Investigation

For the purpose of this Directive only, a failure is defined as a condition where the pipeline is incapable of retaining the fluid being transported; however, a fluid release of a temporary nature caused by a leakage at flanges, packing glands, and similar fittings, that can be corrected by mechanical adjustments such as the tightening of bolts, is not considered a failure. This definition is only applicable to the pipelines addressed in this directive.

Failures, as defined hereinabove, of a pipeline under this Directive must be reported immediately to ABSA, per Section 35 of the PESR, and a written report must also be submitted to ABSA without delay. The failure will be investigated by ABSA as a pressure equipment incident, and the conclusions of the investigation will be provided to the ERCB. In certain circumstances, ABSA and the ERCB may conduct a joint investigation of the incident. If a failure causes the injury or death of any person, the failure investigation may also involve representatives of Workplace Health and Safety and other regulatory authorities.

7) Changes to Registered Designs

Changes to a registered design will be handled by ABSA, in accordance with Section 22 of the PESR. A submission for registration of a change to an existing registered design must clearly indicate what has changed.

Management of change procedures must be in place to ensure appropriate engineering consideration is given to any proposed changes to the design of the system. This requirement applies throughout the design, construction and in-service life of the pipeline.

The ABSA process does not provide for design registration of an existing ERCB regulated pipeline to accommodate a change to steam service from existing service with any other fluid.

IV TREATMENT OF EXEMPTIONS

Details for exemptions and treatment of exemptions are as prescribed under Section 3.4 of Part B of the ERCB Directive 077. In general:

- 1) Temporary steam pipelines of a capacity greater than 0.5 cubic metres (m³) require design registration, without regards to the length of time they are to be in service. The usual ABSA registration procedure applies.
- 2) Steam pipelines confined strictly within the facility surface lease boundaries of a steam generating plant, satellite, battery or well site, and steam manifolds and measuring facilities at multi-well satellites are considered to form pressure piping systems, as defined in the PESR, and are not exempted from registration by ABSA if of a capacity greater than 0.5 cubic metres (m³). The usual ABSA registration procedure applies.

V STATUTES AND REGULATIONS REFERENCED

References in this Directive to statutes and regulations include amendments thereto made from time to time.

<original signed by>

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ANNEX A

Steam Pipeline Overpressure Protection by System Design (OPPSD) Requirements

When an owner, or an owner's agent with the concurrence of the owner, proposes the use of pipelines without using a PRV for overpressure protection, then other means of overpressure protection shall be proposed. At a minimum, the following information will be required for the application to be considered:

- a) **Pipeline list** - A detailed list of pipelines to which the overpressure protection by system design (OPPSD) is proposed to apply, on a numbered document with revision number, with a PEng / PE stamp;
- b) **Technical Justification for using OPPSD in lieu of PRV** - A written justification needs to be provided that will include the owner's proposed technical justification for using OPPSD in pipelines included in the list above. Acceptable justification must relate to safety.
- c) **Design Basis** - The design basis for the OPPSD needs to include:
 - how maximum system upset pressure was established, and
 - how the margin between maximum operating and design conditions was established.

Note: For steam pipelines with OPPSD, the design submission needs to show that the maximum upset pressure in the each steam pipeline does not exceed the design pressure.
- d) **Analysis** – A document that summarizes the results from hazards and operability analysis (HazOp), failure modes, effects and criticality analysis (FMECA), "what-if" analysis, or other equivalent methodology is required. This document must summarize the analyses based on the design pressures proposed for all systems included with the OPPSD. ABSA does not necessarily need to receive the actual documents detailing these analyses; the summary will usually be sufficient. If an owner is doing the engineering work, the analysis needs to have a signature of an owner's authorized representative and be stamped by P. Eng. Otherwise, analysis need to be stamped by P. Eng. In addition, they need to be co-signed by an authorized representative of the owner and an authorized representative of the owner's agent (EPCM) doing the engineering work.

- e) **Monitoring System** – A description of the monitoring program proposed to be used as part of the OPPSD shall be provided and be acceptable to ABSA.

The monitoring program must address:

- Calibration, maintenance and testing requirements and records for monitoring devices and instrumentation;
- Continuous recording of operating conditions of all pipelines subject to OPPSD;
- Administrative procedures to initiate an internal investigation if the system pressure exceeds maximum operating pressure. The ultimate purpose of such investigation is to avoid such a scenario from ever recurring.

- f) **Owner Statement** – A representative authority from the owner shall provide ABSA with a separate letter, on their letterhead, acknowledging their responsibility for OPPSD. The letter shall include statements to the effect:

- the owner accepts the OPPSD as presented and all risks associated with it;
- the owner will update its operating procedures and documentation to ensure that operators are informed about the systems safeguarded by OPPSD, and that no changes to safe operating limits per PESR 37(e) are permitted;
- the owner will create and maintain management-of-change procedures which will prohibit any changes to the maximum operating conditions of the systems safeguarded by OPPSD, without first obtaining express written acceptance from ABSA for the change;
- the owner will update its Integrity Management System to specifically address the OPPSD, the pipelines protected by it, the required frequency of related HAZOPs, how the owner is monitoring all affected pipelines, how redundancy and calibration of monitoring devices is maintained, and lists all records that are kept in relation to the monitored equipment and monitoring devices;
- a safe shutdown of plant equipment and / or reduction in pressure will occur in the event that pressure exceeds safe operating limits per PESR 37(e);
- the owner, as vendor, will notify the purchaser of a steam pipeline which relies on OPPSD of their duty to satisfy all requirements of this Directive. The owner needs to provide steam pipeline records to the person who acquires it;

- if the pipeline pressure exceeds safe operating limits per Section 37(e) of the PESR, it constitutes a reportable unsafe condition per Section 35 of the PESR. In the event of such an overpressure event, the Administrator shall be notified in writing according to Section 35 of the PESR; and
- the owner will involve ABSA field inspectors for initial and periodic reviews and acceptance of the above-noted documents and records relating to management of change, operating procedures, and the Integrity Management System.

Superseded by IB10-006 Rev.1