

Reference Tool for *Directive 056*: Instructions for Increasing H₂S Partial Pressure of Existing Oil Effluent Pipelines

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1 Introduction

This document addresses self-disclosure and pipeline licence amendment applications to increase the licensed limits of hydrogen sulphide (H₂S) content or maximum operating pressure for existing oil effluent pipelines **licensed prior to January 1, 2008**, that result in H₂S partial pressure increases over certain thresholds. It includes instruction that is supplementary to that given in *Directive 056: Energy Development Applications and Schedules*. The General Principles section below provides common instructions for oil effluent pipelines. Sections 3 through 5 provide additional detailed instructions for self-disclosure and licence amendment applications. For those, the applicant must submit a nonroutine application by checking “no” to question 3 in Section 7 on Schedule 3 of *Directive 056* and including the information listed. All Participant Involvement requirements as specified in Table 6.2 of *Directive 056* must be met prior to submitting any application.

2 General Principles

- The Alberta *Pipeline Regulation* adopts *CSA Standards Z662, Z245.1, Z245.11, Z245.12, and Z245.15* as the minimum requirements applicable to oil and gas pipelines in Alberta.
- *CSA Standards Z245.11, Z245.12, and Z245.15* require that flanges, fittings, and valves must be resistant to sulphide stress cracking (SSC) in Region 3 sour service, as defined in *NACE MR0175/ISO 15156*. Therefore, all evaluations of flanges, fittings, and valves must determine the compatibility with Region 3 requirements.
- *CSA Z662* and *Z245.1* specify the requirements for pipe. The pipe is not required to meet *NACE MR0175/ISO 15156* Region 3 specifications, but pipe evaluations must determine compatibility with current *CSA Z245.1* requirements for sour service pipe.
- Oil effluent pipelines licensed on or after January 1, 2008, must meet all applicable requirements of *CSA Z662-07*.
- The existing *ERCB Reference Tool for Sour Service Conversions of Existing Carbon Steel Pipelines* cites *CAN/CSA Z662-03*, not the current *CSA Z662-07*. The *ERCB* document is being revised; meanwhile, the concepts in it remain applicable. The specific requirements in *CAN/CSA Z662-07* dealing with sour service are addressed in Clause 16, and the requirements dealing with integrity of pipeline systems, change in service fluid, and engineering assessments are addressed in Clause 10.14.
- Existing oil effluent pipelines licensed prior to January 1, 2008, with an existing H₂S partial pressure between 0.30 and 70 kilopascals (kPa) that experience a change in service conditions resulting in an H₂S partial pressure increase may continue to operate within compliance, providing that they remain an oil effluent pipeline with H₂S partial pressure at or below 70 kPa. However, self-disclosures and licence amendment applications must be submitted to the Facilities Applications Group to ensure accurate licence records.

Applications for this group of pipelines may be made as routine and are described as Case 1 in the attached table.

- When filing an application, the existing category type is to be as defined in Table 6.1 of the 2008 edition of *Directive 056*. This may result in an existing pipeline changing category automatically.
- If requesting to amend a licence that results in H₂S partial pressure above 70 kPa, the licensee must conduct a complete sour service conversion evaluation, as described in the *Reference Tool for Sour Service Conversions*. For self-disclosures, sour service operating history will not be acceptable as a justification to license a pipeline above 70 kPa H₂S partial pressure.
- The licensee is responsible to perform the evaluations necessary to satisfy itself that the pipeline is suitable for the desired licensed operating conditions and to present the complete engineering justification to the ERCB.

3 Instruction for Self-Disclosures—Actual H₂S Partial Pressure of 0.30-70 kPa

In addition to the above general principles, the following instructions are specific to self-disclosures for existing oil effluent pipelines with an actual H₂S partial pressure between 0.30 and 70 kPa. This applies to a pipeline licensed prior to January 1, 2008, and

- currently licensed for zero H₂S or H₂S content resulting in partial pressure ≤ 0.30 kPa;
- currently operating with H₂S partial pressure between 0.30 and 70 kPa; and
- being self-disclosed to relicense to any H₂S partial pressure between 0.30 and 70 kPa.

Supporting information presented with the self-disclosure must

- 1) demonstrate suitability of materials, using conclusive evidence of successful sour service operating history (no indications of cracks due to sour service) over the last two years for each pipeline segment—if records of sour service operating history over the last two years are not available or are not conclusive, the licensee must conduct an analysis of the welds, pipe, valves, flanges, and fittings to determine suitability for sour service, in accordance with the *Reference Tool for Sour Service Conversion*; any materials that cannot be confirmed as suitable for sour service must be replaced; and
- 2) include an engineering assessment considering the results of work completed in (1) above and as described in the *Reference Tool for Sour Service Conversion* that clearly demonstrates that the pipeline segments have suitable long-term integrity for operation in the desired licence conditions of H₂S partial pressure at or below 70 kPa.

These applications are described as Case 2 in the attached table.

4 Instruction for Licence Amendments—Proposed H₂S Partial Pressure of 0.30-70 kPa

In addition to the above general principles, the following instructions are specific to licence amendments for oil effluent pipelines with proposed H₂S partial pressure between 0.30 and 70 kPa. This applies to a pipeline licensed prior to January 1, 2008, that is

- currently licensed and operating with zero H₂S or H₂S content resulting in partial pressure ≤ 0.30 kPa, and
- proposed to be licensed at an H₂S partial pressure between 0.30 and 70 kPa.

Supporting information presented with the licence amendment application must

- 1) demonstrate the suitability of materials for sour service by presenting an analysis of the welds, pipe, valves, flanges, and fittings, in accordance with the *Reference Tool for Sour Service Conversion*; any materials that cannot be confirmed as suitable for sour service must be replaced; and
- 2) include an engineering assessment considering the results of work completed in (1) above and as described in the *Reference Tool for Sour Service Conversion* that clearly demonstrates that the pipeline segments have suitable long-term integrity for operation in the desired licence conditions of H₂S partial pressure at or below 70 kPa.

These applications are described as Case 3 in the attached table.

5 Instruction for Licence Amendments and Self-Disclosures—H₂S Partial Pressure above 70 kPa

In addition to the above general principles, the following instructions are specific to licence amendments and self-disclosures for existing oil effluent pipelines with a proposed or actual H₂S partial pressure above 70 kPa. This applies to a pipeline licensed prior to January 1, 2008, that is

- currently licensed and operating with H₂S partial pressure at or below 70 kPa and proposing to be licensed for an H₂S partial pressure above 70 kPa (licence amendment), or
- currently licensed for H₂S partial pressure at or below 70 kPa and self-disclosing to relicense for H₂S partial pressure above 70 kPa (self-disclosure).

Any licensee filing a licence amendment application or self-disclosure for licensing above 70 kPa H₂S partial pressure must conduct a complete sour service conversion evaluation as described in the *Reference Tool for Sour Service Conversion*.

The supporting information presented with the licence amendment application or self-disclosure must

- 1) demonstrate suitability of materials for sour service by presenting an analysis of the welds, pipe, valves, flanges, and fittings, in accordance with the *Reference Tool for Sour Service Conversion*; any materials that cannot be confirmed as suitable for sour service must be replaced;
- 2) demonstrate that the requirements in *CAN/CSA Z662-07*, Clause 16, for multiphase pipelines with H₂S partial pressure above 70 kPa have been met (such additional requirements include design to accommodate internal maintenance cleaning and inspection devices, improved weld quality, and allowable repair methods for internal corrosion); and
- 3) include an engineering assessment considering the results of work completed in (1) and (2) above and as described in the *Reference Tool for Sour Service Conversion* that clearly demonstrates that the pipeline segments have suitable long-term integrity for operation in the desired licence conditions of H₂S partial pressure above 70 kPa.

These applications are described as Cases 4, 5, and 6 in the attached table.

Instructions for Oil Effluent Pipeline Applications for Pipelines Licensed Prior to January 1, 2008—H₂S Partial Pressure Increase

Case	Current licence	Current service	Requested licence	Action	Type of application
1	>0.3 to 70 kPa H ₂ S partial pressure	>0.3 to 70 kPa H ₂ S partial pressure	>0.3 to 70 kPa H ₂ S partial pressure	Conduct engineering assessment; no documents submitted	Self-disclosure or amendment; Routine
2	0 to ≤ 0.3 kPa H ₂ S partial pressure	>0.3 to 70 kPa H ₂ S partial pressure	>0.3 to 70 kPa H ₂ S partial pressure	Confirm materials via service history; confirm suitable long-term integrity; confirm applicable Clause 16 compliance	Self-disclosure; Nonroutine
3	0 to ≤ 0.3 kPa H ₂ S partial pressure	0 to ≤ 0.3 kPa H ₂ S partial pressure	>0.3 to 70 kPa H ₂ S partial pressure	Confirm materials via conversion assessment; confirm suitable long-term integrity; confirm applicable Clause 16 compliance	Amendment; Nonroutine
4	0 to ≤ 0.3 kPa H ₂ S partial pressure, OR >0.3 to 70 kPa H ₂ S partial pressure	0 to ≤ 0.3 kPa H ₂ S partial pressure, OR >0.3 to 70 kPa H ₂ S partial pressure	> 70 kPa H ₂ S partial pressure	Confirm materials via conversion assessment; confirm suitable long-term integrity; confirm full Clause 16 compliance	Amendment; Nonroutine
5	0 to ≤ 0.3 kPa H ₂ S partial pressure, OR >0.3 to 70 kPa H ₂ S partial pressure	> 70 kPa H ₂ S partial pressure	> 70 kPa H ₂ S partial pressure	Confirm materials via conversion assessment; confirm suitable long-term integrity; confirm full Clause 16 compliance	Self-disclosure; Nonroutine
6	0 to ≤ 0.3 kPa H ₂ S partial pressure	>0.3 to 70 kPa H ₂ S partial pressure	> 70 kPa H ₂ S partial pressure	Confirm materials via conversion assessment; confirm suitable long-term integrity; confirm full Clause 16 compliance	Self-disclosure; Nonroutine