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# Standard Practice

# Stress Corrosion Cracking (SCC) Direct Assessment Methodology

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## Foreword

Stress corrosion cracking direct assessment (SCCDA) is a structured process that is intended to assist pipeline companies in assessing the extent of stress corrosion cracking (SCC) on a section of buried pipeline and thus contribute to their efforts to improve safety by reducing the impact of external SCC on pipeline integrity.

Primary guidance for managing the integrity of a natural gas pipeline that has a risk of containing stress corrosion cracks is provided in Part A3 of ASME[(1)] B31.8S.1[1] which identifies several options for assessment and mitigation. Additional guidance for management of the integrity of natural gas and liquid petroleum pipelines subject to near-neutral-pH SCC is provided in the CEPA[(2)] Stress Corrosion Cracking Recommended Practices.[2] When applying guidance found in these documents to liquids pipelines, the potential for fatigue and/or corrosion fatigue must be considered in order to establish appropriate assessment intervals and mitigation activities.

The standard practice for SCCDA presented in this standard addresses the situation in which a pipeline company has identified a portion of its pipeline as an area of interest with respect to SCC based on its history, operations, and risk assessment process and has decided that direct assessment is an appropriate approach for integrity assessment. This standard provides guidance for managing SCC by selecting potential pipeline segments, selecting dig sites within those segments, inspecting the pipe, collecting and analyzing data during the dig, establishing a mitigation program, defining the reevaluation interval, and evaluating the effectiveness of the SCCDA process.

This standard practice is intended for use by pipeline operators and others who must manage pipeline integrity for the threat of SCC. SCCDA as described in this standard is specifically intended to address buried onshore petroleum (natural gas, crude oil, and refined products) production, transmission, and distribution pipelines constructed from line pipe steels. Users of this standard must be familiar with all applicable pipeline safety regulations for the jurisdiction in which the pipeline operates. This includes all regulations requiring specific pipeline integrity assessment practices and programs.

This standard was originally prepared in 2004 by NACE Task Group (TG) 273, “Stress Corrosion Cracking Direct Assessment, External,” which is administered by Specific Technology Group (STG) 35, “Pipelines, Tanks, and Well Casings.” It was reaffirmed in 2008 by STG 35 and revised in 2015 by TG 273. This standard is issued by NACE under the auspices of STG 35.

In NACE standards, the terms *shall, must, should*, and *may* are used in accordance with the definitions of these terms in the *NACE Publications Style Manual*. The terms *shall* and *must* are used to state a requirement, and are considered mandatory. The term *should* is used to state something good and is recommended, but is not considered mandatory. The term *may* is used to state something considered optional.

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## Section 1: General

1.1 Introduction

1.1.1 This standard covers the NACE SCCDA process for buried steel pipeline systems. It is intended to serve as a guide for applying the NACE SCCDA process on typical petroleum (natural gas, crude oil, and refined products) pipeline systems. Background information may be obtained from NACE Publication 35103.[3]

1.1.2 SCCDA as described in this standard is specifically intended to address buried onshore petroleum (natural gas, crude oil, and refined products) pipelines constructed from line pipe steel.

1.1.2.1 This procedure is designed to be applied to both forms of external SCC (near-neutral-pH SCC and high-pH SCC) on these pipelines.

1.1.3 SCCDA requires the integration of data from historical records, indirect surveys, field examinations, and pipe surface evaluations (i.e., direct examination) combined with the physical characteristics and operating history of the pipeline.

1.1.4 This standard was written as a flexible guideline for an operator to tailor the SCCDA process to specific pipeline situations. Nothing in this standard is intended to preclude modifications that tailor the SCCDA process to specific pipeline situations and operators.

1.1.5 SCCDA is a continuous improvement process. Through successive applications, SCCDA should identify and address locations where SCC has occurred, is occurring, or might occur.

1.1.5.1 SCCDA provides the advantage and benefit of indicating areas where SCC might occur in the future rather than only areas where SCC is known to exist.

1.1.5.2 Comparing the results of successive SCCDA applications is one method of evaluating SCCDA effectiveness and demonstrating that confidence in the integrity of the pipeline is continuously improving.

1.1.6 SCCDA was developed as a process for improving pipeline safety. Its primary purpose is to reduce the threat of external SCC on pipeline integrity by means of condition monitoring, mitigation, documentation, and reporting.

1.1.6.1 This standard assumes SCC is a threat to be evaluated. It can be used to establish a baseline from which future SCC can be assessed for pipelines on which SCC is not currently a significant threat.

1.1.7 SCCDA is complementary to other inspection methods such as in-line inspection (ILI) or hydrostatic testing, and is not necessarily an alternative or replacement for these methods in all instances. SCCDA is also complementary to other direct assessment procedures such as those given in NACE SP0206.[4]

1.1.7.1 ILI or hydrostatic testing might not be warranted based on the initial SCCDA assessment of the pipeline system.

1.1.7.2 SCCDA can be used to prioritize a pipeline system for ILI or hydrostatic testing if SCC is found that is sufficient to warrant general mitigation as defined by Paragraph 6.2.3.

1.1.8 SCCDA may detect other pipeline integrity threats, such as mechanical damage, external corrosion, etc. When such threats are detected, additional assessments or inspections shall be performed. The pipeline operator shall use appropriate methods such as ASME B31.8S,[1] ASME B31.4,[5] ASME B31.8,[6] API[(3)] 1160,[7] NACE standards, international standards, and other documents to address risks other than external SCC.

1.1.9 SCCDA can be applied to most onshore petroleum pipelines, regardless of the coating system. Precautions should be taken when applying these techniques just as with other assessment methods.

1.1.10 Given the diversity of pipelines and their operation, this standard recognizes that SCCDA may be inappropriate for some situations because of the complexity of conditions to which buried pipeline systems are exposed.

1.1.11 The provisions of this standard shall be applied under the direction of competent persons who, by reason of knowledge of the physical sciences and the principles of engineering, geosciences, and mathematics, acquired by

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