CSA N290.15:19

Requirements for the safe operating envelope of nuclear power plants

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Contents

Technical Committee on Reactor Safety and Risk Management *2*

Technical Subcommittee on Requirements for the Safe Operating Envelope of Nuclear Power Plants *4*

Preface *5*

0 Introduction *6*
0.1 General *6*
0.2 Objectives *6*
0.3 Benefits *6*

1 Scope *7*

2 Reference publications *7*

3 Definitions and abbreviations *8*
3.1 Definitions *8*
3.2 Abbreviations *11*

4 SOE requirements *11*

Annex A (informative) — Guidance for operating CANDU® nuclear power plants *14*

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Preface

This is the second edition of CSA N290.15, *Requirements for the safe operating envelope of nuclear power plants*. It supersedes the previous edition published in 2010.

The CSA N-Series Standards provide an interlinked set of requirements for the management of nuclear facilities and activities. CSA N286 provides overall direction to management to develop and implement sound management practices and controls, while the other CSA Group nuclear Standards provide technical requirements and guidance that support the management system. This Standard works in harmony with CSA N286 and does not duplicate the generic requirements of CSA N286; however, it may provide more specific direction for those requirements.

Users of this Standard are reminded that the design, manufacture, construction, commissioning, operation, and decommissioning of nuclear facilities in Canada are subject to the provisions of the Nuclear Safety and Control Act and its supporting Regulations.

This Standard has been prepared by the Subcommittee on Requirements for Safe Operating Envelope of Nuclear Power Plants, under the jurisdiction of the Technical Committee on Reactor Safety and Risk Management and the Strategic Steering Committee on Nuclear Standards, and has been formally approved by the Technical Committee.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
3) *This Standard was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
4) *To submit a request for interpretation of this Standard, please send the following information to* ***inquiries@csagroup.org*** *and include "Request for interpretation" in the subject line:*
   a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
   b) *provide an explanation of circumstances surrounding the actual field condition; and*
   c) *where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

   Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are available on the* Current Standards Activities *page at* ***standardsactivities.csa.ca****.*
5) *This Standard is subject to review within five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to* ***inquiries@csagroup.org*** *and include "Proposal for change" in the subject line:*
   a) *Standard designation (number);*
   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

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Requirements for the safe operating envelope of nuclear power plants

0 Introduction

0.1 General

The licensing of a nuclear power plant (NPP) requires the following:

a) a detailed safety evaluation to demonstrate its safe operation;
b) a set of operating limits; and
c) operation of the NPP to be in accordance with the safety evaluation and operating limits.

The analysis limits for operating parameters and availability conditions for equipment are a key element of the essential requirements for safe NPP operation.

The set of limits and conditions associated with these essential safety requirements forms the safe operating envelope (SOE). Inclusion in the SOE is based on those aspects of safe NPP operation for which the operating organization is responsible to demonstrate compliance and to take corrective action in cases of non-compliance.

Note: *In Canada, the Licence Conditions Handbook, which provides compliance verification criteria used to verify compliance with the conditions in the licence, states that the SOE is part of the licensing basis.*

0.2 Objectives

A successfully implemented and managed SOE program ensures that

a) the SOE, as expressed in terms of the limits and conditions that govern NPP operation in compliance with the deterministic safety analysis, is clearly, completely, and consistently defined and fully reflected in the documentation that governs NPP operation;
b) the SOE and the basis for its derivation are contained in a set of documentation that can be readily referenced by users requiring an understanding of the basis for safe NPP operation;
c) a compliance framework that avoids NPP operation outside of the SOE, ensures timely detection of NPP operation outside of the SOE, and specifies appropriate and timely corrective actions to restore NPP operation to within the SOE has been established; and
d) the SOE is kept up to date within the context of other processes.

0.3 Benefits

The benefits of achieving the objectives listed in Clause 0.2 can include enhanced

a) safety of NPP operation and nuclear safety, by assuring that important deterministic safety analysis parameters are recognized and are monitored and controlled accordingly;
b) change control process, by improving the documented baseline against which the safety implications of changes or unplanned events can be assessed;
c) safety culture, by promoting more widespread awareness, understanding, and acceptance of the basis for the constraints imposed on safe NPP operation;
d) generation performance and economics, by removing ambiguity around the constraints imposed on safe NPP operation; and

e) regulatory relationship, by allowing compliance with the constraints imposed on safe NPP operation to be demonstrated rigorously.

1 Scope

1.1

This Standard outlines a consensus approach to defining, implementing, and maintaining the SOE at NPPs. Additional guidance is provided in Annex A for operating CANDU® NPPs.

1.2

In this Standard, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below.

CSA Group

N290.9-19
Reliability and maintenance programs for nuclear power plants

N290.16-16
Requirements for beyond design basis accidents

N290.19-18
Risk-informed decision making for nuclear power plants

ANSI/ISA (American National Standards Institute/International Society of Automation)

S67.04.01-2006 (R2011)
Setpoints for Nuclear Safety-Related Instrumentation

CNSC (Canadian Nuclear Safety Commission)

REGDOC-2.4.1 (2014)
Deterministic Safety Analysis