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**N290.18-17**

# **Periodic safety review for nuclear power plants**

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# Contents

Technical Committee on Reactor Safety and Risk Management	4
Subcommittee on Periodic Safety Review for Nuclear Power Plants	6
Preface	7
<b>0 Introduction</b>	<b>8</b>
0.1 Reactor technology context	8
0.2 Graded approach	8
0.3 The periodic safety review process	8
0.4 First PSR and subsequent PSR	9
0.5 PSR initiation and process	10
0.6 Safety factors	10
<b>1 Scope</b>	<b>10</b>
<b>2 Reference publications</b>	<b>11</b>
<b>3 Definitions and abbreviations</b>	<b>12</b>
3.1 Definitions	12
3.2 Abbreviations	16
<b>4 Overview of a PSR</b>	<b>16</b>
4.1 PSR interval	16
4.2 PSR scope	17
4.3 Immediate NPP safety	17
4.4 Support of continued safe operation	17
4.5 Management of the PSR process – Project plan	17
4.6 Peer review	17
<b>5 The PSR basis document</b>	<b>18</b>
5.1 PSR basis document content	18
5.1.1 Operating strategy	18
5.1.2 Current baseline	18
5.1.3 Scope	18
5.1.4 Methodology	18
5.1.5 Additional requirements for PSR for long-term operation	21
5.1.6 Unit-specific, multi-unit, and site-specific issues	21
5.1.7 Common PSR	21
5.2 Modern requirements documents and practices	21
5.2.1 Selection and hierarchy of modern requirements documents and practices	21
5.2.2 Selection of type of review against modern requirements documents and practices	22
5.2.3 Emerging issues	23
5.3 Safety factor review	23
5.3.1 Identify safety factors	23
5.3.2 Safety factor information	23
5.3.3 Identification and categorization of safety factor findings	24

5.3.4	Interfaces and interdependencies between safety factors	24
5.4	Global assessment methodology	24
5.5	Preparing the IIP methodology	24
<b>6</b>	<b>Review against modern requirements documents and practices</b>	<b>25</b>
6.1	Review methodology	25
6.2	Clause-by-clause reviews	25
6.3	High level reviews	26
6.4	Incremental reviews	26
<b>7</b>	<b>Safety factor reports</b>	<b>26</b>
7.1	Generic requirements for safety factor reports	26
7.1.1	Description of review process	26
7.1.2	Statement of objective	26
7.1.3	Use of previous reviews	27
7.1.4	Interfaces with other safety factor reports	27
7.1.5	Safety factor review process	27
7.1.6	Safety factor report content	29
7.2	Requirements for safety factor reviews	29
7.2.1	Safety factor 1 — Plant design	29
7.2.2	Safety factor 2 — Actual condition of SSCs important to safety	30
7.2.3	Safety factor 3 — Equipment qualification	30
7.2.4	Safety factor 4 — Aging	30
7.2.5	Safety factor 5 — Deterministic safety analysis	31
7.2.6	Safety factor 6 — PSA	32
7.2.7	Safety factor 7 — Hazard analysis	32
7.2.8	Safety factor 8 — Safety performance	32
7.2.9	Safety factor 9 — Use of experience from other NPPs (OPEX) and research findings	33
7.2.10	Safety factor 10 — Organization, management system, and safety culture	33
7.2.11	Safety factor 11 — Procedures	34
7.2.12	Safety factor 12 — Human factors	34
7.2.13	Safety factor 13 — Emergency planning	34
7.2.14	Safety factor 14 — Radiological impact on the environment	35
7.2.15	Safety factor 15 — Radiation protection	35
<b>8</b>	<b>Global assessment</b>	<b>36</b>
8.1	General	36
8.2	Consolidate safety factor findings into global issues and strengths	37
8.3	Assess global issues	37
8.4	Evaluate proposed resolutions	38
8.5	Action prioritization	38
8.6	Overall statement of acceptable operation	39
8.7	Global assessment report (GAR)	39
<b>9</b>	<b>IIP</b>	<b>39</b>
9.1	Development of IIP	39
9.2	IIP change control process	40
9.3	IIP implementation	40
9.4	Integrated Implementation Plan (IIP)	40

Annex A (informative) — Sample methodology for safety factor reviews 48

Annex B (informative) — Guidance on review against modern requirements documents and practices 51

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# Technical Committee on Reactor Safety and Risk Management

<b>M.K. O'Neill</b>	Ian Martin Limited, Scarborough, Ontario <i>Category: Service Industry</i>	<i>Chair</i>
<b>L. Gilbert</b>	Bruce Power, Tiverton, Ontario <i>Category: Owner/Operator/Producer</i>	<i>Vice-Chair</i>
<b>J. Luxat</b>	McMaster University, Hamilton, Ontario <i>Category: General Interest</i>	<i>Vice-Chair</i>
<b>M. Buckler</b>	Bruce Power, Tiverton, Ontario	<i>Associate</i>
<b>D. Burger</b>	Ontario Power Generation, Courtice, Ontario <i>Category: Owner/Operator/Producer</i>	
<b>B. Chan</b>	Technical Standards & Safety Authority, Toronto, Ontario <i>Category: Government and/or Regulatory Authority</i>	
<b>Q.B. Chou</b>	Canadian Power Utility Services Ltd. (CPUS), Toronto, Ontario	<i>Associate</i>
<b>V. Chugh</b>	Power Generation Integrated Engineering, Toronto, Ontario <i>Category: General Interest</i>	
<b>R. Clavero</b>	CANDU Owners Group Inc., Toronto, Ontario	<i>Associate</i>
<b>D. Cornick</b>	Canadian Nuclear Laboratories Limited (CNL), Chalk River, Ontario <i>Category: Owner/Operator/Producer</i>	
<b>C. Harwood</b>	Canadian Nuclear Safety Commission (CNSC), Ottawa, Ontario	<i>Associate</i>

<b>R. Henry</b>	Amec Foster Wheeler, Toronto, Ontario <i>Category: Service Industry</i>	
<b>W.K. Lam</b>	Ontario Ministry of Energy, Toronto, Ontario <i>Category: Government and/or Regulatory Authority</i>	
<b>P. Lawrence</b>	Kinectrics Inc., Pickering, Ontario <i>Category: Service Industry</i>	
<b>L. Luckhardt</b>	GE Oil and Gas, Dundas, Ontario	<i>Associate</i>
<b>D. Mullin</b>	NB Power Corporation, Lepreau, New Brunswick <i>Category: Owner/Operator/Producer</i>	
<b>M. Musat</b>	Ontario Power Generation Inc., Pickering, Ontario	<i>Associate</i>
<b>M. Reid</b>	CANDU Owners Group Inc., Toronto, Ontario <i>Category: General Interest</i>	
<b>P. Santamaura</b>	SNC-Lavalin Nuclear Inc., Mississauga, Ontario <i>Category: Service Industry</i>	
<b>A. Viktorov</b>	Canadian Nuclear Safety Commission (CNSC), Ottawa, Ontario <i>Category: Government and/or Regulatory Authority</i>	
<b>A. Wolf</b>	CSA Group, Toronto, Ontario	<i>Project Manager</i>

# ***Subcommittee on Periodic Safety Review for Nuclear Power Plants***

<b>J. Luxat</b>	McMaster University, Hamilton, Ontario	<i>Chair</i>
<b>R. Clavero</b>	CANDU Owners Group Inc., Toronto, Ontario	<i>Vice-Chair</i>
<b>A.C. Dennier</b>	Amec Foster Wheeler, Toronto, Ontario	
<b>M. Jansen</b>	Canadian Power Utility Services Ltd. (CPUS), Toronto, Ontario	
<b>S. Mistry</b>	Canadian Nuclear Laboratories Limited (CNL), Chalk River, Ontario	
<b>D. Mullin</b>	NB Power Corporation, Lepreau, New Brunswick	
<b>A. Omar</b>	Canadian Nuclear Safety Commission (CNSC), Ottawa, Ontario	
<b>M. Ruffolo</b>	Ontario Power Generation, Pickering, Ontario	
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<b>M. Trandafirescu</b>	Candesco Division of Kinectrics Inc., Toronto, Ontario	
<b>M. Wrightsell</b>	Bruce Power Inc., Tiverton, Ontario	
<b>C. ...</b>	SNC-Lavalin Nuclear Inc., Mississauga, Ontario	
<b>A. Wolf</b>	CSA Group, Toronto, Ontario	<i>Project Manager</i>

# Preface

This is the first edition of CSA N290.18, *Periodic safety review for nuclear power plants*.

This Standard provides requirements regarding the conduct of a periodic safety review in accordance with CNSC regulatory document REGDOC-2.3.3, *Periodic Safety Reviews*. This Standard is consistent with the IAEA's Specific Safety Guide No. SSG-25, *Periodic Safety Review for Nuclear Power Plants*.

Users of this Standard are reminded that the site selection, design, manufacture, construction, installation, commissioning, operation, and decommissioning of nuclear facilities in Canada are subject to the *Nuclear Safety and Control Act* and its *Regulations*. The Canadian Nuclear Safety Commission might impose additional requirements to those specified in this Standard.

The CSA N-Series Standards provide an interlinked set of requirements for the management of nuclear facilities and activities. The CSA N286 Standard 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 might provide more specific direction for those requirements.

This Standard was prepared by the Subcommittee on Periodic Safety Review for 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.*
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  - 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.*

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  - a) *Standard designation (number);*
  - b) *relevant clause, table, and/or figure number;*
  - c) *wording of the proposed change; and*
  - d) *rationale for the change.*

# N290.18-17

## *Periodic safety review for nuclear power plants*

### 0 Introduction

#### 0.1 Reactor technology context

This Standard reflects the operating experience of the Canadian nuclear industry but is written to be technology neutral.

#### 0.2 Graded approach

A graded approach, commensurate with risk, may be defined and used when applying the requirements and guidance contained in this Standard.

**Note:** *CSA N286, CNSC REGDOC-2.4.1, and IAEA TECDOC 1740 provide direction with respect to a graded approach.*

#### 0.3 The periodic safety review process

##### 0.3.1

The periodic safety review (PSR) is a systematic and comprehensive nuclear safety assessment of the nuclear power plant (NPP) carried out at regular intervals by the operating organization. The assessment includes the review against the design, condition, and operation elements of the NPP that are considered important to nuclear safety.

The objective of the assessment is to identify practicable nuclear safety enhancements of the facility to a level approaching that of modern requirements documents or practices.

The assessment documents

- a) the extent to which the facility conforms to modern requirements documents and practices;
- b) the extent to which the nuclear safety documentation remains valid;
- c) the adequacy and effectiveness of the programs and the structures, systems, and components (SSCs) that are in place to ensure plant nuclear safety until the next PSR; and
- d) the required nuclear safety enhancements to be implemented to resolve any gaps identified in the review and timelines for their implementation.

**Note:** *Detailed PSR objectives can be found in the guidance to Clause 2 of CNSC REGDOC-2.3.3 and Clause 2.9 of IAEA SSG-25.*

##### 0.3.2

The PSR process is illustrated schematically in Figure 1, showing four phases:

- a) development of a PSR basis document;
- b) conducting the review of safety factors;
- c) performing the global assessment; and
- d) developing the integrated implementation plan (IIP).

### 0.3.3

In Phase 1 of the PSR process, a PSR basis document is developed (see Clause 5).

**Note:** *The PSR basis document is typically submitted to the authority having jurisdiction (AHJ) for acceptance.*

### 0.3.4

In Phase 2 of the PSR process, the safety factors are reviewed and the results documented in safety factor reports.

**Note:** *The safety factor reports are typically submitted to the AHJ for review.*

### 0.3.5

In Phase 3 of the PSR process, a global assessment is performed with the results documented in the global assessment report (GAR).

**Note:** *The GAR is typically submitted to the AHJ for review.*

### 0.3.6

In Phase 4 of the PSR process, the IIP is developed and the results documented in an IIP report.

**Note:** *The IIP is typically submitted to the AHJ for acceptance.*

### 0.3.7

Once the IIP is accepted by the AHJ, the PSR process ends and IIP actions are managed through existing processes in the operating organization.

## 0.4 First PSR and subsequent PSR

### 0.4.1

A first PSR is a full-scope PSR conducted typically after 10 years of the first criticality of a newly built NPP. For an existing operating facility, the first PSR could be a full-scope PSR or could be based on the collection of results of previous safety evaluations and assessments, such as systematic review of safety, integrated safety review, or extensive safety evaluation and enhancement performed by the operating organization.

### 0.4.2

A subsequent PSR is an evaluation performed periodically (typically every 10 years) after the first PSR.

### 0.4.3

While being performed to support the continued safe operation of the NPP, a subsequent PSR will be based on previous reviews and would focus on changes in, for example, requirements, industry practices, facility conditions, operating experience, results of audits and self-assessments, R&D programs, and new information.

### 0.4.4

The PSR is complementary to and does not replace routine and non-routine regulatory reviews, inspections, mid-term reports, event reports, special investigations, and other licensing and verification activities required by the AHJ.

## 0.5 PSR initiation and process

Figure 2 shows the two major elements of initiation and execution of a PSR. The initiation element requires experience with the fundamental processes of project management. Details of the execution element are found in Figures 3 and 4.

## 0.6 Safety factors

### 0.6.1

In a PSR, the important aspects of evaluating the continued safe operation of a NPP are termed safety factors.

### 0.6.2

Figure 5 illustrates the hierarchy of documents that is considered during the conduct of the first PSR (Figure 5B) and subsequent PSR (Figure 5C). Figure 5A shows the documents required to establish the first licensing basis (“baseline”) of a newly built NPP.

# 1 Scope

## 1.1

This Standard provides requirements and guidance related to the performance of periodic safety reviews (PSRs) for nuclear power plants (NPPs).

**Note:** *This Standard may be used to provide guidance for nuclear facilities other than NPPs using a graded approach.*

## 1.2

This Standard provides specific requirements and guidance related to the PSR for

- a) development of the basis document;
- b) conducting reviews of modern requirements documents and practices;
- c) conducting safety factor reviews, including identification of safety factor findings;
- d) analysis of safety factor findings, including consolidation of identified gaps and strengths, development of global issues, and preparation of a global assessment report (GAR); and
- e) preparation of the integrated implementation plan (IIP) where the developed global issues are resolved into actions.

## 1.3

This Standard identifies required deliverables that will help facilitate achieving the objectives of the PSR process.

## 1.4

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.

## 1.5

In this Standard, “shall be considered” or “shall consider” means that the user evaluates the impact and documents any decisions.

**Note:** *Decisions could include no action.*

## 2 Reference publications

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

**Note:** *In cases where the editions listed below are amended, replaced by new editions, or superseded by another standard during the life of this referencing Standard, it is the responsibility of the users of this Standard to investigate the possibility of applying those amendments, new editions, or superseding standards.*

### CSA Group

N286-12

*Management system requirements for nuclear facilities*

N286.0.1-14

*Commentary on N286-12, Management system requirements for nuclear facilities*

N290 series of Standards

N290.8-15

*Technical specification requirements for nuclear power plant components*

### CNSC (Canadian Nuclear Safety Commission)

INFO-0795 (2010)

*Licensing Basis Objective and Definition*

REGDOC-2.3.2 (2013)

*Accident Management: Severe Accident Management Programs for Nuclear Reactors*

REGDOC-2.3.3 (2015)

*Periodic Safety Reviews*

REGDOC-2.4.1 (2014)

*Deterministic Safety Analysis*

REGDOC-2.4.2 (2014)

*Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*

REGDOC-2.5.2 (2014)

*Design of Reactor Facilities: Nuclear Power Plants*