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N1600-14

General requirements for nuclear emergency management programs

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Preface

This is the first edition of CSA N1600, *General requirements for nuclear emergency management programs.*

This Standard provides requirements for a comprehensive nuclear emergency management (EM) program embracing the EM components (prevention/mitigation, preparedness, response, and recovery) in keeping with international EM practice, with a predominant focus on preparedness, response, and recovery. It establishes the elements of a continuous improvement process to develop, implement, maintain, and evaluate the EM functions of nuclear facilities and their surrounding communities.

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 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 Technical Committee on General Requirements for Nuclear Emergency Management Programs, under the jurisdiction of 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 publication 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 publication.*

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 five years from the date of publication, and 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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General requirements for nuclear emergency management programs

0 Introduction

Note: *Words that appear in bold throughout the Standard (with the exception of clause titles) are defined in Clause 3, Definitions.*

0.1 General

This Standard establishes criteria for the **emergency management** programs of on- and **off-site** organizations to address nuclear emergencies at Canadian **nuclear power plants** (**NPPs**). The approach taken is aimed at the protection of health and safety, property, and the environment from nuclear emergencies through a risk-based program of **prevention**, **mitigation**, **preparedness**, **response**, and **recovery** (see Clause 0.3). This Standard reflects the convergence seen over the past several years of public and private sector **emergency management** efforts.

This Standard has been developed to help organizations that might be involved in or affected by a potential **nuclear emergency** to establish and implement a **nuclear emergency management program** (**NEMP**) that is appropriate to its needs. These needs could be shaped by legal, regulatory, organizational, and industry requirements, the products and services, the processes employed, the size and structure of the **organization**, and the needs and requirements of its **stakeholders**.

To facilitate its use and adoption, this Standard is aligned with the plan-do-check-act (PDCA) cycle (see Clause 0.2) referred to in other standards as a continual improvement model. This supports consistent and integrated implementation and operation within and between organizations' management systems. This Standard also supports the components of **emergency management** (see Clause 0.3) developed by the federal, provincial, and territorial governments in their document *An Emergency Management Framework for Canada* (Public Safety Canada), which not only establishes a common approach for the various **emergency management** initiatives but also enables consolidation of collaborative work and ensures more coherent, complementary actions among the different **stakeholders**.

This Standard is applicable to all types and sizes of organizations, regardless of whether or not a formal management system is in place.

0.2 Plan-do-check-act (PDCA) cycle

As indicated in Clause 0.1, this Standard is aligned with the PDCA cycle (see Annex A, Figure A.1).

The first phase of the PDCA cycle is the "plan" phase. During this phase, a plan is developed. In this Standard, the "plan" phase is reflected in Clause 4, **Nuclear emergency management program**, specifically Clause 4.2, Planning basis, Clause 4.4, Program management, Clause 4.5, Nuclear emergency response plan, and Clause 4.6, Nuclear emergency recovery plan.

The second phase of the PDCA cycle is the "do" phase. In this phase, the plan is carried out. In this Standard, the "do" phase is reflected in Clause 4.7, Training, Clause 4.8, Facilities and equipment,

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Clause 4.9, Public awareness and education building, Clause 4.10, Exercises, Clause 5, **Response**, and Clause 6, **Recovery**.

The third phase of the PDCA cycle is the "check" phase. In this phase, a review takes place of what was intended and what was observed in the previous step (the "do" phase). It is focused on measuring effectiveness and analyzing for improvement. In this Standard, the "check" phase is covered in Clause 4.10, Exercises, and Clause 7, NEMP evaluation, audit, and review.

In the last phase of the PDCA cycle, "act", action is taken on the causal system to effect the desired change. It is focused on fully implementing the improved solution. In this Standard, the "act" phase is addressed in Clause 7.3, NEMP review, and Clause 8, Management oversight.

0.3 Components of emergency management

Note: *See Annex A, Figure A.2, for examples on how PDCA relates to the **emergency management** components.*

0.3.1 Prevention and mitigation

0.3.1.1 Prevention

Preventing nuclear emergencies from occurring at Canadian **NPPs** is the responsibility of the **NPP** operators. Through the authority of the *Nuclear Safety and Control Act*, the CNSC regulates the Canadian nuclear industry in order to prevent unreasonable risk to the environment, the health and safety of persons, and national security.

In addition to the regulatory requirements of the *Nuclear Safety and Control Act,* CSA nuclear standards promote the safe and reliable operation of the nuclear power industry in Canada, and subsequently support the **prevention** of nuclear emergencies. This includes, but is not limited to, CSA nuclear standards addressing requirements for systems, structures, and components (SSCs); periodic and in-service inspections; fire protection; and environmental qualification. CSA nuclear standards capture leading practices for industry, document operating experience in order to capture and transfer knowledge, benchmark and harmonize with internationally accepted requirements and practices, and are frequently referenced in Licence and Licence Condition Handbooks of **NPPs** across Canada.

Given this comprehensive approach to the **prevention** of nuclear emergencies in Canada, **prevention** is not addressed in depth in this Standard because it is addressed through the requirements of the **AHJ**.

Notes:

1) *"**Prevention**" is defined as actions taken to ensure that a **nuclear emergency** does not occur in the first place, or to reduce its likelihood of occurring.*

2) *A "**prevention** strategy" refers to measures taken by an **organization** which aim to prevent a **nuclear emergency** from occurring or completely avoiding the impacts of such a **nuclear emergency**.*

3) *Examples of **prevention** measures include*

a) *design of systems, operations, and infrastructure;*
b) *location of systems, operations, and infrastructure;*
c) *use of appropriate materials, systems, operations, and infrastructure;*
d) *institution of controls; and*
e) *institution of protection and security measures such as controlled access, quarantine, permits, and clearances.*

0.3.1.2 Mitigation

On-site **mitigation** of nuclear emergencies is the responsibility of the **NPP** operators. **Off-site mitigation** of nuclear emergencies tends to be driven by local authorities, and may comprise structural measures (e.g., dykes, building reinforcements, etc.) or non-structural measures (e.g., land use planning and

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building codes, public awareness, etc.). It is worth noting that Public Safety Canada's National Disaster Mitigation Strategy (NDMS) promotes **mitigation** as an important component of a robust **emergency management** framework.

The NDMS also emphasizes that it is important for all **stakeholders** to commit to working together to support **mitigation** activities in Canada. The development of this Standard is a reflection of this commitment and one avenue through which the integration of nuclear emergency **mitigation** strategies can occur. **Mitigation** is directly touched upon in Clauses 4.1.1 and 4.6.1.5 of this Standard. It is important to note that **mitigation** is not addressed in depth in this Standard.

Note: *Examples of **mitigation** strategies include*

a) *recognizing, removing, or reducing the potential consequence of the hazard;*
b) *integrating risk **mitigation** strategies into the design of program initiatives for those assumptions with the highest risk rating;*
c) *integrating continuity management strategies into the design of the program such as duplicating or reallocating resources to deal with these strategies;*
d) *establishing hazard warning and communications systems;*
e) *protecting proprietary information and vital records;*
f) *providing protective systems to safeguard information technology; and*
g) *adopting current building and appropriate land-use practices.*

0.3.2 Preparedness

"**Preparedness**" is defined as actions taken prior to a **nuclear emergency** to be ready to respond to it and manage its consequences (Public Works and Government Services Canada, *Emergency Management Vocabulary*). **Preparedness** for nuclear emergencies is a multi-jurisdictional responsibility that is shared by **NPPs** and all levels of government in Canada (i.e., federal government, provincial or territorial governments, and local governments). This is reflected in the number, variety, and integration of plans at all levels (see Annex B).

Nuclear emergency **preparedness** is addressed in Clause 4, **Nuclear emergency management program**, and includes the following:

a) development of nuclear emergency response and recovery plans (see Clauses 4.5 and 4.6);
b) training workers who would be engaged in **response**/**recovery** efforts (see Clause 4.7);
c) testing of emergency **response**/**recovery** equipment (see Clause 4.8);
d) public awareness and education (see Clause 4.9); and
e) exercising the implementation of emergency plans (see Clause 4.10).

0.3.3 Response

"**Response**" is defined as actions taken during a **nuclear emergency** to reduce the magnitude of the hazard and manage its consequences, including the impact of the hazard on people, property, and the environment. **Response** actions include, but are not limited to, emergency public communication, search and rescue, emergency medical assistance, and **shelter-in-place** or evacuation to minimize suffering and losses associated with nuclear emergencies. In addition, nuclear emergency response planning, training, and exercising often occur as part of the **preparedness** efforts. Nuclear emergency response planning (including development, validation, and maintenance) is therefore addressed in Clause 4.5, Nuclear emergency response plan, and the active **response** phase requirements (including plan activation, needs assessment, plan deviation, **response** termination) are defined in Clause 5, **Response**.

0.3.4 Recovery

"**Recovery**" can be defined as the short-term and long-term actions taken in order to restore, to an acceptable level, both the organizations involved in, and the communities affected by, the **nuclear**

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emergency and its associated **response** activities. The level of restoration would typically be determined by the authorities having jurisdiction (**AHJ**), in consultation with the **stakeholders** affected by the **nuclear emergency**. Note that there is a strong relationship between long-term sustainable **recovery** and **prevention** and **mitigation** of future nuclear emergencies. Consequently, **recovery** efforts should be conducted with a view towards risk reduction. Examples of **recovery** efforts include, but are not limited to, environmental monitoring and remediation, containment and disposal of contaminants, psychological and psychosocial support, reconstruction, economic **recovery**, financial assistance, and long-term medical follow-up.

The implementation of **mitigation** strategies can occur in parallel with **recovery** functions. In addition, nuclear emergency **recovery** planning, training, and exercising could occur as part of the **preparedness** efforts. Nuclear emergency **recovery** planning (including development, validation, and maintenance) is therefore addressed in Clause 4.6, Nuclear emergency recovery plan, and the active **recovery** phase requirements (including plan activation, inter-organizational nuclear emergency **recovery** coordination, needs assessment, plan deviation, and termination of the **recovery** operation) are defined in Clause 6, **Recovery**.

1 Scope

1.1

This Standard establishes criteria for the **emergency management** programs of on- and **off-site** organizations to address nuclear emergencies at Canadian nuclear power plants (**NPPs**).

Notes:

1) *This Standard may provide guidance for nuclear facilities other than **NPPs**. The operators of these facilities may, together with the **authorities having jurisdiction** (**AHJs**), determine the applicability and suitability of the guidance provided by this Standard.*

2) *The requirements in this Standard are applied in accordance with the jurisdictional responsibilities of the **organization**.*

1.2

This Standard provides the unique requirements to develop, implement, evaluate, maintain, and continuously improve a **nuclear emergency management program**(**NEMP**) for **prevention**, **mitigation**, **preparedness**, **response**, and **recovery** from a **nuclear emergency** at an **NPP**.

1.3

This Standard does not apply to nuclear emergencies at

a) **Class IB nuclear facilities**;
b) **Class II nuclear facilities**; and
c) uranium mines and mills.

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.

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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

N286-05 (withdrawn)
Management system requirements for nuclear power plants

N286-12
Management system requirements for nuclear facilities

N288.6-12
Environmental risk assessments at class I nuclear facilities and uranium mines and mills

N292.0-14
General principles for the management of radioactive waste

N292.3-14
Management of low- and intermediate-level radioactive waste

N294-09
Decommissioning of facilities containing nuclear substances

Z764-96 (R2012)
A guide to public involvement

CNSC (Canadian Nuclear Safety Commission)

CNSC RD/GD-99.3 (2012)
Public Information and Disclosure

CNSC Regulatory Guide G-306 (2006)
Severe Accident Management Programs for Nuclear Reactors

Government of Canada

Nuclear Liability Act, R.S.C. 1985, c. N-28

Nuclear Safety and Control Act, S.C. 1997, c. 9

Class I Nuclear Facilities Regulations (SOR/2000-204)

Class II Nuclear Facilities and Prescribed Equipment Regulations (SOR/2000-205)

Security Regulations (SOR/2000-209)

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