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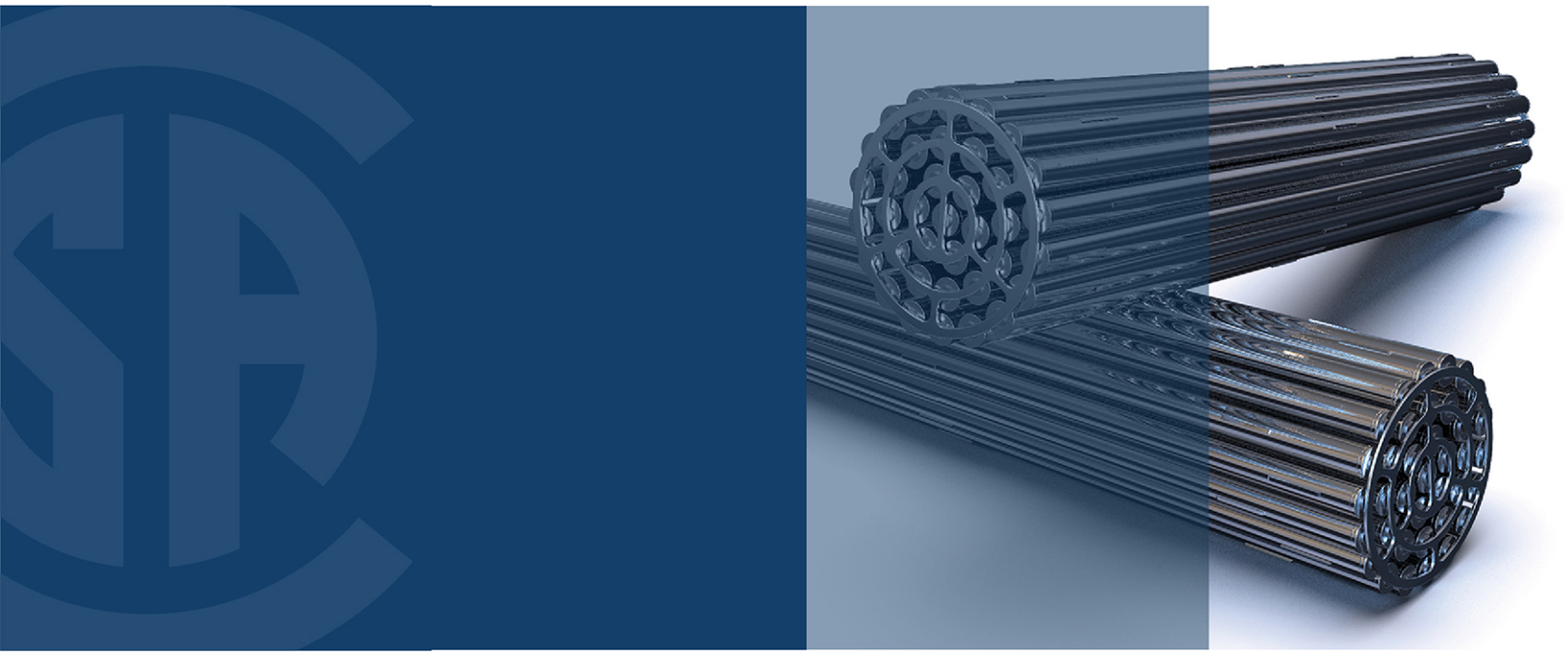
CSA N1600:21

General requirements for nuclear emergency management programs



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Preface

This is the third edition of CSA N1600, *General requirements for nuclear emergency management programs*. It supersedes the previous editions published in 2016 and 2014.

Major changes to this edition include the following:

a) additional requirements and guidance on recovery planning and improved alignment with related industry standards, including IAEA No. GSR Part 7 and IAEA No. GSG-11;
b) additional clarification on the distinction between drills and exercises, and their associated expectations;
c) introduction of the concept of a protection strategy, consistent with Health Canada's *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response*, with clarification regarding the application of reference levels, generic criteria, operational intervention levels, and protective actions; and
d) clarification regarding communication and engagement with other organizations, communities of interest, and Indigenous peoples.

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

Users of this Standard are reminded that the site selection, design, manufacture, construction, installation, commissioning, operation, and decommissioning of reactor facilities in Canada are subject to the *Nuclear Safety and Control Act* and its *Regulations*. The Canadian Nuclear Safety Commission (CNSC) 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 reactor 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 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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   a) *Standard designation (number);*
   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

CSA N1600:21
General requirements for nuclear emergency management programs

0 Introduction

0.1 General

This Standard establishes criteria for the emergency management programs of on- and off-site organizations to address nuclear emergencies at Canadian reactor facilities. The approach taken is aimed at the protection of health and safety, property, and the environment from nuclear emergencies through an all hazards 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.

Canada, from the municipal government level through to the federal government level, uses the all hazards risk-based approach to emergency management, which recognizes that the actions required to manage the consequences of emergencies are essentially the same, irrespective of the nature of the emergency, thereby permitting an optimization of resources. The radiological hazard is unique to nuclear activities and this Standard incorporates the additional requirements to address radiological consequences. [Source: Modified from Public Safety Canada's *Federal Emergency Response Plan*]

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 other organizations, communities of interest, and Indigenous peoples.

To facilitate its use and adoption, this Standard is aligned with the 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 the 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 organizations.

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 PDCA cycle

As indicated in Clause 0.1, this Standard is aligned with the PDCA cycle (see 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, and

specifically Clause 4.4, Program management, Clause 5.2, Planning basis, Clause 7, Nuclear emergency response plan, and Clause 8, 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, Nuclear emergency management program (NEMP), Clause 6, Communication, Clause 9, Training, Clause 10, Facilities and equipment maintenance, Clause 11, Public awareness and education, Clause 12, Exercises, Clause 13, Response, and Clause 14, 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 12, Exercises, and Clause 15, NEMP evaluation, audit, and review.

In the last phase of the PDCA cycle, "act", action is taken to effect the desired change. It is focused on fully implementing the improved solution. In this Standard, the "act" phase is addressed in Clause 15.3, NEMP review, and Clause 16, Oversight and improvement.

0.3 Components of emergency management

0.3.1 Prevention and mitigation

0.3.1.1 Prevention

Preventing nuclear emergencies from occurring at Canadian reactor facilities is the responsibility of the reactor facility operators. Through the authority of the *Nuclear Safety and Control Act*, the CNSC regulates the Canadian nuclear industry in order to limit the risks 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 Group 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 Group nuclear standards addressing requirements for structures, systems, and components (SSCs); periodic and in-service inspections; fire protection; and environmental qualification. CSA Group nuclear standards capture best 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 reactor facilities 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 authority having jurisdiction (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 reactor facility operators. Off-site mitigation of nuclear emergencies tends to be driven by provincial authorities, local authorities, or both, and can comprise structural measures (e.g., dykes, building reinforcements) or non-structural measures (e.g., land use planning and building codes, public awareness). 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 organizations 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 and 8.1.5. It is important to note that mitigation is not addressed in depth in this Standard; however, mitigation is addressed in greater detail in other codes and standards.

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 alerting 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 reactor facilities 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 7 and 8);
b) training workers who would be engaged in response/recovery efforts (see Clause 9);
c) testing of emergency response/recovery equipment (see Clause 10);
d) public awareness and education (see Clause 11); and
e) exercising the implementation of emergency plans (see Clause 12).

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 7, Nuclear emergency response plan, and the active response phase requirements (including plan activation, needs assessment, plan deviation, response termination) are defined in Clause 13, 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 emergency and its associated response activities. The level of restoration is typically determined by the AHJ, in consultation with the organizations, communities of interest, and Indigenous peoples 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 8, 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 14, Recovery.

0.4 Management system

A management system integrates the requirements from management system standards for health, safety, environment, security, economics, and quality.

CSA N286 provides overall direction to management to develop and implement sound management practices and controls.

For reactor facilities, this Standard works in harmony with CSA N286 and does not duplicate the generic requirements of CSA N286, which provides overall direction to management to develop and implement sound management practices and controls. This Standard makes reference to the requirements of CSA N286 in:

a) Clause 4.4.1.4.2, Reactor facility documentation process;
b) Clause 4.4.5.1, NEMP documentation;
c) Clause 4.4.5.4.2, Reactor facility records management process;
d) Clause 4.4.7.2.4, NEMP review documentation;
e) Clause 5.2.3.3, Planning basis review documentation; and
f) Clause 9.9, Records retention.

Notes:

1) *A quality management system (QMS) is a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives, and is relevant to every emergency response organization. A QMS helps coordinate and direct an organization's activities to meet customer and regulatory requirements, and to improve its effectiveness and efficiency on a continuous basis.*
2) *Additional guidance on management systems is available in standards including, but not limited to*
   a) *CAN/CSA-ISO 9001 for quality management systems;*

b) *CAN/CSA-ISO 14001 for environmental management systems; and*
c) *ISO 45001 for occupational health and safety management systems.*

1 Scope

1.1 Reactor facilities

This Standard establishes criteria for the emergency management programs of on- and off-site organizations to address nuclear emergencies at Canadian reactor facilities.

Notes:

1) *This Standard may provide guidance for nuclear facilities other than reactor facilities. The operators of these facilities may, together with the 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 applicable legislation and jurisdictional responsibilities of the organization.*

1.2 Emergency management pillars

This Standard provides the requirements to develop, implement, evaluate, maintain, and continually improve a nuclear emergency management program (NEMP) for prevention, mitigation, preparedness, response, and recovery from a nuclear emergency at a reactor facility irrespective of the initiator.

Note: *The requirements and guidance in this Standard could inform the development of plans for specific initiating events (e.g., fire, flood, security).*

1.3 Business continuity planning

This Standard does not establish requirements for business continuity planning.

Note: *For further information on continuity planning, see CSA Z1600 and ISO 22301.*

1.4 Mandatory language

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 Use of “consider”

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

