

# **Environmental monitoring programs at nuclear facilities and uranium mines and mills**



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<b>J. Lee</b>	CSA Group, Toronto, Ontario, Canada	<i>Project Manager</i>

# Preface

This is the third edition of CSA N288.4, *Environmental monitoring programs at nuclear facilities and uranium mines and mills*. It supersedes the previous editions, published in 2010 under the title *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*, and in 1990 under the title *Guidelines for Radiological Monitoring of the Environment*.

The first edition of this Standard addressed only the monitoring of radioactive contaminants in the environment in pathways leading to human exposure. The scope of the second edition of this Standard was expanded to include protection of the environment in conformance with the regulations under the *Nuclear Safety and Control Act*, which came into force on May 31, 2000. As a result, the scope of the second edition was updated to include monitoring of radioactive and non-radioactive contaminants, physical stressors, potential biological effects, and pathways for both human and non-human biota.

This edition of this Standard has been updated to reflect current industry practice, and include new research and analysis methods. Major changes to this edition include the following:

- a) The structure of the Standard and definitions have been updated for consistency with the CSA N288 series of Standards.
- b) Administrative provisions (e.g., the term “Class 1”) were removed.
- c) The duplicate generic requirements of CSA N286 were removed, with more specific direction for those requirements provided where necessary.
- d) References to recently issued CSA N288 Standards are included to provide further clarification, and replace duplicated content (i.e., CSA N288.6, CSA N288.7, and CSA N288.9).
- e) Additional guidance on analytical results that are below the decision threshold is provided in alignment with current industry standards.
- f) New guidance from relevant publications addressing sampling, analysis, and quality assurance/quality control has been incorporated.
- g) Additional references and guidance on representative sampling, sampling media, and annual reviews have been included.
- h) The former informative Annex A was removed, as it is addressed by CSA N288.6.

This Standard is part of the N288 series of Standards and Guidelines on environmental management for nuclear facilities.

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 was prepared by the Subcommittee on Environmental Monitoring at Nuclear Facilities and Uranium Mines and Mills, under the jurisdiction of the Technical Committee on Environmental

Management for Nuclear Facilities and the Strategic Steering Committee, 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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# CSA N288.4:19

## ***Environmental monitoring programs at nuclear facilities and uranium mines and mills***

### **0 Introduction**

#### **0.1 Background**

##### **0.1.1 Facility interactions with the environment**

Throughout the course of its lifecycle, a nuclear facility can interact with the surrounding environment by

- a) releasing hazardous and/or nuclear substances; and
- b) imposing physical stressors.

##### **0.1.2 Environmental protection framework**

Nuclear facilities are required by the Authority Having Jurisdiction (AHJ) to demonstrate, through performance assessments, monitoring, or other activities, that they have made adequate provision for the protection of the environment, human health, and safety. Consequently, nuclear facilities can be required to perform a number of interrelated activities within their environmental protection programs.

**Note:** A typical environmental protection framework is presented in Figure 1.

An environmental protection framework typically encompasses an environmental assessment (EA) for the activity, or any other document that contains the required information. The EA typically includes a predictive environmental risk assessment (ERA). If the ERA identifies potential risk to humans or the environment, additional programs are implemented, such as

- a) an effluent monitoring program to demonstrate controls on releases;
- b) an environmental monitoring program (EMP) to confirm EA predictions are met;
- c) supplementary studies to reduce uncertainties with the ERA;
- d) a review of current science and potential implications to the ERA;
- e) any other assessment and monitoring activity (e.g., entrainment, impingement, bird-structure mortality, or temperature changes); and
- f) periodic updates of the ERA.

All of the above activities are integrated into an environmental management system (EMS).

**Note:** See CNSC REGDOC-2.9.1 for information on environmental protection programs.