CSA Group

N288.8-17

Establishing and implementing action levels for releases to the environment from nuclear facilities

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Preface

This is the first edition of CSA N288.8, *Establishing and implementing action levels for releases to the environment from nuclear facilities*.

The purpose of this Standard is to provide requirements and guidance to develop and implement action levels for releases from a final discharge point at Class 1 nuclear facilities and uranium mines and mills. Compliance with this Standard will allow facilities to manage effluents in accordance with regulatory requirements.

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 specific 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 can provide more specific direction for meeting those requirements.

This Standard addresses the development and implementation of action levels that incorporates best practices in Canada and internationally.

Users of this Standard are reminded that additional and site-specific requirements might be specified by federal, provincial/territorial, or municipal authorities. This Standard is not a replacement for the requirements contained in any

a) applicable federal/territorial, or provincial statute, including the *Nuclear Safety and Control Act*; or
b) regulation, licence, or permit issued pursuant to an applicable statute.

This Standard was prepared by the Subcommittee on Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities under the jurisdiction of the Technical Committee on Environmental Management for Nuclear Facilities and the Nuclear 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.*
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. 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:*
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   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change;*
   d) *rationale for the change.*

N288.8-17
Establishing and implementing action levels for releases to the environment from nuclear facilities

0 Introduction

0.1 Objective of this Standard

The objective of this Standard is to provide requirements and guidance on establishing and implementing action levels (ALs) at Class 1 nuclear facilities and uranium mines and mills. Through the use of this Standard, ALs are defined for releases at the final discharge point within an effluent monitoring program.

The requirements are intended to achieve a basic level of consistency in the understanding, development, and implementation of these ALs across all nuclear facilities covered by this Standard.

Notes:

1) *This Standard provides guidance for the action levels related to releases to the environment as defined in Canadian Nuclear Safety Commission (CNSC) regulatory documents and regulations.*
2) *In Canada, the environmental protection program requirements are typically defined in the licence issued by CNSC or documents referenced therein.*

0.2 Relationship to an effluent monitoring program

0.2.1 Goal of an effluent monitoring program

Effluent monitoring is a risk-informed activity that quantifies, through measurements or estimates, the nuclear or hazardous substances being released into the surface water or air environment by a facility or activity.

Note: *Further information on effluent monitoring is provided in CSA N288.5.*

0.2.2 Existence of an effluent monitoring program

The requirements and guidance presented in this Standard are based on the assumption that an effluent monitoring program is in place or is being developed as part of a facility's environmental protection program.

Note: *The effluent monitoring program will typically be developed through the use of CSA N288.5; however, the use of CSA N288.5 is not required.*

0.2.3 Influence of an effluent monitoring program on the development of ALs

0.2.3.1

The effluent monitoring program provides the information for the development of ALs and the context for their implementation. Specifically, the effluent monitoring program details, among other parameters, the

a) points of release;

b) contaminants released to the environment;
c) effluent monitoring points (also referred to as final discharge points, if used as the point at which an AL applies in this Standard);
d) monitoring data; and
e) physical stressors and other parameters (e.g., pH, hardness, temperature, and flow).

0.2.3.2

The information from an effluent monitoring program is used as the basis to determine the contaminants and physical stressors and effluent monitoring points that might require an AL.

0.2.3.3

The data obtained from an effluent monitoring program, where available, is used to characterize the statistical distribution of effluent parameters and, via the process described in this Standard, to develop ALs for those parameters.

0.3 Relationship to an environmental risk assessment

0.3.1 Goal of an environmental risk assessment

An environmental risk assessment (ERA) of a nuclear facility is a systematic process used to identify, quantify, and characterize the risk posed by contaminants of potential concern (COPCs) and physical stressors in the environment to biological receptors (human and non-human), including the magnitude and extent of the potential effects associated with a facility.

Note: *Further information on ERAs can be found in CSA N288.6.*

0.3.2 Existence of an environmental risk assessment

This Standard assumes that an environmental risk assessment (ERA) of some form has already been completed. This ERA may be conducted in accordance with CSA N288.6, but the ERA can also be part of an environmental assessment (EA), the environmental management system (EMS), or any other process that produces the required information.

0.3.3 Influence of an ERA on the development of ALs

An ERA will typically provide the basis for the selection of COPCs or physical stressors and effluent monitoring points in the effluent monitoring program.

The ERA may also be used in the selection or screening of COPCs or physical stressors and effluent monitoring points for the purpose of establishing ALs.

0.4 Relationship to an environmental management system

0.4.1 Goal of an environmental management system

An EMS is a process used to develop and implement an environmental policy and a systematic method of managing those activities of its operations that interact with the environment. The EMS provides an organization with a systematic method of achieving its environmental obligations and performance goals.

Note: *Further information on EMS can be found in CSA N286 and ISO 14001.*

0.4.2 Influence of an EMS on established ALs

If a change in an activity, product, or service decreases the effluent release rate, activity, or concentration of a particular contaminant or physical stressor, this results in a decrease in the upper value of normal operational release, and the resulting AL might decrease. A change in an activity, product, or service might, however, also result in an increase in effluent rate, activity, or concentration. Consequently, the upper value of normal operational release will shift upward, and the AL might increase. Such changes would be identified through periodic reviews conducted in accordance with the EMS.

0.5 Relationship to an effluent control and monitoring framework

0.5.1 Effluent control and monitoring framework

An effluent control and monitoring framework at a nuclear facility often consists of internal investigation levels (i.e., levels set by a facility for internal control or process improvement), ALs (i.e., higher levels requiring investigation, corrective action, and reporting to the authority having jurisdiction (AHJ)), and authorized release limits (ARLs) (i.e., limits specified by the AHJ).

In some facilities, operators use internal investigation levels that represent the high end of normal operational releases, and these are often defined statistically (e.g., 97.5th percentile of the statistical distribution of release rate, activity, or concentration). The exceedance of an internal investigation level can trigger an internal investigation and disposition according to the facility's corrective action program. It is expected that the disposition and corrective action will return releases to normal levels.

Note: *The internal investigation level is also sometimes called an administrative level.*

0.5.2 Influence of other limits/levels on ALs

The development of the internal investigation levels in some facilities might use a process similar to that described in this Standard for the development of the upper value of normal operational release (Clauses 7.3.2 and 8.4).

The ARLs used for environmental compliance, when available, are also considered in the AL development process. ALs in this Standard are developed so as not to exceed the available ARLs.

Notes:

1) *ARLs can include derived release limits (DRLs), limits specified in a CNSC licence, limits specified by provincial permits, and limits defined by regulation.*
2) *The relationship between the internal investigation levels, ALs, and ARLs is shown in Figure 1. A comparison of these levels or limits to nuclear power plant operational states, defined in a safety analysis, is also shown. Figure 2 provides an example illustrating the consideration of monitoring data in establishing action levels.*

0.6 Relationship to a radiation protection program

0.6.1 Goal of a radiation protection program

The goal of a radiation protection program is to

a) keep radiation doses to humans as low as reasonably achievable (ALARA) through
   i) management control over work practices;
   ii) personnel qualification and training;
   iii) control of occupational and public exposure to radiation, and
   iv) planning for unusual situations.
b) evaluate the quantity and concentration of nuclear substances released through
   i) direct measurement as a result of monitoring, or

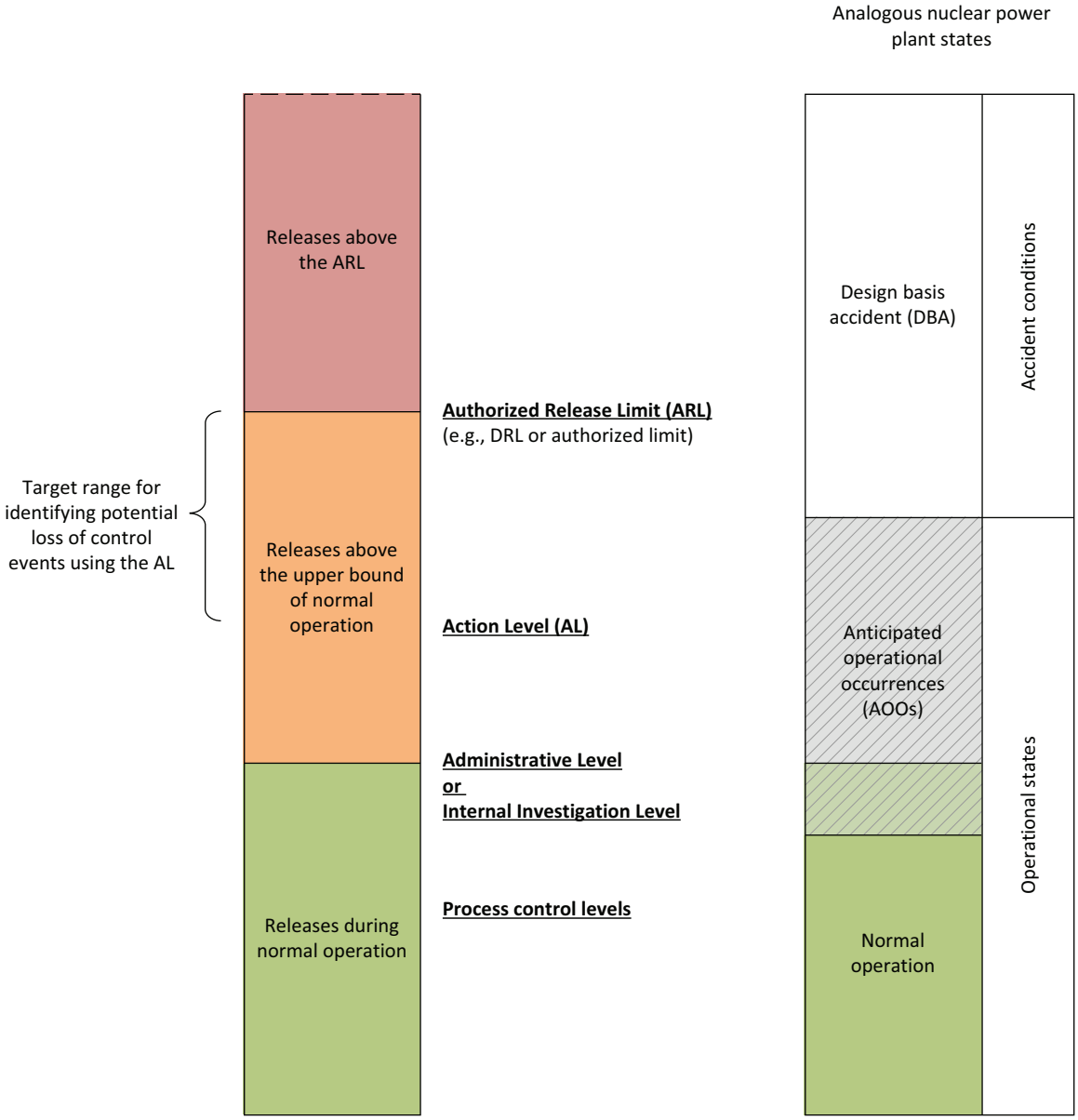
ii) estimation.

Source: *Radiation Protection Regulations.*

0.6.2 Relationship to a radiation protection program

The Standard applies directly to Item b) of Clause 0.6.1, which may also be considered a part of the environmental protection program. Exceeding an AL is an indication of a potential loss of control of the environmental protection program. The implementation of an AL process will, however, also contribute to keeping radiation doses to members of the public ALARA, particularly for unusual situations.

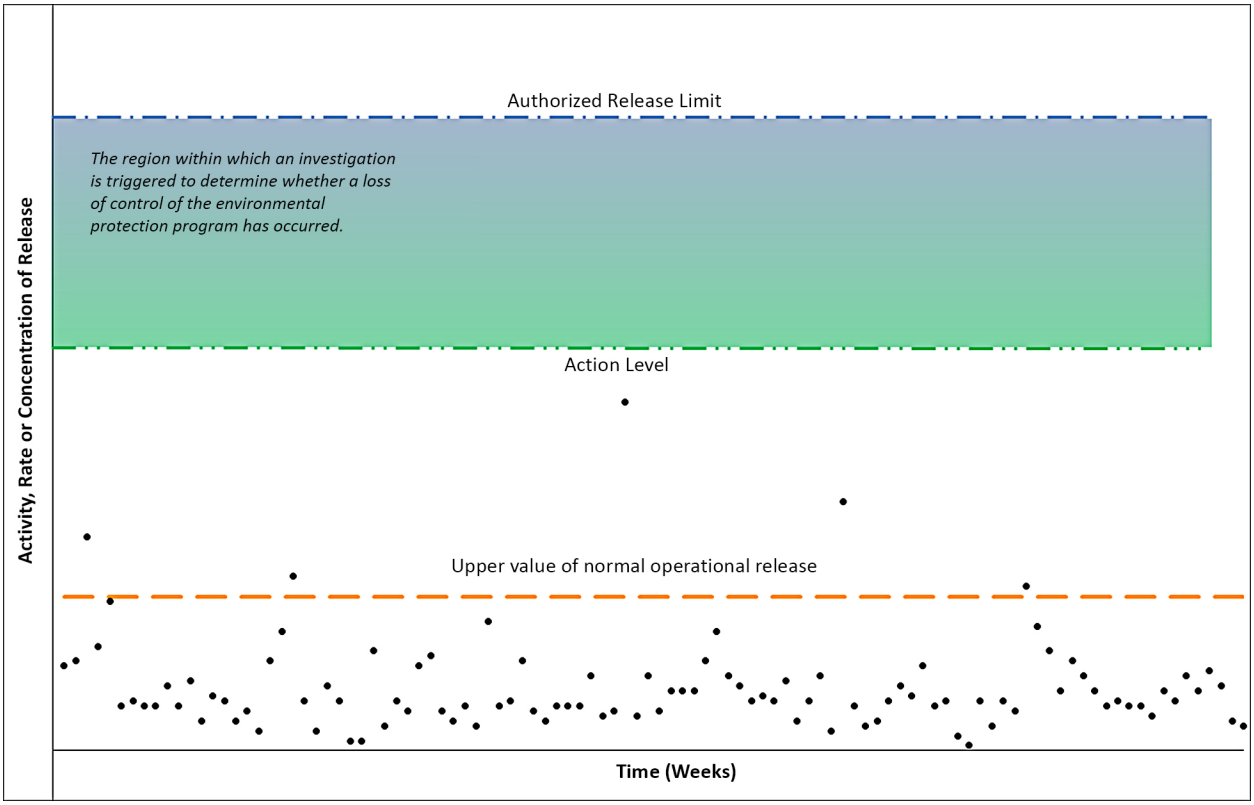
Figure 1
Relationship of ALs with operational levels and regulatory limits
(See Clause 0.5.2.)



Notes:

1) *The Figure is intended to illustrate the general relationship of various levels and limits. These relationships might vary (e.g., values from anticipated operational occurrences (AOOs) that are similar to normal operation).*
2) *Although not illustrated in this Figure, some limits may be a range or a minimum. Further guidance on the use of ranges and minimums as ALs can be found in the definition of "action level" in Clause 3.*

Figure 2
Illustration of monitoring data and action level
(See Clause 0.5.2.)



1 Scope

1.1 Facilities

1.1.1 Types of facilities

1.1.1.1

This Standard addresses the establishment and implementation of ALs for Class I nuclear facilities and uranium mines and mills.

Notes:

1) *In this Standard, any type of Class I nuclear facility or uranium mine and mill is included in the term "nuclear facilities".*
2) *Conventional waste management facilities (e.g., landfills, incinerators, and sewage treatment plants handling non-radioactive material) that have final discharge points subject to ARLs on a Class I nuclear facility (or uranium mine and mill) are included in the scope of this Standard.*
3) *Not all Class I nuclear facilities, uranium mines and mills, or waste management facilities will need ALs. See Clause 5 on criteria for establishing ALs.*

1.1.1.2

This Standard may also apply to the establishment and implementation of ALs for

a) Class II nuclear facilities;
b) facilities that use or store naturally occurring radioactive materials; and
c) any other nuclear facility that could benefit from ALs.

Note: *In these situations, the operator of the facility is responsible for determining the applicability and suitability of this Standard in consultation with the AHJ.*

1.1.2 Facility lifecycle

This Standard may be applied during the following phases of a facility lifecycle

a) site preparation, construction, and commissioning;
b) operations; and
c) decommissioning.

Notes:

1) *The specifics of how an AL is developed and implemented may change over the lifecycle of the facility. For example, there is unlikely to be effluent during site preparation and construction. Therefore, ALs may be established but not implemented for that phase.*
2) *Elements of this Standard, such as the consideration and prospective development of ALs, may also be applicable during facility design.*
3) *The operational lifecycle of a Class 1 nuclear facility is assumed to include storage with surveillance.*
4) *A facility might have a licence post-decommissioning; however, it assumed there are no longer controlled releases, and, therefore, ALs are not required.*

1.2 Operating conditions

The establishment and implementation of ALs described in this Standard are applicable for contaminants and physical stressors identified in an effluent monitoring program (e.g., CSA N288.5) during normal operations over the lifecycle of a nuclear facility.

Notes:

1) *Any release resulting from a planned and controlled deviation from routine operational practice that is expected to occur once or several times during the operating lifetime of a nuclear facility or licensed activity is not typically considered to represent a loss of control event. However, these should be evaluated on a case-by-case basis (see Clause 6.5).*
2) *For the purposes of this Standard, AOOs might or might not represent a loss of control event.*
3) *Significant spills and leaks are not considered part of normal operations.*
4) *The physical parameter temperature is outside the scope of this Standard, as specified in Clause 1.3.2.*

1.3 Contaminants, physical stressors, and final discharge points

1.3.1

This Standard is to be applied to develop ALs at the final discharge point for those contaminants or physical stressors monitored in an effluent monitoring program.

Notes:

1) *The effluent monitoring program is typically developed though CSA N288.5.*
2) *The contaminants or physical stressors that represent a potential risk or are the primary contributors to potential risk are known as COPCs or physical stressors, and are evaluated through CSA N288.6.*
3) *The contaminants and physical stressors include physical parameters.*

1.3.2

The physical parameter temperature is outside the scope of this Standard.

1.4 Interpretation of data

This Standard provides guidance on the interpretation of data that is relevant to the development of ALs.

Note: *Users are cautioned that the statutes, regulations, licences, and permits that govern a nuclear facility can impose requirements regarding data analysis and interpretation that differ from those described in this Standard. The operator of the nuclear facility is responsible for determining what data analysis and interpretations are necessary to confirm compliance with all statutes, regulations, licences, or permits that govern the operation of the nuclear facility.*

1.5 Terminology

1.5.1

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.

1.5.2

In this Standard, "shall be considered" or "shall consider" means that the user shall consider the possibility, make a decision, and document the reason(s) for that decision.

Note: *Examples of decisions can include no action, operating procedures, design features.*

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.

CSA Group

N286-12
Management system requirements for nuclear facilities

N288.1-14
Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities

N288.5-11
Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills

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