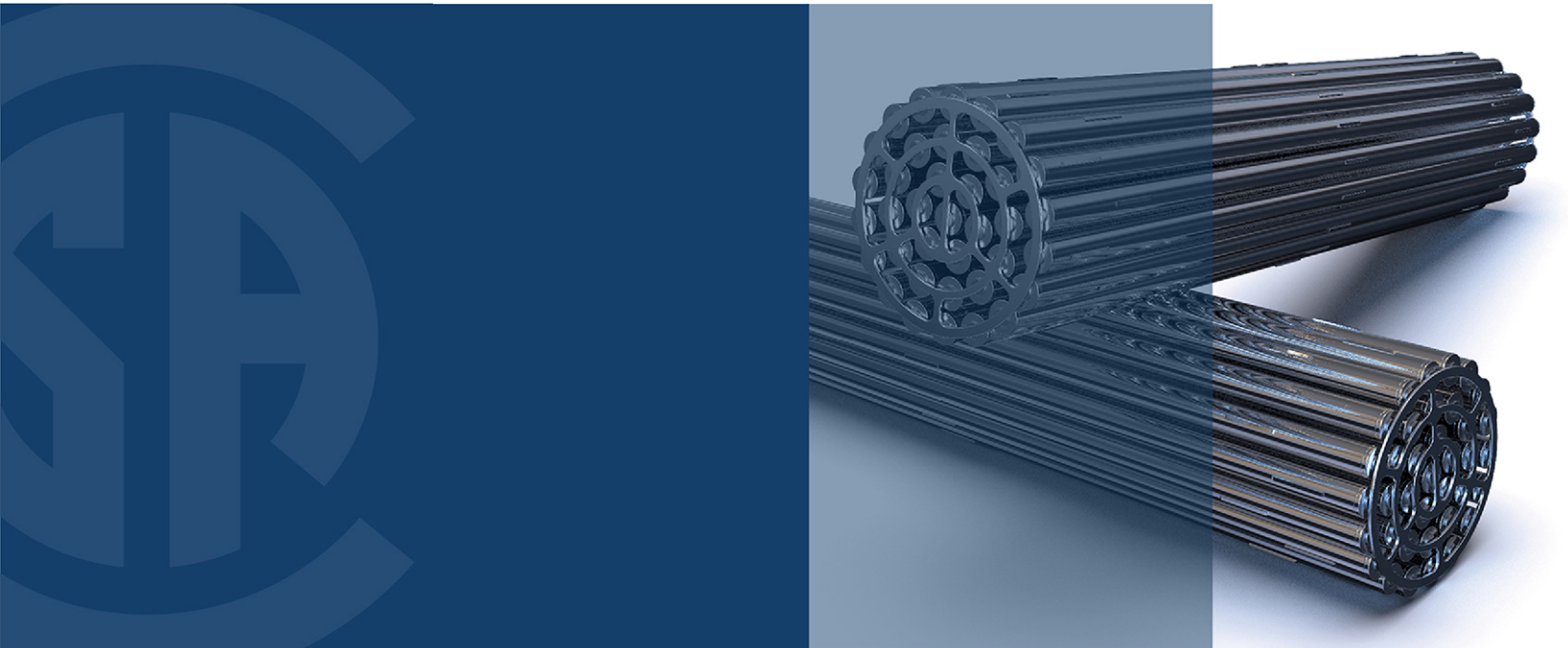


Guidelines for calculating the radiological consequences to the public of a release of airborne radioactive material for nuclear reactor accidents



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Contents

Technical Committee on Environmental Management for Nuclear Facilities	5
Subcommittee on Guidelines for Calculating the Radiological Consequences to the Public of a Release of Airborne Radioactive Material for Nuclear Reactor Accidents	8
Preface	10
0 Introduction	12
1 Scope	12
1.1 Type of consequence assessments	12
1.2 Facilities	13
1.3 Operating conditions	13
1.4 Time scale	13
1.5 Spatial scale	13
1.6 Meteorological sampling	14
1.7 Pathways	14
1.8 Contaminants	14
1.9 Receptors and end points	14
1.10 Exclusions	14
1.10.1 Routine releases during normal operation	14
1.10.2 Spills and liquid releases	14
1.10.3 Urban dispersion	14
1.10.4 Fire and explosions	14
1.10.5 Hurricanes and tornados	15
1.10.6 Regional and global dispersion	15
1.10.7 Chemical contaminants	15
1.10.8 Ingestion pathway	15
1.10.9 Economic costs including those arising from off-site interventions	15
1.10.10 Logistics of protective actions	15
1.10.11 Non-human biota	15
1.11 Terminology	15
2 Reference publications	16
3 Definitions and abbreviations	30
3.1 Definitions	30
3.2 Abbreviations	35
4 Treatment of meteorology	37
4.1 Types of consequence calculations	37
4.2 General requirements	38
4.2.1 Deterministic calculations	38
4.2.2 Probabilistic calculations	39
4.3 Meteorological data requirements	39
4.3.1 Representativeness	39
4.3.2 Meteorological station data	40

4.4	Stochastic sampling	44
4.5	Statistical quantities	45
4.6	Real-time and forecast weather data for emergency response	48
4.6.1	Sources of data	48
4.6.2	Meteorological data	48
4.6.3	Short-range dose assessment	49
4.6.4	Medium- and long-range dose assessment	49
4.6.5	Point of contact	49
4.6.6	Emergency response products	50
5	Source characterization	50
5.1	Source term	50
5.2	Source characteristics important for calculation of doses	50
5.2.1	Characteristics to be defined	50
5.2.2	Radiological characteristics	50
5.2.3	Physical characteristics	51
5.3	Acceptable methods to account for different release durations and time dependence	52
5.3.1	Definitions	52
5.3.2	Instantaneous or short-term release	52
5.3.3	Prolonged or long-term release	52
5.3.4	Level of detail of source term representation	53
5.3.5	Number of release segments	53
5.4	Attributes required to allow the containment models to be coupled with the release models	54
5.4.1	Periodicity	54
5.4.2	Decay and ingrowth	54
5.5	Radionuclides to be considered	54
5.5.1	Selection of radionuclides	54
5.5.2	Justification	55
5.5.3	Unfiltered release	55
5.5.4	Filtered release	56
5.5.5	Tritium	56
5.6	Treatment of decay and daughter products	57
5.6.1	Accounting for decay and build-up	57
5.6.2	Precursors	57
5.6.3	Application of release fractions	57
5.7	Multiple point, area, or volume sources	57
5.7.1	Initial dimensions	57
5.7.2	Multiple release points	57
6	Modelling atmospheric dispersion	58
6.1	Model applicability	58
6.1.1	General requirements	58
6.1.2	Release characteristics	58
6.1.3	Meteorological conditions	58
6.1.4	Distance from source	59
6.1.5	Terrain	59
6.2	Atmospheric dispersion phenomena and model capabilities	59
6.2.1	Important phenomena and corresponding default model capabilities	59

6.2.2	Specialized model capabilities	60
6.3	Functional requirements for default models	60
6.3.1	Plume rise	60
6.3.2	Downwash	60
6.3.3	Entrainment	61
6.3.4	Effective release height	61
6.3.5	Plume broadening	61
6.3.6	Mixing height	62
6.3.7	Height of TIBL	62
6.3.8	Reflection at an elevated inversion	63
6.3.9	Fumigation	64
6.3.10	Plume transport	64
6.3.11	Plume diffusion	64
6.3.12	Wet deposition	64
6.3.13	Dry deposition	65
6.3.14	Plume depletion	65
6.4	Functional requirements for specialized models	66
6.4.1	General definition of conditions requiring specialized models	66
6.4.2	Complex terrain	66
6.4.3	Non-stationary conditions	67
6.4.4	Shoreline dispersion	67
6.4.5	Low wind speeds and calms	67
6.4.6	Fog effects	67
6.4.7	Resuspension and re-emission	67
6.4.8	Tritiated hydrogen gas (HT)	68
6.4.9	Multiple point, area, and volume sources	68
6.5	Justification of the model choice	68
6.5.1	General requirements	68
6.5.2	Model validation	69

7 Calculation of consequences 69

7.1	Quantities	69
7.2	Receptors	70
7.3	Concentrations	71
7.4	Doses	71
7.4.1	General	71
7.4.2	Compliance with dose limits	71
7.4.3	Severe accident assessment	71
7.4.4	Dose intervention levels and emergency reference levels	72
7.5	Pathways	72
7.6	Dose from external exposure to the cloud	72
7.6.1	Definition	72
7.6.2	Semi-infinite cloud approximation	73
7.6.3	Finite cloud effects	73
7.6.4	Dose conversion factors for external exposure to the cloud	73
7.7	Dose from internal exposure to the cloud	74
7.7.1	Definition	74
7.7.2	Inhalation rates	74
7.7.3	Committed dose conversion factors for inhalation	74

7.7.4	Period of integration	74
7.7.5	Chemical form of particulates	75
7.7.6	Noble gases	75
7.7.7	HTO absorption through skin	75
7.8	Dose from external exposure to ground deposition	75
7.8.1	Definition	75
7.8.2	Period of exposure	75
7.8.3	Dose conversion factors for external exposure to ground deposition	76
7.8.4	Surface roughness	76
7.9	Decay and daughter products	76
7.9.1	Dose calculations	76
7.9.2	Secular equilibrium	76
7.9.3	Decay-chain calculation	77
7.9.4	Ground contamination	77
7.10	Phases of exposure — Definition	77
7.11	Shielding and filtration effects	77
7.11.1	Definition	77
7.11.2	Basis	77
7.11.3	Occupancy factors	78
7.11.4	Shielding factor	78
7.11.5	Filtration effect	78
7.12	Stochastic health effect calculation	78
7.13	Deterministic health effect calculation	79
7.13.1	Severe accident assessment	79
7.13.2	Detailed models	79
7.13.3	Simplified model	79
7.13.4	Calculation	80
7.14	Collective dose	80
7.14.1	Definition	80
7.14.2	Limits of integration	80
8 Model uncertainties 80		
8.1	Identification of sources of uncertainty	80
8.2	Use of uncertainty assessment	81
8.3	Uncertainty assessment	81
8.3.1	Documentation	81
8.3.2	Method	81
8.3.3	Sensitivity calculations	81
8.3.4	Quantitative uncertainty assessment	83
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Annex A (informative) — Meteorological data		86
Annex B (informative) — Dispersion phenomena and acceptable modelling approaches		102
Annex C (informative) — Classification of atmospheric dispersion models and their capabilities		126
Annex D (informative) — Deterministic health effects models		132
Annex E (informative) Historical background on CSA N288.2		134

Preface

This is the third edition of CSA N288.2, *Guidelines for calculating the radiological consequences to the public of a release of airborne radioactive material for nuclear reactor accidents*. It supersedes the previous editions published in 2014 and 1991 under the title *Guidelines for calculating radiation doses to the public from a release of airborne radioactive material under hypothetical accident conditions in nuclear reactors*.

This Standard is part of a series of Standards on environmental management for nuclear facilities. This Standard describes acceptable methods for modelling the consequences of accidents at nuclear reactors for safety assessment and real-time emergency response. This Standard also identifies acceptable data sources and acceptable methodologies to account for specific effects, and recommends standardized end points for the calculations.

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

- a) The 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) Additional clarification in areas identified by users was added.
- d) The definitions for “beyond design basis accidents (BDDBA)” and “severe accident” were aligned with the definitions provided in CSA N290.16-16.

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. 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.

This Standard was prepared by the Subcommittee on Guidelines for Calculating the Radiological Consequences to the Public of a Release of Airborne Radioactive Material for Nuclear Reactor Accidents, under the jurisdiction of the Technical Committee on Environmental Management for Nuclear Facilities 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.*

- 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:
- define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;
 - provide an explanation of circumstances surrounding the actual field condition; and
 - 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 guide lines 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:
- Standard designation (number);
 - relevant clause, table, and/or figure number;
 - wording of the proposed change; and
 - rationale for the change.

CSA N288.2:19

Guidelines for calculating the radiological consequences to the public of a release of airborne radioactive material for nuclear reactor accidents

0 Introduction

This Standard describes acceptable methods that can be used to calculate the radiological consequences of a release of airborne radioactive material for nuclear reactor accidents. This Standard does not mandate a single approach or code, or provide detailed equations to construct a code. This Standard also identifies acceptable data sources and acceptable methodologies to account for specific effects, and recommends standardized end points for the calculations. Once the user has chosen a specific code, the user should obtain the equations and parameter values required to calculate doses and other end points from the code documentation to confirm the selected code aligns with the methodologies specified in this Standard.

The previous edition of the Standard described equations and parameters that were to be used to calculate the doses to an individual. The selected equations and parameters were closely associated with an implementation of the Standard in the code PEAR (Public Exposures from Accidental Releases).

The clauses of this Standard start with the treatment of meteorology, including the statistical sampling of meteorological parameters (Clause 4). Source characterization is discussed in Clause 5 and modelling dispersion in the atmosphere in Clause 6. The calculation of consequences such as ground contamination and dose assessment for stochastic and deterministic health effects is addressed in Clause 7. Uncertainty assessment is covered in Clause 8. Informative guidance is provided in the Annexes.

1 Scope

1.1 Type of consequence assessments

This Standard proposes methods for modelling the consequences of accidents at nuclear reactors for safety assessment and real-time emergency response.

Notes:

- 1) *Models used to assess the consequences of a postulated accident for safety assessment purposes have much in common with those used for a real-time nuclear accident for emergency response purposes, including the calculation of dispersion and air concentrations. However, the two types of models differ in their treatment of source terms and end points.*
- 2) *Safety assessment is a prospective activity that includes*
 - a) *deterministic and probabilistic calculations carried out for Authority Having Jurisdiction (AHJ) requirements;*
 - b) *probabilistic risk assessment for cost-benefit analyses; and*
 - c) *deterministic and probabilistic calculations carried out for emergency planning purposes.*