American Nuclear Society

criteria for modeling and calculating atmospheric dispersion of routine radiological releases from nuclear facilities

an American National Standard

REAFFIRMED

November 11, 2021
December 21, 2017
ANSI/ANS-2.15-2013 (R2021)

This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards and documents referenced herein. It is the responsibility of the user to review each of the references and to determine whether the use of the original references or more recent versions is appropriate for the facility. Variations from the standards and documents referenced in this standard should be evaluated and documented.
This standard does not necessarily reflect recent industry initiatives for risk informed decision-making or a graded approach to quality assurance. Users should consider the use of these industry initiatives in the application of this standard.

published by the
American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60526 USA

ANSI/ANS-2.15-2013

ANSI/ANS-2.15-2013

American National Standard
Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities

Secretariat
American Nuclear Society

Prepared by the
American Nuclear Society
Standards Committee
Working Group ANS-2.15

Published by the
American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60526 USA

Approved February 27, 2013
by the
American National Standards Institute, Inc.

American National Standard

Designation of this document as an American National Standard attests that the principles of openness and due process have been followed in the approval procedure and that a consensus of those directly and materially affected by the standard has been achieved.

This standard was developed under the procedures of the Standards Committee of the American Nuclear Society; these procedures are accredited by the American National Standards Institute, Inc., as meeting the criteria for American National Standards. The consensus committee that approved the standard was balanced to ensure that competent, concerned, and varied interests have had an opportunity to participate.

An American National Standard is intended to aid industry, consumers, governmental agencies, and general interest groups. Its use is entirely voluntary. The existence of an American National Standard, in and of itself, does not preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard.

By publication of this standard, the American Nuclear Society does not insure anyone utilizing the standard against liability allegedly arising from or after its use. The content of this standard reflects acceptable practice at the time of its approval and publication. Changes, if any, occurring through developments in the state of the art, may be considered at the time that the standard is subjected to periodic review. It may be reaffirmed, revised, or withdrawn at any time in accordance with established procedures. Users of this standard are cautioned to determine the validity of copies in their possession and to establish that they are of the latest issue.

The American Nuclear Society accepts no responsibility for interpretations of this standard made by any individual or by any ad hoc group of individuals. Responses to inquiries about requirements, recommendations, and/or permissive statements (i.e., "shall," "should," and "may," respectively) should be sent to the Standards Department at Society Headquarters. Action will be taken to provide appropriate response in accordance with established procedures that ensure consensus.

Comments on this standard are encouraged and should be sent to Society Headquarters.

Published by

American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60526 USA

Printed in the United States of America

Inquiry Requests

The American Nuclear Society (ANS) Standards Committee will provide responses to inquiries about requirements, recommendations, and/or permissive statements (i.e., "shall," "should," and "may," respectively) in American National Standards that are developed and approved by ANS. Responses to inquiries will be provided according to the Policy Manual for the ANS Standards Committee. Nonrelevant inquiries or those concerning unrelated subjects will be returned with appropriate explanation. ANS does not develop case interpretations of requirements in a standard that are applicable to a specific design, operation, facility, or other unique situation only, and therefore is not intended for generic application.

Responses to inquiries on standards are published in ANS's magazine, *Nuclear News*, and are available publicly on the ANS Web site or by contacting the ANS standards administrator.

Inquiry Format

Inquiry requests must include the following:

(1) the name, company name if applicable, mailing address, and telephone number of the inquirer;

(2) reference to the applicable standard edition, section, paragraph, figure and/or table;

(3) the purposes of the inquiry;

(4) the inquiry stated in a clear, concise manner;

(5) a proposed reply, if the inquirer is in a position to offer one.

Inquiries should be addressed to

American Nuclear Society
ATTN: Standards Administrator
555 N. Kensington Avenue
La Grange Park, IL 60526

or standards@ans.org

Foreword

(This Foreword is not a part of American National Standard "Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities," ANSI/ANS-2.15-2013.)

Atmospheric dispersion modeling is the mathematical simulation of atmospheric processes involving the release, transport, diffusion, and fate of airborne pollutants. Computer programs and systems that implement atmospheric dispersion modeling have been in widespread use for decades. As a result, there are many common practices among model users. However, a national standard does not exist that provides criteria for model selection and use for different types of modeling applications (e.g., assessment of annual releases, accidental release events) or for different types of modeling domains (e.g., flat terrain, mountain/valley areas, water/land environments). Instead, atmospheric dispersion modeling practices are often based on a diverse set of regulatory guidance and other documents that date from the 1970s and 1980s.

Since the publication of these guidance documents, considerable advances have occurred in our understanding of the atmospheric processes that govern the transport, diffusion, and deposition of atmospheric pollutants. Dramatic improvements in computer technologies have resulted in the significant increase in computational processing speeds and information sharing capabilities of available models. Also, technological advances have occurred in the areas of meteorological monitoring, data collection, and data sharing that can greatly expand the capabilities of atmospheric dispersion models. As a result of these changes, atmospheric dispersion modeling selection and usage practices need to be updated to incorporate the scientific and technological enhancements, improve modeling results, and support greater consistency among model users.

Subject matter experts from the Nuclear Utilities Meteorological Data User's Group, the U.S. Department of Energy's Meteorological Coordinating Council, and other organizations began working together in 2004 to define and standardize practices that can be used to address the atmospheric dispersion modeling of radiological releases from nuclear facilities. The working group decided that several standards were needed, based on end-use considerations:

- ANS-2.15, addressing atmospheric dispersion modeling of routine releases;
- ANS-2.16, addressing atmospheric dispersion modeling of design-basis accidents;
- ANS-3.8.10, addressing atmospheric dispersion modeling of accidental releases for emergency response.

This document, on the modeling of routine releases, is the first of these dispersion modeling standards. The working group decided to create all three standards in sequence to take advantage of their similarities, to achieve consistency among the standards, and to incorporate the lessons learned from one in preparing the next.

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied. A statement has been included in the references section that provides guidance on the use of references.

This standard does not incorporate the concepts of generating risk-informed insights, performance-based requirements, or a graded approach to quality assurance. The user is advised that one or more of these techniques could enhance the application of this standard.

This standard was developed by the ANS-2.15 Working Group of the Standards Committee of the American Nuclear Society, which had the following membership:

J. Ciolek (Chair), *AlphaTRAC, Inc.*

M. Abrams, *ABS Group*
T. Bellinger, *Y-12 National Security Complex*
D. Brown, *U.S. Nuclear Regulatory Commission*
M. Carroll, *Murray & Trettel, Inc.*
H. Cruz, *Bechtel*
J. Fairobent, *U.S. Department of Energy*
P. Fransioli, *Bechtel*
C. Glantz, *Pacific Northwest National Laboratory*
B. Harvey, *U.S. Nuclear Regulatory Commission*
J. Hatmaker, *Tennessee Valley Authority*
C. Hunter, *Savannah River National Laboratory*
A. Kasprak, *MassHighway*
M. Kinley, *Duke Energy*
J. Laznow, *JL & Associates*
Y. J. Lin, *Bechtel*
M. Mazaika, *U.S. Nuclear Regulatory Commission*
C. A. Mazzola, *Shaw Environmental & Infrastructure, Inc.*
E. McCarthy, *Pacific Gas and Electric Company*
J. Nasstrom, *Lawrence Livermore National Laboratory*
M. Parker, *Savannah River National Laboratory*
D. Pittman, *Individual*
J. Rishel, *Pacific Northwest National Laboratory*
A. Simpkins, *Dade Moeller & Associates*
M. Syed, *Comanche Peak Nuclear Power Plant*
S. Vigeant, *Shaw Environmental*
P. Wan, *Bechtel*
K. Wastrack, *Tennessee Valley Authority*
J. Williams, *Arizona Public Service*

Subcommittee ANS-24, Modeling and Analysis, had the following membership at the time of its approval of this standard:

J. A. Wehrenberg (Chair), *Individual*

C. Beyer, *Pacific Northwest National Laboratory*
J. Ciolek, *AlphaTRAC, Inc.*
J. Gilmer, *U.S. Nuclear Regulatory Commission*
C. Glantz, *Pacific Northwest National Laboratory*
D. Pittman, *Individual*
T. Rucker, *SAIC*
S. Salayameh, *Individual*
J. Savy, *Individual*
J. Sejvar, *Individual*

The Nuclear Facility Standards Committee (NFSC) had the following membership at the time of its approval of this standard:

C. A. Mazzola (Chair), *Shaw Environmental & Infrastructure, Inc.*
W. B. Reuland (Vice Chair), *Individual*

J. A. August, *CORE, Inc.*
W. H. Bell, *South Carolina Electric & Gas Company*
B. B. Bevard, *Oak Ridge National Laboratory*
L. O. Brandon, *Geosyntec Consultants, Inc.*
J. R. Brault, *Shaw MOX Project*
C. K. Brown, *Southern Nuclear Operating Company*
K. R. Bryson, *Individual*
D. R. Eggett, *Automated Engineering Services Corporation*
R. W. Englehart, *Individual*
P. K. Guha, *U.S. Department of Energy*
P. S. Hastings, *Babcock & Wilcox*
A. B. Hull, *U.S. Nuclear Regulatory Commission*
N. P. Kadambi, *Individual*
M. A. Linn, *Oak Ridge National Laboratory*
E. M. Lloyd, *Exitech Corporation*
E. P. Loewen, *General Electric Company*
S. A. Lott, *Los Alamos National Laboratory*
H. W. Massie, *Defense Nuclear Facilities Safety Board*
R. H. McFetridge, *Westinghouse Electric Company, LLC*

T. K. Meneely, *Westinghouse Electric Company, LLC*
C. H. Moseley, *ASME NQA Liaison*
D. G. Newton, *AREVA, NP*
M. W. Peres, *Flour Enterprises, Inc.*
R. M. Ruby, *Individual*
J. C. Saldarini, *Bechtel Power Corporation*
D. J. Spellman, *Oak Ridge National Laboratory*
S. L. Stamm, *Shaw Nuclear Services*
J. D. Stevenson, *Individual*
J. A. Wehrenberg, *Individual*
M. J. Wright, *Individual*

NFSC Liaisons:

G. Hutcherson, *Institute of Nuclear Power Operations*
J. Riley, *Nuclear Energy Institute*

Contents