

American Nuclear Society

**emergency planning
for research reactors**

an American National Standard



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

ANSI/ANS-15.16-2008

**American National Standard
Emergency Planning
for Research Reactors**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-15.16**

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

Approved September 23, 2008
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 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 It may be reaffirmed, revised, or withdrawn at any time in accordance with established procedures.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. Requests for interpretation 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 on the interpretation.

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**

Copyright © 2008 by American Nuclear Society. All rights reserved.

Any part of this standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-15.16-2008 with permission of the publisher, the American Nuclear Society." Reproduction prohibited under copyright convention unless written permission is granted by the American Nuclear Society.

Printed in the United States of America

Foreword

(This Foreword is not a part of the American National Standard “Emergency Planning for Research Reactors,” ANSI/ANS-15.16-2008.)

The American Nuclear Society (ANS) established Subcommittee ANS-15, Operation of Research Reactors, in the fall of 1970 for the purpose of preparing a standard for the operation of research reactors. In January 1972, this charter was expanded to include the multiple tasks of preparing all standards for research reactors. To implement this enlarged responsibility, a number of subcommittee working groups were established to develop standards for consideration and complementary action by Subcommittee ANS-15. ANS-15.16 is one of these groups.

In August 1980, the U.S. Nuclear Regulatory Commission (NRC) published new rules for *Code of Federal Regulations*, Title 10, “Energy,” Part 50, “Licensing of Production and Utilization Facilities,” Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities.” The changes to the regulations place emphasis on emergency preparedness in regard to notifying off-site authorities and initiating protective actions on the basis of severity of facility damage and potential as well as actual radiological releases that are occurring or have occurred. The regulations also require the identification of a spectrum of radiological emergencies applicable to a reactor facility and the grouping of these emergencies into specified classes of emergencies. They also require that a facility’s emergency plan identify emergency action levels that are to be used to initiate the planned emergency responses for each emergency. In addition, the regulations require the determination of the need for establishing an off-site emergency planning zone (EPZ) on a case-by-case basis and require the identification of predetermined actions for protecting individuals within this zone.

In January of 1994, *Code of Federal Regulations*, Title 10, “Energy,” Part 20, “Standards for Protection Against Radiation” (10 CFR 20), was extensively revised to use SI units and terminology. The NRC issued supportive guidance in the form of Appendix 1 to NUREG-0849 in April 1997. NRC Information Notice 97-34, issued in June 1997, informed licensees of revised guidance. As a result of the changes to 10 CFR 20, the working group was tasked to revise American National Standards Institute (ANSI)/ANS-15.16-1982 (R2000) to be consistent. The present revision incorporates the use of SI units; the regulatory positions from NRC Regulatory Guide 2.6, Revision 1, March 1983 relative to the content, approval, and revision control of emergency procedures; and recognition of physical security of the reactor facility issues for emergency planning.

ANSI/ANS-15.16-2008 identifies the elements of an emergency plan. It provides criteria and guidance that should be considered in formulating an emergency plan. The standard identifies the emergency classes that should be used to categorize the spectrum of radiological emergencies and provides guidance for establishing the emergency classification system. It provides examples of typical emergency action levels associated with each emergency and guidance for establishing an EPZ.

The applicability of the emergency plan elements presented in this standard will vary from one research reactor facility to another depending upon the reactor power level and the potential radiological consequences that result from postulated events. The risk from credible radiological emergency situations at many research reactor facilities is usually minimal and may not require the application of all the emergency plan elements in this standard or the establishment of an EPZ.

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 reference section that provides guidance on the use of references.

This revision was led by M. L. Gildner (Oak Ridge National Laboratory) with the support of Subcommittee ANS-15, Operation of Research Reactors, of the American Nuclear Society Standards Committee, which had the following membership at the time of its approval of this standard:

W. J. Richards (Chair), *National Institute of Standards and Technology*

A. Adams Jr., *U.S. Nuclear Regulatory Commission*
L. M. Bobek, *University of Massachusetts Lowell*
J. Bryson, *Sandia National Laboratories*
C. D. Cooper, *Bechtel BWXT*
M. L. Gildner, *Oak Ridge National Laboratory*
M. Krause, *University of Texas*
P. M. Madden, *U.S. Nuclear Regulatory Commission*
C. McKibben, *University of Missouri–Columbia*
S. Miller, *Armed Forces Radiobiology Research Institute Naval Medical Center*
T. Myers, *National Institute of Standards and Technology*
R. Nelson, *Research Reactor Safety Analysis Services*
D. S. O’Kelly, *University of Texas*
P. B. Perez, *Entergy Nuclear Vermont*
T. Schmidt, *Sandia National Laboratories*
C. F. Sears, *The Pennsylvania State University*
T. M. Raby, *National Institute of Standards and Technology*

The American National Standards Committee N17, Research Reactors, Reactor Physics, and Radiation Shielding, had the following membership at the time it reviewed and approved this standard:

T. M. Raby (Chair), *National Institute of Standards and Technology*
A. Weitzberg (Vice Chair), *Individual*

D. R. Anderson, *Electric Boat Corporation*
W. H. Bell, *American Institute of Chemical Engineers*
(Alt. R. D. Zimmerman, *American Institute of Chemical Engineers*)
R. E. Carter, *Individual*
D. M. Cokinos, *Brookhaven National Laboratory*
M. L. Coradini, *National Council on Radiation Protection and Measurements*
B. Dodd, *Health Physics Society*
E. Ehrlich, *General Electric*
B. K. Grimes, *Individual*
N. E. Hertel, *Georgia Institute of Technology*
C. Heyssel, *McMaster University*
W. A. Holt, *Individual*
W. C. Hopkins, *Individual*
M. A. Hutmaker, Jr., *U.S. Department of Energy*
A. C. Kadak, *Massachusetts Institute of Technology*
L. I. Kopp, *Individual*
P. M. Madden, *U.S. Nuclear Regulatory Commission*
(Alt. A. Adams, Jr., *U.S. Nuclear Regulatory Commission*)
J. F. Miller, *Institute of Electrical and Electronics Engineers*
J. E. Olhoeft, *Individual*
R. E. Pevey, *University of Tennessee–Knoxville*
W. J. Richards, *National Institute of Standards and Technology*
C. T. Rombough, *CTR Technical Services, Inc.*
T. R. Schmidt, *Sandia National Laboratories*
S. H. Shepherd, *Southern California Edison*
A. O. Smetana, *Savannah River National Laboratory*
R. R. Tsukimura, *Aerotest Operations*
A. R. Veca, *General Atomics*
S. H. Weiss, *National Institute of Standards and Technology*
(Alt. T. J. Myers, *National Institute of Standards and Technology*)

Contents	Section	Page
	1	
	Scope	1
	2	
	Definitions	1
	3	
	Content of emergency plan	2
	3.1 Introduction	2
	3.2 Definitions	2
	3.3 Organization and responsibilities	2
	3.4 Emergency classification system	3
	3.5 Emergency action levels	4
	3.6 Emergency planning zones	6
	3.7 Emergency response	7
	3.8 Emergency facilities and equipment	8
	3.9 Recovery	8
	3.10 Maintaining emergency preparedness	8
	4	
	References	9
	Tables	
	Table 1 Emergency classes	5
	Table 2 Alternate method for determining the size of an EPZ	7