



Emergency Planning for Research Reactors

An American National Standard

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

Secretariat
American Nuclear Society

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

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Foreword (This Foreword is not a part of the American National Standard “Emergency Planning for Research Reactors,” ANSI/ANS-15.16-2015.)

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 involved in 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 (EALs) 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 the International System of Units (SI) 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 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 the recognition of reactor facility physical security issues for emergency planning.

In 2014, ANSI/ANS-15.16-2008 was revised to incorporate security-related events into the emergency plan in a risk-informed way. Because of the low inventory of radioactive material, most research and test reactors do not meet the threshold levels that initiate either a General Emergency or a Site Area Emergency. In fact, many do not meet the threshold for an Alert classification. As such, the revisions ensured that security-related events were incorporated into emergency plans without creating emergency classifications that did not or would not otherwise exist.

ANSI/ANS-15.16-2015 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 EALs associated with each emergency and guidance for establishing an EPZ. This standard is intended to be applicable to all research reactors. Research reactors that are not licensed by the NRC, such as those operated for the U.S. Department of Energy (DOE) will also find

this standard applicable. However, it is understood that more prescriptive guidance, for example, DOE Order 151.1C, *Comprehensive Emergency Management System*, provides more detail (DOE-specific) than is found in this standard.

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.

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Emergency Planning for Research Reactors

1 Scope

This standard identifies the elements of an emergency plan that describes the approach to coping with emergencies and minimizing the consequences of accidents at research reactor facilities. The emphasis given each of these elements shall be commensurate with the potential risk involved.

2 Definitions

2.1 Shall, should, and may

The word “shall” is used to denote a requirement; the word “should” is used to denote a recommendation; and the word “may” is used to denote a permission, neither a requirement nor a recommendation.

2.2 Definitions

emergency: An emergency is a condition that calls for immediate action beyond the scope of normal operating procedures to avoid an accident or to mitigate the consequences of one.

emergency action levels (EALs): Specific instrument readings or observations, radiological dose or dose rates, or specific contamination levels of airborne, waterborne, or surface-deposited radioactive materials that may be used as recognized conditions that result in actions such as (a) establishing emergency classes and (b) initiating appropriate emergency measures.

emergency classes: Emergency classes are classes of accidents grouped by severity level for which predetermined emergency measures should be taken or considered.

emergency plan: An emergency plan is a document that provides the basis for actions to cope with an emergency. It outlines the objectives to be met by the emergency procedures and defines the authority and responsibilities to achieve such objectives.

emergency planning zone (EPZ): Area for which off-site emergency planning is performed to assure that prompt and effective actions can be taken to protect the public in the event of an accident. The EPZ size is dependent on reactor power level and the distance beyond the site boundary at which the protective action guides could be exceeded.

emergency procedures: Emergency procedures are documented instructions that detail the implementation actions and methods required to achieve the objectives of the emergency plan.

off-site: The geographical area that is beyond the site boundary.

on-site: The geographical area that is within the site boundary.

operations boundary: The area within the site boundary such as the reactor building (or the nearest physical personnel barrier in cases where the reactor building is not a principal physical personnel barrier) where the reactor chief administrator has direct authority over all activities. The area within this boundary shall have prearranged evacuation procedures known to personnel frequenting the area.

protective action guides: Projected radiological dose or dose commitment values to individuals that warrant protective action following a release of radioactive material. Protective actions would be warranted provided the reduction in individual dose expected to be achieved by carrying out the protective action is not offset by excessive risks to individual safety in taking the protective action. The projected dose does not include the dose that has occurred prior to the assessment.