American Nuclear Society

safety categorization and design criteria for nonreactor nuclear facilities

an American National Standard

REAFFIRMED

April 9, 2020

ANSI/ANS-58.16-2014 (R2020)

ANSI/ANS-58.16-2014

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American National Standard
Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities

Secretariat
American Nuclear Society

Prepared by the
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Standards Committee
Working Group ANS-58.16

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American National Standard

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Foreword

(This foreword is not a part of American National Standard "Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities," ANSI/ANS-58.16-2014.)

Nonreactor nuclear facilities are designed, constructed, and operated using regulations, standards, and practices to assure that the workers in the facilities and members of the public outside the facilities are safe during the normal operations of the facilities and also in case of abnormal events or accidents. This is achieved through judicious categorization of structures, systems, and components (SSCs) and specific administrative controls (SACs) to prevent or mitigate such events. The categorization determines the types and levels of controls needed, based on the hazards at the facilities. This standard provides a roadmap to identifying existing industry codes and standards for reliable design, construction, and operation of various categories of controls, and also some new requirements that are not addressed in existing standards.

This standard provides criteria for the categorization of SSCs and SACs specifically for nonreactor nuclear facilities. Standards for design of categories of hazard controls are also identified. It has an overall objective similar to American National Standards Institute (ANSI)/American Nuclear Society (ANS) American National Standard ANSI/ANS-58.14-2011, "Safety and Pressure Integrity Classification Criteria for Light Water Reactors," in that both provide safety categorization criteria and design codes and standards for design. While the objectives of these two standards are the same (i.e., specification of appropriate design codes and standards for safety features), ANSI/ANS-58.16-2014 requires the determination of design-basis events (DBEs) as a first step, which is not required as part of the procedures invoked by ANSI/ANS-58.14-2011 for reasons discussed below.

Nonreactor nuclear facilities are often unique and of a one-of-a-kind design. Operators of these facilities can work very close to the hazards themselves. The hazards associated with nonreactor nuclear facilities are highly dependent on the nature of the facility and its mission. For example, those hazards can involve exposure to radioactive and other hazardous materials as a result of fires, explosions, process upsets, spills and leaks, as well as inadvertent nuclear criticality. A hazard analysis is required to identify the hazards and the type of events that can be associated with them. These analyses are used to develop DBEs and the needed safety functions to prevent or mitigate them to protect workers and the public.

Light water reactors are less diverse, and DBEs are based on experience with licensing safety reviews over a period of decades, focused on protection of the public. Facility workers are not in immediate contact with the hazardous materials. The very high energy associated with nuclear fission and the high level of fission products contained in a reactor core and their energy of decay lead to a focus on ensuring reactor core cooling, including pressure boundary integrity. A new hazard analysis is not usually needed because DBEs have been preselected.

As a result, readers, reviewers, and users of this standard should not expect that there would be a high degree of correlation between this standard and ANSI/ANS-58.14-2011.

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 or performance-based requirements. The user is advised that one or more of these techniques could enhance the application of this standard.

The ANS-58.16 Working Group acknowledges the significant contributions made to this standard by Dr. Richard W. Englehart and Dr. John D. Stevenson who passed away before the standard was issued. Both Dr. Englehart and Dr. Stevenson played key roles in all phases of the standard, starting with the formulation, through the development process, and preparation of the final draft. The ANS-58.16 Working Group of the Standards Committee of the American Nuclear Society had the following membership at the time the standard was developed:

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Contents Page

Tables