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Foreword

(This Foreword is not a part of American National Standard Safety and Pressure Integrity Classification Criteria for Light Water Reactors, ANSI/ANS-58.14-1993.)

This standard revises and supersedes the safety and pressure integrity classification criteria provided in ANSI/ANS-51.1-1983 (R1988), American National Standard Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, and ANSI/ANS-52.1-1983 (R1988), American National Standard Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants*. The criteria in this standard are primarily objective; are applicable to all nuclear power plant functions, structures, systems, components, and parts (including consumables); and are applicable to any light water reactor (LWR) nuclear power plant design. The criteria in ANSI/ANS-51.1-1983 (R1988) and ANSI/ANS-52.1-1983 (R1988) are primarily subjective; apply primarily to systems; and apply only to the new designs of PWRs and BWRs available in the USA in 1983. Appendix A of this standard provides a discussion of the evolution of safety and pressure integrity classification criteria as well as the background and history of previous efforts to develop the criteria.

This standard uses separate sets of terms for safety classification criteria (safety-related, supplemented grade, and non-safety-related) and pressure integrity classification criteria (Classes 1, 2, 3, 4, and 5). ANSI/ANS-51.1-1983 (R1988) and ANSI/ANS-52.1-1983 (R1988) address both safety and pressure integrity classification criteria using a single set of terms (Safety Classes 1, 2, and 3, and Non-Nuclear Safety). As discussed in Appendix B of this standard, the applicability of these two sets of criteria is not identical. The single set of terms used in ANSI/ANS-51.1-1983 (R1988) and ANSI/ANS-52.1-1983 (R1988) creates inconsistencies and a potential for misinterpretations. These limitations are avoided in this standard.

The safety classification criteria in this standard are based on NEDC-31509, *Safety Classification Methodology and Criteria for Structures, Systems, Components and Parts in BWR Nuclear Power Plants,* de.veloped by the Parts Safety Classification Committee of the BWR Own.ers Group and GE Nuclear Energy; and on EPRI NP-6895, *Guidelines for the Safety Classification of Systems, Components and Parts Used in Nuclear Power Plant Applications (NCIG-17),* developed by the Nuclear Construction Issues Group, a utility group sponsored by the Electric Power Research Institute.

The application of many requirements to nuclear power plant structures, systems, components, and parts is based upon their safety classification. The safety classification of an item is typically used to determine which design, procurement, manufacturing, construction, and operating requirements or controls apply.

The term "safety-related" is used to identify items that, due to their functional safety importance, must meet stringent design requirements such as Seismic Category I criteria, IEEE Class 1E criteria for electrical items, ASME Boiler and Pressure Vessel Code Section III criteria for pressure integrity items, and environmental qualification requirements of 10 CFR 50.49.**

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* The remaining portions of ANSI/ANS-51.1-1983 (R1988) and ANSI/ANS-52.1-1983 (R1988) are not superseded by this standard. Proposed ANS-50.1, Nuclear Safety Design Criteria for Light Water Reactors, which is currently under development, is intended to supersede the remaining portions.

** For this and other portions of the Code of Federal Regulations, see Section 8, References, of this standard.

The safety classification of an item might be also used to help establish the procurement requirements for the item. Typically there are three types of procurement classifications: safety-related, commercial grade, and non-safety-related. A safety-related procurement refers to an item that is purchased subject to the provisions of 10 CFR 21 and is intended for use in applications that are functionally safety-related. A commercial grade procurement refers to an item that is purchased without the provisions of 10 CFR 21, but is intended to be dedicated after receipt for use in applications that are functionally safety-related. Once a commercial-grade item is dedicated, it becomes a safety-related item. A non-safety-related procurement refers to an item that is purchased without the provisions of 10 CFR 21, and is intended for use in applications that are functionally non-safety-related.

During construction, safety-related items are subject to specific material selection, design, fabrication, examination, testing, inspection, certification, installation, and quality assurance requirements.

Operationally, safety-related items typically are subject to specified requirements for inservice inspection, inservice testing, maintenance, surveillance, and quality assurance.

The classification "supplemented grade" is applied to certain non-safety-related items during procurement, construction, and operations.

The pressure integrity classification criteria provided in Section 6 are similar to those of ANSI/ANS-51.1-1983 (R1988), ANSI/ANS-52.1-1983 (R1988), and Regulatory Guide 1.26, but have been revised to be applicable to any light water reactor design (particularly an advanced passive design).

The relationship of safety classification to pressure integrity classification, electrical classification, seismic classification, environmental qualification classification, and functional mode classification is discussed in Appendix B of this standard.

The basic design requirements for items assigned to each safety classification are summarized in Section 7.

This standard has been written for prospective use, but the criteria are based on current practices and requirements applicable to licensed LWR designs.

Continuing efforts will be required to assess the criteria in this standard and to provide revisions or clarifications as appropriate.

Working Group ANS-58.14 of the Standards Committee of the American Nuclear Society had the following membership at the time it developed this standard:

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At the time of its ballot of this standard, the LWR Criteria Management Committee, MC-1, had the following membership:

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The American Nuclear Society's Nuclear Power Plant Standards Committee (NUPPSCO) had the following membership at the time of its approval of this standard:

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Safety and Pressure Integrity Classification Criteria for Light Water Reactors

1. Introduction

This standard supersedes all safety classification criteria and pressure integrity classification criteria specified in ANSI/ANS-51.1-1983 (R1988), American National Standard Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants [1][1], and ANSI/ANS-52.1-1983 (R1988), American National Standard Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants [2]. In particular, the affected parts of each standard are 3.3, Equipment Classification; 3.4, Industry Codes and Standards; and the paragraphs entitled "Safety Class" within Section 4, Design Criteria, enumerated 4.x.4 (e.g., 4.1.4, 4.5.4, 4.20.4)[2]. The terms Safety Classes 1, 2, 3, and Non-Nuclear Safety that were used to denote both the safety classification and pressure integrity classification in ANSI/ANS-51.1-1983 (R1988) and ANSI/ANS-52.1-1983 (R1988) have been superseded by the terms safety-related, supplemented grade, and non-safety-related, to denote safety classification; and by Classes 1, 2, 3, 4, and 5, to denote pressure integrity classification. The bases for the change in terminology are discussed in other parts of this document.[3]

The basic design requirements for each safety classification are discussed in Section 7.

1.1 Scope. This standard specifies criteria for the safety classification of items (structures, systems, components, and parts (including consumables) in a light water reactor (LWR) nuclear power plant as either safety-related (Q), supplemented grade (S), or non-safety-related (N). Criteria are also provided to establish a procurement subclassification within Class Q, called commercial grade (C). In addition, pressure integrity classification criteria are provided for the assignment of Classes 1, 2, 3, 4, or 5 to the pressure retaining portions of items.

1.2 Purpose. This standard has two purposes. The first is to provide criteria for the safety classification of items in LWR nuclear power plants. The second is to provide criteria for the assignment of pressure integrity Classes to pressure-retaining items.

The application of the criteria specified in this document is intended to ensure that the safety and pressure integrity classifications of an item are based on that item's functions.[4]

The classification criteria specified in this standard:

(1) establish an objective, technically sound rationale for the determination of safety and pressure integrity classifications[5]– one that minimizes subjective judgments and incorrect classifications;
(2) include provisions for ensuring that all items required by licensing requirements and commitments are appropriately classified;
(3) allow maximum compatibility with plant-specific designs, policies, and procedures; and
(4) achieve consistency (i.e., minimize classification differences among similar items in the plant; among utilities, vendors, designers, and regulators; and with current industry and NRC practices).

1.3 Applicability. This standard is applicable to new LWR designs.[6] It is based upon current regulations, criteria, and experience. Some of the criteria and guidance provided herein might differ from those used as the bases for a licensed design.

[1] Numbers in brackets refer to corresponding numbers in Section 8, References.

[2] The remaining portions of ANSI/ANS-51.1-1983 (R1988) and ANSI/ANS-52.1-1983 (R1988) are not superseded by this standard. Proposed ANS-50.1, Nuclear Safety Design Criteria for Light Water Reactors, which is currently under development, is intended to supersede the remaining portions.

[3] See the Foreword and Appendices A and B.

[4] Historically, the classifications of some items have been based on licensing commitments and not only on the regulatory definition and the functional criteria presented in this standard. The licensing bases of a new plant or design might require a different classification of some items than the regulatory definition and the criteria provide din this standard.

[5] See Appendix B for discussion of other types of classifications.

[6] The classifications of some items in passive advanced light water reactor (ALWR) designs are currently under discussion with the Nuclear Regulatory Commission, and may be safety-related based on licensing requirements or commitments, and not on the criteria presented in this standard.