

# American Nuclear Society

**WITHDRAWN**

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**nuclear safety criteria for the design of  
stationary pressurized water reactor plants**

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**American National Standard  
Nuclear Safety Criteria for the Design of  
Stationary Pressurized Water Reactor Plants**

**Secretariat  
American Nuclear Society**

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# Foreword

(This Foreword is not a part of American National Standards Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983(R1988).)

This standard is a complete revision and combination of N18.2-1973/ANS-51.1 and N18.2a-1975/ANS-51.8. It has been prepared by Subcommittee ANS-51, Pressurized Water Reactor Criteria, to incorporate additional requirements for the design of pressurized water reactor (PWR) nuclear power plants and to address three major areas:

## 1. Safety Classes

The results of the ANS Nuclear Power Plant Standards Committee (NUPPSCO) Ad Hoc Committee and NUPPSCO Coordinating Working Group 3 on Equipment Classification are incorporated. These results define Safety Classes and specify requirements for all equipment and structures in a stationary nuclear power plant having a nuclear safety function. A methodology is given to classify all equipment into one of three Safety Classes according to its importance to nuclear safety and its capability for maintenance, surveillance testing, and inspection, or into a Non-Nuclear Safety Class. In addition, classification interface criteria are defined.

## 2. Plant Conditions

The results of the NUPPSCO Coordinating Working Group 2 have been incorporated. The concept of Plant Conditions is developed that includes individual process conditions, combinations of process conditions, and the combinations of process conditions and external hazards that could result in simultaneous effects on plant equipment. Probability of occurrence is the unifying basis for the categorization of Plant Conditions.

## 3. Design Requirements

This standard provides a set of design requirements for all Safety Classes and Non-Nuclear Safety Class in terms of industry codes and standards for each category of Plant Conditions. The design requirements reference specific standards and ensure substantial interrelationship with other codes and standards.

The content of this standard reflects an attempt to achieve the following objectives:

- a. To establish a consistent set of requirements for light water reactor nuclear power plants;
- b. To establish a disciplined, systematic method for defining nuclear safety requirements for nuclear power plants;
- c. To establish and delineate the functional nuclear safety requirements for the design of nuclear power plants;
- d. To be responsive to both the regulatory requirements of the Nuclear Regulatory Commission and the design and technical requirements of industry codes and standards;
- e. To provide a framework for augmenting these criteria as additional standards are developed within the nuclear industry; and
- f. To provide a uniform basis for design safety requirements which may be reflected in regulatory documents.

The existence of unique plant or site characteristics might require the consideration of alternate design concepts. This standard has been developed along functional lines to permit this flexibility. The standard has, however, cited many standards, some of which were still in draft form at the time this document was published. Provisions

contained in any draft standard should be considered and used with great discretion. It is strongly suggested that the prospective user fully understand the present status of the referenced standard and major factors on why it might be still in draft form; for example, controversial issues should be recognized.

A number of considerations under development concurrent with the preparation of this standard are not addressed in this standard. Examples of these considerations include: human factors engineering (HFE), probabilistic risk assessment (PRA), systems interaction, diversity, plant security, emergency response facilities, degraded core, minimizing challenges to engineered safety features, safety goals and consideration of cost/benefit analysis, and anticipated transients without scram. Subsequent revisions of this standard will address these considerations as appropriate when they become adequately defined.

A designer is not restricted by this standard from proposing or using alternate criteria to ensure adequate nuclear safety. Frequently, a desirable overall result can be obtained by any of several design concepts. The designer may choose from several alternatives in satisfying the specifics of this standard by the proper consideration of the interrelationship of components and systems within the plant. For example, the PRA approach may be used as an alternative method to evaluate plant design; however, its usefulness is somewhat limited without safety goals that are currently under development.

Portions of this standard were prepared separately under ANS-50 Nuclear Power Plant Systems Engineering and were reviewed individually by ANS-51, ANS-50, and NUPPSCO which replaced ANS-50 during this time. The separate documents that have been incorporated into this standard include the Glossary (CWG-1), Conditions of Design (CWG-2), and Equipment Classification (Ad Hoc Committee on Equipment Classification). The structure of this standard is based on the standard format guide (CWG-4). This standard was approved by NUPPSCO in 1982.

This standard and all other ANS standards have been written for prospective use.

Continuing efforts will be required to augment or modify the criteria in this standard to implement changing licensing requirements, to achieve standardization among the various industry criteria and standards currently being developed, and to provide additional clarification or interpretation as appropriate. The ANS-51 PWR Criteria Committee meets periodically to consider revisions or modifications to this standard.

Comments, suggestions, and requests for interpretations should be addressed to the Chairman, ANS-51 PWR Criteria Committee, American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Ill. 60525.

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4.X.2	Definition	
4.X.3	Performance Criteria	
4.X.4	Safety Class	
4.X.5	Design Criteria	
4.X.5.1	Nuclear Design Criteria	
4.X.5.2	Systems Design Criteria	
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