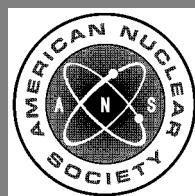


American Nuclear Society

**criteria for investigations of
nuclear facility sites for
seismic hazard assessments**

an American National Standard



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American Nuclear Society
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ANSI/ANS-2.27-2008

**American National Standard
Criteria for Investigations of
Nuclear Facility Sites for
Seismic Hazard Assessments**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-2.27**

Published by the
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American National Standard

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Foreword (This Foreword is not part of American National Standard “Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments,” ANSI/ANS-2.27-2008.)

This standard provides requirements and recommended practices for conducting investigations and acquiring data sets needed to characterize seismic sources for probabilistic seismic hazard analysis (PSHA). The data sets provide information for site response and soil-structure interaction analyses needed for design of those facilities. They also are used to evaluate fault rupture and associated secondary deformation and other seismically induced ground failure hazards (e.g., liquefaction, ground settlement, slope failure).

This standard is one of a group of four standards that establish requirements for the seismic design of nuclear facilities. The overall objective of these standards is to achieve a risk-informed design that protects the public, the environment, and workers from potential consequences of earthquakes. The other three standards are American National Standards Institute/American Nuclear Society ANSI/ANS-2.26-2004, “Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design”; ANSI/ANS-2.29-2008, “Probabilistic Seismic Hazards Analysis”; and American Society of Civil Engineers/Structural Engineering Institute ASCE/SEI 43-05, “Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities.” The procedural relationship among these four standards is shown in Fig. A.

The seismic design process for nuclear facilities is based on the consequences of seismic-initiated failure of structures, systems, and components (SSCs). The

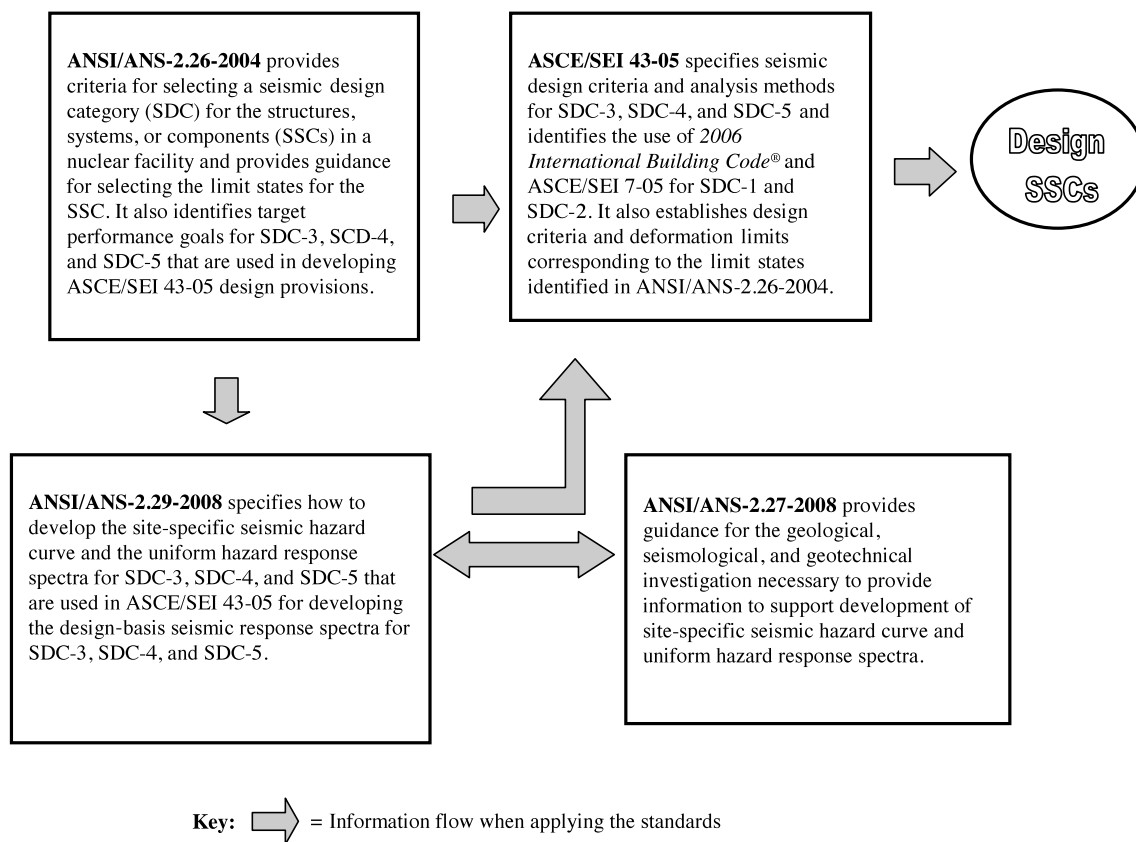


Figure A – Schematic showing the relationships of the seismic standards

seismic design categories identified in ANSI/ANS-2.26-2004 and the design requirements specified in ASCE/SEI 43-05 satisfy target performance goals defined in terms of the annual probability of exceeding specified SSC performance limits. Achieving a target performance goal is directly related to the probability of occurrence of a seismic load that is beyond design specifications. ANSI/ANS-2.29-2008 establishes procedures for performing a PSHA needed to support selection of the seismic loads used in ASCE/SEI 43-05. This standard provides guidance for the geological and geotechnical investigations needed to provide information to support (a) seismic source characterization input to the PSHA, (b) evaluation of surface fault rupture hazards, (c) site response analyses, and (d) seismic-induced ground failure hazards.

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.

Working Group ANS-2.27 of the ANS-25 Subcommittee to the Nuclear Facilities Standards Committee (NFSC) of the American Nuclear Society (ANS) had the following membership at the time of approval of this standard:

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This is a preview of "ANSI/ANS-2.27-2008". [Click here to purchase the full version from the ANSI store.](#)

Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments

1 Scope

This standard provides criteria and guidelines for conducting geological, seismological, and geotechnical investigations needed to provide information to support the following:

- (1) seismic source characterization input to a probabilistic seismic hazard analysis (PSHA);
- (2) evaluation of surface fault rupture hazard;
- (3) site response analysis;
- (4) seismic-induced ground failure hazard.

These criteria are applicable for Seismic Design Category (SDC)-3, SDC-4, and SDC-5 structures, systems, or components (SSCs).

This standard does not address the use of PSHA results or the selection of design-basis events for nuclear facilities. These topics are covered in American National Standards Institute/American Nuclear Society ANSI/ANS-2.26-2004, "Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design" [1]¹⁾ and American Society of Civil Engineers/Structural Engineering Institute ASCE/SEI 43-05, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities" [2].

This standard is one of a series of national standards designed to provide criteria and guidelines to promote uniform and effective assessment of seismic hazards at nuclear facilities. These hazards must be properly identified and characterized commensurate with the level of risk and design requirements associated with each nuclear facility as specified in ANSI/ANS-2.26-2004 [1] and ASCE/SEI 43-05 [2]. As defined in ANSI/ANS-2.26-2004 [1], a nuclear facility is a facility that

stores, processes, tests, or fabricates radioactive materials in such form and quantity that a nuclear risk to the workers, to the off-site public, or to the environment may exist. These include, but are not limited to, nuclear fuel manufacturing facilities; nuclear material waste processing, storage, fabrication, and reprocessing facilities; uranium enrichment facilities; tritium production and handling facilities; and radioactive materials laboratories. Additional criteria may be specified by the applicable regulatory authority.

This standard outlines standard criteria and procedures to collect data needed as input to probabilistic analysis of seismic hazards at nuclear facilities as specified in ANSI/ANS-2.29-2008, "Probabilistic Seismic Hazards Analysis" [3]. Appropriate approaches are outlined to ensure that the current state-of-the-art methodology is being used in the site characterization. The selection of specific techniques and level of detail required to assess seismic and seismic-induced hazards is dependent on both the nature of the nuclear facility (i.e., SDC²⁾ as defined by ANSI/ANS-2.26-2004 [1] and site-specific conditions.³⁾

2 Acronyms and definitions

2.1 List of acronyms

ANS: American Nuclear Society

ANSI: American National Standards Institute

ASCE/SEI: American Society of Civil Engineers/Structural Engineering Institute

ASTM: American Society for Testing and Materials

BPT: Becker penetration test

¹⁾ Numbers in brackets refer to corresponding numbers in Sec. 5, "References."

²⁾ The SDCs used in this standard are not the same as the SDCs referred to in the International Building Code (IBC).

³⁾ In this standard, material that is double-indented indicates a commentary.