



Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities

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An American National Standard

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**American National Standard
Criteria for Assessing Tectonic Surface
Fault Rupture and Deformation
at Nuclear Facilities**

Secretariat
American Nuclear Society

Prepared by the
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Working Group ANS-2.30**

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American National Standard ANSI/ANS-2.30-2015

Foreword

(This foreword is not a part of the American National Standard “Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities,” ANSI/ANS-2.30-2015.)

This standard provides criteria and guidelines for assessing permanent ground deformation (PGD) hazard due to tectonic surface fault rupture and deformation at nuclear facilities. Specifically, the purpose of this standard is to provide an outline of procedures and methods for performing probabilistic fault displacement hazard analysis (PFDHA) and probabilistic tectonic deformation hazard analysis (PTDHA).

This standard replaces ANSI/ANS-2.7-1982, “Criteria and Guidelines for Assessing Capability for Surface Faulting at Nuclear Power Plants,” which is obsolete because of changes in the state-of-knowledge, technical methods, public concerns, and regulatory programs. This new standard includes updated information to make it useful for siting/licensing nuclear facilities in the U.S.

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 (R2010), “Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design.”

Two complementary standards describe procedures for performing site characterization and assessing seismic hazards, respectively: ANSI/ANS-2.27-2008, “Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments,” and ANSI/ANS-2.29-2008, “Probabilistic Seismic Hazard Analysis.”

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied.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.

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Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities

1 Scope

This standard provides criteria and guidelines for assessing permanent ground deformation (PGD) hazard due to tectonic surface fault rupture and deformation at nuclear facilities. Specifically, the purpose of this standard is to provide an outline of procedures and methods for performing probabilistic fault displacement hazard analysis (PFDHA) for surface rupture hazard and probabilistic tectonic deformation hazard analysis (PTDHA) for surface deformation due to displacements along blind (buried) faults. Probabilistic approaches for assessing surface fault displacement and tectonic deformation hazard are relatively new; thus, criteria and guidelines have not been defined previously. PGD due to fault rupture is a potential hazard for nuclear facilities founded across or near a fault. In this standard, only coseismic PGD hazard related to movement on crustal faults is addressed. Deformation in the form of creep or afterslip and uplift and subsidence during subduction zone earthquakes is not addressed. Non-tectonic deformation, as described in Section 5.1, is not addressed in this standard.

Methods to investigate and characterize surface fault displacement and tectonic deformation hazards have advanced significantly, justifying a new standard. Specifically, it is possible to quantify the expected PGD from surface or near-surface fault rupture due to advances in geologic, geomorphic, and paleoseismic techniques used to identify and quantify the location, rate, and amount of Quaternary deformation as well as empirical observations of PGD resulting from historical earthquakes. Modern engineering practice has developed sufficiently such that the design or retrofit of structures, systems, or components (SSCs) might be able to accommodate or resist certain amounts of earthquake-induced surface rupture or other types of ground deformation. Therefore, characterization of PGD is a critical step during the siting and design of engineered facilities that are to be located in areas where such deformation may occur.

This standard replaces ANSI/ANS-2.7-1982 (withdrawn), "Criteria and Guidelines for Assessing Capability for Surface Faulting at Nuclear Power Plant Sites," [1]¹ which is obsolete because of changes in technical methods, public concerns, and regulatory programs. This new standard includes updated information to make it useful for siting/licensing nuclear facilities in the U.S.

This standard does not specify methods for estimating the probability of other seismically induced hazards such as soil liquefaction, soil settlement, landsliding, and earthquake-induced flooding. These hazards may be applicable for certain sites and need to be evaluated and included in design requirements.

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

¹ Numbers in brackets refer to corresponding numbers in Sec. 11, "References."