

# American Nuclear Society

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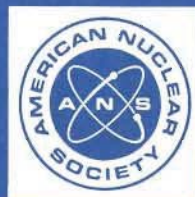
**guidelines for evaluating  
site-related geotechnical parameters  
at nuclear power sites.**

## an American National Standard

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**American National Standard  
Guidelines for Evaluating  
Site-Related Geotechnical Parameters  
at Nuclear Power Sites**

**Secretariat  
American Nuclear Society**

**Prepared by the  
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Working Group ANS-2.11**

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## Foreword

(This Foreword is not a part of American National Standard Guidelines for Evaluating Site-Related Geotechnical Parameters at Nuclear Power Sites, ANSI/ANS-2.11-1978.)

The purpose of this standard is to provide guidelines for establishing site-related geotechnical parameters to be considered in site evaluation, and in the design, construction, and performance of foundations and earthwork for nuclear power plants. It is also the intent of this standard to provide guidelines regarding geotechnical information used in preparing Safety Analysis Reports (SAR's) and Environmental Reports (ER's) for nuclear power plants. The user of this standard is encouraged to concentrate his evaluation on those geotechnical parameters which are required for the actual design and safety analysis of the power plant facilities at a specific site. Extraneous information should be kept to a minimum. The guidelines identify those geotechnical parameters which may be necessary for site evaluation, design, construction, or performance monitoring; the exploration methods and laboratory methods which may be used to establish the geotechnical parameters; and a discussion of the philosophy of quality assurance as related to geotechnical work.

This standard does not restrict or limit the use of alternative approaches or innovations for assessing geotechnical parameters.

It is not the intent of this standard to describe procedures for the evaluation of regional geotechnical aspects such as regional structure, regional ground water including dispersion of radionuclides, and seismicity. Many of these aspects are covered in other American Nuclear Society standards. Further, it is not the intent of this standard to describe the use of the geotechnical parameters in design, construction, or performance monitoring. Many of these aspects are covered in draft standards under development by the American Society of Civil Engineers\* in guidelines N175, "Foundation Design Criteria," and N725, "Analysis of Nuclear Safety Class I Earth Structures."

This is one of a number of standards currently being developed on individual subjects within the field of site evaluation. The standard was developed under the auspices of the American Nuclear Society Standards Committee by Subcommittee 2, "Site Evaluation." The standard was prepared by Working Group ANS-2.11 of ANS-2.

Working Group ANS-2.11 was formed under Subcommittee ANS-2, "Site Evaluation", of the American Nuclear Society Standards Committee at a meeting held in Philadelphia, Pennsylvania, on June 27, 1974. The first meeting of the working group was held in Chicago, Illinois, on October 25, 1974. At this meeting, a scope and tentative outline for the standard were developed and assignments were made to the working group members for the preparation of various sections of this standard.

Working Group ANS-2.11 of the Standards Committee of the American Nuclear Society had the following membership. (Current members are indicated by the asterisk):

- |   |   |
|---|---|
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| T. C. Buschbach, <i>Illinois State Geological Survey</i>  | *C. R. McClure, <i>Bechtel Incorporated</i>                                       |
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| A. J. Hendron, <i>University of Illinois</i>              | *L. A. White, <i>U.S. Nuclear Regulatory Commission</i>                           |
| D. Hendron, <i>Woodward-Clyde &amp; Associates, Inc.</i>  | P. R. Zaman, <i>Black &amp; Veatch</i>  |

\*Draft Standards N175, "Foundation Design Criteria," and N725, "Analysis of Nuclear Safety Class I Earth Structures." Assigned Correspondent: John D. Stevenson, 6200 Oak Tree Blvd., Cleveland, Ohio 44131.

The membership of Subcommittee ANS-2 at the time of approval of this standard was:

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The American National Standards Committee, N18, "Nuclear Design Criteria," had the following membership at the time it approved this standard:

G. L. Wessman, *Chairman*  
M. D. Weber, *Secretary*

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American Concrete Institute .....	R. E. Mast
American Nuclear Society .....	G. L. Wessman
American Society of Civil Engineers .....	M. I. Goldman C. Gogolick (Alt)
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\*Non-balloting member

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# Guidelines for Evaluating Site-Related Geotechnical Parameters at Nuclear Power Sites

## 1. Scope

This standard presents guidelines for evaluating site-related geotechnical parameters for nuclear power sites. Aspects considered include geology, ground water, foundation engineering, and earthwork engineering. These guidelines identify the basic geotechnical parameters to be considered in site evaluation, and in the design, construction, and performance of foundations and earthwork aspects for nuclear power plants. Also included are tabulations of typical field and laboratory investigative methods useful in identifying geotechnical parameters. Those areas where interrelationships with other standards may exist are indicated.

## 2. Purpose

The purpose of this standard is to provide guidelines for establishing site-related geotechnical parameters to be considered in site evaluation, and in the design, construction, and performance of foundations and earthwork aspects for nuclear power plants. This standard also provides guidelines regarding geotechnical information used in preparing Safety Analysis Reports (SAR's) and Environmental Reports (ER's) for nuclear power plants.

## 3. Definitions

The following special definitions, used in the context of geotechnical investigations, will be useful in understanding this standard:

### core recovery

$$\text{CR in \%} = 100 \times \frac{\text{total length of core recovered}}{\text{length of core run}}$$

**fault.** A fault is a surface or zone of fracture in soil or rock along which there has been displacement.

**non-tectonic ground disruptions.** Ground disruptions due to landslides, subsidence or

uplift caused by man's activities, solution activity, differential settlement, or ice shove.

**parameter.** As used in this standard, a parameter is a set or part of a set of physical properties whose values determine the characteristics or behavior of a system.

**potentiometric surface.** An imaginary surface representing the static head of ground water and defined by the level to which water will rise in a series of wells.

**rock quality designation (RQD).** Rock quality designation (RQD) as defined by Deere [1]<sup>1</sup>

$$\text{RQD in \%} = 100 \times \frac{\text{length of core in pieces 4 in. and longer}}{\text{length of core run}}$$

RQD (%)	Quality Description
Exceeding 90	Excellent
90-75	Good
75-50	Fair
50-25	Poor
Less than 25	Very Poor

Breakage due to drilling techniques or exposure to air should not be considered as natural breaks.

**safety related.** Plant features necessary to assure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of Title 10 Code of Federal Regulations, Part 100, "Reactor Site Criteria." [2]

**shall, should, may.** The word "shall" is used to denote a requirement, the word "should" is used to denote a recommendation, and the word

<sup>1</sup>Numbers in brackets refer to corresponding numbers in Section 8, "References."