

# American Nuclear Society

**criticality safety criteria for the handling, storage,  
and transportation of LWR fuel outside reactors**

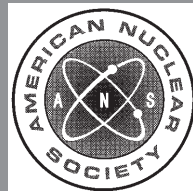
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**Criticality Safety Criteria for the Handling, Storage,**  
**and Transportation of LWR Fuel Outside Reactors**

Secretariat  
**American Nuclear Society**

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## Foreword

(This Foreword is not a part of American National Standard Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors, ANSI/ANS-8.17-1984.)

Criticality safety is an important component in a comprehensive safety assessment of a facility or an operation involving fissile materials. Designers, operators and standards writing groups having concern with non-reactor nuclear facilities justifiably have occasion to address criticality safety. In order to avoid diverse and inadequate attention being given to the subject and in the interest of an orderly presentation that embodies criticality safety principles and practices consistent with existing ANS standards in the field of criticality safety, Subcommittee 8, Fissionable Materials Outside Reactors, of the ANS Standards Committee undertook the present work. The principal intent of the Work Group, ANS-8.17, has been to provide basic requirements that address the criticality safety aspects of a facility or operation and which can be referenced or used in conjunction with other safety standards or regulations to address the total safety and operational requirements. This standard presents criticality safety criteria applicable to the handling, storage, and transportation of light water reactor (LWR) fuel rods and elements outside a reactor core.

This standard was drafted by Work Group ANS-8.17 of Subcommittee 8 of the American Nuclear Society. The following members participated in the preparation:

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The American National Standards Committee N16, Nuclear Criticality Safety, which reviewed and approved this standard in 1983, had the following membership:

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# Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors

## 1. Introduction

The potential for criticality accidents during the handling, storage, and transportation of fuel for nuclear reactors represents a health and safety risk to personnel involved in these activities, as well as to the general public. Appropriate design of equipment and facilities, handling procedures, and personnel training can minimize this risk. While American National Standard for Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors, ANSI/ANS-8.1-1983[1]<sup>1</sup> provides general criteria for assurance of criticality safety, this standard provides additional guidance applicable to handling, storage, and transportation of light water reactor (LWR) nuclear fuel units in any phase of the fuel cycle outside the reactor core.

## 2. Scope

This standard provides nuclear criticality safety criteria for the handling, storage, and transportation of LWR fuel rods and units outside reactor cores.

## 3. Definitions

**3.1 Limitations.** The definitions given below are of a restricted nature for the purpose of this standard. Other specialized terms are defined in American National Standard Glossary of Terms in Nuclear Science and Technology, ANSI N1.1-1976/ANS-9 [2].

**3.2 Shall, Should, and May.** The word "shall" is used to denote a requirement, the word "should" to denote a recommendation, and the word "may" to denote permission, neither a requirement nor a recommendation. In order to conform with this standard, all operations shall be performed in accordance with its requirements but not necessarily with its recommendations.

<sup>1</sup>Numbers in brackets refer to corresponding numbers in Section 6, References.

## 3.3 Glossary of Terms

**array.** Any fixed configuration of fuel units maintained by mechanical devices.

**controlled parameter.** A parameter that is kept within specified limits, and, when varied, influences the margin of subcriticality.

**fuel rod.** A long slender column of material containing fissile nuclides, normally encapsulated by metallic tubing.

**fuel unit.** The fundamental item to be handled, stored, or transported. It may be an assembly of fuel rods, canned spent fuel, or consolidated fuel rods.

## 4. General Safety Criteria

**4.1** General administrative and technical practices are contained in American National Standard ANSI/ANS-8.1-1983<sup>2</sup> [1].

**4.2** Methods used to calculate subcriticality shall be validated in accordance with ANSI/ANS-8.1-1983 [1].

**4.3** Guidance to determine the need for and use of criticality alarms for personnel protection is contained in American National Standard Criticality Accident Alarm System, ANSI/ANS-8.3-1979 [3].

**4.4** Prior to first use of, or before implementing changes to, any operation or system involving handling, storage, or transportation of fuel units or rods, a criticality safety evaluation shall be performed for all normal and credible abnormal conditions<sup>3</sup> to determine that the entire opera-

<sup>2</sup> Additional guidance is also found in proposed American National Standard Administrative Practices for Nuclear Criticality Safety, ANS-8.19; assigned correspondent: D. R. Smith, Los Alamos National Laboratory, P. O. Box 1663, Los Alamos, New Mexico 87545.

<sup>3</sup> Examples of conditions to be considered are given in the Appendix.