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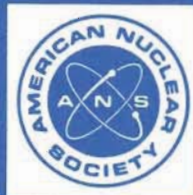
**WITHDRAWN**

December 31, 1996  
ANSI/ANS-8.3-1986

**criticality accident alarm system**

**an American National Standard**

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published by the  
American Nuclear Society  
555 North Kensington Avenue  
La Grange Park, Illinois 60525 USA



**ANSI/ANS-8.3-1986**  
**Revision of**  
**ANSI/ANS-8.3-1979**

**American National Standard**  
**Criticality Accident Alarm System**

Secretariat  
**American Nuclear Society**

Prepared by the  
**American Nuclear Society**  
**Standards Committee**  
**Working Group ANS-8.3**

Published by the  
**American Nuclear Society**  
**555 North Kensington Avenue**  
**La Grange Park, Illinois 60525 USA**

Approved August 29, 1986  
by the  
**American National Standards Institute, Inc.**

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**American Nuclear Society**  
**555 North Kensington Avenue, La Grange Park, Illinois 60525 USA**

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## Foreword

(This Foreword is not a part of American National Standard Criticality Accident Alarm System, ANSI/ANS-8.3-1986.)

The usefulness and protective features of criticality alarm systems have been demonstrated in instances of accidental criticality that have occurred during the processing of fissionable materials. This standard provides guidance for the establishment and maintenance of an alarm system to initiate personnel evacuation in the event of inadvertent criticality. Preparation of the standard, begun in 1966, resulted in the issuance of N16.2-1969, and an initial revision was issued in 1979. This revision incorporates relevant features of ANSI/ANS-8.3-1979 and American National Standard Immediate Evacuation Signal for Use in Industrial Installations, ANSI N2.3-1979. N2.3 was originally developed under the aegis of Committee N2 of the American Standards Association. The 1979 revision was sponsored by American National Standards Committee N16.

ANSI N2.3-1979 and ANSI/ANS-8.3-1979 were concurrently undergoing revision and review in 1979. Several reviewers suggested that the two documents, each concerned with immediate evacuation of process areas, should be combined. It was decided that development of the combined document at that time would result in undesired delays, but that the next revision of these two standards should attempt consolidation. The current revision provides this consolidation by adding important features of N2.3-1979 to ANSI/ANS-8.3-1979 and deleting the section of ANS-8.3 that addressed emergency planning. This deletion reflected a long-recognized position that emergency planning was not properly part of an alarm standard. Guidance for emergency planning can now be found in American National Standard Administrative Practices for Nuclear Criticality Safety, ANSI/ANS-8.19-1984, and does not need to be retained in the alarm standard.

This revision was prepared by ANS Standards Subcommittee 8, sitting as a committee of the whole, with additional participation by James E. McLaughlin, Radiation Protection Officer, University of California at Los Angeles. The membership of ANS-8 at the time of the standard's approval was:

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Consensus Committee N16, Nuclear Criticality Safety, which reviewed and approved this standard in 1985, had the following membership:

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E. B. Johnson, Secretary

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Dixon Callihan .....	American Nuclear Society
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# Criticality Accident Alarm System

## 1. Introduction

Guidance for the prevention of criticality accidents in the handling, storing, processing, and transporting of fissionable materials is presented in American National Standard for Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors, ANSI/ANS-8.1-1983 [1]<sup>1</sup>. In most operations with fissionable materials the risk of inadvertent criticality is very low; however, this risk cannot be eliminated. It is important in such operations to provide a means of alerting personnel and a procedure for their prompt evacuation, thus limiting their exposure to radiation.

## 2. Scope

This standard is applicable to all operations with plutonium, <sup>233</sup>U, uranium enriched in <sup>235</sup>U, and other fissionable materials in which inadvertent criticality may occur and cause the exposure of personnel to unacceptable amounts of radiation. This standard does not require separate additional instrumentation when the operating instrumentation of facilities, such as nuclear reactors or critical experiments, meets the requirement of this standard.

This standard does not include details of administrative actions, which are considered to be managerial prerogatives, or specific design and description of instrumentation. Details of nuclear accident dosimetry, personnel exposure evaluations, and post-accident diagnostics are not within the scope of this standard.

Details of this standard are directed principally toward gamma-radiation rate-sensing systems. Analogous considerations are applicable to integrating systems and to systems detecting neutrons.

Process equipment used in areas from which immediate evacuation may be required should be so

designed that leaving the equipment will not introduce significant risk. Such design is beyond the scope of this standard.

## 3. Definitions

**3.1 Limitations.** The following definitions 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, 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.

## 3.3 Glossary of Terms

**criticality accident.** The release of energy as a result of accidentally producing a self sustaining or divergent neutron chain reaction.

**minimum accident of concern.** The smallest accident a criticality alarm system is required to detect.

**process area.** An area in which fissionable material is handled, stored, or processed.

## 4. General Principles

### 4.1 General

**4.1.1** Alarm systems shall be provided wherever it is deemed that they will result in a reduction in total risk. Consideration shall be given to hazards that may result from false alarms.

**4.1.2** Installation of an alarm system implies a nontrivial risk of a criticality accident. Where alarm systems are installed, emergency plans should be maintained. Guidance for the preparation of emergency plans may be found in

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