



# Nuclear Criticality Accident Emergency Planning and Response

An American National Standard

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Emergency Planning and  
Response**

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American National Standard ANSI/ANS-8.23-2019

**Foreword** (This foreword is not a part of American National Standard “Nuclear Criticality Accident Emergency Planning and Response,” ANSI/ANS-8.23-2019, but is included for informational purposes only.)

This standard provides criteria for emergency planning and response to a nuclear criticality accident for facilities outside reactors that process, store, or handle fissionable material. This standard focuses on those elements of planning and response needed specifically in the event of a criticality accident. It is not a general emergency planning and response standard.

This revision removes the assumption from the previous editions [ANS-8.23-1997 and ANS-8.23-2007 (R2012)], that user facilities have an alarm system that complies with ANSI/ANS-8.3-1997 (R2017), “Criticality Accident Alarm System.” Elements of this standard might be appropriate for certain facilities that are not using an alarm system compliant with ANSI/ANS-8.3-1997 (R2017) yet have credible and non-trivial hazards from a criticality accident. This revision emphasizes that an immediate evacuation zone should be established based on multiple factors and not solely based on dose estimates. The recent update of ANSI N13.3-2013 (R2019), “Dosimetry for Criticality Accidents,” for criticality accident dosimetry is included, and a few additional clarifications have been made. Appendix C now includes references to additional methods for estimating fission yield for a criticality accident. Users should understand the assumptions and limitations of these methods and use them only where applicable. Appendix C is not intended to be a tutorial on the complex topic of criticality accident analysis. Appendix D is added to help users select a dose criterion that corresponds to radiation levels immediately dangerous to life and health.

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied.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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# Nuclear Criticality Accident Emergency Planning and Response

## 1 Introduction

Criticality safety programs at facilities that use fissionable material are primarily directed at avoiding nuclear criticality accidents. However, the possibility of such accidents exists, and the consequences can be life threatening. Therefore, advance planning, practice in planned emergency responses, and verification of readiness are considered necessary.

## 2 Scope

This standard<sup>1)</sup> provides criteria for minimizing risks to personnel during emergency response to a nuclear criticality accident outside reactors. The criteria address management and technical staff responsibilities, planning, equipment, evacuation, rescue, reentry, stabilization, classroom training, drills, and exercises. This standard applies to facilities, locations, or activities judged to have credible and non-trivial consequences from a criticality accident. This standard does not apply to nuclear power plant sites or to licensed research reactor facilities, which are addressed by other standards.

## 3 Definitions

### 3.1 Limitations

The definitions given below are of a restricted nature for the purposes of this standard. Other specialized terms are defined in *Glossary of Terms in Nuclear Science and Technology* [1].<sup>2)</sup>

### 3.2 Shall, should, and may

**shall, should, and may:** The word “shall” is used to denote a requirement; the word “should” is used to denote a recommendation; and the word “may” is used to denote permission, neither a requirement nor a recommendation.

### 3.3 Glossary of terms

**drill:** Supervised instruction intended to test, develop, maintain, and practice the skills required in a particular emergency response activity. A drill may be a component of an exercise.

**emergency coordinator:** A person authorized to direct the overall emergency response.

**emergency response:** Actions taken from the time of indication of a criticality accident, through response to the emergency, to stabilization and start of recovery operations.

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<sup>1)</sup> The current standard, ANSI/ANS-8.23-2019, is hereinafter referred to as “this standard.”

<sup>2)</sup> Numbers in brackets refer to corresponding numbers in Sec. 9, “References.”