



REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 3.43

NUCLEAR CRITICALITY SAFETY IN THE STORAGE OF FISSILE MATERIALS

A. INTRODUCTION

Section 70.22, "Contents of Applications," of 10 CFR Part. 70, "Domestic Licensing of Special Nuclear Material," requires that applications for a specific license to own, acquire, deliver, receive, possess, use, or transfer special nuclear material contain proposed procedures to avoid accidental conditions of criticality. This regulatory guide provides guidance for complying with this portion of the Commission's regulations by describing procedures acceptable to the NRC staff for the prevention of criticality accidents in the storage of fissile materials outside nuclear reactors.

B. DISCUSSION

ANSI N16.5-1975, "Guide for Nuclear Criticality Safety in the Storage of Fissile Material,"¹ was prepared by Subcommittee 8, Fissionable Materials Outside Reactors, of the Standards Committee of the American Nuclear Society. ANSI N16.5-1975 was approved by the American National Standards Committee N16, Nuclear Criticality Safety, in 1974 and subsequently by the American National Standards Institute (ANSI) on April 12, 1975.

* ANSI N16.5-1975 is applicable to the storage of fissile materials as metals and oxides. Its applicability is limited to 100 wt-% U-233, uranium containing more than 30 wt-% U-235, and plutonium containing more than 80 wt-% Pu-239 (all percentages based on metal content only). The standard presents tabulated mass limits of these fissile materials in storage cells of idealized water-reflected storage arrays. Caution in the use of the tabulated values in the standard is advised to ensure subcriticality

*Lines indicate substantive changes from previous issue.

¹Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60525.

USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. This guide was revised as a result of substantive comments received from the public and additional staff review.

of each storage cell and of the storage array. These tabulated values do not include the effects of moderation by hydrogenous materials contiguous to the fissile materials. Evaluation of these effects by use of a validated computational technique is recommended in the standard. The standard also presents guidance on reduction factors to be applied to the tabulated mass limits to account for the effects of position and double batching of fissile material in a storage cell, the reflecting properties of concrete or other masonry construction materials used in the storage facility, and the proximity of individual storage arrays.

C. REGULATORY POSITION

The nuclear criticality safety practices, limits, and conditions for the storage of fissile material and the guidance for other storage configurations contained in ANSI N16.5-1975 provide procedures generally acceptable to the NRC staff for the prevention of criticality accidents in the storage of fissile materials outside nuclear reactors subject to the following:

1. Use of ANSI N16.5-1975 is not a substitute for detailed nuclear criticality safety analyses for specific storage arrangements for fissile materials.

2. The mass limits tabulated in the standard that are marked by a superscript "a" to show that they exceed 90 percent of the critical mass of a water-reflected sphere should not be used unless it can be demonstrated that their use could not result in criticality under conditions involving errors or accidents such as double batching or water immersion.

3. The tabulated masses in the standard are not acceptable without all of the appropriate adjustments called for by the standard. License applicants wanting to use the standard should,

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among other things, demonstrate that the requirements of paragraphs 5.3 through 5.6 of the standard have been met.

4. Section 7 of ANSI N16.5-1975 lists additional documents referred to in the standard. The specific applicability or acceptability of these listed documents will be covered separately in other regulatory guides, where appropriate.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants regarding the NRC staff's plans for using this regulatory guide.

The methods described in this guide were applied in a number of specific cases during reviews and selected licensing actions. These methods reflect the latest general NRC approach to criticality safety in the storage of certain types of fissile material outside of nuclear reactors. Therefore, except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein is being and will continue to be used in the evaluation of submittals for license applications submitted pursuant to 10 CFR Part 70 until this guide is revised as a result of suggestions from the public or additional staff review.



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