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DRAFT REGULATORY GUIDE AND VALUE/IMPACT STATEMENT

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PROPOSED REVISION 2 TO REGULATORY GUIDE 3.4

NUCLEAR CRITICALITY SAFETY IN OPERATIONS WITH FISSIONABLE
MATERIALS OUTSIDE REACTORS

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 initially transfer special nuclear material contain proposed procedures to avoid accidental criticality. This guide describes procedures acceptable to the NRC staff for preventing accidental criticality in operations with fissionable materials outside reactors and for validating calculational methods used in assessing nuclear criticality safety.

B. DISCUSSION

ANSI/ANS-8.1-1983, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors,"¹ was prepared by Subcommittee 8, Fissionable Materials Outside Reactors, of the Standards Committee of the American Nuclear Society as a consolidation of revisions to ANSI N16.1-1975/ANS-8.1 and ANSI N16.9-1975/ANS-8.11. ANSI/ANS-8.1-1983 was approved by the American

*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.

This regulatory guide and the associated value/impact statement are being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. They have not received complete staff review and do not represent an official NRC staff position.

Public comments are being solicited on both drafts, the guide (including any implementation schedule) and the value/impact statement. Comments on the value/impact statement should be accompanied by supporting data. Comments on both drafts should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch, by June 26, 1985.

Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Technical Information and Document Control.

National Standards Committee N16, Nuclear Criticality Safety, in 1982 and by the American National Standards Institute (ANSI) on October 7, 1983.

ANSI/ANS-8.1-1983 applies to handling, storing, processing, and transporting fissionable material outside nuclear reactors. The standard presents generalized basic criteria and specific limits (maximum subcritical) for some single units of simple shape containing ^{233}U , ^{235}U , or ^{239}Pu , but not for multi-unit arrays. Further, the subcritical limits specified in the standard allow for uncertainties in the calculations and experimental data used in their derivation but not for contingencies such as double batching or failure of analytical techniques to yield accurate values.

This standard also delineates requirements for establishing the validity and area of applicability of a calculational method used in assessing nuclear criticality safety. However, it is concerned only with validating calculational methods and does not address important related questions such as the margin of safety to be used with the method or the qualifications of the personnel responsible for the data input.

This standard does not apply to the assembly of fissionable materials under controlled conditions, e.g., in critical experiments. Nor does the standard include the details of administrative controls, the design of processes or equipment, the description of instrumentation for process control, or detailed criteria to be met in transporting multi-unit arrays of fissionable materials.

C. REGULATORY POSITION

The nuclear criticality safety practices, the single-parameter limits for fissionable nuclides, and the guidance for multiparameter control contained in ANSI/ANS-8.1-1983 provide procedures generally acceptable to the NRC staff for preventing accidental conditions of criticality in handling, storing, processing, and transporting special nuclear materials outside of nuclear reactors. However, use of ANSI/ANS-8.1-1983 is not a substitute for detailed nuclear criticality safety analyses for specific operations.

The guidelines for validating calculational methods for nuclear criticality safety contained in ANSI/ANS-8.1-1983 provide a procedure generally acceptable to the NRC staff for establishing the validity and area of applicability of calculational methods used in assessing nuclear criticality safety. However, it will not be sufficient merely to refer to this guide in describing the

validation of a method. The details of validation indicated in Section 4.3.6 of the standard should be provided to demonstrate the adequacy of the safety margins relative to the bias and criticality parameters and to demonstrate that the calculations embrace the range of variables to which the method will be applied.

Section 7 of ANSI/ANS-8.1-1983 lists additional documents referred to in the standard. Endorsement of ANSI/ANS-8.1-1983 by this regulatory guide does not constitute an endorsement of these documents.

D. IMPLEMENTATION

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

This proposed Revision 2 of the guide has been released to encourage public participation in its development. It is a consolidation of revisions to currently active Regulatory Guides 3.4 (Revision 1-R, February 1978) and 3.41 (Revision 1, May 1977). Except in those cases in which an applicant proposes acceptable alternative methods for complying with specified portions of the Commission's regulations, the methods described in the currently active Regulatory Guides 3.4 and 3.41 will continue to be used in the evaluation of license applications for special nuclear materials. The methods to be described in the active Revision 2 of Regulatory Guide 3.4 reflecting public comments will be used in the evaluation of submittals for special nuclear material license applications docketed after the implementation date to be specified in the active revision. The implementation date will in no case be earlier than December 2, 1985.

DRAFT VALUE/IMPACT STATEMENT

1. PROPOSED ACTION

1.1 Description

Each application for a specific license for special nuclear material is required by the Commission's regulations to contain proposed procedures to avoid accidental criticality. The proposed action is to update two regulatory guides that provide procedures for preventing criticality accidents in operations with fissionable materials outside reactors and for validating calculational methods used in assessing nuclear criticality safety.

1.2 Need for Proposed Action

Guidance for preventing criticality accidents in operations with fissionable materials outside reactors is contained in Regulatory Guide 3.4 (Revision 1-R), "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," dated February 1978, which endorsed ANSI N16.1-1975/ANS-8.1. Guidelines for validating calculational methods for nuclear criticality safety are contained in Regulatory Guide 3.41 (Revision 1), "Validation of Calculational Methods for Nuclear Criticality Safety," dated May 1977, which endorsed ANSI N16.9-1975/ANS-8.11. Both standards have been revised and consolidated into ANSI/ANS-8.1-1983 with the NRC staff having been involved in the development, review, and approval of the revisions. ANSI/ANS-8.1-1983 was approved by the American National Standards Institute on October 7, 1983. Current NRC guidelines on nuclear criticality safety in operations with fissionable materials outside reactors and on validating calculational methods for nuclear criticality safety are thus based on obsolete national standards and should be updated. Consistent with past NRC practice, this guidance should be provided by revising Regulatory Guide 3.4 to endorse ANSI/ANS-8.1-1983. Regulatory Guide 3.41 will be withdrawn upon issuance of Revision 2 of Regulatory Guide 3.4 as an active guide.

1.3 Value/Impact of Proposed Action

1.3.1 NRC

Since the purpose of the proposed action is to provide updated guidance, this value/impact statement is based on changes proposed to the guidance contained in Regulatory Guides 3.4 and 3.41. The proposed action establishes an NRC position on ANSI/ANS-8.1-1983. Subcriticality limits have been increased in ANSI/ANS-8.1-1983 where the margin of subcriticality seemed unnecessarily large. In other cases, where subcriticality appeared doubtful, the limits have been reduced. Additional limits have been provided where they seemed likely to be useful. No significant changes have been made in requirements for establishing the validity and areas of applicability of any calculational method used in assessing nuclear criticality safety. The impact of the proposed action will be minimal.

1.3.2 Other Government Agencies

Not applicable unless a government agency is an applicant.

1.3.3 Industry

The impact on industry associated with the NRC endorsement of the standard should be minimal.

1.3.4 Workers

No impact on workers can be foreseen.

1.3.5 Public

No impact on the public can be foreseen.

1.4 Decision on Proposed Action

As previously stated, updated guidance should be published on nuclear criticality safety in operations with fissionable materials outside reactors.

2. TECHNICAL APPROACH

This section is not applicable to this value/impact statement since the proposed action is an update of previously issued guidance. The technical issues are discussed in Section 1.3.1 of this statement.

3. PROCEDURAL APPROACH

Since the proposed action is an update of information contained in an existing regulatory guide, the appropriate procedural approach is a revision to the existing guide.

4. STATUTORY CONSIDERATIONS

4.1 NRC Authority

Authority for the proposed action is derived from the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended, and implemented through the Commission's regulations in Title 10 of the Code of Federal Regulations cited in the introduction to the guide.

4.2 Need for NEPA Assessment

The proposed action does not require an environmental impact statement since it is categorically excluded from the NEPA process in accordance with paragraph 51.22(c)(16) of 10 CFR Part 51.

5. RELATIONSHIP TO OTHER EXISTING OR PROPOSED REGULATIONS OR POLICIES

The proposed revision to the guide does not conflict with or overlap any requirements promulgated by other agencies. Implementation of the proposed action is discussed in Section D of the proposed revision.

6. SUMMARY AND CONCLUSIONS

A revision to Regulatory Guide 3.4, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," should be prepared. The revision should endorse ANSI/ANS-8.1-1983 with any needed supplemental provisions.

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