U.S. NUCLEAR REGULATORY COMMISSION

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REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 3.41

VALIDATION OF CALCULATIONAL METHODS FOR NUCLEAR CRITICALITY SAFETY

A. INTRODUCTION

Applicants for licenses under 10 CFR Parts 50 or 70 proposing to handle, process, or store quantities of fissile material outside reactors sufficient to form a critical mass are required to demonstrate that their controls will prevent accidental criticality under normal or accident conditions. Each application must include information on personnel, equipment, and procedures. Although the equipment and procedures used to prevent criticality may be, and often are, based on designs and methods of demonstrated validity already in the literature, the applicant may choose to use his own methods of calculation, which, of course, must be demonstrated to be valid by comparison with experimental data. This guide provides a procedure acceptable to the NRC staff for validating methods of calculation. Although these measures are broadly applicable, it is anticipated that they will be applied primarily to electronic computer codes.

B. DISCUSSION

Subcommittee 8 on Fissionable Material Outside Reactors of the Standards Committee of the American Nuclear Society has developed a standard that delineates requirements for establishing the validity and area of applicability of a calculational method used in assessing nuclear criticality safety. * This standard was approved by American National Standards Committee N16, Nuclear Criticality Safety, and was approved as an American National Standard by the American National Standards Institute (ANSI) on September 18, 1975, under the designation ANS-8-11/N16.9-1975, "Validation of Calculational Methods for Nuclear Criticality Safety."

As indicated by the scope of the standard, it is concerned only with validation of 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.

*Lines indicate substantive changes from previous issues.

C. REGULATORY POSITION

The guidelines for validation of calculational methods for nuclear criticality safety contained in ANSI N16.9-1975, "Validation of Calculational Methods for Nuclear Criticality Safety,"[1] provide a generally acceptable procedure 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 the validation indicated in Section 4.6 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.

D. IMPLEMENTATION

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

This guide reflects current NRC staff practice. 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 special nuclear material license, operating license, or construction permit applications until this guide is revised as a result of suggestions from the public or additional staff review.

[1]Copies may be obtained from the American Nuclear Society, 244 East Ogden Avenue, Hinsdale, Illinois 60521.

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