U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

DRAFT REGULATORY GUIDE AND VALUE/IMPACT STATEMENT

May 1981
Division 3
Task FP 027-5

Contact: M. S. Weinstein (301)443-5910

PROPOSED REVISION 1 TO REGULATORY GUIDE 3.1

USE OF BOROSILICATE-GLASS RASCHIG RINGS AS A NEUTRON ABSORBER IN SOLUTIONS OF FISSILE MATERIAL

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. Procedures for this purpose include incorporating neutron-absorbing material such as boron in process equipment. 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 by use of borosilicate-glass raschig rings as a neutron absorber in solutions of fissile material.

B. DISCUSSION

ANSI/ANS 8.5-1979, "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material,"[1] is a revision of ANSI N16.4-1971 and was prepared by Subcommittee 8, Fissionable Materials Outside Reactors, of the Standards Committee of the American Nuclear Society. ANSI/ANS 8.5-1979 was approved by the American National Standards Committee N16, Nuclear Criticality Safety, in early 1979 and by the American National Standards Institute (ANSI) on October 9, 1979. *

* Lines indicate substantive changes from previous issue.

[1] Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, LaGrange Park, Illinois 60525.

ANSI/ANS 8.5-1979 provides guidance on the use of borosilicate-glass raschig rings as a neutron absorber in solutions of fissile material. The standard applies to the use of borosilicate-glass raschig rings for primary and for secondary criticality control in solutions containing ^{235}U, ^{239}Pu, and ^{233}U. The chemical and physical environment, properties of the rings and packed vessels, maintenance inspection procedures, and criticality operating limits are specified in the standard.

Maximum permissible concentrations of homogeneous solutions of plutonium or of uranium in vessels of unlimited size packed with borosilicate-glass raschig rings are specified in the standard. The concentration of these solutions is expressed as the mass of plutonium or of uranium per unit volume. The density of hydrogen in any solution cannot be less than 75 g/liter nor greater than 115 g/liter. Limitations on the relative abundance of the various isotopes of plutonium are imposed in the specifications applicable to plutonium solutions. The concentrations specified for uranium enriched in ^{235}U apply regardless of the ^{235}U enrichment but with a limitation on the ^{233}U content. For solutions of uranium containing up to 5.0 wt-% ^{235}U and no ^{233}U, the limitations are expressed as mass of ^{235}U per unit volume. The concentrations specified for solutions of ^{233}U also apply to mixtures of ^{233}U and other uranium isotopes provided the ^{233}U content is greater than 1 wt-% of all the uranium.

C. REGULATORY POSITION

The guidance contained in ANSI/ANS 8.5-1979 for the use of borosilicate-glass raschig rings as a neutron absorber in solutions of fissile material provides a procedure generally acceptable to the NRC staff for the prevention of accidental conditions of criticality.

Section 8.0 of ANSI/ANS 8.5-1979 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 plan for using this regulatory guide.

This proposed Revision 1 of the guide has been released to encourage public participation in its development. Except in those cases in which an applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described in the currently active guide dated January 8, 1973, will continue to be used in the evaluation of license applications docketed after that date. The method to be described in the active Revision 1 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. Implementation by the staff will in no case be earlier than October 1, 1981.