



REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 3.1

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

A. INTRODUCTION

Section 70.22 of 10 CFR Part 70, "Contents of Applications", requires that an application for a license to receive title to, own, acquire, deliver, receive, possess, use, transfer, import or export special nuclear material, other than an application for a license authorizing export only, shall contain, among other information, 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 describes a method of using borosilicate-glass raschig rings as a neutron absorber for criticality control in plants processing special nuclear materials acceptable to the AEC regulatory staff.

B. DISCUSSION

Subcommittee ANS-8, Fissionable Material Outside of Reactors, of the Standards Committee of the American Nuclear Society has developed a standard for guidance on the use of borosilicate-glass raschig rings as a neutron absorber in solutions of fissile materials. This standard was approved by the American National Standards Institute (ANSI) on October 20, 1971, and applies to the use of borosilicate-glass raschig rings for primary 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.

Maximum concentrations of homogeneous solutions of uranium and plutonium in vessels of unlimited size packed with borosilicate-glass raschig rings are specified. The concentration of these solutions is expressed in terms of the mass of uranium or plutonium per unit volume. The concentrations specified for uranium enriched in the ^{235}U isotope are applied regardless of the ^{235}U enrichment but with a limitation on the ^{233}U content. Specifications for solutions of uranium which are primarily of the ^{233}U isotope are designated as "Solutions containing more than 1 wt % ^{233}U ". Limitations on the relative abundance of the various isotopes of plutonium are imposed on the specifications applicable to plutonium solutions. The density of hydrogen in any solution cannot be less than 75 g/liter nor greater than 115 g/liter.

C. REGULATORY POSITION

Use of borosilicate-glass raschig rings as a neutron absorber for criticality control in plants processing fissile materials in accordance with the guidance and requirements contained in ANSI N16.4-1971 "American National Standard—Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Materials,"¹ constitutes a generally acceptable procedure to avoid accidental conditions of criticality.

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

142 171

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