U.S. NUCLEAR REGULATORY COMMISSION

Revision 1
April 1989

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 3.45
(Task CE 802-5)

NUCLEAR CRITICALITY SAFETY FOR STEEL-PIPE INTERSECTIONS CONTAINING AQUEOUS SOLUTIONS 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 and processing of aqueous solutions of fissile materials in steel-pipe intersections.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Part 70, which provides the regulatory basis for this guide. The information collection requirements in 10 CFR Part 70 have been cleared under OMB Clearance No. 3150-0009.

B. DISCUSSION

ANSI/ANS-8.9-1987, "Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Material,"[1] was prepared by Subcommittee 8, Fissionable Materials Outside Reactors, of the Standards Committee of the American Nuclear Society. ANSI/ANS 8.9-1987 was approved by the American National Standards Institute (ANSI) on April 3, 1987.

ANSI/ANS-8.9-1987 provides specifications for pipe intersections containing homogeneous aqueous solutions of fissile materials. All dimensions are interpreted as nominal values of schedule 10 or heavier standard steel pipe. Only single columns with intersections are considered in the standard. For multiple columns or columns in the vicinity of other fissile materials and the influence of environmental factors, the standard requires that experimental data or validated computational techniques be used to determine the safe configuration. Criteria and data provided are based on criticality experiments and validated calculations that are generally applicable to homogeneous aqueous solutions of fissile materials. Specific information is included on fissile solutions containing uranium enriched in the ^{235}U or ^{233}U isotope or plutonium and on uranium solutions having a ^{235}U content not exceeding 5 weight-percent of the total uranium.

C. REGULATORY POSITION

The nuclear criticality safety practices and guidance for calculating safe steel-pipe intersections for aqueous solutions of fissile materials contained in ANSI/ANS-8.9-1987 provide procedures generally acceptable to the NRC staff for the prevention of criticality accidents in the storage and processing of aqueous solutions of fissile materials.

[1]Copies may be obtained from the American Nuclear Society, 555 N. Kensington Avenue, La Grange Park, IL 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.

This guide was issued after consideration of comments received from the public. 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.

Written comments may be submitted to the Regulatory Publications Branch, DFIPS, ARM, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
3. Fuels and Materials Facilities
4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
8. Occupational Health
9. Antitrust and Financial Review
10. General

Copies of issued guides may be purchased from the Government Printing Office at the current GPO price. Information on current GPO prices may be obtained by contacting the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7082, telephone (202)275-2060 or (202)275-2171.

Issued guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161.

D. IMPLEMENTATION

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

These methods reflect the latest general NRC approach to criticality safety in the storage and processing of aqueous solutions of fissile materials in steel-pipe intersections. Therefore, except in those cases in which the applicant proposes an acceptable alternative method for complying with the specified portions of the Commission's regulations, the method described here will be used in the evaluation of submittals for license applications submitted pursuant to 10 CFR Part 70.

VALUE/IMPACT STATEMENT

A draft value/impact statement was published with the proposed Revision 1 to Regulatory Guide 3.45 (Task CE 802-5) when the draft guide was published for public comment in May 1988. No changes were necessary, so a separate value/impact statement for the final guide has not been prepared. A copy of the draft value/impact statement is available for inspection and copying for a fee at the Commission's Public Document Room at 2120 L Street NW., Washington, DC, under Task CE 802-5.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

FIRST CLASS MAIL
POSTAGE & FEES PAID
USNRC

PERMIT No. G-67