U.S. NUCLEAR REGULATORY COMMISSION

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REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 2.3

QUALITY VERIFICATION FOR PLATE-TYPE URANIUM-ALUMINUM FUEL ELEMENTS FOR USE IN RESEARCH REACTORS

A. INTRODUCTION

Paragraph (a)(7) of § 50.34, "Contents of Applications: Technical Information," of 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that each applicant for a construction permit to build a production or utilization facility include in its Preliminary Safety Analysis Report (PSAR) a description of the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. This guide describes a method acceptable to the NRC staff for establishing and executing a quality assurance program for verifying the quality of plate-type uranium-aluminum fuel elements used in research reactors.

B. DISCUSSION

Work Group ANS-15.2 of Subcommittee ANS-15, Research Reactors, of the American Nuclear Society Standards Committee has revised the American National Standards Institute (ANSI) Standard N8.1-1967, "Quality Control for Plate-Type Uranium-Aluminum Fuel Elements." The revised standard provides guidelines for establishing and executing a program designed to verify the quality of plate-type uranium-aluminum fuel elements for use in research reactors. The revised standard was approved by the American National Standards Committee N17, Research Reactors, Reactor Physics and Radiation Shielding, and its Secretariat. It was subsequently approved and designated ANSI N398-1974 by ANSI on November 19, 1974.

It should be recognized that ANSI N398-1974 covers only one limited aspect of quality assurance. ANSI N402, "Quality Assurance Program Guidelines for Research Reactors," which is currently being developed under Subcommittee ANS-15, is expected to provide overall guidance for establishing quality assurance programs for research reactors.

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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. This guide was revised as a result of substantive comments received from the public and additional staff review.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Section.

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Copies of published guides may be obtained by written request indicating the divisions desired to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Office of Standards Development.

The revision reflects comments received from the public and from additional staff review. *

C. REGULATORY POSITION

The guidance contained in ANSI N398-1974, "Quality Verification for Plate-Type Uranium-Aluminum Fuel Elements,"** is generally acceptable to the NRC staff and provides an adequate basis for complying with paragraph 50.34(a)(7) of 10 CFR Part 50 with respect to establishing and executing a quality assurance program for verifying the quality of plate-type uranium-aluminum fuel elements for use in research reactors, subject to the following:

1. For the purpose of this guide, a research reactor should be defined as a nuclear reactor that is used for scientific, engineering, or training purposes and is designed to operate at a thermal power level of 1 megawatt or less or a level of 10 megawatts or less if it does not contain a circulating loop through the core in which fuel experiments are conducted, a liquid fuel loading, or an experimental facility in the core in excess of 16 square inches in cross section.

2. Subdivision 2.1.5 of the standard requires that the total impurity content not exceed the equivalent ^{10}B content of 1.5 ppm on a weight basis relative to uranium. The NRC staff considers that an equivalent ^{10}B content up to 4.0 ppm on a weight basis relative to uranium is acceptable.

3. The procedure in Subdivision 7.2.1 requires that the blister test consist of heating each completed fuel plate in an air-atmosphere furnace at 932°F (-10°F, +20°F) for a minimum of 30 minutes. The NRC staff considers that a temperature in the range 932°F to 1015°F for a minimum of 30 minutes is acceptable for the test.

4. Section 14.1 of the standard requires the polyethylene bag used for shipping to be at least 0.010 in. thick. A thickness of at least 0.006 in. is considered acceptable.

D. IMPLEMENTATION

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

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*Lines indicate substantive change from previous issue.

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

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 herein will be used by the NRC staff in the evaluation of submittals for research reactor construction permit or operating license applications docketed after September 1, 1976.

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