U.S. NUCLEAR REGULATORY COMMISSION

June 1976

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 1.116

QUALITY ASSURANCE REQUIREMENTS FOR INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT AND SYSTEMS

A. INTRODUCTION

Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," establishes overall quality assurance requirements for the design, construction, and operation of safety-related structures, systems, and components of nuclear power plants. This guide describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to quality assurance requirements for installation, inspection, and testing of mechanical equipment and systems for water-cooled and high-temperature gas-cooled nuclear power plants.

B. DISCUSSION

Working Group N45-2.8 of the American National Standards Committee N45, Reactor Plants and Their Maintenance, has prepared a standard that includes quality assurance requirements for installation, inspection, and testing of mechanical equipment and systems for water-cooled and high-temperature gas-cooled nuclear power plants. This standard was approved by Subcommittee N45-2, Nuclear Quality Assurance Standards, of the American National Standards Committee N45 and the full committee. It was subsequently approved and designated N45.2.8-1975[1] by the American National Standards Institute on May 20, 1975.

NRC documents WASH 1309, "Guidance on Quality Assurance Requirements During the Construction Phase of Nuclear Power Plants," dated May 10, 1974 (Green Book, Revision 0) and WASH 1284, "Guidance on Quality Assurance Requirements During the Operations Phase of Nuclear Power Plants," dated October 26, 1973 (Orange Book, Revision 0) contain guidance on acceptable methods of implementing portions of the quality assurance program. These documents are used by the NRC staff in the evaluation of applications for construction permits and operating licenses. WASH 1284 contains extracts of proposed standard N45.2.8 (Draft 3, Rev. 2) and WASH 1309 contains proposed standard N45.2.8 (Draft 3, Rev. 3). ANSI N45.2.8-1975 reflects development from the proposed versions referenced in the above WASH documents to the final version approved by the American National Standards Institute.

No substantive changes have been made to NRC guidance on quality assurance requirements for installation, inspection, and testing of water-cooled and high-temperature gas-cooled nuclear power plant mechanical equipment from that previously provided.

It is important to consider the relationship of the quality assurance requirements included in Sections III and XI of the ASME Boiler and Pressure Vessel Code with those included in ANSI N45.2.8-1975. Code-covered activities are primarily intended to assure the integrity of the pressure boundary of an item. Not all activities of safety importance are covered by the Code. The Code does not cover requirements to assure operability of components. Accordingly, activities of N45.2.8-1975 apply to Code components except for those activities addressed in the Code. The applicability of N45.2.8-1975 and Sections III and XI of the ASME Boiler and Pressure Vessel Code is addressed in Section 1.2 of ANSI N45.2.8-1975.

C. REGULATORY POSITION

The requirements for installation, inspection, and testing of mechanical equipment and systems of water-cooled and high-temperature gas-cooled nuclear power

[1] ANSI N45.2.8-1975, "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants." Copies may be obtained from the American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017.

plants that are included in ANSI N45.2.8-1975 are acceptable to the NRC staff and provide an adequate basis for complying with the pertinent quality assurance requirements of Appendix B to 10 CFR Part 50, subject to the following:

1. Subdivision 1.5 of ANSI N45.2.8-1975 states: "Documents that are required to be included as a part of this standard are identified at the point of reference and described in Section 8 of this standard." The specific acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations where appropriate.

2. Although ANSI N45.2.8-1975 is entitled "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants," the requirements included in the standard are considered to be applicable during the operations phase as well as the construction phase and should be followed for those applicable operations phase activities that are comparable to activities occurring during the construction phase. In this regard, it should be noted that N45.2.8-1975 does not address radiological considerations associated with installation, inspection, and testing of mechanical components in radioactively contaminated systems.

3. Section 5 of N45.2.8-1975 includes requirements for installed system inspections and tests. Individual subsections address preoperational tests, cold functional tests, and hot functional tests. Regulatory Guide 1.68, "Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors," describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to preoperational and initial startup testing programs for water-cooled nuclear power plants.[2] In this regard, the requirements of Section 5 of N45.2.8-1975 pertaining to preoperational tests, cold functional tests, and hot functional tests should be used in conjunction with Regulatory Guide 1.68.

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 operating license or construction permit applications until this guide is revised as a result of suggestions from the public or additional staff review.

[2] Although Regulatory Guide 1.68 pertains to preoperational and initial startup test programs for water-cooled nuclear power plants, it should be used as guidance in preparing preoperational and initial startup test programs for high-temperature gas-cooled nuclear power plants.