



## DRAFT REGULATORY GUIDE

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### DRAFT REGULATORY GUIDE DG-1165

(Proposed Revision 1 of Regulatory Guide 1.37, dated March 1973)

## QUALITY ASSURANCE REQUIREMENTS FOR CLEANING OF FLUID SYSTEMS AND ASSOCIATED COMPONENTS OF WATER-COOLED NUCLEAR POWER PLANTS

### A. INTRODUCTION

Nuclear power plants and fuel reprocessing plants include structures, systems, and components (SSCs) that prevent or mitigate the consequences of postulated accidents. In Title 10, Part 50, of the *Code of Federal Regulations* (10 CFR Part 50), "Domestic Licensing of Production and Utilization Facilities," Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," establishes quality assurance (QA) requirements for the design, construction, and operation of such SSCs. The pertinent requirements of Appendix B to 10 CFR Part 50 apply to all activities affecting the safety-related functions of the SSCs. These activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying. Appendix B requires, in part, that measures must be established to control the cleaning of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration.

This regulatory guide describes methods that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for use in complying with the Commission's QA-related regulations regarding the cleaning and cleanliness control of fluid systems and associated components for nuclear power plants during manufacturing, construction, repairs, and modifications.

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This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received staff review or approval and does not represent an official NRC staff position.

Public comments are being solicited on this draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rules and Directives Branch, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Comments may be submitted electronically through the NRC's interactive rulemaking Web page at <http://www.nrc.gov/what-we-do/regulatory/rulemaking.html>. Copies of comments received may be examined at the NRC's Public Document Room, 11555 Rockville Pike, Rockville, MD. Comments will be most helpful if received by **December 15, 2006**.

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The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with regulatory guides is not required. The NRC issues regulatory guides in draft form to solicit public comment and involve the public in developing the agency's regulatory positions. Draft regulatory guides have not received complete staff review and, therefore, they do not represent official NRC staff positions.

This regulatory guide contains information collections, covered by the requirements of 10 CFR Part 50 and 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," that the Office of Management and Budget (OMB) approved under OMB control numbers 3150-0011 and 3150-0151, respectively. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

## **B. DISCUSSION**

In March 1973, the Atomic Energy Commission (AEC) issued Regulatory Guide (RG) 1.37, which generally endorsed the provisions and recommendations in American National Standards Institute (ANSI) N45.2.1-1973, "Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants."<sup>1</sup> This ANSI standard contained QA criteria for onsite cleaning of materials and components, cleanness control, and preoperational cleaning and layup of nuclear plant fluid systems. The AEC found that ANSI N45.2.1-1973 provided an adequate basis for complying with the pertinent QA requirements of Appendix B to 10 CFR Part 50, subject to six additional regulatory positions.

In 1975, the American Society of Mechanical Engineers (ASME), Committee on Nuclear Quality Assurance (NQA), accepted the overall responsibility to develop and maintain nuclear power QA standards. Four years later, ASME issued NQA-1, "Quality Assurance Program Requirements for Nuclear Power Plants."<sup>2</sup> That standard was based on ANSI N45.2-1977, "Quality Assurance Program Requirements for Nuclear Facilities"; ANSI N46.2, Revision 1, "Quality Assurance Program Requirements for Post-Reactor Nuclear Fuel Cycle Facilities"; and seven other standards in ANSI N45.2. Then, in 1983, ASME issued NQA-2, "Quality Assurance Requirements for Nuclear Power Plants," based on seven standards in ANSI N45, including ANSI N45.2.1-1980, "Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants." Six years later, ASME issued NQA-3, "Quality Assurance Program Requirements for the Collection of Scientific and Technical Information on Site Characterization of High-Level Nuclear Waste," to expand the QA standards to address site characterization of high-level nuclear waste repositories. Then, in the 1990s, ASME restructured the NQA standards into a single, multipart document. Initially issued as NQA-1-1994, that standard included criteria and nonmandatory guidance to establish and implement a QA program for any nuclear facility application, and was divided into four parts:

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<sup>1</sup> Copies of ANSI N45.2.1-1973 may be obtained from the American National Standards Institute, 1819 L Street, NW, 6<sup>th</sup> Floor, Washington, DC 20036; telephone (202) 293-8020; fax (202) 298-9287; <http://www.ansi.org/>.

<sup>2</sup> Copies of ASME standards discussed herein may be obtained from the American Society of Mechanical Engineers, Three Park Avenue, New York, New York 10016-5990; telephone (800) 843-2763; <http://catalog.asme.org/home.cfm?CATEGORY=CS&TaxonomyItemID=3021>.

- Part I contained QA program criteria for the siting, design, construction, operation, and decommissioning of nuclear facilities.
- Part II contained the QA criteria for planning and conducting fabrication, construction, modification, repair, maintenance, and testing of systems, components, or activities for nuclear facilities.
- Part III contained nonmandatory guidance and application appendices.
- Part IV contained NQA position papers, application matrices for users, cross-reference comparisons to NQA, and other program information.

ASME NQA-1-1994, Part II, Subpart 2.1, “Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants,” contains updated QA criteria for ANSI N45.2.1-1973.

This proposed revision to RG 1.37 endorses ASME NQA-1-1994, Part II, Subpart 2.1 as a generally acceptable standard. In preparing this revision, the staff compared ANSI N45.2.1-1973 to ASME NQA-1-1994, Part II, Subpart 2.1, and evaluated the differences between the two standards, as well as the need for additional regulatory positions associated with endorsing ASME NQA-1-1994, Part II, Subpart 2.1. This comparison revealed that although the text may have changed, the content and intent of these standards have not.

On the basis of the staff’s evaluation, Regulatory Positions 1 and 2 of this proposed revision of RG 1.37 update Regulatory Positions 1 and 3 from the original version of RG 1.37, with respect to endorsing the applicable sections of ASME NQA-1-1994, Part II, Subpart 2.1. The other regulatory positions from the original version of RG 1.37 are no longer needed because they have been subsumed into ASME NQA-1-1994, Part II, Subpart 2.1. However, Regulatory Position 3 is new and states that licensees should follow the precautions in ASME NQA-1-1994, Part III, Subpart 3.2, Nonmandatory Appendix 2.1, “Guidance on Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants.” In addition, the new Regulatory Position 3 includes a precaution, recommending the addition of inhibitors for chloride stress-corrosion cracking in fresh water, when used for austenitic stainless steel components.

## **C. REGULATORY POSITION**

The NRC staff finds that the provisions and recommendations included in ASME NQA-1-1994, Part II, Subpart 2.1 are generally acceptable for onsite cleaning of materials and components, cleanliness control, and preoperational cleaning and layup of water-cooled nuclear power plant fluid systems. These provisions and recommendations provide an adequate basis for complying with the pertinent QA requirements of Appendix B to 10 CFR Part 50, subject to the following regulatory positions:

### **1. Referenced Documents**

Section 7 of the Introduction to ASME NQA-1-1994, Part II, which is applicable to Subpart 2.1, states that the codes, standards, and specifications referenced in this Part may be identified with the applicable date or citation at the point of reference or in Table entitled "Codes, Standards, and Specifications Referenced in Text." The specific applicability or acceptability of these listed documents has been (or will be) covered separately in other regulatory guides or in Commission regulations, as appropriate.

### **2. Water Quality**

Section 3.4.1 of ASME NQA-1-1994, Part II, Subpart 2.1 states that "the water quality for mixing cleaning solutions, rinsing, and flushing shall be specified by the organization responsible for cleaning unless otherwise stipulated in procurement documents or approved procedures." The water quality for final flushes of fluid systems and associated components should be at least equivalent to the quality of the operating system water.

### **3. Precautions**

Sections 8.2.2 and 8.2.3 of ASME NQA-1-1994, Part II, Subpart 2.1 provide precautions related to the use of alkaline cleaning solutions and chelating agents, respectively, by referencing nonmandatory Appendix 2.1 to ASME NQA-1-1994, Part III, Subpart 3.2. These precautions should be followed. In addition, a suitable chloride stress-cracking inhibitor should be added to the fresh water used to flush systems containing austenitic stainless steels.

## **D. IMPLEMENTATION**

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this draft regulatory guide. No backfitting is intended or approved in connection with its issuance.

The NRC has issued this draft guide to encourage public participation in its development. Except in those cases in which an applicant or licensee proposes or has previously established an acceptable alternative method for complying with specified portions of the NRC's regulations, the methods to be described in the active guide will reflect public comments and will be used in evaluating (1) submittals in connection with applications for construction permits, standard plant design certifications, operating licenses, early site permits, and combined licenses, and (2) submittals from operating reactor licensees who voluntarily propose to initiate system modifications, if there is a clear nexus between the proposed modifications and the subject for which guidance is provided herein.

# REGULATORY ANALYSIS

## 1. Statement of the Problem

In March 1973, the AEC endorsed, through RG 1.37, the provisions and recommendations in ANSI N45.2.1-1973. This ANSI standard contained QA criteria for onsite cleaning of materials and components, cleanness control, and preoperational cleaning and layup of nuclear plant fluid systems. In RG 1.37, the AEC found that the provisions of ANSI N45.2.1-1973 were generally acceptable and provided an adequate basis for complying with the pertinent QA requirements of Appendix B to 10 CFR Part 50, subject to six regulatory positions. In 1975, the ASME NQA Committee accepted the overall responsibility to develop and maintain nuclear power QA standards. In 1983, ASME NQA-2 incorporated the provisions of ANSI N45.2.1. In the early 1990s, ASME restructured the NQA standards into a single, multipart document. Initially issued as NQA-1-1994, that standard included criteria and nonmandatory guidance to establish and implement a QA program for any nuclear facility application. ASME NQA-1-1994, Part II, Subpart 2.1, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants," contains updated QA criteria for ANSI N45.2.1-1973.

## 2. Objective

The objective of this regulatory action is to update the NRC's guidance regarding QA requirements for the cleaning and cleanness control of fluid systems and associated components for nuclear power plants during manufacturing, construction, repairs, and modifications. The original version of RG 1.37 refers to the 1973 ANSI N45.2.1 standard, which has been updated and revised since its original issuance. The proposed revision to RG 1.37 would endorse ASME NQA-1-1994, Part II, Subpart 2.1 as a generally acceptable standard.

## 3. Alternative Approaches

The NRC staff considered the following alternative approaches to the problem of outdated guidance regarding the QA requirements for the management of cleaning and cleanness control of fluid systems and associated components for nuclear power plants during manufacturing, construction, repairs, and modifications:

- (1) Do not revise Regulatory Guide 1.37.
- (2) Update Regulatory Guide 1.37.

### 3.1 Alternative 1: Do Not Revise Regulatory Guide 1.37

Under this alternative, the NRC would not revise the guidance, and licensees would continue to use the original version of RG 1.37. This alternative is considered the baseline or "no action" alternative and, as such, involves no value/impact considerations.

### 3.2 Alternative 2: Update Regulatory Guide 1.37

Under this alternative, the NRC would update RG 1.37, endorsing ASME NQA-1-1994, Part II, Subpart 2.1 as generally acceptable to provide an adequate basis for compliance with the pertinent QA requirements of Appendix B to 10 CFR Part 50 with respect to onsite cleaning of materials and components, cleanness control, and preoperational cleaning and layup of nuclear plant fluid systems.

The costs to the NRC would be the one-time cost of issuing the revised regulatory guide (which is expected to be relatively small). Applicants and licensees would incur little or no cost. Current licensees have already developed QA practices that comply with the Commission's regulations. This regulatory guidance will recommend that applicants for new nuclear power plants comply with the most current QA standards, thereby minimizing the NRC's requests for additional information, as well as the need for applicants to resubmit information. In developing the revised regulatory guidance, the staff will also allow a public comment period to identify and resolve any issues regarding ASME NQA-1-1994, Part II, Subpart 2.1.

#### **4. Conclusion**

Based on this regulatory analysis, the staff recommends that the NRC revise RG 1.37 to incorporate the current accepted standards. The staff concludes that the NRC should (1) prepare updated guidance, generally endorsing ASME NQA-1-1994, Part II, Subpart 2.1, (2) issue the draft regulatory guide for public comment, and (3) finalize the regulatory guide upon resolution of public comments.

### **BACKFIT ANALYSIS**

This draft regulatory guide provides licensees and applicants with updated guidance that the NRC staff considers acceptable for use in complying with the Commission's QA-related regulations regarding the cleaning and cleanliness control of fluid systems and associated components for nuclear power plants during manufacturing, construction, repairs, and modifications. This regulatory guide will support the review of applications that the agency expects to receive for new nuclear reactor construction permits, standard plant design certifications, operating licenses, early site permits, and combined licenses. No backfit (as defined in 10 CFR 50.109, "Backfitting") is either intended or implied.