



U.S. ATOMIC ENERGY COMMISSION

# REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

## REGULATORY GUIDE 1.37

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

#### A. INTRODUCTION

Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," requires, in part, that measures be established to control the cleaning of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. This guide describes an acceptable method of complying with the Commission's regulations with regard to quality assurance requirements for on-site cleaning of materials and components, cleanliness control, and preoperational cleaning and layout of water-cooled nuclear power plant fluid systems. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

#### B. DISCUSSION

Working Group N45-2.1 (formerly ad hoc committee N45-3.1) of the American National Standards Institute (ANSI) Standards Committee N45, Reactor Plants and Their Maintenance, has prepared a standard which includes quality assurance requirements for on-site cleaning of materials and components, cleanliness control, and preoperational cleaning and layout of nuclear plant fluid systems. The standard was approved by subcommittee N45-2, Nuclear Quality Assurance Standards, of the ANSI Standards Committee N45 and the full committee and its Secretariat. It was subsequently approved and designated N45.2.1-1973 by the American National Standards Institute on February 26, 1973.

#### C. REGULATORY POSITION

The requirements and recommendations for on-site cleaning of materials and components, cleanliness control,

and preoperational cleaning and layout of water-cooled nuclear power plant fluid systems that are included in ANSI N45.2.1-1973, "Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants,"<sup>1</sup> are generally acceptable 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 N45.2.1-1973 states that other documents required to be included as a part of the standard are either identified at the point of reference or described in Section 10 of the standard. The specific applicability or acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations, where appropriate.

2. Although subdivision 1.2 of ANSI N45.2.1-1973 states that the requirements promulgated apply during the construction phase of a nuclear power plant, many of the requirements and recommendations contained in the standard are also appropriate to cleaning of fluid systems and associated components during the operation phase of a nuclear power plant, and they should be used when applicable. In this regard, however, it should be particularly noted that decontamination and cleanup of radioactively contaminated systems and components are not addressed by ANSI N45.2.1-1973. These operations will be considered separately in future regulatory guides.

3. Subdivision 3.2 of ANSI N45.2.1-1973 states that the selection of the water quality for a specific application shall be made by the organization responsible for the cleaning operations unless otherwise specified in the purchase document. The water quality

<sup>1</sup>Copies may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

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for final flushes of fluid systems and associated components should be at least equivalent to the quality of the operating system water.

4. Section 5 of ANSI N45.2.1-1973 states, in part, that low sulfur, low fluorine, and/or low chlorine compounds may be used on austenitic stainless steels and that low sulfur and low lead compounds may be used on nickel-base alloys. Chemical compounds that could contribute to intergranular cracking or stress-corrosion cracking should not be used with austenitic stainless steel and nickel-base alloys. Examples of such chemical compounds are those containing chlorides, fluorides, lead, zinc, copper, sulfur, or mercury where such elements are leachable or where they could be released by breakdown of the compounds under expected environmental conditions (e.g., by radiation). This limitation is not intended to prohibit the use of trichlorotrifluoroethane which meets the requirements of Military Specification Mil-C-81302b for cleaning or degreasing of austenitic stainless steel

provided the precautions of subdivision 7.3(4) of ANSI N45.2.1-1973 are observed.

5. Section 5 of ANSI N45.2.1-1973 states, in part, that operations such as grinding and welding which generate particulate matter should be controlled. Adequate control of tools used in abrasive work operations such as grinding, sanding, chipping, or wire brushing should be provided. Specifically, tools which contain materials that could contribute to intergranular cracking or stress-corrosion cracking or which, because of previous usage, may have become contaminated with such materials should not be used on surfaces of corrosion-resistant alloys. Examples of such materials are listed in Regulatory position 4.

6. Subdivision 1.4 of ANSI N45.2.1-1973 suggests the use of ASTM A 262-68 or ASTM A 393-63 for detection of intergranular precipitation of chromium carbides in corrosion-resistant alloys. ASTM A 393-63 has been withdrawn by ASTM and is no longer considered a valid test.