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REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 3.30

SELECTION, APPLICATION, AND INSPECTION OF PROTECTIVE COATINGS (PAINTS) FOR FUEL REPROCESSING PLANTS

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 quality assurance program requirements for the design, construction, and operation of structures, systems, and components of fuel reprocessing plants. Criterion III, "Design Control," of Appendix B requires assurance that appropriate quality standards are specified and that measures be established for selecting appropriate materials for such structures, systems, and components; Criterion IX, "Control of Special Processes," requires that special processes be controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes and standards; and Criterion X, "Inspection," defines requirements for inspecting activities affecting quality.

Protective coatings (paints) are used in fuel reprocessing plants to preserve from corrosion and erosion the surfaces of structures, systems, and components important to safety and to facilitate the removal of radioactive contamination from all such plant surfaces during plant operation, maintenance, and decommissioning. Many acceptable practices for the selection, application, and inspection of protective coatings are available and have been used. These practices can differ significantly because there has not been sufficient guidance toward standardization. In the interest of standardization, this guide describes practices acceptable to the NRC staff for the selection, application, and inspection of protective coatings for fuel reprocessing plants.

B. DISCUSSION

Subcommittee N46-5 of American National Standards Committee N46, "Nuclear Reactor-Fuel Cycle," under the sponsorship of the American Institute of Chemical Engineers, has developed a standard for evaluating and selecting protective coatings (paints) for nuclear plants by using reproducible tests. The standard also provides guidance for preparing the surfaces to be coated and for applying and inspecting the coatings under both shop and field conditions. The standard defines the performance requirements of coatings and provides tests for radiation tolerance, decontamination, chemical resistance, and physical properties. This standard, identified as ANSI N512-1974,[1] was approved by American National Standards Committee N46 and, subsequently, on June 21, 1974, by the American National Standards Institute.

This standard may be used for structures, systems, and components of fuel reprocessing plants and should be used in conjunction with Regulatory Guide 3.21, "Quality Assurance Requirements for Protective Coatings Applied to Fuel Reprocessing and to Plutonium Processing and Fuel Fabrication Plants," which refers to ANSI N101.4-1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities."

Section 1.2.2 of ANSI N512-1974 makes reference to American National Standard N101.2-1972, "Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities," as a standard for the selecting and evaluating of protective coatings specifically for nuclear reactor containment facilities. The exposure conditions and corresponding test conditions given therein, in particular the Design Basis Accident (DBA) conditions, are not necessarily applicable to any conditions expected to be found in a fuel reprocessing plant or to the appropriate tests for coatings for fuel reprocessing plant structures, systems, and components.

Most polymers such as those now used in paint formulation are subject to radiation damage with the production of hydrogen gas and methane, among other radiolysis products. Normally this is of no great consequence since the production rate is very low even

[1] Copies may be obtained from the American Institute of Chemical Engineers, 345 East 47th Street, New York, NY 10017.

in severe radiation environments. However, if unventilated enclosed spaces having a high coated-surface-to-volume ratio were subjected to high radiation levels over long periods, combustible gases from radiolysis could become significant, and control of possible ignition sources or provision of sufficient ventilation to avoid such hazards may be warranted.

C. REGULATORY POSITION

ANSI N512-1974, "Protective Coatings (Paints) for the Nuclear Industry,"[1] when used in conjunction with Regulatory Guide 3.21, "Quality Assurance Requirements for Protective Coatings Applied to Fuel Reprocessing and to Plutonium Processing and Fuel Fabrication Plants," provides a generally acceptable basis for complying with the pertinent requirements of Criteria III, IX, and X of Appendix B to 10 CFR Part 50 with respect to the selection, application, and inspection of protective coatings in fuel reprocessing plants for structures, systems, and components important to health and safety, subject to the following:

1. Sections 1.4 and 1.5 of ANSI N512-1974 refer to other ANSI standards and to standards of other organizations that are referenced in ANSI N512-1974. The specific applicability or acceptability of these other listed guides and standards has been or will be covered separately in other regulatory guides or in appropriate Commission regulations.

2. Instead of Sample Forms 2.1 and 5.1, alternative documentation consistent with the requirements of Appendix B to 10 CFR Part 50 is also acceptable to the NRC staff.

3. Section 11, "Glossary of Terms," of ANSI N512-1974 states that quality assurance is the verification of the conformance of materials and methods of application to the governing specification in order to achieve the desired result. This definition should be expanded because Appendix B to 10 CFR Part 50 also considers organizational structure, procedures, and other matters not implied by verification of conformance of materials and methods of application to a specification. Consequently, the term "quality assurance" as used in ANSI N512-1974 should be considered to comprise all those planned and systematic actions necessary to provide adequate confidence that shop or field coating work for nuclear facilities will perform satisfactorily in service.

The "Glossary of Terms" of ANSI N512-1974 also defines "inspection agency" as a person or persons empowered to act for the owner to verify performance of the coating work with documented specifications, instructions, and procedures, and states that the inspection agency may be a part of the owner's, or his representative's, organization; a representative of the coating manufacturer or the coating applicator; or an independent organization, provided the inspection personnel do not report directly to the immediate supervisor responsible for the coating work. Criterion I of Appendix B to 10 CFR Part 50 requires persons and organizations having authority and responsibility for verifying, as by checking and inspecting, the correct performance of activities affecting the safety-related functions of structures, systems, and components to report to a management level such that they are provided with sufficient organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions. The organizational freedom may take various forms but should provide sufficient independence from cost and schedules where they conflict with safety considerations, and should provide direct access to such levels of management as may be necessary to perform these functions adequately. Assurance that the inspection agency processing these authorities and responsibilities has the required organizational freedom is of particular importance if the inspection agency is a representative of the coating manufacturer or the coating applicator.

D. IMPLEMENTATION

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

Except in those cases in which the applicant proposes to use an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used in the evaluation of submittals for construction permit or operating license applications docketed on or after October 1, 1975.

If an applicant wishes to use this regulatory guide in developing submittals for applications docketed prior to October 1, 1975, the pertinent portions of the application will be evaluated on the basis of this guide.

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