



Standard Guide for Establishing Procedures to Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant¹

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1. Scope

1.1 This guide covers procedures for establishing a program to monitor Service Level I coating systems in operating nuclear power plants. Monitoring is an on going process of evaluating the condition of the in-service coating systems.

1.2 It is the intent of this guide to provide a recommended basis for establishing a coatings monitoring program, not to mandate a singular basis for all programs. Variations or simplifications of the program described in this guide may be appropriate for each operating nuclear power plant depending on their licensing commitments. Similar guidelines may be applicable for Service Level II and other areas outside containment.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 610 Test Methods for Evaluating Degree of Rusting on Painted Steel Surfaces²
- D 714 Test Method for Evaluating Degree of Blistering of Paints³
- D 1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base³
- D 3359 Test Methods for Measuring Adhesion by Tape Test³
- D 4121 Practice for Photographic Documentation of Coating and Lining Failures and Defects⁴
- D 4537 Guide for Establishing Procedures to Qualify and Certify Inspection Personnel for Coating Work in Nuclear Facilities²

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² *Annual Book of ASTM Standards*, Vol 06.02.

³ *Annual Book of ASTM Standards*, Vol 06.01.

⁴ Discontinued; see 1992 *Annual Book of ASTM Standards*, Vol 06.01.

D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers²

F 1130 Practice for Inspecting the Coating System of a Ship⁵

F 1131 Practice for Inspecting the Coating System of a Ship's Tanks and Voids⁵

F 1132 Practice for Inspecting the Coating System of a Ship's Decks and Deck Machinery⁵

F 1133 Practice for Inspecting the Coating System of a Ship's Underwater Hull and Boottop During Drydocking⁵

2.2 ANSI Standard:

N45.2.6—Qualification of Inspection, Examination, and Testing Personnel for Nuclear Power Plants⁶

2.3 SSPC Standard:

SSPC-PA2—Measurement of Dry Paint Thickness With Magnetic Gages⁷

2.4 NACE Standard:

RP0188-88—Standard Practice Discontinuity (Holiday) Testing of Protective Coatings⁸

3. Significance and Use

3.1 Establishment of an in-service coatings monitoring program permits planning and prioritization of coatings maintenance work as needed to maintain coat integrity and performance in nuclear Service Level I coating systems. For additional information on nuclear maintenance coating work, refer to ASTM Manual on Maintenance Coatings for Nuclear Power Plants.⁹

3.2 A coatings monitoring program enables early identification and detection of potential problems in coating systems. Some Service Level I coating systems may be known in advance to be suspect, deficient, or unqualified. Monitoring

⁵ *Annual Book of ASTM Standards*, Vol 01.07.

⁶ Available from American National Standards Institute, 11 W. 42nd Street, 13th Floor, New York, NY 10036.

⁷ Available from Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213.

⁸ Available from National Association of Corrosion Engineers, P. O. Box 218340, Houston, TX 77218.

⁹ Available from ASTM Headquarters, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.

coating performance will assist in developing follow-up procedures to resolve any significant deficiency relative to coating work.

3.3 Degraded coatings may generate debris under design basis accident conditions that could adversely affect the performance of the post-accident safety systems. A coatings monitoring program may be required to fulfill safety analysis report commitments for Service Level I coating work in a nuclear power plant facility.

4. Responsibility

4.1 The owner/operator shall identify the department or group within the organization to be responsible for establishing the applicable requirements for activities or procedures covered by this guide and shall document the scope of their responsibility. Owner/operator delegation of this responsibility to other outside qualified organizations is permitted and shall be documented.

4.2 It is the responsibility of the owner/operator or his designee performing these activities to specify the detailed methods and procedures for meeting the applicable requirements of this guide.

4.3 The owner/operator or his designee shall assign a coordinator to be responsible for supervising coating inspection activities, data collection and documentation, and for ensuring that inspection personnel are adequately trained and qualified.

4.4 The owner/operator shall assign responsibility for evaluating the results of inspection activities carried out under the coatings performance monitoring program.

5. Frequency

5.1 Frequency of in-service coating inspection monitoring shall be determined by the owner/operator. In operating nuclear power plants certain monitoring activities may be restricted to major maintenance outages or refueling outages. It is a good practice to perform inspections during each refueling outage or during other major maintenance outages as needed.

6. Records and Past History

6.1 Coating performance will depend on the operating conditions experienced by the coating systems. Records of these conditions shall be obtained for each operating unit. These may include, but not be limited to, ambient conditions, temperatures, humidity, immersion, splash and spillage, chemical exposures, radiation exposures, previous decontamination procedures, abrasion and physical abuse, and start-up/shutdown frequency. Any change in service criteria or modifications of the physical design must be identified and dated.

6.2 The last two performance monitoring reports pertaining to the coating systems shall be reviewed prior to the monitoring process. Other past coatings history data to be reviewed may include:

6.2.1 Copies of coating specifications, manufacturer's product data sheets, and application procedures for in-place coatings.

6.2.2 Quality control documentation for the existing in-place coating systems and their application.

6.2.3 Copies of previous inspection or monitoring reports.

6.2.4 Documentation pertaining to any maintenance work performed on existing coating systems.

7. Premonitoring Procedure

7.1 Prior to conducting an inspection of the coating systems, the responsible organization shall ensure that the necessary services and equipment required for inspection are provided. Factors that must be considered while planning the inspection activities include, but are not limited to, lighting, access to coated surfaces, cleaning surfaces of any deposit or build up, ventilation and, where necessary, special underwater inspection requirements.

7.2 Station access procedures for Service Level I coating systems monitoring shall be followed. While access procedures may vary from plant to plant, specific station access procedures may include:

7.2.1 Security clearance for protected, radiation controlled, and vital areas, and escorted or unescorted clearance as required,

7.2.2 Radiological history including prior radiation exposure for all personnel involved,

7.2.3 Health physics classroom training in the use of radiation detection and monitoring devices and procedures for wearing anticontamination clothing,

7.2.4 A radiation work permit based on health physics radiological survey of the work location,

7.2.5 Compliance with radiation work permit requirements and other special radiation controls unique to each work location, and

7.2.6 Issuance of dosimetry.

7.3 The safety requirements of the facility owner/operator must be met when performing all inspection operations.

8. Personnel Requirements, Qualifications, and Training

8.1 The facility owner/operator shall specify the requirements and guidelines for qualification and training of inspection personnel involved in the program. However, inspectors and the coordinator shall be knowledgeable coatings personnel meeting the requirements of ASTM Guide D 4537 or ANSI N45.2.6. The coordinator shall, as a minimum, be a Level II Coatings Inspector.

8.2 The evaluator shall be a person knowledgeable and experienced in nuclear coatings work.

9. Inspection Plan

9.1 The owner/operator shall develop a plant specific inspection plan to accomplish the objectives of the monitoring program. A general visual inspection shall be conducted on all readily accessible coated surfaces during a walk-through. After the walk-through, thorough visual inspections shall be carried out on previously designated areas and on areas noted as deficient during the walk-through. A thorough visual inspection shall also be carried out on all coatings near sumps or screens associated with the Emergency Core Cooling System (ECCS). The inspection plan shall address the following based on specific owner/operator requirements:

9.1.1 A pre-inspection briefing to familiarize all inspection personnel with objectives of the inspections, procedures to be followed, and precautions to be taken,

10. Reporting and Documentation

10.1 Inspection reports for submittal to responsible evaluation personnel based on specific owner/operator requirements should be prepared by a qualified Level II or Level III Coatings Inspector and should include at least the following information:

10.1.1 A list and location of all areas evidencing deterioration,

10.1.2 Prioritize the repair areas into areas that must be repaired during the same outage and areas where repair can be postponed to future outages, keeping the coating under surveillance in the interim period,

10.1.3 *Inspection Data Sheets*—A typical data sheet is given in Fig. 1, and

10.1.4 *Photographic Documentation*—A typical location map for photographic identification is given in Fig. 2. The location and direction of all photographs shall be recorded on the maps for comparison with past and future photographs and to record existing conditions. Numbers 3-1 through 3-13 in Fig.

2 depict the location of the photographer and the directions of the view.

11. Evaluation

11.1 The inspection report shall be evaluated by the responsible evaluation personnel. The evaluator shall prepare a report that includes a summary of findings and recommendations for future surveillance or repair; this would include an analysis of the reasons or suspected reasons for failure. The repair work should be prioritized into major and minor defective areas. A recommended corrective plan of action must be provided for the major defective areas so that the plant can repair these areas, if appropriate, during the same outage.

12. Keywords

12.1 coatings monitoring program; coating performance; inspection; maintenance; nuclear power plant; safety related coatings; Service Level I; surveillance

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