WOLF CREEK
NUCLEAR OPERATING CORPORATION

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Vice President
Operations

March 21, 1991

NO 91-0091

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Subject: Docket No. 50-582: Request for Use of Code Case N-458 for RCP Flywheel Examinations

Gentlemen:

The purpose of this letter is to request approval for the use of ASME Section XI Code Case N-458, "Magnetic Particle Examination of Coated Materials, Section XI, Division 1", pursuant to 10 CFR 50.55a(a)(3).

Technical Specification 4.4.10 requires that each reactor coolant pump (RCP) flywheel be inspected per the recommendations of Regulatory Position C.4.b of Regulatory Guide 1.14, Revision 1, August 1975, "Reactor Coolant Pump Flywheel Integrity." Regulatory Position C.4.b(2) of this Regulatory Guide recommends a surface examination of all exposed surfaces and a complete ultrasonic volumetric examination be performed at approximately 10-year intervals.

A spare RCP motor, currently shared between Wolf Creek Generating Station (WCGS) and the Callaway Nuclear Plant, allows RCP motors to be rotated out of service for refurbishment at a vendor shop. The flywheel is removed as part of the motor refurbishment activities. An ultrasonic volumetric examination is scheduled to be performed at that time along with surface examinations of the bore and keyway areas of the flywheel using dye penetrant testing. The bore and keyways are the most highly stressed area of the flywheel. The remainder of the flywheel surface is covered with a protective coating. This would normally preclude a surface examination without extensive efforts to remove the coating.

Code Case N-458 provides supplementary rules which may be used for performing a magnetic particle examination on coated ferritic materials without removal of the coating. This Code case was approved by ASME Boiler and Pressure Vessel Code Committee on August 14, 1990, but is not included in the most recent listing of NRC approved Code cases in Revision 8 of Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability -- ASME Section IX Division 1." By using the methods described in this Code case, a surface examination of the coated portions of the RCP flywheels can be performed in accordance with Regulatory Guide 1.14 without requiring removal of the flywheel coating.

Wolf Creek Nuclear Operating Corporation requests approval for use of Code Case N-458 by April 25, 1991 in order to support ongoing efforts to prepare for performance of these inspections.

If you have any questions concerning this matter, please contact me or Mr. H. K. Chernoff of my staff.

Very truly yours,

John A. Bailey

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Vice President
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JAB/aem

Attachment

cc: A. T. Howell (NRC), w/a
R. D. Martin (NRC), w/a
D. V. Pickett (NRC), w/a
M. E. Skow (NRC), w/a

Approval Date: August 14, 1990
See Numerical Index for expiration and any reaffirmation dates.

Case N-458
Magnetic Particle Examination of Coated Materials
Section XI, Division 1

Inquiry: When conducting magnetic particle examination (MT) in accordance with Section XI, Division 1, IWA-2221, which references Article 7 of Section V, what supplementary rules may be used for examining coated ferritic materials by the AC yoke technique without removing the coating?

Reply: It is the opinion of the Committee that magnetic particle examination may be conducted in accordance with IWA-2221 using the AC yoke technique on coated ferritic materials without removing the coating, when the applicable requirements of Section XI, Division 1, and the following requirements are met.

1.0 PROCEDURE

Magnetic particle examination shall be performed in accordance with a written procedure. The procedure shall include the following:

(a) identification of surface configurations to be examined, including coating materials, maximum qualified coating thickness, and product forms (e.g., base material or welded surface)

(b) surface condition requirements and preparation methods

(c) manufacturer and model of AC yoke

(d) manufacturer and type of magnetic particles

(e) minimum and maximum yoke leg separation

(f) method of measuring coating thickness

(g) identification of the steps in performing the examination

(h) minimum lighting and AC yoke lifting power requirements (as measured in accordance with 4.0 below)

(i) methods of identifying flaw indications and discriminating between flaw indications and nonrelevant indications (e.g., magnetic writing or particle held by surface irregularities)

(j) instructions for identification and confirmation of suspected flaw indications

(k) recording criteria

(l) personnel qualification requirements

(m) reference to the procedure qualification records

(n) method of verifying that the yoke lifting power and the illumination source used in the production examination are at least as great as specified.

2.0 EQUIPMENT

(a) A powered powder blower which provides for controlled, continuous powder application shall be utilized for application of dry powder. Hand squeezed particle applicators shall not be used.

(b) Magnetic particles shall contrast with the component background.

(c) Nonconductive materials such as plastic shim stock may be used to simulate nonconductive coatings for procedure and personnel qualification.

3.0 COATING THICKNESS MEASUREMENT

Procedure demonstration and performance of examinations shall be preceded by measurement of the coating thickness in the areas to be examined. If the coating is nonconductive, an eddy current technique may be used to measure the coating thickness. If the coating is conductive, a magnetic coating thickness technique shall be used in accordance with ASTM D1186. Coating measurement equipment shall be used in accordance with the equipment manufacturer's instructions. Coating thickness measurements shall be taken at the intersections of a 2 in. maximum grid pattern over the area of examination and at least $\frac{1}{2}$ the maximum yoke leg separation beyond the examination area. The thickness shall be the mean of three separate readings within $\frac{1}{4}$ in. of each intersection.

CASE (continued)

N-458

4.0 PROCEDURE QUALIFICATION

(a) A qualification specimen is required. The material used for the specimen shall be the same as the coated ferromagnetic material to be examined. The specimen shall be of similar geometry or weld profile and contain at least one surface crack no longer than the maximum flaw size allowed in the applicable acceptance criteria.

(b) Examine the uncoated specimen in the most unfavorable orientation expected during the performance of the production examination.

(c) Document the measured yoke maximum lifting power, illumination levels, and the results.

(d) Measure the maximum coating thickness on the item to be examined in accordance with the requirements of 3.0 above.

(e) Coat the specimen with the same type of coating, conductive or nonconductive, to the maximum thickness measured on the production item to be examined. Alternately, nonconductive shim stock may be used to simulate nonconductive coatings.

(f) Examine the coated specimen in the most unfavorable orientation expected during the performance of the production examination. Document the measured yoke maximum lifting power, illumination level, and examination results.

(g) Compare the length of the indication resulting from the largest flaw no longer than the maximum flaw size allowed by the applicable acceptance criteria, before and after coating. The coating thickness is qualified when the length of the indication on the coated surface is at least 50% the length of the corresponding indication prior to coating.

(h) Requalification of the procedure is required for a decrease in either the AC yoke lifting power or the illuminated level, or for an increase in the coating thickness.

5.0 PERSONNEL QUALIFICATION

In addition to the requirements of SNT-TC-1A, personnel shall be qualified by demonstrating that they can detect the qualification flaws through the maximum qualified coating thickness using the qualified procedure.

6.0 EXAMINATION

(a) Surfaces to be examined, and all adjacent areas within at least 1 in., shall be free of all dirt, grease, lint, scale, welding flux and spatter, oil, and loose, blistered, flaking, or peeling coating.

(b) Examine the coated item in accordance with the qualified procedure.

(c) If an indication greater than 50% of the maximum allowable flaw size is detected, the coating in the area of the indication shall be removed and the examination repeated.

7.0 DOCUMENTATION

(a) Procedure qualification documentation shall include the following:

(1) identification of the procedure

(2) identification of the personnel performing and witnessing the qualification

(3) description and drawings or sketches of the qualification specimen, including coating thickness measurements and flaw dimensions

(4) equipment and materials used

(5) illumination level and yoke lifting power

(6) qualification results, including maximum coating thickness and flaws detected.

(b) Personnel qualification documentation shall include the following:

(1) name and certification level

(2) identification of the procedure

(3) name of Level III administering the qualification examination

(4) description and drawings or sketches of the qualification specimen, including coating thickness measurements and flaw dimensions

(5) equipment and materials used

(6) illumination level and yoke lifting power

(7) qualification results, including maximum coating thickness and flaws detected.

8.0 DEMONSTRATION

The procedure shall be demonstrated to the satisfaction of the Inspector.

9.0 REFERENCES TO TECHNICAL REPORTS

The following Electric Power Research Institute reports are relevant to this Case. Requests for copies should be directed to EPRI Research Reports Center, Box 50490, Palo Alto, CA 94303.

NP-5834 – Nondestructive Examination of Welds Through Painted Surfaces, May 1988.

NP-5951 – Reliability of Magnetic Particle Inspection Performed Through Coatings, July 1988.