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**Technical Evaluation Report on the
Second 10-year Interval inservice
Inspection Program Plan:
Duke Power Company
McGuire Nuclear Station, Unit 2
Docket Number 50-370**

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ABSTRACT

This report presents the results of the evaluation of the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection (ISI) Program Plan*, Revision 0, submitted September 16, 1993, including the requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, requirements that the licensee has determined to be impractical. The *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of the examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The requests for relief are evaluated in Section 3 of this report.

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SUMMARY

The licensee, Duke Power Company, has prepared the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan, Revision 0*, to meet the requirements of the 1989 Edition of the ASME Code. The second 10-year interval began March 2, 1994.

The information in the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan, Revision 0*, submitted September 16, 1993, has been reviewed. Included in the review were the requests for relief from the ASME Code Section XI requirements that the licensee has determined to be impractical. As a result of this review, a request for additional information (RAI) was prepared describing the information and/or clarification required from the licensee in order to complete the review. The licensee provided the requested information in submittals dated February 14, 1995, and March 22, 1995.

Based on the review of the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan, Revision 0*, the licensee's response to the Nuclear Regulatory Commission's RAI, and the recommendations for granting relief from the ISI examinations that cannot be performed to the extent required by Section XI of the ASME Code, no deviations from regulatory requirements or commitments were identified in the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan, Revision 0*, except as noted in Section 2.2.4(b).

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SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN:
DUKE POWER COMPANY
McGUIRE NUCLEAR STATION, UNIT 2
DOCKET NUMBER 50-370

1. INTRODUCTION

Throughout the service life of a water-cooled nuclear power facility, 10 CFR 50.55a(g)(4) (Reference 1) requires that components (including supports) that are classified as American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, Class 2, and Class 3 meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components* (Reference 2), to the extent practical within the limitations of design, geometry, and materials of construction of the components. This section of the regulations also requires that inservice examinations of components and system pressure tests conducted during successive 120-month inspection intervals shall comply with the requirements in the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein. The components (including supports) may meet requirements set forth in subsequent editions and addenda of this Code that are incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein, and subject to Nuclear Regulatory Commission (NRC) approval. The licensee, Duke Power Company, has prepared the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0 (Reference 3), to meet the requirements of the 1989 Edition of ASME Section XI. The second 10-year interval began March 2, 1994, and ends March 1, 2004.

As required by 10 CFR 50.55a(g)(5), if the licensee determines that certain Code examination requirements are impractical and requests relief from them, the licensee shall submit information and justification to the Nuclear Regulatory Commission (NRC) to support that determination.

Pursuant to 10 CFR 50.55a(g)(6), the NRC will evaluate the licensee's determination that Code requirements are impractical to implement. The NRC may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Alternatively, pursuant to 10 CFR 50.55a(a)(3), the NRC will evaluate the licensee's determination that either (i) the proposed alternatives provide an acceptable level of quality and safety, or (ii) Code compliance would result in hardship or unusual difficulty without a compensating increase in safety. Proposed alternatives may be used when authorized by the NRC.

The information in the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, submitted September 16, 1993, has been reviewed, including the requests for relief from the ASME Code Section XI requirements that the licensee has determined to be impractical. The review of the ISI Program Plan was performed using the Standard Review Plans of NUREG-0800 (Reference 4), Section 5.2.4, "Reactor Coolant Boundary Inservice Inspections and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components."

In a letter dated October 12, 1994, (Reference 5), the NRC requested additional information that was required to complete the review of the ISI Program Plan. The requested information was provided by the licensee in the "Response to Request for Additional Information" dated February 14, 1995, and March 22, 1995 (References 6 and 7).

The *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during the NRC's previous reviews.

The requests for relief are evaluated in Section 3 of this report. Unless otherwise stated, references to the Code refer to the ASME Code, Section XI, 1989 Edition. Specific inservice test (IST) programs for pumps and valves are being evaluated in other reports.

2. EVALUATION OF INSERVICE INSPECTION PROGRAM PLAN

This evaluation consists of a review of the applicable program documents to determine whether or not they are in compliance with the Code requirements and any previous license conditions pertinent to ISI activities. This section describes the submittal reviewed and the results of the review.

2.1 Documents Evaluated

Review has been completed on the following information from the licensee:

- (a) *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, dated September 16, 1993 (Reference 3).
- (b) Response to Request for Additional Information, dated February 14, 1995 (Reference 6).
- (c) Response to Request for Additional Information, dated March 22, 1995 (Reference 7).

2.2 Compliance with Code Requirements

2.2.1 Compliance with Applicable Code Editions

The Inservice Inspection Program Plan shall be based on the Code editions defined in 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(b). Based on the March 2, 1994, starting date of the second 10-year interval, the Code applicable to the second interval ISI program is the 1989 Edition. As stated in Section 1 of this report, the licensee has prepared the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0 to meet the requirements of the 1989 Edition.

2.2.2 Acceptability of the Examination Sample

Inservice volumetric, surface, and visual examinations shall be performed on ASME Code Class 1, 2, and 3 components and their supports using sampling schedules described in Section XI of the ASME Code and 10 CFR 50.55a(b). The sample size and weld selection have been

implemented in accordance with the Code and 10 CFR 50.55a(b) and appear to be correct.

2.2.3 Exemption Criteria

The criteria used to exempt components from examination shall be consistent with Paragraphs IWB-1220, IWC-1220, IWC-1230, IWD-1220, and 10 CFR 50.55a(b). The exemption criteria have been applied by the licensee in accordance with the Code as discussed in the ISI Program Plan, and appear to be correct.

2.2.4 Augmented Examination Commitments

In addition to the requirements in Section XI of the ASME Code, the licensee has committed to perform the following augmented examinations:

- (a) Volumetric and surface examination of the Reactor Coolant Pump Flywheels in accordance with Regulatory Guide 1.14, Revision 1 (Reference 3);
- (b) Reactor pressure vessel weld examinations are being performed in accordance with Regulatory Guide 1.150, Rev. 1. (Reference 9), as applicable. It is noted, however, that the licensee stated that the recording threshold will be based on 50% DAC reflectors in lieu of 20% DAC as required by the Code and Regulatory Guide 1.150, Rev. 1. The INEL staff finds this approach unacceptable. Studies performed to determine the flaw detection reliability associated with recording criteria (References 10 and 11) have shown that flaws may not be detected when procedures require a recording level of 50% DAC. In the case of ultrasonic examinations of vessels, the INEL staff does not view the 20% recording criteria as having a major impact on vessel examinations. It is typically not difficult to distinguish geometric indications from flaw indications in vessels because vessel welds are flush ground with the base metal and geometric reflectors, which are the result of attachments, are readily identifiable;

- (c) Steam Generator Preheater Section Tube examinations will be performed in accordance with Regulatory Guide 1.83, Revision 1 (Reference 12) and the applicable McGuire Nuclear Station Technical Specifications; and
- (d) VT-3 visual inspections of modifications made to prevent tube vibration at the steam generator feedwater nozzles will be performed during the interval.

2.3 Conclusions

Based on the review of the documents listed above, no deviations from regulatory requirements or commitments were identified in the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, with the exception noted in Section 2.2.4(b).

3. EVALUATION OF RELIEF REQUESTS

The request for relief from the ASME Code requirement that the licensee has determined to be impractical for the second 10-year inspection interval is evaluated in the following section.

3.1 Class 1 Components

3.1.1 Reactor Pressure Vessel

3.1.1.1 Request for Relief No. 93-005, Examination Category B-D, Items B3.90 and B3.100, Examination Scheduling Requirements for Reactor Pressure Vessel Nozzle-to-Vessel Welds and Inner Radius Sections

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-D, Items B3.90 and B3.100 require that for reactor pressure vessel nozzle welds at least 25% but not more than 50% (credited) of the nozzles shall be examined by the end of the first inspection period, and the remainder by the end of the inspection interval.

Licensee's Code Relief Request: The licensee requested relief from the Code requirement to examine at least 25% of the Vessel-to-Nozzle welds and inner radius sections during the first examination period of the second 10-year interval.

Licensee's Basis for Requesting Relief (as stated):

"During the first period of the first inspection interval at McGuire Nuclear Station Unit 2, the 29" outlet nozzle-to-vessel welds, outlet nozzle to safe end welds, outlet nozzle safe end to Reactor Coolant System piping welds, were examined using Babcock & Wilcox's Automated Reactor Inspection Tool (ARIS).

"The four nozzle welds examined for Unit 2 met the 50% requirement of Table IWB-2500-1 Category B-D (Note 2). * No recordable indications were detected.

"During the third period of the first ten year inspection interval all Reactor Vessel nozzle-to-vessel and all respective nozzle-to-pipe welds were examined using automated inspection equipment. Included in this examination were the 29" outlet

nozzle-to-vessel and nozzle-to-pipe welds examined during the first period. The re-examination of these 29" outlet nozzles were performed meeting the requirements of the 1989 ASME Section XI Code. Credit will be applied to the second interval, first period requirement for the 29" outlet nozzle-to-vessel welds under Table IWB-2500-1, Category B-D, Items B3.90, B3.100, and Category B-F, Items B5.010 and B5.130. These examinations will not be performed during the first period of the second inspection interval."

Licensee's Proposed Alternative Examination (as stated):

"Automated re-examination of all the Reactor Vessel nozzle-to-vessel weld, including respective nozzle-to-pipe welds will be deferred to the last period of the second ten year inspection interval.

"Following this inspection sequence will provide assurance of the integrity of the nozzle-to-vessel and nozzle-to-pipe welds; and will not adversely affect the health and safety of the public."

Evaluation: The licensee stated that the scheduling requirements of Examination Category B-D Items B3.90 and B3.100 result in a hardship as stated in the basis for relief. It has been previously determined that for these Items deferral of the first period examinations is acceptable provided that they are completed within the same period in which the preceding examinations were performed, or earlier, so that there is no more than 10 years between examinations.

The licensee has established an acceptable level of quality and safety for the RPV nozzle welds by examinations performed during the third period of the previous 10-year interval. The imposition of Examination Category B-D examinations in the first and third periods of the second 10-year interval is regarded as a burden. The proposed alternative, performance of all Category B-D, Items B3.90 and B3.100, examinations in the third period of the second 10-year interval, should be authorized provided that all of the examinations are completed within the same period in which the preceding examinations were performed, or earlier, so that there is no more than 10 years between examinations.

Conclusion: The INEL staff has reviewed the licensee's request for relief from Code scheduling requirements. It is concluded that for Examination Category B-D, Items 83.90 and 83.100, performing the required examinations during the first and third period of the second 10-year interval would result in an unnecessary burden without a compensating increase in the level of quality and safety. Therefore, it is recommended that, the proposed alternative scheduling be authorized pursuant to 10 CFR 50.55a(a)(3)(ii), provided that all of the examinations are completed within the same period in which the preceding examinations were performed, or earlier, so that there is not more than 10 years between examinations.

- 3.1.2 Pressurizer (No relief requests)
- 3.1.3 Heat Exchangers and Steam Generators (No relief requests)
- 3.1.4 Piping Pressure Boundary (No relief requests)
- 3.1.5 Pump Pressure Boundary (No relief requests)
- 3.1.6 Valve Pressure Boundary (No relief requests)
- 3.1.7 General (No relief requests)
- 3.2 Class 2 Components (No relief requests)
- 3.3 Class 3 Components (No relief requests)
- 3.4 Pressure Tests (No relief requests)
- 3.5 General (No relief requests)

4. CONCLUSION

Pursuant to 10 CFR 50.55a(a)(3), it is concluded that for Request for Relief No. 93-005 the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii), provided that the licensee satisfy the condition stated in the evaluation.

The licensee should continue to monitor the development of new or improved examination techniques. As improvements in these areas are achieved, the licensee should incorporate these techniques in the ISI program plan examination requirements.

Based on the review of the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, and the licensee's response to the NRC's request for additional information, no deviations from regulatory requirements or commitments were identified except as noted in Section 2.2.4(b).

5. REFERENCES

1. Code of Federal Regulations, Title 10, Part 50.
2. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Division 1:
1989 Edition
3. *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, dated September 16, 1993.
4. NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*, Section 5.2.4, "Reactor Coolant Boundary Inservice Inspection and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components," July 1981.
5. Letter dated October 12, 1994, Nerses (NRC) to T. C. Meekin (Duke Power) containing NRC Request for Additional Information (RAI), October 12, 1994.
6. Letter dated February 14, 1995, T. C. Meekin (Duke Power) to Document Control Desk (NRC) containing response to the October 12, 1994, Request for Additional Information.
7. Letter dated March 22, 1995, T. C. Meekin (Duke Power) to Document Control Desk (NRC) containing additional response to the October 12, 1994, Request for Additional Information.
8. NRC Regulatory Guide 1.14, Revision 1, *Reactor Coolant Pump Flywheel Integrity*, August 1975.
9. NRC Regulatory Guide 1.150, *Reactor Pressure Vessel Beltline Weld Examinations*, Rev. 1, February 1983.
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10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

This report documents the results of the evaluation of the *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection (ISI) Program Plan*, Revision 0, submitted September 16, 1993, including the request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements that the licensee has determined to be impractical. The *McGuire Nuclear Station, Unit 2, Second 10-Year Interval Inservice Inspection Program Plan* is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The request for relief is evaluated in Section 3 of this report.

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