



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 13, 2021

Mr. Joel P. Gebbie
Senior Vice President and Chief
Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 – PROPOSED
ALTERNATIVE TO USE ENCODED PHASED ARRAY ULTRASONIC
EXAMINATION TECHNIQUES (EPID L-2020-LLR-0073)

Dear Mr. Gebbie:

By letter dated April 30, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20126G457), Indiana Michigan Power Company (I&M, the licensee), submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to the requirements of 10 CFR 50.55a and the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at Donald C. Cook Nuclear Plant, Units 1 and 2 (CNP). The proposed alternative, ISIR-5-03, would allow the licensee to use encoded phased array ultrasonic testing in lieu of radiography testing in the examination of welds in austenitic stainless-steel piping.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the proposed alternative in ISIR-5-03 for the fifth 10-year inservice inspection interval at CNP which began March 1, 2020, and is scheduled to expire February 28, 2030.

All other ASME Code requirements for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

J. Gebbie

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If you have any questions, please contact Scott P. Wall, at 301-415-2855 or via e-mail at Scott.Wall@nrc.gov.

Sincerely,

Nancy L. Salgado, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

cc: Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE REQUEST ISIR-5-03

ENCODED PHASED ARRAY ULTRASONIC EXAMINATION TECHNIQUES

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50 315 AND 50 316

1.0 INTRODUCTION

By letter dated April 30, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20126G457), Indiana Michigan Power Company (I&M, the licensee), submitted Proposed Alternative ISIR-5-03 for the fifth 10-year Inservice Inspection (ISI) interval at Donald C. Cook Nuclear Plant, Units 1 and 2 (CNP). The licensee's request describes alternative requirements to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Paragraphs IWA-4221 and IWA-4520. Proposed Alternative ISIR-05-03 uses phased array ultrasonic testing (PAUT) in lieu of the required radiographic testing (RT) in the examination of welds in austenitic piping as part of the repair and replacement activities at CNP.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), "Acceptable level of quality and safety," the licensee requested authorization of its proposed alternative on the basis that the proposed alternative will provide an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

The regulation in 10 CFR 55a(g)(4) state, in part, that ASME Code Class 1, 2 and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in Section XI of the applicable editions and addenda of the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction of the components.

Regulation 10 CFR 50.55a(z) states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the U.S. Nuclear Regulatory Commission (NRC), if the licensee demonstrates: (1) the proposed alternatives would provide an acceptable level of quality and safety, or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(z)(1), the licensee is proposing an alternative to paragraph IWA-4221 and subarticle IWA-4520 of the 2013 Edition of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the request for alternative to ASME Code requirements has been evaluated and the bases for disposition are documented below.

Applicable Code Edition and Addenda

The applicable Code edition and addenda for the fifth ISI interval of CNP is the 2013 Edition of ASME Code, Section XI.

3.1 Proposed Alternative ISIR-5-03

3.1.1 Applicable Code Requirement

Subarticle IWA-4221 of the 2013 Edition of the ASME Code, Section XI, requires that items used for repair/replacement activities meet the applicable Owner's Requirements and Construction Code requirements when performing repair/replacement activities.

Subsubarticle IWA-4520 of the 2013 Edition of the ASME Code, Section XI, requires that welding or brazing areas and welded joints made for fabrication or installation of items be examined in accordance with the Construction Code identified in the Repair/Replacement Plan.

3.1.2 ASME Code Components Affected

All ASME Code, Section XI, austenitic piping welds requiring radiography during repair/replacement activities at CNP.

3.1.3 Duration of the Alternative

The duration of the proposed alternatives is for the fifth 10-year ISI interval, which began on March 1, 2020, and is scheduled to end on February 28, 2030.

3.1.4 Reason for Request

The licensee stated that replacement of piping is periodically performed in support of the repair replacement activities. The use of encoded PAUT in lieu of RT to perform the required examinations of the replaced welds would eliminate the safety risk associated with performing RT, which includes both planned and unplanned radiation exposure to plant workers. Encoded PAUT also minimizes the impact on other outage activities normally involved with performing RT, such limited work access to work areas.

In addition, the licensee stated that encoded PAUT is equivalent or superior to the ASME Code-required RT examination for ASME austenitic piping repair/replacement welds for detecting and sizing critical (planar) flaws, such as cracks and lack of fusion. PAUT provides sizing capabilities for both depth and length dimensions of the flaw, which are required to apply the acceptance criteria of the applicable code case. RT does not provide depth sizing

capabilities. The proposed alternative is requested to support both planned and unplanned piping repair and replacement activities.

3.1.5 Licensee's Proposed Alternative

The licensee is proposing to perform encoded PAUT in lieu of the ASME Code-required RT for ASME austenitic piping repair/replacement welds. The proposed examination will be performed using procedures, equipment, and qualified personnel as defined in ASME Code Case N-831-1, "Ultrasonic Examination in Lieu of Radiography for Welds in Ferritic or Austenitic Pipe," dated July 25, 2018. Important aspects of the proposed alternative which are identified in ASME Code Case N-831-1 include:

- The written ultrasonic examination procedure will be qualified by performance demonstration.
- Ultrasonic examination procedures shall be qualified using either a blind or a non-blind performance demonstration using a minimum of 30 flaws covering a range of sizes, positions, orientations and types of fabrication flaws. The demonstration set shall include specimens to represent the minimum and maximum diameter and thickness covered by the procedure.
- Ultrasonic personnel performance examination shall be qualified to detect and size flaws with the qualified procedure using blind performance demonstration testing.
- The examination volume shall include 100% of the weld volume and the weld-to-base metal interface.
- All detected axial and circumferential flaws shall be evaluated as planar flaws and compared to the preservice acceptance standards for volumetric examination in accordance with ASME Code, Section XI, Articles IWB-3000, IWC-3000, or IWD-3000 as applicable.
- The examination will be spatially encoded, and the data will be recorded.
- The licensee will store electronic data files for the encoded PAUT as archival-quality records permitting off-line analysis of images built from the data.

The licensee stated that the root mean square (RMS) grading equation, as is shown in the 2013 Edition of ASME Code, Section XI, Article VIII-3120(d), will be utilized in lieu of the incorrect equation in Section 7(d) of Code Case N-831-1.

3.1.6 Licensee's Proposed Basis for Use

The licensee stated that the basis for this proposed alternative is that encoded PAUT is equivalent or superior to RT for detecting and sizing critical (planar) flaws. The licensee also stated that the basis for the proposed alternative was developed from the ASME Code, code cases, relevant industry experience, articles, and the results of RT and encoded PAUT examinations. The examination procedure and personnel performing examinations are qualified in accordance with ASME Code Case N-831-1 using representative piping conditions and flaws that demonstrate the ability to detect and size flaws that are both acceptable and unacceptable to the defined acceptance standards. The licensee stated that the demonstrated ability of the examination procedure and personnel to appropriately detect and size flaws provides an acceptable level of quality and safety alternative as allowed by 10 CFR 50.55a(z)(1).

3.2 NRC Staff Evaluation

The NRC staff has evaluated Proposed Alternative ISIR-5-03 pursuant to 10 CFR 50.55a(z)(1) to determine if the proposed alternative provides an acceptable level of quality and safety. Ultrasonic testing (UT), like RT, is a volumetric inspection technique that is commonly used to inspect welds in nuclear power plants and in other industries. Ultrasonic examinations are not the same as radiographic examinations as they use different physical mechanisms to detect and characterize discontinuities. These differences in physical mechanisms result in several key differences in sensitivity and discrimination capability. The staff review of the capabilities and limitations of the application of PAUT in lieu of RT was specifically for austenitic stainless-steel welds. The licensee stated that the examination procedure and personnel performing examinations are qualified using representative piping conditions and flaws that demonstrate the ability to detect and size flaws that are both acceptable and unacceptable to the defined acceptance standards. The proposed examinations will be performed using procedures, equipment, and qualified personnel as defined in ASME Code Case N-831-1 which provide the rules for performing ultrasonic examination of welds in both ferritic and austenitic piping. Given the above, the NRC staff considered whether the proposed alternative applies UT in a way that provides reasonable assurance of finding structurally significant flaws. Important aspects of the proposed alternative which are identified in Code Case N-831-1 are described in section 3.1.5, above.

Based on the inspection and qualification requirements described in the licensee's request for alternative, the NRC staff concludes that there is reasonable assurance that the encoded PAUT will provide an adequate level of quality and safety because all flaws detected by encoded PAUT will be treated as planar flaws and will subsequently be evaluated against appropriate preservice acceptance standards. Therefore, the staff finds the licensee's request for alternative acceptable.

4.0 CONCLUSION

As identified above, the NRC staff concludes that the licensee's proposed alternative to use PAUT in lieu of RT provides reasonable assurance of structural integrity and leak tightness austenitic stainless-steel piping welds requiring radiography during repair/replacement activities. The proposed alternative that is based on the requirements and provisions as defined in ASME Code Case N-831-1 and described in ISIR-5-03 will provide an acceptable level of quality and safety. Accordingly, the NRC staff concludes the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of Proposed Alternative ISIR-5-03 for the duration of the fifth 10-year Inservice Inspection interval at CNP, which began on March 1, 2020, and is scheduled to end on February 28, 2030.

The NRC staff notes that the approval of Proposed Alternative ISIR-5-03 does not imply or infer the NRC approval of ASME Code Case N-831-1 for generic use.

All other ASME Code requirements for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: E. Reichelt, NRR

Date: January 13, 2021

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 – PROPOSED ALTERNATIVE TO USE ENCODED PHASED ARRAY ULTRASONIC EXAMINATION TECHNIQUES (EPID L-2020-LLR-0073) DATED JANUARY 13, 2021

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