INDIANA MICHIGAN POWER

Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106
aep.com

April 30, 2020

AEP-NRC-2020-23
10 CFR 50.55a

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Donald C. Cook Nuclear Plant, Units 1 and 2
Request for Use of Encoded Phased Array Ultrasonic
Examination Techniques in Lieu of Radiography

Pursuant to 10 CFR 50.55a(z)(1), Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2, requests approval to implement a proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

The ASME Boiler and Pressure Vessel Code, Section XI, requires that certain austenitic piping welds be examined using radiographic examination techniques to satisfy nondestructive examination requirements. I&M requests U.S. Nuclear Regulatory Commission (NRC) approval to use encoded phased array ultrasonic examination techniques as an alternative to radiographic examination. I&M considers that the proposed alternative provides an acceptable level of quality and safety.

I&M would like to request NRC review and approval of the proposed alternative commensurate with the NRC's normal review schedule.

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NRR

There are no new or revised regulatory commitments made in this letter. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Director, at (269) 466-2649.

Sincerely,

Q. Shane Lies
Site Vice President
Indiana Michigan Power Company

BMC/kmh

Enclosure: 10 CFR 50.55a Relief Request ISIR 5-03, Request for Use of Encoded Phased Array Ultrasonic Examination Techniques in Lieu of Radiography

c: R. J. Ancona – MPSC
EGLE – RMD/RPS
J. B. Giessner – NRC Region III
NRC Resident Inspector
S. P. Wall – NRC Washington, D.C.
A. J. Williamson – AEP Ft. Wayne, w/o enclosures

Enclosure to AEP-NRC-2020-23

10 CFR 50.55a Relief Request ISIR-5-03

Request for Use of Encoded Phased Array Ultrasonic Examination Techniques in Lieu of Radiography

1. ASME Code Component(s) Affected

American Society of Mechanical Engineers (ASME), Boiler & Pressure Vessel (B&PV) Code, Section XI, austenitic piping welds requiring radiography during repair/replacement activities.

2. Applicable Code Edition and Addenda

ASME B&PV Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2013 Edition, with no Addenda.

3. Applicable Code Requirement

ASME Code, Section XI, 2013 Edition, paragraph IWA-4221 requires that items used for repair/replacement activities meet the applicable Owner's Requirements and Construction Code requirements when performing repair/replacement activities. IWA-4520 requires that welded joints made for installation of items be examined in accordance with the Construction Code identified in the Repair/Replacement Plan.

4. Reason for Request

Replacement of piping is periodically performed in support of repair and replacement activities. The use of encoded Phased Array Ultrasonic Examination Techniques (PAUT) in lieu of radiography (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. PAUT also minimizes the impact on other outage activities normally involved with performing RT, such as limited access to work areas.

In addition, encoded PAUT is equivalent or superior to the code-required RT examinations 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. This proposed alternative is requested to support both planned and unplanned piping repair and replacement activities.

5. Proposed Alternative and Basis for Use

Proposed Alternative

The use of encoded PAUT is proposed in lieu of the code-required RT examination for ASME austenitic piping repair/replacement welds. Similar techniques are being used throughout the nuclear industry for examination of dissimilar metal welds, overlaid welds, as well as other applications including B31.1 piping replacements. This proposed alternative request includes requirements that provide an acceptable level of quality and safety that satisfies the requirements of 10 CFR 50.55a(z)(1). The capability of the alternative technique is comparable to the examination methods documented in the ASME Code, Sections III, VIII, and IX, and associated code cases (References 1 - 8) using ultrasonic examination techniques for weld acceptance.

It should also be noted that Code Case N-831 (Revision 0) (Reference 9), which provides rules for performing ultrasonic examination of welds in ferritic piping in lieu of RT, was recently approved for use at operating nuclear plants, and is listed in Table 2, "Conditionally Acceptable Section XI Code Cases," of Revision 19 of Regulatory Guide 1.147. As stated in the Final Rule published in Volume 85, No. 51 of the Federal Register, dated Monday, March 16, 2020 (Reference 10), "The NRC finds the Code Case acceptable with the condition that it is prohibited for use in new reactor construction."

The proposed examinations will be performed using procedures, equipment, and qualified personnel as defined in ASME Code Case N-831-1 (Reference 11), which provides rules for performing ultrasonic examination of welds in both ferritic and austenitic piping. The Root Mean Square (RMS) Grading equation, as shown in the 2013 Edition of ASME Section XI, Article VIII-3120(d), will be utilized in lieu of the incorrect equation in Section 7(d) of N-831-1.

$$RMS = \left[\frac{\sum_{i=1}^{n}(m_i - t_i)^2}{n}\right]^{1/2}$$

Basis for Use

The basis for this proposed alternative is that PAUT is equivalent or superior to RT for detecting and sizing critical (planar) flaws. In this regard, the basis for the proposed alternative was developed from numerous codes, code cases, associated industry experience, articles, and the results of RT and encoded PAUT examinations. 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 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).

6. Duration of Proposed Alternative

This alternative request will be applied for the duration of the fifth 10-year Inservice Inspection interval at Donald C. Cook Nuclear Plant Units 1 and 2, which began on March 1, 2020, and ends on February 28, 2030.

7. Precedents

The use of encoded PAUT in lieu of the code-required RT examination for ASME austenitic piping repair/replacement welds was recently approved by the Nuclear Regulatory Commission (NRC) for the following other nuclear sites:

- Edwin I. Hatch Nuclear Plant Units 1 and 2, Joseph M. Farley Nuclear Plant Units 1 and 2, and Vogtle Electric Generating Plant Units 1 and 2, Relief Request GEN-ISI-ALT-2019-01, dated September 30, 2019 (ML19273A926). NRC approval dated February 11, 2020 (ML20034E894).
- Virgil C. Summer Nuclear Station Unit 1, Relief Request RR-4-20, dated July 17, 2019 (ML19204A117). NRC approval dated January 24, 2020 (ML19361A070).
- Catawba Nuclear Station Units 1 and 2, McGuire Nuclear Station Units 1 and 2, Oconee Nuclear Station Units 1, 2, and 3, Brunswick Steam Electric Plant Units 1 and 2, H. B. Robinson Steam Electric Plant Unit 2, Shearon Harris Nuclear Power Plant Unit 1, Relief Request 19-GO-001, dated May 20, 2019 (ML19143A072). NRC approval dated September 17, 2019 (ML19254A620).
- Braidwood Station Units 1 and 2, Byron Station Units 1 and 2, Calvert Cliffs Nuclear Power Plant Units 1 and 2, Clinton Power Station Unit 1, Dresden Nuclear Power Station Units 2 and 3, James A. Fitzpatrick Nuclear Power Plant , LaSalle County Station Units 1 and 2, Limerick Generating Station Units 1 and 2, Nine Mile Point Nuclear Station Units 1 and 2, Peach Bottom Atomic Power Station Units 2 and 3, Quad Cities Nuclear Power Station Units 1 and 2, R. E. Ginna Nuclear Power Plant, dated Feb 15, 2019 (ML19049A001), supplemented by letter dated June 25, 2019 (ML19176A343). NRC approval dated September 27, 2019 (ML19269C534).
- Virginia Electric and Power Company (Dominion Energy Virginia) North Anna Power Station Units 1 and 2 ASME Section XI Inservice Inspection Program Relief Requests N1-I5-CMP-001 and N2-I5-CMP-001; Proposed Alternative - Use of PAUT in Lieu of RT dated August 15, 2018 (ML18234A133). NRC approval dated May 28, 2019 (ML19140A288).

8. References

1. ASME Section III Code Case N-659-2, "Use of Ultrasonic Examination in Lieu of Radiography for Weld Examination Section III, Divisions 1 and 3," dated June 9, 2008.
2. ASME B31.1, Case 168, "Use of Ultrasonic Examination in Lieu of Radiography for B31.1 Application," dated June 1997.

3. ASME Code Case 2235-9, "Use of Ultrasonic Examination in Lieu of Radiography Section I, Section VIII, Divisions 1 and 2, and Section XII," dated October 11, 2005.
4. ASME Code Case 2326, "Ultrasonic Examination in Lieu of Radiographic Examination for Welder Qualification Test Coupons Section IX," dated January 20, 2000.
5. ASME Code Case 2541, "Use of Manual Phased Array Ultrasonic Examination Section V," dated January 19, 2006.
6. ASME Code Case 2558, "Use of Manual Phased Array E-Scan Ultrasonic Examination Per Article 4 Section V," dated December 30, 2006.
7. ASME Code Case 2600, "Use of Linear Phased Array S-Scan Ultrasonic Examination Per Article 4 Section V," dated January 29, 2008.
8. ASME Section XI, Code Case N-713, "Ultrasonic Examination in Lieu of Radiography," dated November 10, 2008.
9. ASME Section XI, Code Case N-831, "Ultrasonic Examination in Lieu of Radiography for Welds in Ferritic Pipe," dated October 20, 2016.
10. Federal Register Notice: Approval of American Society of Mechanical Engineers' Code Cases, published March 16, 2020 (85 FR 14736).
11. ASME Section XI, Code Case N-831-1, "Ultrasonic Examination in Lieu of Radiography for Welds in Ferritic or Austenitic Pipe," dated July 25, 2018.