



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

November 3, 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 – RELIEF REQUEST
ISIR-4-11 LIMITED COVERAGE EXAMINATIONS DURING THE FOURTH
10-YEAR INSERVICE INSPECTION INTERVAL (EPID L-2021-LLR-0017)

Dear Mr. Gebbie:

By letter dated March 1, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21067A102), and supplemented by a letter dated July 21, 2021 (ADAMS Accession No. ML21202A417), Indiana Michigan Power Company (I&M or licensee), requested relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. Relief Request (RR) ISIR-4-11, Revision 0, pertains to examination coverage of Class 1 and 2 welds at the Donald C. Cook Nuclear Power Plant, Units 1 and 2 (CNP).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief from the required examination coverage for inservice inspection (ISI) of the welds on the basis that the ASME Code requirements are impractical.

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(g)(5)(iii). The NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest, given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the NRC staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Therefore, the NRC staff grants relief from the ASME Code examination requirements for the welds included in RR ISIR-4-11 for CNP for the fourth 10-year ISI interval, which began on March 1, 2010 and ended on February 29, 2020.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request 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
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

10 CFR 50.55a REQUEST ISIR-4-11, REVISION 0

FORTH 10-YEAR INTERVAL INSERVICE TESTING INTERVAL

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 March 1, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21067A102), and supplemented by a letter dated July 21, 2021 (ADAMS Accession No. ML21202A417), Indiana Michigan Power Company (I&M or licensee), requested relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. Relief Request (RR) ISIR-4-11, Revision 0, pertains to examination coverage of Class 1 and 2 welds at the Donald C. Cook Nuclear Power Plant, Units 1 and 2 (CNP).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief from the required volumetric or surface examination coverage for inservice inspection (ISI) of the component welds on the basis that the ASME Code requirements are impractical to physical obstructions and limitations imposed by design, geometry, and materials of construction of the subject components.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), "Inservice inspection standards requirement for operating plants," components (including supports) that are classified as ASME Code Class 1, Class 2, and Class 3, must meet the requirements in 10 CFR 50.55a throughout the service life of a boiling- or pressurized-water reactor. The exception is the design and access provisions and preservice examination requirements set forth in Section XI of editions and addenda of the ASME Code that become effective subsequent to editions specified in 10 CFR 50.55a(g)(2) and (3), which are incorporated by reference in 10 CFR 50.55a(a)(1)(ii) to the extent practical within the limitations of design, geometry, and materials of construction of the components.

Pursuant to 10 CFR 50.55a(g)(4)(ii), "Applicable ISI Code: Successive 120-month intervals," inservice examination of components and system pressure tests conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(a) 12 months before the start of the 120-month inspection interval (or the optional ASME Code Cases listed in

U.S. Nuclear Regulatory Commission (NRC or Commission) Regulatory Guide (RG) 1.147, when using ASME Code, Section XI, as incorporated by reference in 10 CFR 50.55a(a)(3)(ii), subject to the conditions listed in 10 CFR 50.55a(b)).

Pursuant to 10 CFR 50.55a(g)(5)(iii), "ISI program update: Notification of impractical ISI Code requirements," if the licensee has determined that conformance with a ASME Code requirement is impractical for its facility, the licensee must notify the NRC and submit, as specified in § 50.4, information to support the determinations. Determinations of impracticality in accordance with 10 CFR 50.55a(g)(5)(iii) must be based on the demonstrated limitations experienced when attempting to comply with the ASME Code requirements during the ISI interval for which the request is being submitted. Requests for relief made in accordance with 10 CFR 50.55a(g)(5)(iii) must be submitted to the NRC no later than 12 months after the expiration of the initial or subsequent 120-month inspection interval for which relief is sought.

Pursuant to 10 CFR 50.55a(g)(5)(iv), "ISI program update: Schedule for completing impracticality determinations," if the licensee has determined that conformance with a ASME Code requirement is impractical for its facility, and is not included in the revised ISI program as permitted by paragraph 10 CFR 50.55a(g)(4), the basis for this determination must be demonstrated to the satisfaction of the Commission not later than 12 months after the expiration of the initial 120-month period of operation from the start of facility commercial operation and each subsequent 120-month period of operation during which the examination is determined to be impractical.

Pursuant to 10 CFR 50.55a(g)(6)(i), "Impractical ISI requirements: Granting of relief," the Commission will evaluate determinations under 10 CFR 50.55a(g)(5) that ASME Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines are authorized by law, will not endanger life or 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.

The licensee requests granting of a relief from the requirements of article IWB-2500 of the ASME Code, Section XI, pursuant to 10 CFR 50.55a(g)(5)(iii).

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 ASME Code Components Affected

The affected components are ASME Code Class 1 and 2 welds associated with the following examination categories and items numbers per the ASME Code, Section XI, IWB-2500-1, IWC-2500-1, and Risk-Informed Inservice Inspection (RI-ISI) program.

Examination Categories: B-A, B-D, B-K, C-B, R-A

Item Nos.: B1.11; B1.21; B1.22; B3.110; B10.10; C2.21; R1.11; R1.11/16; R1.16; and R1.20

3.2 Applicable Code Edition and Addenda

The ASME Code, Section XI, 2004 Edition, as modified by 10 CFR 50.55a, was the code of record for the fourth 10-year ISI interval at CNP. In addition, the licensee followed the requirements of the ASME Code, Section XI, Appendix VIII, and the Performance Demonstration Initiative in accordance with the 2001 Edition of the ASME Code, Section XI, for the limited examinations contained in this request as conditioned by 10 CFR 50.55a(b)(2)(xv) and 10 CFR 50.55a(b)(2)(xxiv).

3.3 Applicable Code Requirements

Exam Categories	Exam Items	Weld Examination Coverage Requirements
B-A	B1.11	RPV [reactor pressure vessel] shell weld volume per Figure IWB-2500-1
B-A	B1.21	RPV head welds volume per Figure IWB-2500-3
B-A	B1.22	RPV head welds volume per Figure IWB-2500-3
B-D	B3.110	Pressurizer nozzle-to-vessel weld volume per Figures IWB-2500-7(a), (b), (c) or (d)
B-K	B10.10	Pressurizer support skirt attachment weld surface per Figure IWB-2500-14
C-B	C2.21	To include essentially 100% examination of the nozzle-to-shell (nozzle to head or nozzle to nozzle) weld as depicted in Figures IWC-2500-4(a), (b), or (d)
R-A	R1.11	To include essentially 100% of the examination location potentially subject to thermal fatigue
R-A	R1.11/16	To include essentially 100% of the examination location potentially subject to thermal fatigue and intergranular stress corrosion cracking (IGSCC).
R-A	R1.16	To include essentially 100% of the examination location potentially subject to IGSCC.
R-A	R1.20	To include essentially 100% of the examination location with no degradation mechanism.

The ASME Code, Section XI, IWB-2500 and IWC-2500, require 100 percent coverage of the specified volume or surface when performing nondestructive examinations of various welds and nozzles. However, RG 1.147, Revision 19, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1" (ADAMS Accession No. ML19128A244), approves the generic

use of ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds Section XI, Division 1." Code Case N-460 permits the use of essentially 100 percent examination coverage which equates to more than 90 percent of the required examination volume or surface area of each weld where the reduction in coverage is due to interference by another component or part geometry. The licensee has invoked Code Case N-460 for the required coverage associated with the welds in ISIR-4-11.

3.4 Reason for Request

The licensee stated that pursuant to 10 CFR 50.55a(g)(5)(iii) this RR should be submitted on or before February 28, 2021, which is the end of the fourth ISI interval. However, because February 28, 2021, falls on a Sunday, and 10 CFR 50.4(a) states that: "If a submission due date falls on a Saturday, Sunday, or Federal holiday, the next Federal working day becomes the official due date," the licensee submitted the RR on the next business day, March 1, 2021.

3.4.1 Impracticality of Compliance

The licensee stated that the construction permits for CNP were issued on March 25, 1969, and fall under the provisions of 10 CFR 50.55a(g)(1), which were applied to components (including supports) that must meet the requirements of paragraphs (g)(4) and (g)(5) to the extent practical. The licensee indicated that although the design of the plants has provided access for examinations to the extent practical, component design configurations with conditions resulting in examination limitations such as those from support interference, geometric configurations of welds and materials such as fittings or valve bodies made of cast stainless steel may not allow the full required examination volume or surface area coverage with the latest techniques available. The licensee reported that the welds listed in this RR did not receive the required code volume or surface area coverage due to their component design configurations or interference by other items. These conditions resulted in scanning or surface area access limitations that prohibited obtaining essentially 100 percent examination coverage of the required examination volumes or surface areas, but for the weld volumes or surface areas that are accessible the examination coverage was 100 percent. Details of examination restrictions and reductions in required examination coverage are provided in Attachment 1 of the licensee's submittal.

3.4.2 Burden Caused by Compliance

The licensee contended that to comply with essentially 100 percent examination coverage, the subject welds and their associated components would have to be physically modified and/or disassembled beyond their current design. The licensee explained that the subject components and fittings are constructed of standard design items and materials meeting typical national standards that specify required configurations and dimensions. The licensee stated that to replace these items with items of alternate configurations or materials to enhance examination coverage would require unique redesign and fabrication. The licensee also stated that because these items are in the ASME Code Class 1 and 2 boundaries and for the ASME Code Class 1 items that form a part of the reactor coolant pressure boundary, their redesign and fabrication would be an extensive effort based on the limitations that exist.

For the ASME Code Class 1 piping welds examined per the RI-ISI programs, the limitations listed in ISIR-4-11 are typically limited by their design configurations or materials. The configurations of these welds or their materials only allow ultrasonic testing (UT) examination coverage from one side of the weld or limited coverage and, thus, they would also require a

design modification or replacement to obtain the required examination coverage. Based on this, the licensee stated that it is not possible to obtain UT interrogation of greater than 90 percent of the required code examination volume or surface areas for the welds in this RR without extensive weld or component design modifications or plant component disassembly. The licensee further stated that examinations have been performed to the maximum extent possible. The licensee explained that use of radiographic testing to examine the subject welds is impractical because of the work being performed a 24-hour basis. Using radiography would result in numerous work-related stoppages and increased exposure due to the shutdown and startup of other work in the areas of the welds. For radiography, the water may need to be drained from systems or components where radiography is performed, which increases the radiation dose rates over a much broader area than the weld being examined. The licensee concluded that there is significant impracticality associated with the performance of weld or area modifications or the use of radiography to increase the examination coverage.

3.5 Proposed Alternative

In lieu of the 100 percent examination coverage in accordance with the ASME Code, Section XI, and the essentially 100 percent examination coverage of Code Case N-460, the licensee proposed the examination coverage as shown in the licensee's submittal.

In addition, the licensee proposed the following:

- (1) Perform periodic system pressure tests and visual (VT-2) examinations in accordance with the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P for Class 1 pressure-retaining welds and items during each refueling outage and Table IWC-2500-1, Examination Category C-H for Class 2 pressure retaining welds and items during each ISI period.
- (2) Conduct required penetrant testing, magnetic particle testing (MT) or UT examinations to the maximum extent possible as required by the ASME Code, Section XI or the RI-ISI Programs.

3.6 Basis for Use

The licensee stated that pursuant to 10 CFR 50.55a(g)(4), components which are classified as ASME Code Class 1, Class 2, and Class 3, must meet the requirements set forth in the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction of the subject welds and items. When a component is found to have conditions, which limit the required examination volume or surface area, the licensee is required to request the NRC for relief from the ASME Code provisions.

The licensee further stated that the RR addresses areas where these types of conditions exist and where the required coverage was reduces below the minimum acceptable. The licensee explained that there is instrumentation in place to assure that early detection of any reactor coolant system (RCS) pressure boundary leakage is identified. This is accomplished by the leakage detection instrumentation inside the containment where the RCS leakage detection instrumentation is required to be operable. As stated in CNP TS 3.4.15, "RCS Leakage Detection Instrumentation," the instrumentation consists of monitoring of containment sump level in each sump, containment atmosphere particulate radioactivity, and containment atmosphere gaseous radioactivity. These instruments are used to quantify any unidentified leakage from the RCS and to meet the CNP technical specifications (TSs) surveillance

requirements (SRs) that have a limiting condition for operation (LCO) in TS 3.4.13 stating that RCS operational leakage shall be limited to:

- a. No pressure boundary LEAKAGE;
- b. 0.8 gallons per minute (gpm) unidentified LEAKAGE;
- c. 10 gpm identified LEAKAGE; and
- d. 150 gallons per day primary to secondary LEAKAGE through any one steam generator

3.7 Duration of Proposed Alternative

This request for relief is for the CNP fourth 10-Year ISI interval, which began on March 1, 2010, and ended on February 29, 2020.

3.8 NRC Staff Evaluation

The NRC staff evaluated the proposed examination coverage, examination results, and defense-in-depth (DID) measures in the RR as follows.

3.8.1 Examination Coverage

To show impracticality, the licensee submitted detailed diagrams of the UT beam scan, weld configurations, and informative color photographs of the welds in the field to demonstrate the examination inaccessibility of the subject welds. As the diagrams and photographs show, the NRC recognizes that the UT transducers are not able to perform the necessary scan of the subject welds to achieve essentially 100 percent examination coverage. For example, the NRC staff determined that the low examination coverage of 47.61 percent in Weld 2-RPV-E was caused by the location and layout of the bottom mounted instrumentation tubes at the RPV lower head. The NRC staff further determined that the licensee performed a best effort examination to achieve a coverage of 47.61 percent under the existing impracticality.

The NRC staff determined that the licensee has provided sufficient evidence to demonstrate the impracticality to achieve essentially 100 percent examination coverage. The NRC staff determined that the licensee used the appropriate examination techniques as prescribed in the ASME Code, Section V and Section XI, Appendix VIII, for the subject welds and followed the NRC-approved RR ISIR-4-01, which was approved for both the third and fourth 10-year ISI intervals (ADAMS Accession Nos. ML072620553 and ML11073A084, respectfully) and Code Case N-716-1, which the NRC has approved in NRC RG 1.147, Revision 18 (ADAMS Accession No. ML16321A336), when examining the welds under the RI-ISI program.

3.8.2 Examination Results

The NRC staff determined that the licensee detected indications in several welds. The licensee accepted all detected indications based on the provisions of the ASME Code, Section XI, IWB-3500. This means that the detected indications are not significant enough to require an analytical evaluation and the affected welds can remain in service. The NRC staff notes that the 2004 Edition of the ASME Code, Section XI, IWB-2420(a), states, that "...The sequence of component examinations which was established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical...". This provision requires the licensee to reexamine the same components that contains the indications in the future 10-year ISI intervals. As such, the required reexamination will monitor the conditions of

the indications in the future. The NRC staff notes that for the future ISI intervals, i.e., the fifth and sixth intervals, the licensee will need to use NRC-approved later editions of the ASME Code, Section XI, which also require reexamination of the affected components as in the 2004 Edition. The NRC staff finds that because the affected components will be reexamined in the future ISI intervals, their structural integrity will be reasonably assured and, therefore, the affected welds are acceptable.

As a case in point regarding reexamination, the NRC staff noted that the licensee detected one indication in Weld 6"-2-RC-22 and two indications in Weld 6"-2-RC-25 in 1997. In 2012, the licensee re-examined the three indications. The licensee reported that all three welds had not grown from 1997 to 2012. The NRC staff finds that the reexamination provides reasonable assurance that the structural integrity of these two welds is maintained because the detected indications had not grown in approximately 15 years.

The NRC notes that the licensee examined certain welds under the RI-ISI program in accordance with either NRC-approved RR ISIR-4-01, which is based on Code Case N-716, or Code Case N-716-1. As part of weld examination, Code Case N-716-1 (and RR ISIR-4-01) requires the licensee perform a change-in-risk (delta risk) estimation to assess the welds whose examination coverage could not achieve the essentially 100 percent coverage. Code Case N-716-1 specifies acceptance criteria of 1E-07 for cumulative damage frequency (CDF) and 1E-08 for large early release frequency (LERF). The licensee used the probabilistic risk assessment to estimate changes in the CDF and LERF based on the pipe failure probability. In its pipe failure probability calculations, the licensee included (credited) and excluded (did not credit) the affected welds to determine the change in risk. The NRC staff noted that the licensee's analysis showed that change-in-risk is negligible and well below the acceptable limits of Code Case N-716-1 for all RI-ISI welds. The NRC staff finds that the licensee has appropriately addressed the change-in-risk for the RI-ISI welds. Therefore, the NRC staff finds that the proposed examination coverage for the RI-ISI welds are acceptable in accordance with NRC-approved Code Case N-716-1 and RR ISIR-4-01.

3.8.3 DID Measures

ASME Code, Section XI, Table IWB-2500-1, requires a periodic system leakage test for all Class 1 Examination Category B-P pressure-retaining components each refueling outage. Table IWC-2500-1 requires a periodic system leakage test for all Class 2 pressure-retaining components each ISI period. As part of the system leakage test, Tables IWB-2500-1 and IWC-2500-1, require a visual (VT-2) examination per IWA-5240. The NRC staff finds that the periodic system leakage test required by the ASME Code, Section XI, provides appropriate DID measures to monitor structural integrity of the subject welds and, therefore, is acceptable.

In addition to the leakage test, the NRC determines that each CNP unit has instrumentation in the containment to ensure that early detection of any RCS pressure boundary leakage. CNP TS 3.4.15 "RCS Leakage Detection Instrumentation," requires instruments to monitor containment sump level, containment atmosphere particulate radioactivity, and containment atmosphere gaseous radioactivity during normal operation. These instruments are used to quantify any leakage from the RCS and to meet the CNP TS SRs that have an LCO in TS 3.4.13. The LCO prohibits leakage in the pressure boundary (i.e., no leakage). Should leakage occur, the LCO limits unidentified leakage to 0.8 gpm and identified leakage to 10 gpm. The NRC staff finds that the licensee's RCS leakage detection systems provide the necessary DID monitoring such that should the coolant leaking from a degraded weld, operator can take

corrective action to protect structural integrity of the subject welds and associated piping systems.

Based on the examination coverage achieved, the examination results and the DID measures, the NRC staff concludes that, if significant service-induced degradation was present in the subject welds, evidence would have been detected by the examinations performed. Based on operational experience and the extent to which the examinations were performed, the NRC staff has determined with reasonable assurance that the structural integrity of these welds will be maintained throughout the fourth 10-year ISI interval.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest, given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the NRC staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii). Therefore, the NRC staff grants relief from the ASME Code examination requirements for the welds included in RR ISIR-4-11 at CNP for the fourth 10-year ISI interval, which began on March 1, 2010, and ended on ended February 29, 2020.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this RR remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: E. Reichelt, NRR
J. Tsao, NRR

Date: November 3, 2021

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 ISIR-4-11 LIMITED COVERAGE EXAMINATIONS DURING THE FOURTH
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 DATED NOVEMBER 3, 2021

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