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

February 12, 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, UNIT 1 - RELIEF REQUEST ISIR-5-04 RELATED TO ASME CODE CASE N-729-6 SUPPLEMENTAL EXAMINATION REQUIREMENTS OF REACTOR VESSEL CLOSURE HEAD PENETRATION NOZZLES (EPID L-2020-LLR-0133 [COVID-19])

Dear Sir or Madam:

By letter dated October 5, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20279A713), as supplemented by letter dated October 9, 2020 (ADAMS Accession No. ML20287A435), Indiana Michigan Power Company (I&M, or the licensee), submitted relief request (RR) ISIR-5-04, proposing an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Case N-729-6, "Alternative Examination Requirements for PWR [pressurized-water reactor] Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1," as conditioned by Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.55a(g)(6)(ii)(D), for Donald C. Cook Nuclear Plant, Unit 1 (CNP-1).

Specifically, pursuant to 10 CFR 50.55a(z)(2), the licensee requested to use the proposed alternative in ISIR-5-04 on the basis that compliance with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

On October 14, 2020 (ADAMS Accession No. ML20289A712), the U.S. Nuclear Regulatory Commission (NRC) verbally authorized the use of ISIR-5-04 at CNP-1 for one cycle of operation, not to exceed the end of the next refueling outage, U1C31. The enclosed safety evaluation describes the technical basis for the NRC's verbal authorization.

The NRC staff reviewed the licensee's submittals and determined that the proposed alternative in RR ISIR-5-04 provides reasonable assurance of structural integrity of the subject components and that complying with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of ISIR-5-04 for one cycle of operation until CNP-1 cycle 31 refueling outage.

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

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

Digitally signed by Nancy L. Salgado
Date: 2021.02.12 07:57:20 -05'00'

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

Docket No. 50-315

Enclosure:
Safety Evaluation

cc: Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST ISIR-5-04 REGARDING ALTERNATIVE INSPECTION OF

REACTOR PRESSURE VESSEL CLOSURE HEAD PENETRATION NOZZLES

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT, UNIT NO. 1

DOCKET NO. 50 315

1.0 INTRODUCTION

By letter dated October 5, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20279A713), as supplemented by letter dated October 9, 2020 (ADAMS Accession No. ML20287A435), Indiana Michigan Power Company (I&M, or the licensee) proposed an alternative in relief request (RR) ISIR-5-04 to the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.55a(g)(6)(ii)(D), "Augmented ISI [inservice inspection] requirements: Reactor vessel head inspections," which requires American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME Code) Case N-729-6, "Alternative Examination Requirements for PWR [pressurized-water reactor] Reactor Vessel Upper Heads with Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1," for inspection of the reactor vessel closure head (RVCH) at Donald C. Cook Nuclear Plant, Unit 1 (CNP-1).

Specifically, pursuant to 10 CFR 50.55a(z)(2), "Hardship without a compensating increase in quality and safety," the licensee requested authorization of its proposed alternative on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

On October 14, 2020 (ADAMS Accession No. ML20289A712), the U.S. Nuclear Regulatory Commission (NRC or Commission) staff verbally authorized the use of ISIR-5-04 at CNP-1 for one cycle of operation, not to exceed the end of the next refueling outage, U1C31. This safety evaluation (SE) describes the technical basis for the NRC's verbal authorization.

2.0 REGULATORY EVALUATION

Repair and Replacement activities for ASME Code Class 1, 2, and 3 components is to be performed in accordance with ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable editions and addenda as required by 10 CFR 50.55a(g), "Preservice and inservice inspection requirements," except where specific written relief has been granted by the NRC.

The regulation 10 CFR 50.55a(g)(6)(ii), "Augmented ISI program," states that "The Commission may require the licensee to follow an augmented inservice inspection program for systems and components for which the Commission deems that added assurance of structural reliability is necessary." In accordance with 10 CFR 50.55a(g)(6)(ii)(D), all licensees of PWRs must augment their ISI program with ASME Code Case N-729-6, subject to conditions specified in paragraphs (g)(6)(ii)(D)(2) through (4)."

Section 50.55a(z), "Alternatives to codes and standards requirements," of 10 CFR states, in part, that "Alternatives to the requirements of [paragraph (g) of 10 CFR 50.55a] or portions thereof may be used, when authorized by the Director, Office of Nuclear Reactor Regulation. A proposed alternative must be submitted and authorized prior to implementation." The licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety, or (2) compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on the above and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request the use of an alternative and the NRC to authorize the proposed alternative.

3.0 TECHNICAL EVALUATION

3.1 ASME Code Components Affected

The affected components are ASME Code Class 1 PWR RVCH with nozzles and associated partial-penetration welds fabricated with Alloy 690/52/152 materials. Each of these nozzles and associated welds is categorized as Item B4.30 in ASME Code Case N-729-6, Table 1.

3.2 ISI Interval and Applicable Code Edition and Addenda

CNP-1 is currently in its fifth 10-year ISI interval, which began March 1, 2020, and is scheduled to end on February 28, 2030. The ASME Code of record for the fifth 10-year ISI interval is the 2013 Edition with no addenda.

3.3 Code Requirement for Which Relief is Requested

The regulation in 10 CFR 50.55a(g)(6)(ii)(D)(1), "Implementation," requires that licensees augment their ISI programs in accordance with ASME Code Case N-729-6, subject to the conditions specified in paragraphs (2) through (8) of 10 CFR 50.55a(g)(6)(ii)(D). ASME Code Case N-729-6, paragraph 3142.2, requires that nozzles with relevant conditions indicative of possible nozzle leakage undergo supplemental examinations consisting of a volumetric examination (VE) of the nozzle tube and surface examination of the partial-penetration weld or surface examination of the nozzle tube inside surface, the partial-penetration weld, and nozzle tube outside surface below the weld, in accordance with paragraph 3200(b).

Paragraph-3200(b), "Supplemental Examinations," of N-729-6 requires supplemental VEs of the nozzles and welds if relevant conditions indicative of possible nozzle leakage remain after visual examinations of the RVCH in accordance with paragraph -3142.1 of N-729-6.

3.4 Licensee's Proposed Alternative

The licensee submitted a proposed alternative to performing supplemental examinations of the CNP-1 RVCH in accordance with ASME Code Case N-729-6 due to the hardship identified in the submittal.

The licensee stated that it would clean the remaining area of the RVCH surface, including each annulus between the head and nozzle surface, and verify the structural integrity of the RVCH. During the upcoming cycle of operation, the licensee stated that it would monitor for leakage in a manner which will continue to ensure the structural integrity of the RVCH. Finally, during the next scheduled refueling outage, U1C31, the licensee would perform an additional visual examination of the bare metal of the RVCH to ensure no leakage is occurring from the RVCH nozzles or associated welds.

Specific details are provided in the October 5, 2020, application, as supplement by letter dated October 9, 2020.

3.5 Licensee's Basis for the Proposed Alternative

During the current refueling outage (U1C30) at CNP-1, the licensee performed a RVCH VE and identified 17 nozzles, which after light cleaning methods could not have their relevant conditions of possible nozzle leakage resolved per ASME Code Case N-729-6 and supplemental guidance in Regulatory Information Summary (RIS) 2018-06. The licensee's analysis showed a likely source for the deposits on the RVCH, however in accordance with RIS 2018-06 an additional source from nozzle leakage could still be possible. Therefore, ASME Code Case N-729-6, Paragraph -3142.2 would require supplemental volumetric and surface examinations in accordance with Paragraph -3200(b).

Beyond the licensee's initial analysis, including light surface cleaning techniques, the licensee performed carbon dioxide head cleaning to obtain to get the RVCH to a bare metal surface. The license performed a subsequent bare metal visual examination of the head surface and identified no degradation. In addition, the licensee will perform a bare metal visual examination of the RVCH during the next refueling outage (U1C31). Due to the carbon dioxide head cleaning this outage, the future bare metal visual exam should be able to identify any potential active leakage by that time.

The licensee indicated that to perform the supplemental volumetric and surface examinations required in Code Case N-729-6, paragraph-3200(b), would expose personnel to elevated dose rates not previously planned for the refueling outage.

On January 31, 2020, the U.S. Department of Health and Human Services declared a Coronavirus Disease 2019 (COVID-19) public health emergency (PHE) for the United States. Subsequently, the Centers for Disease Control and Prevention issued recommendations (e.g., social distancing, limiting assemblies) to limit the spread of COVID-19. The licensee estimated approximately 18 personnel over a period of approximately 3 weeks would be needed to complete the supplemental examinations. This would extend the duration of increased risk of COVID-19 infection.

For these reasons, the supplemental examinations represent a hardship or unusual difficulty, pursuant to 10 CFR 50.55a(z)(2).

3.6 Licensee's Proposed Duration of Relief Request

The licensee proposed this alternative during the fall 2020 refueling outage (U1C30) for one cycle of operation, until refueling outage U1C31.

3.7 NRC Staff Review

The NRC staff reviewed the licensee's proposed alternative in accordance with 10 CFR 50.55a(z)(2) to determine if compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Verbal authorization for proposed alternative ISIR-5-04 was given on October 14, 2020 (ADAMS Accession No. ML20289A712). This SE documents the technical basis for the NRC's verbal authorization.

The licensee supported their proposed alternative by describing the possible sources of leakage, the location of the deposits, the crack resistance of the nozzle and weld materials of the RVCH at CNP-1 and the radiological dose hardship and potential COVID-19 impacts of performing additional supplemental examinations at CNP-1 during the current refueling outage.

Without the proposed alternative, in accordance with ASME Code Case N-729-6, paragraph 3142.2, the licensee would have been required to perform supplemental volumetric and/or surface examinations to disposition any nozzles for which an absence of reactor coolant pressure boundary leakage had not been demonstrated. This activity would have required additional work in a high radiation area that was not previously planned for this refueling outage.

The NRC staff reviewed the licensee's identified hardship and found the licensee's estimation of radiological dose and personnel necessary to perform the supplemental VE during this outage was consistent with estimates at other facilities. As such, the NRC staff finds that the radiological dose and COVID-19 concerns in a period of a national pandemic, are a hardship on the licensee consistent with 10 CFR 50.55a(z)(2).

The NRC staff reviewed the licensee's proposed alternative by evaluating whether the actions identified by the licensee to provide reasonable assurance of structural integrity of the RVCH for the next operating cycle without requiring the licensee to perform supplemental VEs during the current refueling outage. The NRC notes the nozzle and weld material (alloy 690/52/152) of the RVCH at CNP-1 has demonstrated no cracking in service in pressurized water reactor environments. Additionally, extensive crack initiation testing in laboratories has been performed on these materials nationally and internationally with no indication of cracking under similar operating environments found at CNP-1. Confirmatory ongoing crack initiation testing is being performed by the NRC Office of Nuclear Regulatory Research (RES) simulating over 20 years of operation in similar environments at CNP-1, with no indications of cracking. This testing supports the conclusion that it is unlikely that cracking is currently present in the CNP-1 RVCH penetrations. Further, if a crack had initiated and grown to a size to allow minor leakage of a RVCH penetration, the known resistance of alloy 690/52/152 to crack growth, verified by over 6 years of testing by the NRC RES, provides additional assurance that any cracking currently present would be unlikely to increase to the point of challenging the structural integrity of the RVCH over one additional operating cycle. Finally, the licensee's identified leakage monitoring actions enable detection of the onset or increase in leakage through a RVCH penetration prior to it presenting a significant challenge to structural integrity of the RVCH. Hence, the NRC finds that the licensee's proposed alternative provides reasonable assurance of the structural integrity

of the RVCH for the next operating cycle at CNP-1 without requiring the licensee to perform supplemental VEs during the current refueling outage.

Therefore, based on the above evaluation, the NRC staff finds that the licensee's proposed alternative meets the requirements for authorization under 10 CFR 50.55a(z)(2) and provides reasonable assurance of structural integrity of the RVCH at CNP-1 until the next refueling outage, U1C31.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the licensee has demonstrated that the proposed alternative in RR ISIR-5-04 provides reasonable assurance of structural integrity of the subject components and that complying with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes the use of RR ISIR-5-04 at CNP-1 for one cycle of operation, not to exceed the end of the next refueling outage, U1C31.

All other ASME Code requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable.

Principal Contributor: J. Collins

Date: February 12, 2021

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNIT 1 - RELIEF REQUEST ISIR-5-04 RELATED TO ASME CODE CASE N-729-6 SUPPLEMENTAL EXAMINATION REQUIREMENTS OF REACTOR VESSEL CLOSURE HEAD PENETRATION NOZZLES (EPID L-2020-LLR-0133 [COVID-19]) DATED FEBRUARY 12, 2021

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