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AEP-NRC-2021-18
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Docket No.: 50-316

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

Donald C. Cook Nuclear Plant Unit 2
Response to Request for Additional Information Regarding License Amendment Request for One-Time Extension of the Containment Type A Leak Rate Testing Frequency

References:

1. Letter from Q. S. Lies, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC), "Donald C. Cook Nuclear Plant, Unit 2, License Amendment Request for One-Time Extension of the Containment Type A Leak Rate Testing Frequency," dated December 14, 2020, Agencywide Documents Access and Management System Accession (ADAMS) No. ML20363A011.

2. E-mail from S. P. Wall, NRC, to M. K. Scarpello, I&M, "FINAL RAI - D.C. Cook 2 - License Amendment Request for One-Time Extension Containment Type A ILRT (EPID No. L-2020-LLA-0280)," dated February 16, 2021.

This letter provides Indiana Michigan Power Company's (I&M), licensee for Donald C. Cook Nuclear Plant (CNP) Unit 2, response to the Request for Additional Information (RAI) by the U. S. Nuclear Regulatory Commission (NRC) regarding a license amendment request (LAR) for a one-time extension to the 15-year frequency of the CNP Unit 2 containment leakage rate test (i.e. Integrated Leak Rate Test or Type A test). This test is required by Technical Specification 5.5.14, Containment Leakage Rate Testing Program.

By Reference 1, I&M submitted a request for a one-time extension to the 15-year frequency of the CNP Unit 2 Containment Type A test. By Reference 2, the NRC submitted an RAI concerning the LAR submitted by I&M as Reference 1.

Enclosure 1 to this letter provides an affirmation statement. I&M is providing Enclosure 2 to this letter as its response to the NRC's RAI from Reference 2.

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There are no new 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

BMC/mll

Enclosures:

1. Affirmation
2. Response to Request for Additional Information Regarding Unit 2 Request for One-Time Extension of the Containment Type A Leak Rate Testing Frequency

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

**Enclosure 1 to AEP-NRC-2021-18**

AFFIRMATION

I, Q. Shane Lies, being duly sworn, state that I am the Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the U. S. Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

Indiana Michigan Power Company

Q. Shane Lies
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 18th DAY OF February 2021

Notary Public

My Commission Expires 02-20-2025

**Enclosure 2 to AEP-NRC-2021-18**

**Response to Request for Additional Information Regarding Unit 2 Request for One-Time Extension of the Containment Type A Leak Rate Testing Frequency**

By letter dated December 14, 2020 (Agencywide Documents Access and Management System Accession No. ML20363A011), Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 2, submitted a license amendment request for a one-time extension to the 15-year frequency of the CNP Unit 2 containment leakage rate test (i.e. Integrated Leak Rate Test (ILRT) or Type A test) (Reference 1). This test is required by Technical Specification 5.5.14, Containment Leakage Rate Testing Program.

The U. S. Nuclear Regulatory Commission (NRC) staff is currently reviewing the submittal and has determined that additional information is needed in order to complete the review. The request for additional information (RAI) and I&M's response are provided below.

**RAI-ESEB (ILRT)**

*Applicable Regulation and Guidance*

*Subsection IWL of the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," as incorporated by reference in Title 10 of the Code of Federal Regulations (10 CFR) Section 50.55a, (b)(2)(v)(iii), requires general visual examinations for concrete components.*

*Issue*

*In Section 4.4.2, "IWL Examinations," of the December 14, 2020, application, the licensee stated that the 2006, 2011, and 2017 inspection results indicated that (1) a small section (approximately one square inch) of spalled concrete was discovered, exposing either rebar or a mechanical rebar splice connector, (2) four surface cracks between 1/32 in, and 1/16 in. were found, (3) there were concrete popouts, (4) the maximum depth of the spalling and popout identified was only 1 in. deep which is bounded by the criterion of concrete elements for "a loss of concrete cover up to 3 inches", and (5) the degraded concrete conditions that were observed in the IWL inspections have either been repaired or determined to be structurally acceptable. The above descriptions create inconsistency with respect to concrete degradation, and of the adequacy of the criterion for determining structural acceptability without a need of repairing for the degraded concrete.*

*Request for Additional Information*

**RAI-ESEB-01**

*The minimum concrete cover thickness for rebar or mechanical rebar splice connectors is 1.5 inches, based on the American Concrete Institute (ACI) Code. If rebar is exposed as stated, the depth of concrete cracking would be at least 1.5 inches below the concrete surface. Concrete spalling or popout typically has an inverted cone shape (larger area on the concrete surface and smaller area near the rebar). Therefore, for a 45 degrees cone with its apex at the rebar, the surface area would be 7.07 square inches (3.1416 x 1.5 in x 1.5 in), not one square inch as stated. In addition to the*

*above inconsistency, the licensee's description that "the maximum depth of the spalling and popout identified was only 1 in. deep" is also inconsistent with the minimum concrete cover of 1.5 inches for rebars.*

- *To help resolve these inconsistencies, please describe the cause and the three-dimensional shape of the concrete spalling or popout from the concrete surface to the rebar below and how the repair was performed.*

**I&M Response to RAI-ESEB-01**

A photograph of the spall is included below as Figure 1. The spall depth to the surface of the rebar splice was estimated at 0.5 inch (") - 0.75". Since the diameter of the cadweld rebar splice is larger (approximately 3.75"), compared to the #18 rebar (approximately 2.25"), the cover provided to the rebar at this location is 1.25" to 1.5". The cause of the condition was that a previous repair in this area had deteriorated.

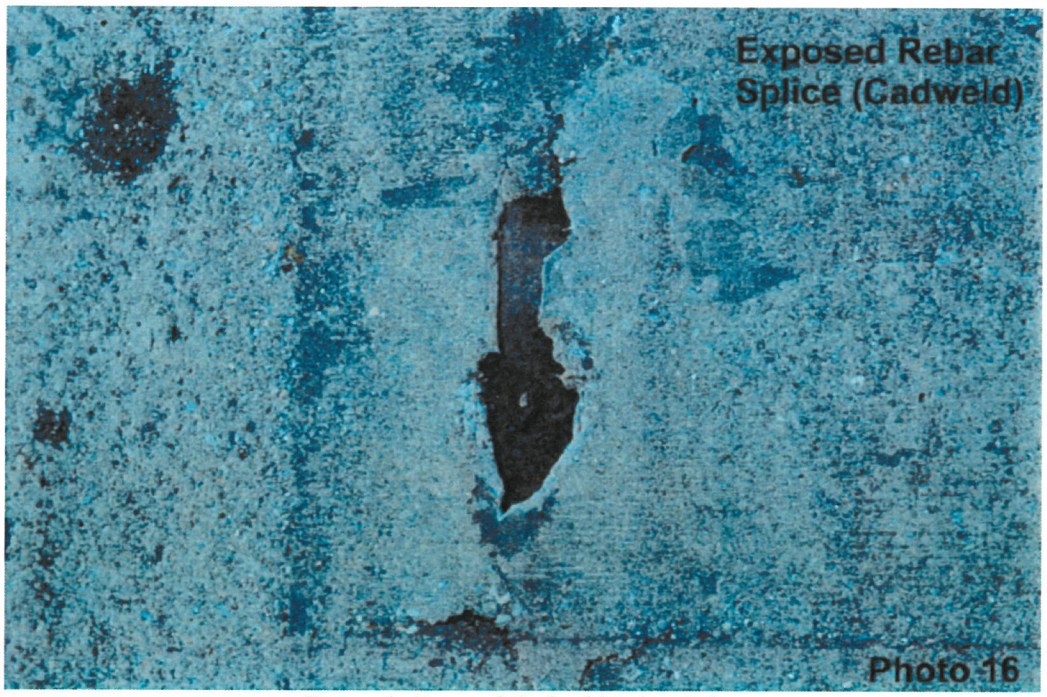


*Figure 1: Exposed Cadweld Rebar Splice*

The identified condition was repaired in 2010. The repair process involved chipping the concrete from around the exposed rebar splice, allowing at least one inch of clearance all around, then providing 3" concrete cover over the exposed rebar splice, working the concrete to blend with the surrounding concrete with good trowel finish, to the extent possible.

**RAI-ESEB-02**

*Describe the length and depth of these four surface cracks between 1/32 in. and 1/16 in., and how these surface cracks were repaired.*

**I&M Response to RAI-ESEB-02**

The IWL examination at CNP uses a tiered approach to examination and evaluation of indications identified. For identified cracks, the first threshold (Recordable) specifies the criteria for when a condition is to be recorded. The action to be taken at this threshold is to document the condition along with any supplemental information (e.g., orientation, reference points, susceptibility to future deterioration) necessary to identify the area for future monitoring.

All cracks identified during the 2007 examination met the criteria of recordable indications and necessary details needed for future monitoring were recorded. The length and depth information requested would only be recorded if the second threshold (Suspect) were met and a detailed visual examination were applied to the indications. For a general visual examination with indications only meeting the first threshold, determining the depth of cracks in the concrete cover is not performed. All cracks were characterized as surface cracks less than 1/16" in width.

In the 2007 IWL Report, when evaluating the results, the cracks were determined to be typical of a concrete structure and, therefore, were determined to not pose a problem, structurally. The 2011 IWL Report for the locations where these cracks were identified states that results from the original examination (2001) and the 2006-2007 examination were reviewed prior to and during the 2011 examination, and that no significant changes were noted. The 2017 IWL examination also found no significant changes in these locations.

**RAI-ESEB-03**

*The use of "A loss of concrete cover up to 3 inches" as a bounding criterion for accessing structural acceptability is unclear.*

- *Please confirm that the containment remains structurally acceptable with "a loss of concrete cover up to 3 inches."*
- *Describe the basis for the 3 inch cover criterion.*

**I&M Response to RAI-ESEB-03**

- *Describe the basis for the 3 inch cover criterion.*

As stated in the CNP Updated Final Safety Analysis Report, Section 5.2.2.6, for the containment reinforcing a 3" cover of concrete was provided. This value of 3" for concrete cover was used in the IWL examination reports when determining the maximum stresses for a discrepant condition in the concrete cover.

- *Please confirm that the containment remains structurally acceptable with "a loss of concrete cover up to 3 inches.*

CNP evaluation NED-2000-573-REP, Rev. 0, "Simplified Evaluations of Design Basis Compliance of Select Containment Building Structures," documents the maximum concrete and rebar stresses in the containment structure, broken down into seven groups. The three groups relevant to the evaluation in question are groups 5, 6, and 7.

Group 5 elements are wall elements that are located immediately below the ice condenser, approximately from elevation 638 feet (') - 0" down to the foundation mat elements at elevation 600'-0".

Group 6 elements are wall elements that are located below the elevation 710'-6" (the springline) down to the bottom of the ice condenser, approximately from elevation 710'-6" down to elevation 638'-0". The thickness of the containment wall for Group 5 and Group 6 elements is 3'-6".

Group 7 elements are located above the springline and form the shape of the dome. The thickness of the dome varies from 3'-6" at the springline to 2'-6" at the apex of the dome.

The maximum stress in concrete for Group 5, 6, and 7 elements for various load combinations is given in the table below:

| | Maximum concrete stress, compression, inside face | Maximum concrete stress, compression, outside face |
|---|---|---|
| Group 5 | 0.233 ksi | 1.383 ksi |
| Group 6 | 0.399 ksi | 0.634 ksi |
| Group 7 | 0.000 ksi | 0.547 ksi |

Discounting the concrete cover of 3" from a 3'-6" concrete wall, the maximum stress in a Group 5 element can be found by extrapolating using the ratio of the actual wall thickness to the reduced wall thickness (neglecting the 3" concrete cover). For Group 5 elements that is calculated as:

1.383 ksi x (3.5' / 3.25') = 1.489 ksi

The calculated stress of 1.489 ksi is low compared to the design strength of 4.450 ksi established in calculation SD-010516-001, "Determination of 28 Day Design Strength of Containment Concrete from Test Sample Data." The stress in the concrete would still be less than the allowable stress even if it is conservatively extrapolated using the square of the ratio of the actual wall thickness to the reduced wall thickness. Therefore, any localized deterioration in the 3" concrete cover, provided there is no noticeable degradation in the rebar, will not adversely impact the structural adequacy of the concrete wall. This evaluation is applicable to all wall and dome elements.

While the above evaluation can be used to evaluate the structural adequacy of containment, the IWL examination at CNP uses a tiered approach to examination and evaluation of indications identified. Any popout greater than 0.75" in diameter, spalling that visually appears to be 0.375" or more in depth and 4.25" or greater in any dimension, or scaling that visually appears to be greater than 0.375" in depth is recorded along with any supplemental information necessary to locate the area for future monitoring. Evidence of these indications beyond the concrete cover, corrosion staining, or exposed reinforcing steel would warrant a detailed visual examination, or qualified remote examination where no access is provided, the results of which are forwarded to the responsible professional engineer for disposition.

**References:**

1. Letter from Q. S. Lies, Indiana Michigan Power Company, to U.S. Nuclear Regulatory Commission, "Donald C. Cook Nuclear Plant, Unit 2, License Amendment Request for One-Time Extension of the Containment Type A Leak Rate Testing Frequency," dated December 14, 2020, Agencywide Documents Access and Management System Accession No. ML20363A011.