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Indiana Michigan Power
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
IndianaMichiganPower.com

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AEP-NRC-2016-79
10 CFR 50.54(f)

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike,
Rockville, MD 20852

Donald C. Cook Nuclear Plant Units 1 and 2
Spent Fuel Pool Evaluation Supplemental Report, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

References:

1. Letter from E. J. Leeds and M. R. Johnson, U. S. Nuclear Regulatory Commission (NRC), to all power reactor licensees and holders of construction permits in active or deferred status, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012, Agencywide Document Access Management Systems (ADAMS) Accession No. ML12053A340.

2. Letter from W. M. Dean, NRC, to Power Reactor Licensees, "Final Determination of Licensee Seismic Probabilistic Risk Assessments under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(F) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," dated October 27, 2015, ADAMS Accession No. ML15194A015.

3. Letter from A. N. Mauer, Nuclear Energy Institute (NEI), to J. Davis, NRC, "Request for Endorsement of Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation (EPRI 3002007148)," dated February 23, 2016, ADAMS Accession No. ML16055A017.

4. Electric Power Research Institute (EPRI) document EPRI 3002007148, "Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation," dated February 2016, ADAMS Accession No. ML16055A021.

5. Letter from J. R. Davis, NRC, to J. E. Pollock, NEI, "Endorsement of Electric Power Research Institute Report 3002007148, 'Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation,' " dated March 17, 2016, ADAMS Accession No. ML15350A158.

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6. Electric Power Research Institute document EPRI 1025287, "Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," dated November 2012, ADAMS Accession No. ML12333A170.

7. Letter from Q. S. Lies, Indiana Michigan Power Company to the NRC, "Donald C. Cook Nuclear Plant Units 1 and 2 Update of Commitments Regarding U. S. Nuclear Regulatory Commission Request for Information Pursuant to 10 CFR 50.54(f), Recommendation 2.1 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," AEP-NRC-2016-51, dated September 9, 2016, ADAMS Accession No. 16256A773.

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 which was a request for information from all power reactor licensees pursuant to 10 CFR 50.54(f). Enclosure 1, Item (9) of the 50.54(f) letter requested addressees to provide an evaluation of the spent fuel pool (SFP) integrity in response to a seismic event. By letter dated October 27, 2015, (Reference 2), the NRC transmitted a final seismic information request table which indicted that Indiana Michigan Power Company (licensee for the Donald C. Cook Nuclear Plant) is to conduct a limited scope SFP seismic evaluation. By Reference 3, the Nuclear Energy Institute submitted Electric Power Research Institute (EPRI) report EPRI 3002007148 (Reference 4) which provides guidance for the SFP seismic evaluation. NRC endorsement of EPRI 3002007148 is documented in Reference 5.

EPRI 3002007148 provides criteria for evaluating the seismic adequacy of a SFP to the reevaluated ground motion response spectrum (GMRS) hazard levels. EPRI 3002007148 supplements the guidance in the Reference 6 Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details for plants where the GMRS peak spectral acceleration is less than or equal to 0.8g. Section 3.3 of EPRI 3002007148 lists the parameters to be verified to confirm that the results of the report are applicable to a specific plant, and that the plant's SFP is seismically adequate in accordance with Near-Term Task Force (NTTF) Recommendation 2.1 seismic evaluation criteria.

Enclosure 1 to this letter provides an affirmation. Enclosure 2 provides data for the Donald C. Cook Nuclear Plant that confirms the applicability of the EPRI 3002007148 criteria, confirms that the SFP is seismically adequate, and provides the requested information in response to Item (9) of the Reference 1 50.54 (f) letter associated with NTTF Recommendation 2.1. Submittal of Enclosure 2 fulfills the Regulatory Commitment to perform and submit an SFP integrity evaluation by December 31, 2016, as documented in Reference 7.

This letter contains no new or modified Regulatory Commitments. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Manager, at (269) 466-2649.

Sincerely,

Q. Shane Lies
Site Vice President

JRW/mll

Enclosures:

1. Affirmation.
2. Site-Specific Spent Fuel Pool Criteria for the Donald C. Cook Nuclear Plant

c:

R. J. Ancona, MPSC
A. W. Dietrich, NRC, Washington, D.C.
MDEQ - RMD/RPS
NRC Resident Inspector
C. D. Pederson, NRC, Region III
S. M. Wyman, NRC, Washington, D.C.
A. J. Williamson, AEP Ft. Wayne, w/o enclosures

Enclosure 1 to AEP-NRC-2016-79

AFFIRMATION

I, Q. Shane Lies, being duly sworn, state that I am Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this document 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, Indiana Michigan Power

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 12 DAY OF October, 2016

Notary Public

My Commission Expires 04-04-2018

DANIELLE BURGOYNE
Notary Public, State of Michigan
County of Berrien
My Commission Expires 04-04-2018
Acting in the County of Berrien

Enclosure 2 to

AEP-NRC-2016-79

Site-Specific Spent Fuel Pool Criteria for the Donald C. Cook Nuclear Plant

The references for this enclosure are identified on Pages 4 and 5.

By Reference A, the U. S. Nuclear Regulatory Commission (NRC), requested that, in conjunction with the response to Near Term Task Force (NTTF) Recommendation 2.1, a seismic evaluation be made of licensees spent fuel pools (SFPs). More specifically, licensees were asked to consider "all seismically induced failures that can lead to draining of the SFP." Such an evaluation would be needed for any plant in which the ground motion response spectrum (GMRS) exceeds the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range. The staff confirmed, through References B and C, that the Donald C. Cook Nuclear Plant (CNP) GMRS exceeds the SSE, concluded that an SFP evaluation is merited for CNP, and concluded that the evaluation should include adjustments for a beach sand layer that was not addressed by Reference B. By Reference D, the staff documented its determination that Electric Power Research Institute (EPRI) report EPRI 3002007148 (Reference E) provided an acceptable approach for performing SFP evaluations for plants where the peak spectral acceleration is less than or equal to 0.8g.

The table below lists the criteria from Section 3.3 of EPRI 3002007148 along with data that confirms applicability of those criteria to CNP, and confirms that the CNP SFP is seismically adequate and can retain adequate water inventory for 72 hours in accordance with NTTF Recommendation 2.1 seismic evaluation criteria.

SFP Criteria from EPRI 3002007148	Site-Specific Data
Site Parameters	
1. The site-specific GMRS peak spectral acceleration at any frequency should be less than or equal to 0.8g.	The GMRS peak spectral acceleration documented in Reference B, as accepted by the NRC in Reference C, and adjusted for a layer of beach sand and additional site-specific geological information is 0.596g, which is ≤ 0.8g. Therefore, this criterion is met for CNP.
Structural Parameters	
2. The structure housing the SFP should be designed using a SSE with a peak ground acceleration (PGA) of at least 0.1g.	The SFP is housed in the Auxiliary Building, which is seismically designed to the site SSE with a PGA of 0.20g. The CNP PGA is greater than 0.1g. Therefore, this criterion is met for CNP.
3. The structural load path to the SFP should consist of some combination of reinforced concrete shear wall elements, reinforced concrete frame elements, post-tensioned concrete elements and/or structural steel frame elements.	The structural load path from the Auxiliary Building foundation to the SFP consists of reinforced concrete walls and slabs that have been designed to resist SSE-induced shear stresses per Section 2.9.5 of the Updated Final Safety Analysis Report (UFSAR). Therefore, this criterion is met for CNP.

SFP Criteria from EPRI 3002007148	Site-Specific Data
4. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.	The SFP structure is included in the CNP Structures Monitoring Program Inspection Program (UFSAR Section 15.1.35) in accordance with 10 CFR 50.65, which monitors the performance or condition of structures, systems, or components (SSCs) in a manner sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions. Therefore, this criterion is met for CNP.
Non-Structural Parameters	
5. To confirm applicability of the piping evaluation in Section 3.2 of EPRI 3002007148, piping attached to the SFP up to the first valve should have been evaluated for the SSE.	Indiana Michigan Power Company's understanding of Section 3.2 of EPRI 3002007148 is that Criterion 5 applies to piping attached to the SFP whose failure could result in rapid drain-down of the SFP. A rapid drain-down of an SFP is defined in EPRI 3002007148 as failure of a pool's SSCs such that there is an uncovering of more than 1/3 of the spent fuel height within 72 hours. Although the SFP piping up to the first valve is not evaluated for the SSE, as described below, there is no piping at CNP whose failure could result in rapid drain-down of the SFP. The piping attached to the SFP at CNP consists of piping for the Spent Fuel Pool Cooling System and piping for Spent Fuel Pool Skimmer System. The center lines of the two, 10 in. Spent Fuel Pool Cooling System suction pipes and one, 3 in. Spent Fuel Pool Skimmer System suction pipe SFP wall penetrations are at elevation 643 ft. – 6 in. The normal pool water level is at elevation 645 ft. - 1 1/2 in. The one Spent Fuel Pool Cooling System return pipe and two Spent Fuel Pool Skimmer System return pipes penetrate the SFP wall above the normal water level and terminate six feet above the top of the stored fuel, but have passive anti--siphon provisions four inches below the normal SFP waterline as described in the response to Criterion 6 below. Therefore, failure of any of these suction or return piping segments attached to the SFP could cause a loss of no more than 2 ft. – 1/2 in. of water in the pool from the normal water level.

SFP Criteria from EPRI 3002007148	Site-Specific Data
	The sloshing evaluation described in Section 3.2 of EPRI 3002007148 provides confirmation that a loss of 2 ft. – 1/2 in. of water due to a piping failure would not constitute a rapid drain-down of the SFP. The sloshing evaluation in Section 3.2 encompassed all 41 plants with a GMRS spectral acceleration less than 0.8g (including CNP) to determine whether a loss of water due to sloshing and subsequent pool boiling would result in a rapid drain-down of the SFP. Figure 3.8 of EPRI 3002007148 shows that the time to uncover more than 1/3 of the spent fuel height due to sloshing and subsequent pool boiling for all 41 plants, including CNP, would be well in excess of 72 hours. The water loss assumed for sloshing at CNP was 4 ft. Since the water loss due to a piping failure at CNP (2 ft. – 1/2 in.) would be less than 4 ft., the time to uncover more than 1/3 of the spent fuel height due to a piping failure would also be well in excess of 72 hours. Therefore a piping failure at CNP would not result in a rapid drain-down of the SFP. Since there is no piping attached to the SFP whose failure could result in rapid drain-down of the SFP, there is no piping up to the first valve that should have been evaluated for the SSE. Therefore, this criterion is not applicable to CNP. However, the underlying intent of this criterion is met in that failure of piping attached to the SFP would not cause a rapid drain-down of the pool.
6. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.	As described in the response to Criterion 5 above, the one Spent Fuel Pool Cooling System and two Spent Fuel Pool Skimmer return pipes penetrate the SFP wall above the normal water level and terminate 6 ft. above the top of the stored fuel. Each return pipe has a passive anti-siphoning provision consisting of a 1/4 in. or 1/2 in. hole through the pipe wall, 4 in. below the normal SFP waterline. This prevents siphoning to an SFP level less than 4 in. below the normal water level. There are no active anti-siphoning devices. Therefore, this criterion is met for CNP.

SFP Criteria from EPRI 3002007148	Site-Specific Data
7. To confirm applicability of the sloshing evaluation in Section 3.2 of EPRI 3002007148, the maximum SFP horizontal dimension (length or width) should be less than 125 ft., the SFP depth should be greater than 36 ft., and the GMRS peak spectral acceleration should be <0.1g at frequencies equal to or less than 0.3 Hz.	The SFP has a length of 58 ft. – 6 in., a width of 39 ft. – 3 in., and a depth of 43 ft. – 9 1/2 in. Therefore, this criterion is met for CNP. The GMRS peak spectral acceleration in the frequency range equal to or less than 0.3 Hz is 0.0362g when adjusted for a layer of beach sand and additional site-specific geological information. Therefore, this criterion is met for CNP.
8. To confirm applicability of the evaporation loss evaluation in Section 3.2 of EPRI 3002007148, the SFP surface area should be greater than 500 ft^2 and the licensed reactor core thermal power should be less than 4,000 megawatts-thermal (MWt) per unit.	The surface area of the single CNP SFP is 2,296 $ft.^2$,which is greater than 500 $ft.^2$. Therefore, this criterion is met for CNP. The licensed reactor thermal power for CNP is 3,304 MWt for Unit 1, and 3,468 MWt for Unit 2. Therefore, this criterion is met for CNP.

References

A. Letter from E. J. Leeds and M. R. Johnson, Nuclear Regulatory Commission (NRC), to all power reactor licensees and holders of construction permits in active or deferred status, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012, Agencywide Document Access Management Systems (ADAMS) Accession No. ML12053A340.

B. Letter from Q. S. Lies, Indiana Michigan Power Company (I&M), to the NRC, "Donald C. Cook Nuclear Plant Units 1 and 2, Seismic Hazard and Screening Report (CEUS Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, "dated March 27, 2014, ADAMS Accession No. ML14092A329.

C. Letter from F. Vega, NRC, to L. J. Weber, I&M, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dal-Ichi Accident (TAC Nos. MF3873 AND MF3874)," dated April 21, 2015, ADAMS Accession No. ML15097A196.

D. Letter from J. R. Davis, NRC, to J. E. Pollock, Nuclear Energy Institute, "Endorsement of Electric Power Research Institute Report 3002007148, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation," dated March 17, 2016, ADAMS Accession Number ML15350A158

E. Electric Power Research Institute document EPRI 3002007148, "Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation," dated February 2016, ADAMS Accession No. ML16055A021.