AEP
INDIANA MICHIGAN POWER®
A unit of American Electric Power

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

May 11, 2017

AEP-NRC-2017-16
10 CFR 50.54(f)
10 CFR 50.4

Docket Nos.: 50-315
50-316

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

Subject: Donald C. Cook Nuclear Plant Unit 1 and Unit 2
Submittal of Focused Evaluation in Response to March 12, 2012, Request for Information Regarding Near Term Task Force Recommendation 2.1: Flooding

References:

1. Letter from E. J. Leeds, 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 Documents Access and Management System (ADAMS) Accession No. ML12053A340.

2. Letter from J. P. Gebbie, Indiana Michigan Power Company (I&M), to the NRC, "Donald C. Cook Nuclear Plant (CNP) Unit 1 and 2, Response to March 12, 2012, Request for Information, Enclosure 2, 'Recommendation 2.1: Flooding,' Required Response 2, Hazard Reevaluation Report," dated March 6, 2015, AEP-NRC-2015-14, ADAMS Accession No. ML15069A334.

3. Letter from T. V. Govan, NRC, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request- Flood Causing Mechanism Reevaluation (TAC Nos. MF6096 and MF6097)," dated December 4, 2015, ADAMS Accession No. ML15334A424.

4. Letter from W. M. Dean, NRC Letter, to Power Reactor Licensees, "Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events," dated September 1, 2015, ADAMS Accession No. ML15174A257.

5. Letter from Q. S. Lies, I&M to the NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Mitigating Strategies Flood Hazard Assessment," dated December 15, 2016.

A010
NRR

This letter transmits a Focused Evaluation of the impact of a postulated beyond-design-basis flooding event on structures, systems, and components credited for maintaining Key Safety Functions at the Donald. C. Cook Nuclear Plant (CNP).

By Reference 1, Enclosure 2, the U. S. Nuclear Regulatory Commission (NRC) requested that licensees perform a reevaluation of external flooding sources using present-day regulatory guidance and methodologies. In response to this request, Indiana Michigan Power Company (I&M) submitted, by Reference 2, a Flood Hazard Reevaluation Report (FHRR) for CNP. The FHRR documented the determination that the flood hazard from a postulated Local Intense Precipitation (LIP) event is not bounded by the design basis flood event, a seiche on Lake Michigan. Therefore, a Flooding Integrated Assessment was to be completed and submitted in accordance with then-current NRC Guidance. An NRC Interim Staff Review (Reference 3) determined that the information in the FHRR provided a suitable input for additional assessments required by the 10 CFR 50.54(f) request. In accordance with subsequent NRC guidance (Reference 4), a Focused Evaluation of the impact of a postulated beyond-design-basis flooding event on Structures, Systems, and Components credited for maintaining Key Safety Functions has been performed for CNP, rather than a Flooding Integrated Assessment.

The CNP Focused Evaluation was conducted in accordance with NRC endorsed guidance and used LIP flood information presented in the FHRR, plus LIP flood information from a computer model that had been updated to reflect site watershed changes subsequent to the FHRR. These watershed changes involved changes to site buildings and paved areas. The data for the ten Critical Locations identified in the FHRR remained unchanged, and data for an additional eight locations was evaluated using the updated computer model.

The resultant Focused Evaluation identified LIP floodwater ingress pathways to the Auxiliary Building and Turbine Building that are to be mitigated by flood protection features that will be installed, replaced, augmented, or qualified in order to protect SSCs that are needed to maintain Key Safety Functions. I&M's commitments regarding these flood protection features were documented in the CNP Mitigating Strategies Flood Hazard Assessment transmitted by Reference 5. I&M is committing, in this letter, that three concrete block masonry walls will be evaluated, qualified, modified, or supplemented as necessary to provide adequate flood protection for the Turbine Building. I&M is also committing that the Available Physical Margins and the reliability of these flood protection features will be in accordance with NRC endorsed guidance.

Enclosure 1 to this letter provides an affirmation regarding the information contained herein. Enclosure 2 provides the Focused Evaluation for CNP. Enclosure 3 provides a tabulation of the new Regulatory Commitments made in this letter.

If there are any questions concerning this letter, please contact Mr. Michael K. Scarpello, Manager, Nuclear Regulatory Affairs, at (269) 466-2649.

Sincerely,

Q. Shane Lies
Site Vice President

JRW/jmp

Enclosures:

1. Affirmation
2. Donald C. Cook Nuclear Plant, Units 1 and 2, Focused Flood Evaluation
3. Regulatory Commitments

c: R. J. Ancona, MPSC
J. K. Rankin, NRC, Washington, D.C.
T. V. Govan, NRC, Washington DC
MDEQ – RMD/RPS
NRC Resident Inspector
C. D. Pederson, NRC, Region III
A. J. Williamson, AEP Ft. Wayne, w/o enclosures

Enclosure 1 to AEP-NRC-2017-16

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 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 11th DAY OF May, 2017

Notary Public

My Commission Expires 01/21/2018

Enclosure 2 to AEP-NRC-2017-16

Donald C. Cook Nuclear Plant, Units 1 and 2,
Focused Evaluation

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

Abbreviations, acronyms, and definitions, are identified in Section 4 of this enclosure.

This enclosure documents the results of a Focused Evaluation which determined that SSCs needed to maintain key plant safety functions at CNP would be available following a beyond-design-basis flooding event, provided that certain flood protection feature installations and enhancements are completed. The basis for this determination is as follows.

I&M reevaluated the flood hazard for CNP using present-day regulatory guidance and methodologies in accordance with the March 2012 NRC request for information pursuant to 10 CFR 50.54(f). The FHRR submitted to the NRC in response to that request documented the determination that the hazard from the design basis flood event, a seiche on Lake Michigan, did not bound the hazard from a postulated LIP event. Therefore, in accordance with then-current NRC Guidance, a Flooding Integrated Assessment was to be completed and submitted in the future. An NRC Interim Staff Review determined that the information in the FHRR provided a suitable input for additional assessments required by the 10 CFR 50.54(f) letter. In accordance with subsequent NRC guidance, a Focused Evaluation of the impact of a postulated beyond-design-basis flooding event on SSCs credited for maintaining Key Safety Functions has been performed for CNP, rather than a Flooding Integrated Assessment.

The CNP Focused Evaluation was conducted in accordance with NRC endorsed guidance and used LIP flood information presented in the FHRR, plus LIP flood information from a computer model that had been updated to reflect site watershed changes subsequent to the FHRR. These watershed changes involved changes to site buildings and paved areas. The data for the ten critical locations identified in the FHRR remained unchanged, and data for an additional eight locations were determined using the updated computer model.

The resultant Focused Evaluation identified LIP floodwater ingress pathways to the Auxiliary Building and Turbine Building that are to be mitigated by flood protection features that will be installed, replaced, augmented, or qualified in order to protect SSCs that are needed to maintain Key Safety Functions. I&M's commitments regarding these flood protection features have been documented in the previously submitted CNP Mitigating Strategies Flood Hazard Assessment. I&M is additionally committing to take actions needed to assure three concrete block masonry walls will adequately protect the Turbine Building from unacceptable flooding. The APMs and reliability of these protection features will be in accordance with NRC endorsed guidance. The APMs and reliability of the credited existing plant features is in accordance with NRC endorsed guidance.

2 BACKGROUND

References are identified in Section 3 of this enclosure.

On March 12, 2012, the NRC issued Reference 1 to request information associated with Fukushima Dai-ichi NTTF Recommendations. By Enclosure 2 of Reference 1, the NRC directed licensees to perform a reevaluation of external flooding sources using present-day regulatory guidance and methodologies, and submit an FHRR documenting the results of their reevaluation.

The CNP FHRR was submitted to the NRC on March 6, 2015, (Reference 2), and additional information was submitted on June 16, 2015, (Reference 3) and October 27, 2015, (Reference 4). The CNP FHRR documented the determination that the hazard from the design basis flood event, a seiche on Lake Michigan, did not bound the hazard from a postulated LIP event. The FHRR provided LIP flood water data at 10 CLs in and near the plant Protected Area. This data was re-stated in Table 2 of the NRC Interim Staff Response letter for CNP dated December 4, 2015, (Reference 5) which documented the staff's determination that the information in the FHRR provided a suitable input for additional assessments required by the 10 CFR 50.54(f) information request.

On November 10, 2016, I&M submitted Reference 6 which provided a revision to the ground water intrusion evaluation as described in the FHRR. Since the margin between the postulated ground water elevation and the top of the water proofing membrane installed on safety-related buildings remained positive, the conclusion that SSCs important to safety would not be impacted by groundwater induced flooding remained valid. Additionally, the revision corrected a typographical error in the value for historical Lake Michigan mean water level. The error had no impact because the evaluation assumed a probable maximum lake level elevation that was higher than the historical level. Finally, the revision corrected the stated duration of the rainfall event assumed in the evaluation of flooding from an existing on-site pond. Since the pond evaluation was based on the correct volume of water introduced, rather than the event duration, the conclusion that the site would not be susceptible to a flooding hazard from the pond remained valid. All other changes were administrative. Therefore, the overall conclusion that the design basis hazard did not bound the postulated LIP hazard was not changed, and the flood water data for the 10 CLs was not affected.

Enclosure 2 of Reference 1 requires that an Integrated Assessment be performed for plants at which the design basis flood hazard does not bound the reevaluated flood hazard. However, on September 1, 2015, the NRC issued Reference 7 indicating that new guidance was being prepared to provide a graded approach to flooding reevaluations, and more focused evaluations of LIP events and APM, in lieu of performing an integrated assessment. In response to these changes in the NRC approach, NEI prepared the "External Flooding Assessment Guidelines" documented in NEI 16-05 (Reference 8), which was endorsed by the NRC in July 2016, (Reference 9).

NEI 16-05 indicates that each flood mechanism not bounded by the design basis flood (based on maximum stillwater or wind-wave runup elevation per Table 2 of the Interim Staff Response letter applicable to each site) should be addressed by following one of five assessment paths:

Path 1: Demonstrate Flood Mechanism Through Improved Realism
Path 2: Demonstrate Effective Flood Protection
Path 3: Demonstrate a Feasible Response to LIP
Path 4: Demonstrate Effective Flood Mitigation
Path 5: Scenario Based Approach

In accordance with NEI 16-05, non-bounded flood mechanisms for which Path 1, 2, or 3 is applicable require submittal of a Focused Evaluation of the impact of a postulated beyond-design-basis flooding event on structures, systems, and components credited for maintaining

Key Safety Functions, rather than an Integrated Assessment, to complete the requirements of NTTF Recommendation 2.1. Non-bounded flood mechanisms for which Paths 4 or 5 was applicable would require an Integrated Assessment. As described in Section 5 of this enclosure Path 2 has been followed for CNP.

3 REFERENCES

1. Letter from E. J. Leeds, 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 Daiichi Accident," dated March 12, 2012, Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.

2. Letter from J. P. Gebbie, I&M, to the NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Response to March 12, 2012, Request for Information, Enclosure 2, 'Recommendation 2.1: Flooding,' Required Response 2, Hazard Reevaluation Report," dated March 6, 2015, AEP-NRC-2015-14, ADAMS Accession No. ML15069A334.

3. Letter from J. P. Gebbie, I&M, to the NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Additional Information Regarding Flood Hazard Reevaluation Report,'" dated June 16, 2015, AEP-NRC-2015-56.

4. Letter from J. P. Gebbie, I&M, to the NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Additional Information for NRC Audit of Flood Hazard Reevaluation Conducted in Response to March 12, 2012, NRC Request for Information Regarding Fukushima Near-Term Task Force Recommendation 2.1: 'Flooding,'" dated October 27, 2015, AEP-NRC-2015-105.

5. Letter from T. V. Govan, NRC, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request- Flood Causing Mechanism Reevaluation (TAC Nos. MF6096 and MF6097)," dated December 4, 2015, ADAMS Accession No. ML15334A424.

6. Letter from Q. S. Lies, I&M, to the NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Revision of Flood Hazards Reevaluation Report and Supporting Calculations, Re. March 12, 2012, Request for Information, Enclosure 2, Recommendation 2.1: Flooding," dated November 10, 2016, AEP-NRC-2016-89.

7. Letter from W. M. Dean, NRC Letter, to Power Reactor Licensees, "Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events," dated September 1, 2015, ADAMS Accession No. ML15174A257.

8. NEI Document NEI 16-05, Revision 1, "External Flooding Assessment Guidelines," dated June 2016, ADAMS Accession No. ML16165A176.

9. NRC Japan Lessons-Learned Division Interim Staff Guidance, JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation; Focused Evaluation and Integrated Assessment," Revision 0, dated July 11, 2016, ADAMS Accession No. ML16162A301.

10. NRC Order EA-12-049, "Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012, ADAMS Accession No. ML 12054A735.

11. NEI Document 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, dated August 2012, ADAMS Accession No. ML12242A378.

12. Letter from Q. S. Lies, I&M to the NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Mitigating Strategies Flood Hazard Assessment," dated December 15, 2016.

4 ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

APM - Available Physical Margin

CLs - Critical Locations, i.e., CNP site-specific locations of potential Key SSC vulnerability for which inundation level and duration data were determined using computer modeling based on the site watershed and probable maximum precipitation

CNP - Donald C. Cook Nuclear Plant

CST - Condensate Storage Tank

CVCS - Chemical and Volume Control System

DG - diesel generator

EDG Emergency Diesel Generator

FHRR - Flood Hazard Reevaluation Report (The reevaluated flood hazard information that was submitted by each licensee to the NRC pursuant to the 50.54(f) request of Reference 1, and any relevant response to requests for additional information.)

FLEX - Diverse and flexible strategies as described in Reference 11

Flood hazard - The potential for flood mechanisms to adversely affect a nuclear plant site

Flood mechanism - Flooding from a particular source, such as storm surge, dam failure, or local intense precipitation

Flood Protection Feature - Feature used to prevent flood conditions from adversely affecting SSCs. The feature may be incorporated or temporary features, and may also be passive or active. Examples include walls, embankments, sump pumps, barriers, seals, gates, stop logs, doors, hatches, sandbags, and inflatable barriers

Focused Evaluation – An evaluation that follows Path 1, 2, or 3 on Figure 5-1 NEI 16-05. NRC staff verification that the evaluation meets the criteria specified in NEI 16-05 fulfills and concludes the information request pursuant to the 50.54(f) request of March 12, 2012 and does not require the completion of an integrated assessment

ft. - foot/feet

gpm – gallons per minute

hr. - hour

I&M - Indiana Michigan Power Company, the licensee for CNP Units 1 and 2

in. - inch/inches

Integrated Assessment – An assessment that follows Path 4 or 5 on Figure 5-1 of NEI 16-05

Key Safety Functions – The three functions that site strategies should maintain i.e., core cooling, spent fuel pool cooling, and containment

Key SSCs - The existing installed design basis SSCs required to support a Key Safety Function where a failure of the SSC could lead to the loss of the Key Safety Function. These Key SSCs do not include the flood protection features or mitigation equipment (e.g. FLEX equipment)

LIP - local intense precipitation

MLs - Monitoring Locations, i.e., additional site specific locations of potential Key SSC vulnerability for which inundation level and duration data were determined using computer modeling updated to reflect changes in the site watershed

MSA - Mitigating Strategies Assessment; the process of establishing a plant's mitigating strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in response to the mitigating strategies flood hazard information. Flooding MSAs are described in NEI 12-06, Revision 2, Appendix G

NEI - Nuclear Energy Institute

NGVD29 - National Geodetic Vertical Datum of 1929

NRC - U. S. Nuclear Regulatory Commission

NTTF - Near-Term Task Force

PWST - Primary Water Storage Tank

RHR - Residual Heat Removal

RWST - Refueling Water Storage Tank

SSCs - structures, systems, and components

TDAFW - Turbine Driven Auxiliary Feed Water

5 FLOOD HAZARD PARAMETERS FOR UNBOUNDED MECHANISMS

The NRC Interim Staff Response letter (Reference 5) states the staff's conclusion that the reevaluated flood hazards information in the CNP FHRR (Reference 2) is suitable for the assessment of mitigation strategies developed in response to Order EA-12-049 (Reference 10), and suitable input for other assessments associated with NTTF Recommendation 2.1, "Flooding" (e.g., the 10 CFR 50.54(f) information request transmitted by Reference 1). Table 1

of the Interim Staff Response letter provides a summary of the current design basis and reevaluated flood hazard parameters. Table 1 of the Interim Staff Response letter lists the following flood mechanisms that could be potentially included in the CNP design basis:

- Local Intense Precipitation;
- Streams and Rivers;
- Failure of Dams and Onsite Water Control/Storage Structures;
- Storm Surge;
- Seiche;
- Tsunami;
- Ice Induced Flooding; and
- Channel Migrations/Diversions.

As indicated in Table 1 of the Interim Staff Response letter, the seiche is the only external flood mechanism in the CNP design basis. As indicated in Table 2 of the Interim Staff Response letter and Section 4 of the FHRR, a postulated LIP event, based on present-day regulatory guidance and methodologies, is the limiting reevaluated flood hazard that is not bounded by the CNP design basis seiche. Focused Evaluation Process Path 2, "Demonstrate Effective Flood Protection," was pursued for CNP since NEI 16-05 states that Path 2 should be followed for the LIP mechanism if licensees rely solely on protection features to maintain the Key Safety Functions.

Table 2 of the Interim Staff Response letter lists the flood hazard information (specifically stillwater elevation and wind-wave runup elevation) at 10 site locations for the postulated LIP event, as documented in the FHRR. The flood information for these 10 site locations (designated as CLs in the FHRR) is provided in Table 5-1 below. Elevation data in this enclosure is based on Mean Sea Level NGVD29.

Table 5-1
Inundation Period at CLs

CL	Location	Reevaluated Flood Hazard Elevation	Max. Inundation Level	Approx. Duration (See Note 1)
CL1	1-DR-TUR201 (Turbine Building Unit 1 West Rollup Door)	594.8 ft.	0.0 ft.	NA
CL2	2-DR-TUR220 (Turbine Building Unit 2 West Rollup Door)	596.0 ft.	0.8 ft.	7.5 hr.
CL3	2-DR-TUR260 (Turbine Building Unit 2 East Rollup Door)	609.2 ft.	0.2 ft.	2.5 hr.
CL4	Valve-Shed RWST, 1-TK-33	609.9 ft.	1.5 ft.	> 14 hr.
CL5	Valve-Shed PWST/CST 1	609.9 ft.	1.5 ft.	> 14 hr.
CL6	Valve-Shed RWST, 2-TK-33	609.5 ft.	0.6 ft.	11.5 hr.

Table 5-1 Inundation Period at CLs				
CL	**Location**	**Reevaluated Flood Hazard Elevation**	**Max. Inundation Level**	**Approx. Duration (See Note 1)**
CL7	Valve-Shed PWST/CST 2	609.6 ft.	1.2 ft.	> 14 hr.
CL8	Supplemental DGs (See Note 2)	609.6 ft.	0.6 ft.	7.5 hr.
CL9	1-DR-TUR253 (Turbine Building Unit 1 East Rollup Door)	609.8 ft.	0.8 ft.	7 hr.
CL10	12-DR-AUX381 (Auxiliary Building North Rollup Door)	609.9 ft.	1.0 ft.	>14 hr.

Note 1: Time period that water level is above the critical threshold at the stated location.

Note 2: The Supplemental DGs at CL8 are not KEY SSCs. The data for that location is provided for information only.

Subsequent to the FHRR, I&M updated the associated computer model to reflect changes in the site watershed. These changes involved areas along the primary plant access road, and are listed below in order of increasing distance from the Protected Area. There have been no other significant changes to the watershed.

- Removal of a warehouse and addition of a new Security Access Building in its place.
- Minor expansion of an existing parking lot.
- Removal of a temporary office complex previously designated as the "TSOC."
- Addition of the FLEX Storage Building.
- Addition of a permanent new building designated as the NEST, including sidewalks, parking, and minor topography changes.

The updated model was run and flood water data for 8 additional site locations (designated as MLs) was extracted to evaluate specific points of interest. The flood water data for these additional 8 site locations is presented in Table 5-2 below.

Table 5-2 Inundation Period at Additional Locations				
ML	**Location**	**Reevaluated Flood Hazard Elevation**	**Max. Inundation Level**	**Approx. Duration (See Note 1)**
ML11	Service Building Extension Northwest	606.4 ft.	0.4 ft.	7 hrs.

Table 5-2
Inundation Period at Additional Locations

ML	Location	Reevaluated Flood Hazard Elevation	Max. Inundation Level	Approx. Duration (See Note 1)
ML12	Service Building Annex Northeast	609.0 ft.	1.1 ft.	14 hrs.
ML13	Service Building Annex Southeast	609.7 ft.	0.9 ft.	7.5 hrs.
ML14	Top of Ramp for CL2, 2-DR-TUR220 (Turbine Building Unit 2 West Rollup Door)	595.9 ft.	0.6 ft.	7 hrs.
ML15	Bottom of Ramp for CL2, 2-DR-TUR220 (Turbine Building Unit 2 West Rollup Door)	596.0 ft.	4.0 ft.	15.5 hrs.
ML16	Low Point in Primary Plant Access Road used for FLEX Deployment	610.8 ft.	3.1 ft.	19 hrs.
ML17	Service Building Extension Northeast Corner	608.0 ft.	1.0 ft.	13 hrs.
ML18	Auxiliary Building Track Bay East Wall	609.8 ft.	0.6 ft.	7 hrs.

Note 1: Time period that water level is above the long term ponding elevation at the stated location.

Data for the 10 original CLs was also extracted from the updated model run. However, the CL data from the updated model run was bounded by the CL data from the original model run used for the FHRR. Therefore, the LIP event flood water data for the 10 CLs documented in the Interim Staff Response letter and the FHRR (Table 5-1 above), and the flood water data for the 8 MLs (Table 5-2 above) constitute the input to this Focused Evaluation.

6 OVERALL SITE FLOODING RESPONSE

6.1 DESCRIPTION OF OVERALL SITE FLOODING RESPONSE

As noted above, Path 2 of NEI 16-05 was followed to address the postulated LIP event because CNP will rely solely on existing and planned passive flood protection features to protect the Key SSCs. The Key SSCs potentially impacted by flood waters from the postulated LIP are located in the Auxiliary Building and the Turbine Building. Therefore, plant walkdowns and design document reviews were conducted to identify Auxiliary Building and Turbine Building flood vulnerabilities based on the potential inundation levels from the postulated LIP event. These walkdowns and reviews identified existing plant

features that could be credited, and identified flood water pathways into the Auxiliary Building and the Turbine Building that could result in unacceptable flood water entry from the postulated LIP event. Accordingly, I&M will install, replace, qualify, or augment passive flood protection features to preclude unacceptable flood water entry via these pathways. The specific LIP flood water pathways to be mitigated are listed below in Table 6-1. Except as noted, these are the same pathways identified in the Flooding MSA transmitted by Reference 12.

Table 6-1
Pathways Requiring Flood Protection Features to be Installed, Replaced, or Augmented

Pathway Location and Elevation	Description
Auxiliary Building elevation 609 ft.	Door 1-DR-AUX380
Auxiliary Building elevation 609 ft.	Door 12-DR-AUX381
Auxiliary Building elevation 609 ft.	Door 2-DR-AUX383
Auxiliary Building North elevation 596 ft. – 3 1/2 in.	Unit 1 CD EDG combustion air intake pipe penetration
Auxiliary Building North elevation 596 ft. – 3 1/2 in.	Unit 1 CD EDG exhaust penetration
Auxiliary Building North elevation 596 ft. – 3 1/2 in.	Manhole cover in front of Unit 1 CD EDG vent stack duct penetration
Auxiliary Building South elevation 596 ft. – 3 1/2 in.	Unit 2 AB EDG Exhaust Penetration
Auxiliary Building South elevation 596 ft. – 3 1/2 in.	Manhole cover in front of Unit 2 AB EDG vent stack duct penetration
Unit 1 Turbine Building East elevation 609 ft.	Door 1-DR-TUR253
Unit 1 Turbine Building East elevation 609 ft.	Door 1-DR-TUR254
Unit 1 Turbine Building North, elevations 595 ft. to 609 ft.	Doors 12-DR-SRV540, 12-DR-OFF-1, 12-DR-OFF-25, 12-DR-SRV163, 12-DRSRV164, plus 12-DR-OFF2 which is an additional pathway not identified in Reference 12

Table 6-1 Pathways Requiring Flood Protection Features to be Installed, Replaced, or Augmented	
Pathway Location and Elevation	**Description**
Unit 1 Turbine Building West elevation 591 ft.	Door 1-DR-TUR201
Unit 1 Turbine Building West elevation 591 ft.	Door 1-DR-TUR200
Unit 2 Turbine Building East elevation 609 ft.	Door 2-DR-TUR260
Unit 2 Turbine Building West elevation 591 ft.	Door 2-DR-TUR220
Unit 2 Turbine Building West elevation 591 ft.	Door 2-DR-TUR221
Additionally, there are multiple conduit penetrations for which the seals will be qualified, replaced, or augmented with seals qualified for the applicable flood water level.	

Existing plant features, combined with planned flood protection features for the pathways identified in Table 6-1, will assure that flood water ingress to the Auxiliary Building and Turbine Building would be limited to acceptable levels as described below.

Auxiliary Building

The total flood water potentially entering the Auxiliary Building for the LIP event would be 4,708 gallons. This flood water would enter through the elevation 609 ft. Auxiliary Building Crane Bay. The water would exit the Crane Bay through floor drains and gaps around floor hatches.

Flood water entering the floor drains would flow to the Dirty Waste Holdup Tank which has a capacity of 24,700 gallons. This capacity far exceeds the expected total influx of water.

Flood water falling through gaps around floor hatches would enter elevation 587 ft. in the Drum Storage Room. This room is open to the bulk of the Auxiliary Building at this elevation. Therefore, the water level would not accumulate to any appreciable depth.

Water on elevation 587 ft. or overflow from the Dirty Waste Holdup Tank (if already near capacity at the start of the event) would accumulate on the lowest elevation of the Auxiliary Building. The Auxiliary Building sump, CVCS hold-up tank area, and hold-up tank area sump have a capacity of 192,674 gallons below elevation 573 ft. This capacity is adequate to contain the 4,708 gallons entering the Auxiliary Building, and preventing flood water from reaching elevation 573 ft.

The limiting Key SSCs in the Auxiliary Building with respect to flooding are the RHR pumps. The RHR pumps are located in the Auxiliary Building at elevation 573 ft. These

pumps can be operated with flood water levels up to elevation 576 ft. – 6 in. The potential flood water level of less than 573 ft. in the Auxiliary Building is acceptable because it is less than the elevation at which the RHR pumps could be rendered unavailable by the flood water.

Turbine Building

Three scenarios were evaluated to determine impact of the potential LIP event on the Turbine Building. In all three scenarios, water could enter the west side of the Turbine Building through leakage around two rollup doors (one on the Unit 1 side and one on the Unit 2 side of the Turbine Building) on the floor at 591 ft. elevation and their associated flood barriers. The majority of the water entering in these locations is from direct rainfall on the open area between the flood barriers on the entry ramps and the rollup doors. Water could also enter the east side of the Turbine Building through leakage around two rollup doors and two access doors (one each on the Unit 1 side and one each on the Unit 2 side of the Turbine Building) at elevation 609 ft. That water would flow to the 591 ft. elevation floor via open areas and staircases, etc. Additional leakage would enter the Unit 1 side of the Turbine Building through doors between the Turbine Building and the Service Building at elevation 609 ft.

The total Turbine Building in-leakage from the postulated LIP event would be 10,458 gallons for the Unit 1 side, and 7,847 gallons for the Unit 2 side.

Scenario 1

This scenario addresses a condition in which all floor drains on the 591 ft. elevation floor are plugged, and flow paths to condenser pits, sumps, and stairwells on this elevation are obstructed. Water would accumulate on the 591 ft. elevation floor and would not flow to the Turbine Room Sump or the main condenser pit for either unit. For this scenario, it is also assumed that the rollup doors that separate the Unit 1 and Unit 2 sides of the Turbine Building are closed and do not allow water to pass from one side of the building to the other. Since the volume of water entering the Unit 1 side of the Turbine Building would be greater than that entering the Unit 2 side, the flood water accumulating on the Unit 1 elevation 591 ft. floor would be the most limiting condition. The maximum water level on the 591 ft. floor of the Unit 1 Turbine Building would be 1/2 in.

Scenario 2

This scenario addresses a condition in which all drains to the Turbine Room Sump are blocked and the water on the 591 ft. elevation floor can only drain to the condenser pit sumps or the condenser pits. Since the volume of water entering the Unit 1 side of the Turbine Building is greater than that entering the Unit 2 side, Unit 1 represents the most limiting condition. The flood water would accumulate in the Unit 1 condenser pit to a level of less than 3 1/2 in. above the condenser pit floor, which is at elevation 579 ft.

Scenario 3

This scenario addresses a condition in which all drains flowing to the condenser pit sumps are blocked and water on the 591 ft. elevation floor can only drain to the Turbine Room Sump. The combined volume of water entering both sides of the Turbine Building is used for this scenario because the Turbine Room Sump is common to both Unit 1 and Unit 2. The Turbine Room Sump has a capacity of 94,000 gallons before reaching the high water alarm. This is greater than the total in-leakage to the Unit 1 and Unit 2 sides of the Turbine Building of 18,305 gallons.

The limiting scenario is Scenario 1 which could result in a water level of 1/2 in. on the elevation 591 ft. floor.

The limiting Key SSCs in the Turbine Building are as follows:

- The EDGs would be vulnerable to Turbine Building flooding that exceeded elevation 591 ft. – 7 in. since it would overflow the curb protecting the EDG room corridor. The potential 1/2 in. of flood water on elevation 591 ft. floor is acceptable because it would not overflow the curb.

- The TDAFW pump rooms for both Unit 1 and Unit 2 are connected to the Turbine Building on the elevation 591 ft. floor. The elevation of the pump's concrete pedestals is 591 ft. – 4 1/2 in. The base of the Auxiliary Feed Water Pumps is an additional 8 in. high. Therefore, the critical elevation for the TDAFW pumps is 592 ft. – 1/2 in. The potential 1/2 in. of flood water on elevation 591 ft. floor is acceptable because it is less that the TDAFW pump critical elevation.

Therefore, the planned passive flood protection features which preclude unacceptable water ingress into the Auxiliary Building and the Turbine Building via the pathways identified in Table 6-1 will adequately protect Key SSCs.

6.2 Summary of Plant Modifications and Changes

Plant Modifications will be implemented to protect Key SSCs from unacceptable water ingress into the Auxiliary Building and the Turbine Building via the pathways identified in Table 6-1. In the Flooding MSA submitted by Reference 12, I&M documented Regulatory Commitments to implement these modifications by the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events." As noted in Reference 12, the population of pathways that must be mitigated may change if supported by refinements in the associated evaluations. Therefore the Reference 12 commitment to implement modifications applies to the 12-DR-OFF2 pathway in addition to the pathways explicitly identified in Reference 12.

Additionally, there are three concrete block masonry walls (two in the Turbine Building and one in the adjacent Service Building) that are to be credited for mitigation of postulated LIP flood water ingress into the Turbine Building. These concrete block walls will be evaluated, qualified, modified, or supplemented as necessary to provide flood protection.

7 FLOOD IMPACT ASSESSMENT

7.1 DESCRIPTION OF FLOOD IMPACT

As described in Section 5 of this enclosure, a postulated LIP event would not be bounded by current plant design basis flood protection features. As described in Section 6 of this enclosure, existing plant features combined with implementation of plant modifications for passive flood protection features to address water ingress into the Auxiliary Building and the Turbine Building will provide adequate protection of the Key SSCs from LIP flood water.

7.2 ADEQUATE APM JUSTIFICATION AND RELIABILITY OF FLOOD PROTECTION

This section provides APM values and reliability information for the plant features that are to be credited for preventing unacceptable ingress of flood water from the postulated LIP into the Auxiliary Building and the Turbine Building. The APM values are based on the maximum height of water in the vicinity of the specific plant feature at any time during the LIP event as indicated in Table 5-1 and Table 5-2. This water height was compared to the height of water for which the specific feature provides protection as described below, and the APM determined in accordance with Appendix B of NEI 16-05.

7.2.1 APM and Reliability of Existing Credited Plant Features

Auxiliary Building, Turbine Building, Service Building, and Lakeside Office Building Concrete Walls and Curbs

APM Values

The Auxiliary Building, the Turbine Building, and the adjacent Service Building and Lakeside Office Building have exterior concrete foundation walls and curbs that extend above grade. These concrete walls and curbs are credited as flood protection features that prevent unacceptable ingress of flood water from the postulated LIP into the Auxiliary Building and Turbine Building. With the exception of the south and the central segments of the Turbine Building west concrete wall discussed below, the APM values for these concrete walls and curbs were determined to range from 1.2 feet to over 14 feet. Therefore these APMs provide protection from the postulated LIP flood levels.

The south segment of the Turbine Building west wall consists of the portion of the wall between the south side of the Screen House and the south end of the Turbine Building. The APM for this segment of the Turbine Building West wall was calculated to be 0 feet. NEI 16-05, Appendix B states that negligible or zero APM can be justified as acceptable if the use of conservative inputs, assumptions, and/or methods in the flood hazard reevaluation can be established. The 0 feet APM for this segment of the Turbine Building west wall is acceptable based on the following conservatisms:

- The Turbine Building provides a very large volume in which flood water could collect without impacting the limiting Key SSCs (TDAFW pump and EDGs) with respect to flooding of that building. The Turbine Building lower volume at elevation 591 feet (including condenser pits and Turbine Room Sump) is over 1,297,000 gallons.

- No credit was taken for the 17,731 gpm capacity of the Turbine Room Sump overflow to Lake Michigan.

- No credit was taken for the metal siding that is joined to the top of the concrete wall and extends up the side of the Turbine Building. Although not designed to be a leak tight flood barrier, the siding is designed to be weatherproof with respect to precipitation and would preclude gross inleakage if the flood water level were to exceed the height of the concrete wall height.

- The 0 feet APM condition would exist for a relatively brief period. As shown in Figure B-2 of the FHRR transmitted as Enclosure 2 to Reference 2, the flood water level would reach the top of the wall for no more than 30 minutes.

- The FHRR included the conservative assumption that the Jersey barriers between the turbine building and Lake Michigan were impervious. These assumptions caused the computer model to predict that water would pond on the west side of the Turbine Building rather than flow down to Lake Michigan.

The center segment of the Turbine Building west wall consists of the portion of the wall between the north and south sides of the Screen House. The APM for this segment of the Turbine Building West wall was calculated to be 0 feet. As noted above, NEI 16-05, Appendix B states that negligible or zero APM can be justified as acceptable if the use of conservative inputs, assumptions, and/or methods in the flood hazard reevaluation can be established. The 0 feet APM for this segment of the Turbine Building west wall is acceptable because, in addition to the above noted conservatisms, no credit was taken for the diversion of flood water to the forebay in the Screen House. In order to reach the center segment of the Turbine Building west wall, LIP flood water would have to flow through the Screen House, which contains seven floor gratings with dimensions of approximately 3 ft. by 25 ft., and seven floor gratings with dimensions of approximately 5 ft. by 12 ft. These floor gratings are at elevation 591 ft. Therefore, flood water entering the Screen House would drain through the gratings directly to the forebay, and would not reach the top of the adjacent segment of Turbine Building west concrete wall at elevation 596 ft.

Reliability

The reliability of the credited Auxiliary Building, Turbine Building and Service Building exterior concrete walls and curbs was determined by evaluating their capability to withstand the hydrostatic forces from the LIP flood water stillwater elevation. There would be no hydrodynamic loading from wave effects and debris. The evaluation determined that the walls and curbs would be capable of withstanding those forces. Therefore, assurance is provided that these protection features will continue to perform their function throughout the duration of the flood event.

Valve House Floor Penetration Sleeves and Seals, Manway Seals, and Core Bore Seals

APM Values

Approximately 30 floor penetration sleeves with seals were credited for precluding ingress of flood water from the four RWST and PWST/CST valve houses to the Auxiliary Building via the interconnecting pipe tunnels. The APM values for the floor penetration sleeves with seals range from 1.4 feet to 1.8 feet based on the maximum height of water in the vicinity of the seal and the seal pressure retaining capability. These APM values provide adequate margin above the postulated LIP flood elevation height.

The seals on four manways and the grout in several core bore holes in the four valve house floors were also credited for precluding ingress of flood water from the valve houses to the Auxiliary Building via the interconnecting pipe tunnels. The APMs for the manway seals and core bore grout were not quantified because their pressure retaining capability was judged to be comparable to that of the approximately 2 foot thick concrete floor slabs in which they are located. The hydrostatic capability of the floor slabs is discussed below under "Reliability."

Reliability

The reliability of the floor penetration sleeve seals is assured by procedurally required periodic inspections. The reliability of the valve house concrete floor slabs was determined by evaluating their capability to withstand the hydrostatic forces from the LIP flood water. The evaluation determined that the floors would be capable of withstanding those forces. Additionally, the manways are normally covered by concrete blocks, and are procedurally verified to be closed and re-sealed after each use. Therefore, assurance is provided that these protection features will continue to perform their function throughout the duration of the flood event.

7.2.2 APM and Reliability of Plant Features to be Credited following Engineering Changes

The following permanent plant features are to be addressed by CNP Engineering Changes to assure they can mitigate the postulated LIP flood water ingress into the Auxiliary Building and the Turbine Building by the required compliance date of the forthcoming regulation 10 CFR 155, "Mitigation of Beyond Design-Basis Events."

Auxiliary Building and Turbine Building Doorways and Penetrations

There are LIP flood water ingress pathways to the Auxiliary Building and the Turbine Building through doorways and penetrations (see Table 6-1 above) that will be mitigated by installing, replacing, augmenting or qualifying permanent flood protection features as committed in Reference 12. The APM values and reliability for these protection features will be in accordance with the guidance in NEI 16-05 Appendix B.

Concrete Block Masonry Walls

There are three concrete block masonry walls (two in the Turbine Building and one in the adjacent Service Building) that are to be credited for mitigation of postulated LIP flood water ingress into the Turbine Building. These concrete block walls will be evaluated, qualified, modified, or supplemented as necessary to provide flood protection. The APM values and reliability for these protection features will be in accordance with the guidance in NEI 16-05 Appendix B.

7.3 Adequate Overall Site Response

This section applies only when there are manual actions associated with successfully carrying out an external flood response strategy. No such manual actions are credited at CNP.

8 CONCLUSION

The CNP FHRR documented the determination that the hazard from the design basis flood event, a seiche on Lake Michigan, did not bound the hazard from LIP event. The preceding Focused Evaluation has identified LIP floodwater ingress pathways to the Auxiliary Building and Turbine Building that are mitigated, in part by existing plant features that provide flood protection. Additional flood protection features will be installed, replaced, augmented, or qualified in order to adequately protect all SSCs that are needed to maintain Key Safety Functions following the LIP event. I&M's commitments regarding these flood protection features have been documented in the previously submitted CNP Mitigating Strategies Flood Hazard Assessment.

I&M is additionally committing to take actions needed to assure three concrete block masonry walls will adequately protect the Turbine Building from unacceptable flooding. I&M is committing that, upon completion of all identified changes, the APMs and reliability of the changed protection features will be in accordance with NRC endorsed

guidance. These commitments will be implemented by the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events." The APMs and reliability of the credited existing plant features is in accordance with NRC endorsed guidance, and no manual actions or active flood protection features are credited.

These actions provide assurance that, by the required 10 CFR 50.155 compliance date, adequate protection from the postulated flood hazard (a LIP event) that exceeds the current design basis flood hazard will be provided for the SSCs that are needed to maintain Key Safety Functions at CNP.

Enclosure 3 to AEP-NRC-2017-16

REGULATORY COMMITMENTS

The following table identifies those actions committed to by Indiana Michigan Power Company (I&M) in this document. Any other actions discussed in this submittal represent intended or planned actions by I&M. They are described to the U. S. Nuclear Regulatory Commission (NRC) for the NRC's information and are not regulatory commitments.

Commitment	Date
The plant flood protection features that I&M has committed to install, replace, augment, or qualify as necessary to satisfactorily mitigate the ingress of flood water via the Auxiliary Building and Turbine Building pathways, identified in Table 6-1 of Enclosure 2 to this letter, will provide: • Adequate Available Physical Margin in accordance with Appendix B to NEI 16-05, Revision 1. • Adequate reliability in accordance with Appendix B to NEI 16-05, Revision 1.	By the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events."
The three concrete block masonry walls (two in the Turbine Building and one in the adjacent Service Building) that are to be credited for mitigation of postulated LIP flood water ingress into the Turbine Building will be evaluated, qualified, modified, or supplemented as necessary to provide adequate flood protection.	By the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events."
The three concrete block masonry walls (two in the Turbine Building and one in the adjacent Service Building) that are to be credited for mitigation of postulated LIP flood water ingress into the Turbine Building will provide: • Adequate Available Physical Margin in accordance with Appendix B to NEI 16-05, Revision 1. • Adequate reliability in accordance with Appendix B to NEI 16-05, Revision 1.	By the required compliance date of the forthcoming regulation 10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events."