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PNP 2018-041

September 25, 2018

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

SUBJECT: Focused Evaluation Pursuant to 10 CFR 50.54(f) Request for Information Regarding Recommendation 2.1: Flooding of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

Palisades Nuclear Plant
Docket 50-255
Renewed Facility Operating License No. DPR-20

References:

1. NRC letter, *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 (ADAMS Package Accession No. ML12056A046)
2. NRC memorandum, COMSECY-15-0019, *Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants*, dated July 28, 2015 (ADAMS Package Accession No. ML15153A104)
3. NRC letter, *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)
4. Nuclear Energy Institute report, NEI 16-05, Revision 1, *External Flooding Assessment Guidelines*, dated June 2016 (ADAMS Accession No. ML16165A178)
5. NRC interim staff guidance, JLD-ISG-2016-01, Revision 0, *Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flooding Hazard Reevaluation; Focused Evaluation and Integrated Assessment*, dated July 11, 2016 (ADAMS Accession No. ML16162A301)

6. Entergy Nuclear Operations, Inc. letter, PNP 2017-003, *Notification of Changes to Regulatory Commitments Concerning NRC Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding the Flooding Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*, dated March 7, 2017 (ADAMS Accession No. ML17066A255)

Dear Sir or Madam:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a Title 10 of the Code of Federal Regulations (CFR), paragraph 50.54(f) letter to all power reactor licensees and holders of construction permits in active or deferred status (Reference 1). The letter contained in Enclosure 2 specific requested actions, requested information, and required responses associated with *Recommendation 2.1: Flooding*. One of the required actions was to submit an Integrated Assessment Report for any flood causing mechanism not bounded by the current design basis.

In Reference 2, the NRC discussed a closure plan in which licensees are to address the reevaluated flooding hazards not bounded by the current design basis using a revised integrated assessment process that applies a graded approach. This closure plan was further discussed by the NRC in Reference 3. Guidance for performing the revised process is contained in Reference 4, which was endorsed by the NRC in Reference 5. Per the guidance in Reference 4, the revised process applicable to Palisades Nuclear Plant (PNP) is Path 2, which requires that a focused evaluation be performed to demonstrate that the flood protection strategies ensure that key systems, structures, and components are available to maintain key safety functions.

Attachment 1 of this letter provides the focused evaluation for PNP. The focused evaluation, which was performed in accordance with Reference 4, identified an action to install a flood protection feature to prevent flooding through the north penetration room door (Door-107). Interim flood protection measures for this door have been implemented by the site, pending installation of a flood protection feature.

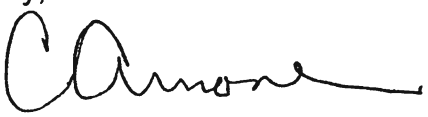
Attachment 2 of this letter contains a new commitment to permanently install a flood protection feature to prevent flooding through Door-107 during the postulated local intense precipitation event.

Submittal of the focused evaluation closes the following commitment made in Reference 6:

> *ENO commits to submit an integrated assessment for Palisades Nuclear Plant, prepared in accordance with NEI 16-05, Revision 1, "External Flooding Assessment Guidelines."*
>
> Scheduled Completion Date: December 31, 2018

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 25, 2018.

Sincerely,



CFA/jse

Attachments:
1. Focused Evaluation for External Flooding at Palisades Nuclear Plant
2. List of New Regulatory Commitments

cc: Director of Office of Nuclear Regulation, USNRC
Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC

Attachment 1

Focused Evaluation for External Flooding at Palisades Nuclear Plant

18 Pages Follow

Entergy

ENTERGY NUCLEAR
Engineering Report Cover Sheet

Engineering Report Title:

FOCUSED EVALUATION FOR EXTERNAL FLOODING AT PALISADES NUCLEAR PLANT

Engineering Report Type:

New ☒ Revision ☐ Cancelled ☐ Superseded ☐
Superseded by: _____

Applicable Site(s)

IP1	☐	IP2	☐	IP3	☐	JAF	☐	PNPS	☐	VY	☐	WPO	☐
ANO1	☐	ANO2	☐	ECH	☐	GGNS	☐	RBS	☐	WF3	☐	PLP	☒

EC No. 77287

Report Origin: ☐ Entergy ☒ Vendor
Vendor Document No.: ENTP051-REPT-001

Quality-Related: ☒ Yes ☐ No

Prepared by: Prepared by Enercon — Date: 9/19/18
Responsible Engineer (Print Name/Sign)

Design Verified: Design Verified by Enercon — Date: 9/19/18
Design Verifier (if required) (Print Name/Sign)

Reviewed by: Greg Hubers — Date: 9/24/18
Reviewer (Print Name/Sign)

Approved by: Bob White — Date: 9-24-18
Supervisor / Manager (Print Name/Sign)

ENERCON Excellence—Every project. Every day.	PROJECT REPORT COVER SHEET	PAGE NO. 1 OF 4

Title:	FOCUSED EVALUATION FOR EXTERNAL FLOODING AT PALISADES NUCLEAR PLANT	REPORT NO.: ENTP051-REPT-001
		REVISION: 0
		Client: Entergy
		Project Identifier: ENTP051

Item	Cover Sheet Items	Yes	No
1	Does this Project Report contain any open assumptions, including preliminary information, that require confirmation? (If **YES**, identify the assumptions.)	☐	☒
2	Does this Project Report supersede an existing Project Report? (If **YES**, identify the superseded Project Report.) **Superseded Project Report No.** _____	☐	☒

Scope of Revision:
Initial Issue

Revision Impact on Results:
N/A

Safety-Related [1] ☐ **Non-Safety-Related [2]** ☒

(Enter Name and Sign)

Originator: **Brian Froese**

Design Verifier [1] (Reviewer for Non-Safety-Related): **Dora Garcia**

Approver: **Jared Monroe** **Date:** **9/19/2018**

Note 1: Design Verification is required for all safety-related Project Reports. A review is adequate for non-safety-related Project Reports.

Note 2: Since this report is augmented quality per the PPD, a design verification was completed even though it is not required for non-safety-related Project Reports per CSP 3.07.

ENERCON Excellence—Every project. Every day.	PROJECT REPORT REVISION STATUS SHEET	PAGE NO. 2 OF 4
FOCUSED EVALUATION FOR EXTERNAL FLOODING AT PALISADES NUCLEAR PLANT	REPORT NO.: ENTP051-REPT-001 REVISION: 0	

PROJECT REPORT REVISION STATUS

REVISION	DATE	DESCRIPTION
0	9/19/2018	Initial Issue

ATTACHMENT REVISION STATUS

APPENDIX NO.	NO. OF PAGES	REVISION	ATTACHMENT NO.	NO. OF PAGES	REVISION
A	13	0	N/A		

1.0 Purpose and Scope

The purpose of this report is to develop the Palisades Focused Evaluation (FE) for external flooding. This is performed in Appendix A and formatted in accordance with NEI developed templates.

2.0 Summary of Results and Conclusions

See Appendix A.

3.0 References

See Appendix A.

4.0 Assumptions

None.

5.0 Design Inputs

None.

6.0 Detailed Discussion

See Appendix A.

7.0 Computer Software

There is no software used in this report.

Appendices

Appendix A – Focused Evaluation

Attachments

None.

TABLE OF CONTENTS

PALISADES NUCLEAR PLANT
FLOODING FOCUSED EVALUATION SUMMARY

1 EXECUTIVE SUMMARY

Palisades Nuclear Plant (PLP) has reevaluated its flooding hazard in accordance with the NRC's March 12, 2012, 10 CFR 50.54(f) request for information (RFI) (Reference 1). The RFI was issued as part of implementing lessons learned from the Fukushima Dai-ichi accident; specifically, to address Recommendation 2.1 of the NRC's Near-Term Task Force report. This information was submitted to the NRC in a flood hazard re-evaluation report (FHRR) on March 11, 2015 (Reference 2) and is summarized in the Mitigating Strategies Flood Hazard Information (MSFHI) documented in the NRC's "Interim Staff Response to Reevaluated Flood Hazards" letter dated December 23, 2015 (Reference 7) and "Staff Assessment" letter dated February 14, 2018 (Reference 20). With the exception of several minor editorial and clarifying changes in Revision 1 of the FHRR (Reference 21), no changes to the flooding analysis have been performed since the issuance of the MSFHI letters and this flooding analysis will serve as input to this Focused Evaluation (FE). The changes in Revision 1 of the FHRR include identification of additional actions to resolve potential leakage through Manhole #4 and through North Penetration Room Door #107 (incorrectly listed as Door 106 in Rev. 0 of the FHRR).

Previously submitted Mitigating Strategies Assessment (MSA) letter PNP 2016-063 (Reference 17) discussed the use of a revised Combined Event flood based on the Empirical Simulation Technique (EST) instead of the originally submitted deterministic calculation. The revised EST-based Combined Event flood is no longer being used in the revised MSA (Reference 13), nor is it used in this FE and instead, the original deterministic method is used.

There are two (2) mechanisms that were found to exceed the design basis flood level at Palisades. These mechanisms are listed below and are included in this FE:

1. Local Intense Precipitation (LIP)
2. Storm Surge (H.4 Combined Event)

Associated effects (AE) and flood event duration (FED) parameters for the LIP and Combined Event flood mechanisms were assessed and submitted as a part of the FHRR.

This FE concludes there will be effective flood protection for maintaining key safety functions (KSFs) during both mechanisms through the demonstration of adequate Available Physical Margin (APM) and reliability of flood protection features. This FE followed Path 2 of NEI 16-05, Rev. 1 and utilized Appendix B to that document for guidance on evaluating the site flood protection features. This report documents completion of the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter.

2 BACKGROUND

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding. The RFI (Reference 1) directed licensees, in part, to submit a FHRR to reevaluate the flood hazards for their sites using present-day methods and guidance used for early site permits and combined operating licenses. For Palisades, the FHRR was submitted on March 11, 2015 (Reference 2).

Following the Commission's directive to NRC Staff in Reference 3, the NRC issued a letter to the industry (Reference 6) indicating that new guidance is being prepared to replace instructions in Reference 14 and provide for a "graded approach to flooding reevaluations" and "more focused evaluations of local intense precipitation and available physical margin in lieu of proceeding to an integrated assessment." NEI prepared the new "External Flooding Assessment Guidelines" in NEI 16-05 (Reference 4), which was endorsed by the NRC in Reference 5. NEI 16-05 Rev. 1 indicates that each flood-causing mechanism not bounded by the design basis flood (using only stillwater and/or wind-wave run-up level) should follow one of the following five assessment paths:

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

Non-bounded flood-causing mechanisms in Paths 1, 2, or 3 would only require a FE to complete the actions related to external flooding required by the March 12, 2012 10 CFR 50.54(f) letter. Mechanisms in Paths 4 or 5 require an Integrated Assessment.

3 TERMS AND DEFINITIONS

- AE – Associated Effects
- AIMs – Assumptions, Inputs, and Methods
- APM – Available Physical Margin
- ARC – Antecedent Rainfall Condition
- CDB – Current Design Basis
- CN – Curve Number
- EST – Empirical Simulation Technique
- FED – Flood Event Duration
- FHRR – Flood Hazard Re-evaluation Report
- FIAP – Flooding Impact Assessment Process
- FLEX – Diverse and Flexible Coping Strategies covered by NRC order EA-12-049
- HHA – Hierarchical Hazard Assessment
- ISR – Interim Staff Response
- Key SSC – A System Structure or Component relied upon to fulfill a Key Safety Function
- KSF – Key Safety Function, i.e. core cooling, spent fuel pool cooling, or containment function
- LIP – Local Intense Precipitation
- MSA – Mitigating Strategies Assessment as described in NEI 12-06 Rev 2, App G
- MSFHI – Mitigating Strategies Flood Hazard Information
- MSL – Mean Sea Level (equivalent to NGVD29 for Palisades)
- NRC – Nuclear Regulatory Commission
- NTTF – Near Term Task Force commissioned by the NRC to recommend actions following the Fukushima Dai-ichi accidents
- PMWS – Probable Maximum Wind Storm
- RFI – Request for Information

4 FLOOD HAZARD PARAMETERS FOR UNBOUNDED MECHANISMS

The NRC has completed the "Interim Staff Response to Reevaluated Flood Hazards" (Reference 7) and "Staff Assessment" (Reference 20) which contain the MSFHI related to Palisades' FHRR (Reference 2). In Reference 7, the NRC states that the "staff has concluded that the licensee's reevaluated flood hazard information is a suitable input for other assessments associated with Near-Term Task Force Recommendation 2.1 'Flooding.'" The enclosure to Reference 7 includes a summary of the CDB and reevaluated flood hazard parameters. In Table 1 of the enclosure to Reference 7, the NRC lists the following flood-causing mechanisms for the current design basis flood:

- 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.

In Table 2 of the enclosure to Reference 7, the NRC lists flood hazard information (specifically stillwater elevation and wind-wave run-up elevation) for the following flood-causing mechanisms that are not bounded by the design basis hazard flood level:

- Local Intense Precipitation
- Storm Surge (H.4 Combined Event, referred to herein as "Combined Event")

These are the reevaluated flood-causing mechanisms that should be addressed in the external flooding assessment. The two non-bounding flood mechanisms for Palisades are described in detail in Reference 2, the FHRR submittal. Table 1 summarizes how these unbounded mechanisms were addressed in this external flooding assessment:

Table 1 – Unbounded Flood Mechanisms

	Flood Mechanism	Summary of Assessment
1	Local Intense Precipitation	Path 2 was determined to be pursued for both mechanisms at Palisades since all flooding vulnerabilities are addressed by flood protection features (see FIAP Path Determination Table, Section 6.3.3 of NEI 16-05). Adequate APM and reliability of flood protection features are demonstrated.
2	Combined Event	

5 OVERALL SITE FLOODING RESPONSE

5.1 DESCRIPTION OF OVERALL SITE FLOODING RESPONSE

The HHA approach described in NUREG/CR-7046 (Reference 8) was used for the evaluation of the LIP and Combined Event mechanisms' resultant water surface elevations at Palisades. For these mechanisms, two-dimensional hydrodynamic computer models were created using the FLO-2D software. These FLO-2D models were developed based on Palisades' site features including: topography, site location, and structures. The results of these FLO-2D evaluations are included in the FHRR.

This FE credits passive protection features to demonstrate that Key SSCs are protected during the two (2) flooding mechanisms. For the LIP, the FHRR determined that on the lower level (590 elevation), none of the locations exceed the minimum flood protection elevation of 594.4 ft MSL. For the upper level, it was determined there are two locations of flooding ingress that could potentially impact Key SSCs. These are through (1) Manhole #4 which eventually leads to the 1C Switchgear Room via conduits and (2) through Door #107 which eventually leads to the 1D Switchgear and EC-40 (Radwaste Panel) Rooms. For Manhole #4, calculation EA-EC55593-01 (Reference 19) which is referenced in the FHRR determined that adequate space is available in the manholes to hold the potential leakage such that there is no concern to the 1C Switchgear Room. Therefore, no physical changes to this manhole or the conduits within are anticipated to be performed. For Door #107 ingress, a flood protection feature (such as a kickplate) will be permanently installed to prevent leakage through the door as part of a future action. As an interim compensatory measure, sandbags are stored outside of Door #107 and will be deployed to protect the door in the event of heavy rainfall. This is integrated into site procedure AOP-38 (Reference 18).

For the Combined Event flood, all Key SSCs are located in flood protected areas or are situated at a minimum elevation of 594.4 feet (ft) MSL per Section 2.2 of the FHRR (Reference 2), which is limited by the lower bearing lube oil reservoirs for the service water pump motors. Thus, the site is considered protected from flooding up to 594.4 ft MSL. For the Combined Event flood, the maximum flood elevation outside the Screen House is 593.9 ft MSL (stillwater) and 594.2 ft MSL (runup with minor waves moving parallel or away from the Intake Structure south door), and the maximum flood elevation inside the Screen House is 593.1 ft MSL. All of these flood levels are below the protected elevation of 594.4 ft MSL and Key SSCs are not impacted. While sandbags may be used as defense-in-depth per AOP-38 (Reference 18) for a Combined Event flood, no manual actions or active components are required by the site to protect Key SSCs for this event.

5.2 SUMMARY OF PLANT MODIFICATIONS AND CHANGES

As a future action, a permanent flood protection feature (such as a kickplate) will be installed on Door #107 to prevent inleakage in the event of a LIP.

6 FLOOD IMPACT ASSESSMENT

6.1 LOCAL INTENSE PRECIPITATION – PATH 2

6.1.1 Description of Flood Impact

The ISR (Reference 7) and Staff Assessment (Reference 20) identified a maximum LIP stillwater elevation of 594.4 ft MSL for the lower level. However, outside the Screen House, the maximum flood elevation is 593.1 ft MSL. Within the screen house are the service water pump lower motor bearing oil reservoirs, which are the limiting SSCs at this elevation. These reservoirs are at an elevation of 594.4 ft MSL and therefore are protected. On the upper level, water ingress through Manhole #4 was determined not to impact any Key SSCs as discussed in Section 5.1. Door #107 will be modified to install a flood protection feature (such as a kickplate) to prevent inleakage. There is a maximum of 1 foot of flooding expected during the LIP outside Door #107 (Reference 2). As an interim action, sandbags are available outside of Door #107 to protect the door in the event of heavy rainfall and this is integrated into AOP-38 (Reference 18).

6.1.2 Adequate APM Justification and Reliability of Flood Protection

Revision 1 of the FHRR identified that water ingress from a LIP through Manhole #4 could potentially impact the 1C Switchgear Room. Calculation EA-EC55593-01 (Reference 19) determined that 684 ft^3 is available in the manholes, which leaves ample margin given the 444 ft^3 of calculated inleakage. Therefore, no leakage is expected to reach 1C Switchgear Room and no changes to the Manhole #4 or supporting conduits are anticipated. For leakage through Door #107, a flood protection feature (such as a kickplate) will be installed. This will be high enough to prevent inleakage through the door throughout the entire LIP event where 1 foot maximum of flooding is expected. Since this has not yet been installed, for the purposes of determining adequacy in this FE, the APM is considered zero or negligible.

Per NEI 16-05 Appendix B Section B.1, "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." Since the AIMs used in this LIP analysis are conservative, this APM is adequate. The following are examples of conservatisms used in the revised LIP flood analysis (Reference 9):

1. The site drainage network was assumed to be non-functional. Culverts were considered to be blocked, and storm sewers were not considered.

2. The Antecedent Rainfall Condition assumed to select the CN values was conservatively chosen as wet (ARC III), which yield higher CNs and runoff.

3. VBS' that would re-direct overland flow away from the site were conservatively not considered, as they are not known to be designed or credited as flood mitigation structures.

4. Conservative HMR-51/52, which determine the greatest rainfall rates theoretically possible for the United States east of the 105th meridian (References 15 & 16), were used for the LIP. A site-specific study would have reduced the ponding elevations.

Per the discussion above, flooding on the lower elevation is bounded by the site flood protection level of 594.4 ft MSL. For flooding on the upper elevation, leakage through Manhole #4 was determined to not impact any Key SSCs. For Door #107, a permanent modification will be made to protect from inleakage through the door. As an interim compensatory measure, AOP-38 (Reference 18) requires sandbags be placed at least 18 inches high in the event of heavy rainfall.

Hydrodynamic and debris loading forces are not applicable to the LIP floods since, as discussed in the MSA (Reference 13), there is no wave run-up, the velocities are relatively low, and there are limited debris sources within the protected area. Therefore, this meets the criteria for reliability of doors and hatches in Appendix B, Section B.2.2.2 in NEI 16-05.

6.1.3 Adequate Overall Site Response

With the installation of a flood protection feature (such as a kickplate) for Door #107, there are no required manual actions for this response to be successful and, therefore, an evaluation of the overall site response is not necessary.

6.2 Combined Event – Path 2

6.2.1 Description of Flood Impact

The primary features protecting the site from a Combined Event are site topography and grading, which are Type 1 features per NEI 16-05 Appendix B Section B.1. Table 2 presents the APM for the limiting Key SSC.

Table 2 – Combined Event Flood Elevations

Re-evaluated Flood Hazard (at Lube Oil Reservoir)	Limiting Key SSC (Lube Oil Reservoir)	APM
593.1 ft MSL	594.4 ft MSL	1.3 ft

The only Type 2 features credited are the circulation water pipes, which break western (shoreward) wind-driven wave action in front of the Screen House. These are considered Type 2 because wave breaking from these pipes was not previously part of the design or licensing basis. Table 3 presents the pipe loading APM, taken from Reference 22.

Table 3 – Combined Event Piping Forces

Stress	Calculated Maximum Stresses	Allowable Stresses	APM
Pipe Stress	6,014 psi	28,800 psi	22,786 psi
Concrete Shear Stress	54 psi	93 psi	39 psi

Additional locations east of the circulation water pipes where the maximum re-evaluated flood hazard elevation was close to this limiting Key SSC elevation of 594.4 ft MSL were evaluated in Reference 2, Table 5-3. It was determined these were either below the limiting elevation or are too far away such that there is no impact. This includes the Diesel Generator Fuel Oil Tank T-10A vent at 597 ft MSL. It is also noted the exterior north chained double door to the Diesel Generators (Door #170), and Doors #141 and #142 within the Diesel Generator Room that lead to the Turbine Building are watertight (References 23 and 24).

The protection features (site grade, circulation water pipes, and building external features) are permanent and passive, requiring no manual actions.

6.2.2 Adequate APM Justification and Reliability of Flood Protection

Protection of all Key SSCs is provided by site topography, the building external flood boundaries, the circulation water pipes, and elevated safety-related equipment, which are inherently permanently installed and passive. Per NEI 16-05 Appendix B Section B.1, the APM of 1.3 ft for the flood elevation is adequate since the AIMs used in the Combined Event analysis were conservative. The following are examples of conservatisms used in the Combined Event analysis (References 10 - 12):

1. A conservative methodology based on the American Society of Civil Engineers (ASCE) 7-10 guidance was used to calculate the standing wave crest elevation.

2. As per ANSI/ANS-2.8-1992 guidelines, the PMWS was conservatively assumed to be at steady state along a straight track, and therefore storm parameters were not varied with time.

3. The calculated 100-year water level is greater than the maximum observed water level in Lake Michigan for the years from 1918 to 2012 and was conservatively used as the antecedent water level for PMSS calculations.

4. A maximum wind speed of 100 mph was used for the PMWS. This was conservatively assumed to be a constant, sustained value for the duration of the wind storm which is conservative because the maximum recorded sustained wind speed was 68 mph.

The APM for the circulation water pipe stresses are also judged to be adequate given the significant margin between the calculated maximums and allowable limits presented in Table 3.

Site topography, building external flood boundaries, and elevated safety-related equipment are Type 1 features that were designed and constructed to mitigate (or minimize) the effects of a Combined Event. These are already credited as part of the Palisades design basis flood protection, and therefore, per Appendix B of NEI 16-05, a reliability analysis to reconstitute all aspects of the original barrier design is not required. For reliability of the circulation water pipes (Type 2 features), a structural evaluation was performed and determined these pipes were adequate (Reference 22). This was included in the FHRR (Reference 2) and the adequacy was confirmed in the Palisades' Staff Assessment (Reference 20, Section 4.3).There are no active components credited.

6.2.3 Adequate Overall Site Response

There are no required manual actions for this response to be successful and, therefore, an evaluation of the overall site response is not necessary.

7 CONCLUSION

The FHRR concluded that there is no site response required to ensure the plant's Key SSCs will perform their KSFs. There is one future action that will be taken, which is to install a flood protection feature (such as a kickplate) for Door #107 to prevent inleakage during a LIP.

The LIP and Combined Event flood mechanisms were not bounded by the site CDB as indicated in the ISR (Reference 7) and Staff Assessment (Reference 20). For the LIP lower level, the maximum flood elevation of 594.1 ft MSL outside the Screen House is below the site protection elevation of 594.4 MSL. On the upper level, leakage through Manhole #4 was evaluated and it was determined that no Key SSCs are impacted. For Door #107, as discussed previously a new protection feature will prevent inleakage through the door. For the Combined Event flood, the maximum elevation of 594.2 ft MSL outside the Intake Structure and 593.1 ft MSL inside the Intake Structure are below the site protection elevation of 594.4 ft MSL. Furthermore, the circulation water pipes were determined to be reliable and have adequate APM to ensure the pipes are an effective means of breaking western (shoreward) wind-driven wave action in front of the Screen House. Therefore, Key SSCs are not impacted by this flood mechanism.

With the Door #107 modification, all vulnerabilities due to the LIP and Combined Event mechanisms are addressed by passive protection features and APM will be adequate to protect Key SSCs. This FE verified the reliability of the flood protection features using Appendix B of NEI 16-05. This evaluation places Palisades in Path 2 to address these unbounded flooding mechanisms. Additional information can be found in the Flooding MSA (Reference 13).

This evaluation completes the actions related to External Flooding Response required by the March 12, 2012, 10 CFR 50.54(f) RFI. It is not anticipated that Phase 2 decision making will be necessary based on the information provided in this FE.

8 REFERENCES

1. NRC Letter, 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 (ML12053A340).

2. PNP 2015-018, Required Response 2 for Near-Term Task Force Recommendation 2.1: Flooding – Hazard Re-Evaluation Report, dated March 11, 2015 (ML15106A681).

3. NRC Staff Requirements Memoranda to COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards", dated March 30, 2015 (ML15089A236).

4. Nuclear Energy Institute (NEI), Report NEI 16-05, Rev. 1, External Flooding Assessment Guidelines (ML16165A178).

5. U.S. Nuclear Regulatory Commission, JLD-ISG-2016-01, Rev. 0, Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation; Focused Evaluation and Integrated Assessment (ML16162A301).

6. NRC Letter, Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events, dated September 1, 2015 (ML15174A257).

7. Palisades Nuclear Plant – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (TAC No. MF6128), dated December 23, 2015 (ML15106A681).

8. NUREG/CR-7046, Design-Basis Flood Estimation for Site Characterization at Nuclear Power Plants in the United States of America, November 2011 (ML11321A195).

9. EA-EC54930-05, Rev. 000, 32-9226944-002 – Palisades Nuclear Plant Flooding Hazard Re-Evaluation – Local Intense Precipitation.

10. EA-EC54930-01, Rev. 000, 32-9226959-000 – Palisades Nuclear Plant Flooding Hazard Re-Evaluation – Probably Maximum Wind Storm.

11. EA-EC54930-03, Rev. 000, 32-9226981-000 – Palisades Nuclear Plant Flooding Hazard Re-Evaluation – Combined Event.

12. EA-EC54930-02, Rev. 000, 32-9226962-000 – Palisades Nuclear Plant Flooding Hazard Re-Evaluation – Probable Maximum Storm Surge and Seiche.

13. PLP-RPT-16-00030, Rev. 001, Mitigating Strategies Assessment for Flooding Documentation Requirements at Palisades Nuclear Plant.

14. Letter from David L. Skeen, U.S. Nuclear Regulatory Commission, to Joseph E. Pollock, Nuclear Energy Institute – Trigger Conditions for Performing an Integrated Assessment and Due Date for Response, dated December 3, 2012 (ML12326A912).

15. Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates, United States East of the 105th Meridian, June 1978.

16. NOAA Hydrometeorological Report No. 52, Application of Probable Maximum Precipitation Estimates – United States East of the 105th Meridian.

17. PNP 2016-063, Mitigating Strategies Assessment for Flooding Submittal, dated December 19, 2016 (ML16354A054).

18. AOP-38, Rev. 14, Acts of Nature.

19. EA-EC55593-01, Rev. 000, Beyond Design Basis (BDB) Evaluation: Local Intense Precipitation Flow Through Manhole 4 to Manhole 1.

20. Palisades Nuclear Plant – Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood Causing Mechanism Reevaluation, February 14, 2018 (ML18037A625).

21. PLP-RPT-15-00010, Rev. 1, 51-9226987-000 – Palisades Nuclear Plant Flooding Hazard Re-Evaluation Report.

22. EA-EC54930-04, Rev. 000, 32-9234660-000 - Palisades Nuclear Plant Flooding Re-Evaluation – Wave Loadings on Cooling Tower Piping.

23. C-48, Rev. 25, Architectural Auxiliary & Reactor Buildings Plans – El. 570'-0" & 590'-0".

24. C-65, Sh. 1, Rev. 40, Architectural Door Schedule.

Attachment 2

List of New Regulatory Commitments

The following table identifies actions committed to by Entergy Nuclear Operations, Inc. (ENO), as discussed in this submittal.

COMMITMENT	TYPE (Check One)		SCHEDULED COMPLETION DATE
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
ENO commits to install a flood protection feature to prevent flooding though the north penetration room door (Door-107) in a postulated local intense precipitation event, as described in the *Focused Evaluation for External Flooding at Palisades Nuclear Plant,* dated September 24, 2018.	X		September 25, 2020