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U. S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

Ref 10 CFR 50.54(f)

9/7/2017

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT
DOCKET NOS. 50-445 AND 50-446
Flooding Focused Evaluation Summary Report
NEI 16-05, Revision 1, Path 2

REFERENCES:

1. NRC letter to R. Flores, Regarding 10 CFR 50.54(f) Request for Information regarding Recommendation 2.1, dated March 12, 2012 (ML12053A340).
2. NRC Order EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, dated March 12, 2012 (ML12054A735).
3. NRC Letter to R. Flores, Regarding Supplemental Information Related to 10 CFR 50.54(f) Request for Information regarding Flooding Hazard Reevaluations for Recommendation 2.1, dated March 1, 2013 (ML13044A561).
4. Luminant Letter TXX-13053 from R. Flores to the NRC dated March 12, 2013, Flood Hazard Reevaluation Report (ML13074A058).
5. Luminant Letter TXX-14048 from R. Flores to NRC dated April 4, 2014, Submittal of Requested Information Regarding Fukushima Lessons Learned – Flood Hazard Reevaluation Report (ML14100A049).
6. Luminant Letter TXX-14094 from R. Flores to the NRC dated August 14, 2014, Flood Hazard Reevaluation Report Supplement 1 (ML14245A136).
7. NRC SRM-COMSECY-14-0037 Staff Requirements for COMSECY-14-0037 – Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards, dated March 30, 2015 (ML15089A236).

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8. Luminant Letter TXX-15111 from R. Flores to the NRC dated September 22, 2015, Submittal of Request for Additional Information Regarding Fukushima Lessons Learned – Flood Hazard Reevaluation Report (ML15278A306).
9. Luminant Letter TXX-16015 from K. Peters to the NRC dated February 3, 2016, Additional Information for Flood Hazard Reevaluation Report (ML16041A029).
10. NRC Letter to K. Peters, Interim Staff Response – Flood-Causing Mechanism Reevaluation, dated February 11, 2016, (ML16041A228).
11. NEI 16-05, Revision 1, External Flooding Assessment Guidelines, dated June 2016 (ML16165A178).
12. NRC, 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 (ML16162A301).
13. Vistra OpCo Letter TXX-17006 from T. P. McCool to NRC dated February 9, 2017, Mitigating Strategies Assessment (MSA) Flood Report.
14. NRC Letter to K. Peters, Flood Hazard Mitigation Strategies Assessment, dated May 9, 2017 (ML17111A960).

Dear Sir or Madam:

The purpose of this letter is to transmit the Flooding Focused Evaluation Summary Report by Vistra Operations Company LLC ("Vistra OpCo") for completion of the Comanche Peak Nuclear Power Plant (CPNPP) Units 1 and 2 Flood Impact Assessment Process.

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to request information associated with Near-Term Task Force Recommendation 2.1 for Flooding. One of the Required Responses in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report (FHRR). Luminant submitted the FHRR for CPNPP Units 1 and 2 on March 12, 2013 (Reference 4). The reevaluated flood hazard was further developed in responses to requests for additional information (Reference 5), subsequent submittal of Supplement 1 of the FHRR (Reference 6) and responses to requests for additional information regarding Supplement 1 of the FHRR (Reference 8). Herein, the References 6 and 8 submittals are referred to as the FHRR. Per Reference 3, the NRC considers the reevaluated flood hazard to be "beyond the current design/licensing basis of operating plants."

Concurrent to the flood hazard reevaluation, CPNPP developed and implemented mitigating strategies in accordance with NRC Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (Reference 2). In NRC SRM-COMSECY-14-0037 (Reference 7), the Commission affirmed that licensees need to address the reevaluated flooding hazards within their mitigating strategies for Beyond Design Basis (BDB) external events, including the reevaluated flood hazards. Letter TXX-17006 (Reference 13) submitted the Mitigating Strategies Assessment (MSA) for New Flood Hazard Information using the "Mitigating Strategies Flood Hazard Information" (MSFHI) summarized in Reference 10, as agreed to in Reference 9. The NRC concluded in Reference 14 that the CPNPP Flooding MSA was performed in accordance with the required guidance.

Subsequently, a Flood Impact Assessment was to be performed in accordance with NEI 16-05 Revision 1 (Reference 11) and JLD-ISG-2016-01 (Reference 12). The attachment to this letter provides the Flooding Focused Evaluation Summary Report for CPNPP Units 1 and 2 that was prepared in accordance with NEI 16-05 Revision 1 and JLD-ISG-2016-01. The Flooding Focused Evaluation Summary Report demonstrates the adequacy of the existing plant design and mitigating strategies for responding to the reevaluated flooding hazards that exceed the facility's design basis flood level.

This letter contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Garry Struble at (254) 897-6628 or garry.struble@luminant.com.

I state under penalty of perjury that the foregoing is true and correct.

Executed on September 7, 2017.

Sincerely,

Thomas P. McCool

Attachment 1. Flooding Focused Evaluation Summary Report
Comanche Peak Nuclear Power Plant, Units 1 and 2

c –

Kriss Kennedy, Region IV
Gregory T. Bowman, NRR
Robert J. Bernardo, NRR
Margaret M. Watford, NRR
Resident Inspectors, Comanche Peak

Flooding Focused Evaluation Summary Report
Comanche Peak Nuclear Power Plant, Units 1 & 2

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1.0 Executive Summary

Vistra Operations Company LLC (Vistra OpCo) has reevaluated the Comanche Peak Nuclear Power Plant (CPNPP) site flooding hazard in accordance with Near-Term Task Force (NTTF) Recommendation 2.1 and U.S. Nuclear Regulatory Commission's (NRC) 10 CFR 50.54(f) request for information. This information was submitted to the NRC on August 14, 2014 in Supplement 1 to the Flood Hazard Reevaluation Report (FHRR) and is outlined in the NRC Mitigating Strategies Flood Hazard Information (MSFHI) letter to CPNPP dated February 11, 2016. There are two (2) mechanisms that were found to exceed the design basis flood level of CPNPP. These mechanisms are listed below and included in this Focused Evaluation (FE):

1. Local Intense Precipitation (LIP)
2. Streams and Rivers Flooding

The reevaluated LIP flooding analysis has been revised since issuance of Supplement 1 to the FHRR and the NRC MSFHI letter. The LIP analysis was revised to account for discrepancies found relating to site design drainage drawings. An evaluation was performed and the MSFHI flood elevation for LIP was determined to bound the peak flood elevations in the revised LIP analysis. Therefore, the FHRR and MSFHI letter serve as the input to the FE for the LIP and the Streams and Rivers Flooding hazards.

The assessments of LIP and Streams and Rivers flooding concluded that the strategy for maintaining key safety functions (KSFs) during both hazards provides effective flood protection through the demonstration of adequate Available Physical Margin (APM) and reliable flood protection features. The response to potential flooding from Streams and Rivers includes procedural actions. An evaluation of these actions determined that the overall site procedural response for Streams and Rivers flooding is adequate. A procedural response strategy is not required for LIP. All Key Structures, Systems, and Components (SSCs) are adequately protected from flooding due to LIP and Streams and Rivers flooding. This FE followed Path 2 of Nuclear Energy Institute (NEI) 16-05, Revision 1 and utilized Appendices B and C for guidance on evaluating the adequacy of the flood protection features and the site strategy. This submittal completes the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter without the need for the NRC staff to perform Phase 2 decision making per NRC Interim Staff Guidance (ISG) JLD-ISG-2016-01 and NEI 16-05.

2.0 Background

On March 12, 2012, the NRC issued Reference 1 to request information associated with NTTF Recommendation 2.1 for Flooding. One of the Required Responses in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report. For CPNPP Units 1 and 2, the FHRR was submitted on March 12, 2013 (Reference 2). The reevaluated flood hazard was further developed in response to requests for additional information (RAIs) (Reference 3), subsequent submittal of Supplement 1 of the FHRR (Reference 4) and a response to requests for additional information regarding Supplement 1 of the FHRR (Reference 5).

Following the Commission's directive to the NRC Staff in Reference 6, the NRC issued a letter to industry (Reference 7) indicating that new guidance is being prepared to replace instructions in Reference 8 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 9), which was endorsed by the NRC in JLD-ISG-2016-01 (Reference 10). NEI 16-05 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
- 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 Focused Evaluation to complete the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter without the need for the NRC staff to perform Phase 2 decision making per JLD-ISG-2016-01 and NEI 16-05. Mechanisms in Paths 4 or 5 require an Integrated Assessment.

3.0 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, NRC Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.

2. CPNPP Letter TXX-13053, "Comanche Peak Nuclear Power Plant Docket Nos. 50-445 and 50-446 Response to March 12, 2012, Request for Information Enclosure 2, Recommendation 2.1, Flood Hazard Reevaluation Report, of the Near Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," dated March 12, 2013, NRC ADAMS Accession No. ML13074A058.

3. CPNPP Letter TXX-14048, "Comanche Peak Nuclear Power Plant (CPNPP), Docket Nos. 50-445 and 50-446 Submittal of Requested Information Regarding Fukushima Lessons Learned – Flood Hazard Reevaluation Report (TAC NOS. MF1099 and MF1100)," dated April 4, 2014, NRC ADAMS Accession No. ML14100A049.

4. CPNPP Letter TXX-14094, "Comanche Peak Nuclear Power Plant (CPNPP), Docket Nos. 50-445 and 50-446, Submittal of Fukushima Lessons Learned – Flood Hazard Reevaluation Report Supplement 1 (TAC NOS. MF1099 and MF1100)," dated August 14, 2014, NRC ADAMS Accession No. ML14245A136.

5. CPNPP Letter TXX-15111, "Comanche Peak Nuclear Power Plant (CPNPP) Docket Nos. 50-445 and 50-446 Submittal of Request for Additional Information Regarding Fukushima Lessons Learned – Flood Hazard Reevaluation Report (TAC NOS. MF1099 and MF1100)," dated September 22, 2015, NRC ADAMS Accession No. ML15278A306.

6. NRC Staff Requirements Memoranda to COMSECY-14-0037, "Staff Requirements – COMSECY-14-0037 – Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," dated March 30, 2015, NRC ADAMS Accession No. ML15089A236.

7. NRC Letter from William M. Dean, NRC, 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, NRC ADAMS Accession No. ML15174A257.

8. NRC Letter from David L. Skeen, NRC, to Joseph E. Pollock, NEI, "Trigger Conditions for Performing an Integrated Assessment and Due Date for Response," dated December 3, 2012, NRC ADAMS Accession No. ML12326A912.

9. NEI Report 16-05, Revision 1, "External Flooding Assessment Guidelines," dated June 2016, NRC ADAMS Accession No. ML16165A178.

10. 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, NRC ADAMS Accession No. ML16162A301.

11. NRC Letter from Victor Hall, NRC, to Ken J. Peters, CPNPP, "Comanche Peak Nuclear Power 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 (CAC NOS. MF1099 and MF1100)," dated February 11, 2016, NRC ADAMS Accession No. ML16041A228.

12. Rizzo Calculation 16-5718 F-03, Revision 1, "Sensitivity Analysis for Updated Representation of Pipes."

13. CPNPP Letter TXX-17006, "Comanche Peak Nuclear Power Plant (CPNPP) Units 1 and 2, Docket Nos. 50-445 and 50-446, Mitigating Strategies Assessment (MSA) Flood Report, NEI 12-06, Appendix G, Revision 2, G.4.1 Path," dated February 9, 2017.

14. NRC Letter from Joseph M. Sebrosky, NRC, to Ken J. Peters, CPNPP, "Comanche Peak Nuclear Power Plant, Units 1 and 2 – Flood Hazard Mitigation Strategies Assessment (CAC Nos. MF7913 and MF7914)," dated May 9, 2017, NRC ADAMS Accession No. ML17111A960.

15. Westinghouse Report WCAP-18227-P, Revision 0, "Comanche Peak Nuclear Power Plant Units 1 & 2 Flooding Focused Evaluation."

16. CPNPP Procedure ABN-907, Revision 15, "Acts of Nature."

17. CPNPP Technical Requirements Manual, Revision 88.

18. CPNPP ODA-308-13.7.34, Revision 3, "Standard LCOAR for TR 13.7.34 Flood Protection."

19. NRC Interim Staff Guidance JLD-ISG-2012-05, Revision 0, "Guidance for Performing the Integrated Assessment for External Flooding," dated November 30, 2012, NRC ADAMS Accession No. ML12311A214.

20. CPNPP Final Safety Analysis Report, Amendment 107.

4.0 Terms and Definitions

- AB – Auxiliary Building
- APM – Available Physical Margin
- BDB – Beyond Design Basis
- CDB – Current Design Basis
- CFR – Code of Federal Regulations
- CPNPP – Comanche Peak Nuclear Power Plat Units 1 & 2
- CWIS – Circulating Water Intake Structure
- ECB – Electrical and Control Building
- FB – Fuel Building
- FE – Focused Evaluation
- FHRR – Flood Hazard Reevaluation Report
- FIAP – Flooding Impact Assessment Process
- FLEX – Diverse and Flexible Coping Strategies Covered by NRC Order EA-12-049
- FSAR – Final Safety Analysis Report
- ISG – Interim Staff Guidance
- Key SSC – A Structure, System, 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
- MSFHI – Mitigating Strategies Flood Hazard Information
- MSL – Mean Sea Level
- NEI – Nuclear Energy Institute
- NRC – U.S. Nuclear Regulatory Commission
- NTTF – Near Term Task Force commissioned by the NRC to recommend actions following the Fukushima Dai-ichi accidents
- PMF – Probable Maximum Flood
- RAI – Request for Additional Information
- SB1 – Unit 1 Safeguards Building
- SB2 – Unit 2 Safeguards Building
- SCR – Squaw Creek Reservoir
- SSC – Structure, System, or Component
- SSI – Safe Shutdown Impoundment
- SWIS – Service Water Intake Structure
- TB – Turbine Building
- TR – Technical Requirement
- TRM – Technical Requirements Manual
- TSA – Time Sensitive Action
- USGS – United States Geological Survey
- Vistra OpCo – Vistra Operations Company LLC

5.0 Flood Hazard Parameters For Unbounded Mechanisms

The NRC has completed the "Interim Staff Response to Reevaluated Flood Hazards" (Reference 11) related to CPNPP's Flood Hazard Reevaluation Report (References 4 and 5). In Reference 11, the NRC states that the "staff has concluded that the licensee's reevaluated flood hazards information, as summarized in this Enclosure, is suitable for the assessment of mitigation strategies developed in response to Order EA-12-049 (i.e., defines the mitigating strategies flood hazard information described in Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide") for Comanche Peak. Further, the NRC 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 11 includes a summary of the current design basis (CDB) and reevaluated flood hazard parameters, respectively. In Table 1 of the enclosure to Reference 11, the NRC lists the following flood-causing mechanisms for the 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 11, the NRC lists flood hazard information for the following flood-causing mechanisms that are not bounded by the design basis:

- Local Intense Precipitation; and
- Streams and Rivers (PMF plus wave run-up).

These are the reevaluated flood-causing mechanisms that should be addressed in the external flooding assessment. The two non-bounding flood mechanisms for CPNPP are described in detail in the FHRR submittals (References 4 and 5) and in the revised LIP analysis (Reference 12). Table 1 summarizes how each of these unbounded mechanisms was addressed in this external flooding assessment.

Table 1 – Summary of Flood Impact Assessment

	Flood Mechanism	Summary of Assessment
1	Streams and Rivers (PMF)	Path 2 was determined to be pursued for CPNPP since use of flood protection features and procedural controls are used as the site strategy to maintain KSFs [see Flooding Impact Assessment Process (FIAP) Path Determination Table, Section 6.3.3 of NEI 16-05]. The parameters listed in Table 2 are based on the FHRR and MSFHI and were not revised as part of the FIAP.
2	Local Intense Precipitation	Path 2 was determined to be pursued for CPNPP since use of flood protection features is the site strategy to maintain KSFs. The parameters listed in Table 3 are based on the FHRR and MSFHI, which were confirmed to be applicable by the revised LIP analysis.

Table 2 of the enclosure to Reference 11 noted that "The licensee is expected to develop flood event duration parameters and applicable flood associated effects". Tables 2 and 3 below provide the parameters used for the PMF and LIP FEs. These parameters are based on the FHRR, the responses to requests for additional information (RAI) submittals, the MSFHI letter, and the Flooding Mitigating Strategies Assessment (MSA). Table 2 for the PMF is consistent with the MSA submittal, but adds PMF routing timing information for use in the evaluation of the procedural actions related to the PMF. Table 3 for LIP is consistent with the Flooding Mitigating Strategies Assessment (MSA) (Reference 13). The parameters were accepted by the NRC staff assessment of the CPNPP Flooding MSA submittal (Reference 14).

Table 2 – Flood Mechanism Parameters for Streams and Rivers

Parameter Description	Values/Discussion
1. Maximum Stillwater Elevation (ft MSL)	792.7 (SSI) 792.6 (CWIS) (Note 1)
2. Maximum Wave Run-up Elevation (ft MSL)	795.8 (SWIS) 794.6 (SSI Dam) 794.9 (CWIS) (Note 2)
3. Maximum Hydrodynamic/Debris Loading (psf)	Minimal (Note 3)
4. Effects of Sediment Deposition/Erosion	Minimal (Note 4)
5. Other associated effects	N/A (Note 5)
6. Concurrent Site Conditions	Hail High Winds Lightning Ponding Water Precipitation (Note 6)
7. Effects on Groundwater (ft MSL)	N/A (Note 7)
8. Warning Time (hours)	19.89 (Note 8)
9. Period of Site Preparation (hours)	7.71 (Note 9)
10. Period of Inundation (hours)	92.40 (Note 10)
11. Period of Recession (hours)	103.33 (Note 11)
12. Plant Mode of Operations	All (Note 12)
13. Other Factors	N/A (Note 13)

Notes:

1. The maximum stillwater elevation is from the FHRR and MSFHI letter (References 4, 5, and Table 2 of Reference 11). As noted in calculations supporting the FHRR, the MSL datum used in the FHRR is equivalent to the NGVD29 datum referenced by the NRC.
2. The maximum wave run-up elevations are from the FHRR and Table 2 of the MSFHI letter.
3. Per the FHRR and Flooding Mitigating Strategies Assessment (MSA) (Reference 13), hydrodynamic/debris loading is not considered consequential due to the layout of the Service Water Intake Structure (SWIS), Squaw Creek Reservoir (SCR) dam, Safe Shutdown Impoundment (SSI) dam, and SSI equalization channel. This is consistent with the Final Safety Analysis Report (FSAR) Section 3.4.2 statement, "The Service Water Intake Structure is not subject to flood currents; therefore, dynamic water force as a result of flood currents is not a design load" (Reference 15).
4. Due to the site characteristics described in the FHRR and MSA, the effects of sediment deposition and erosion to the site are minimal and monitored annually under the site surveillance program in accordance with Technical Requirement (TR) 13.7.33 (Reference 17).

5. No additional associated effects were considered beyond wind wave run-up, hydrodynamic loads, and debris loads.
6. The 72-hour length of the probable maximum precipitation (PMP) event overlaps with the flood flow exceeding elevation 776 ft MSL at the site during a PMF. Due to this overlap, extreme weather may occur coincident with operators having to take measurements at the Circulating Water Intake Structure (CWIS). Therefore, severe weather conditions such as hail, high winds, lightning, ponding water, and precipitation are considered for the implementation of the portions of surveillance and flood response procedures that require operators to go outside and execute actions.
7. The PMF does not significantly contribute to groundwater and is bounded by the LIP hazard, which has a higher peak flood elevation.
8. Plant Procedure ABN-907 (Reference 16) for flood protection does not specifically credit warning time for the PMF. The procedure initiates a limiting condition of operation action request (LCOAR) and implements Technical Requirements Manual (TRM) TR 13.7.34 (Reference 17) and ODA-308-13.7.34 (Reference 18) when the SCR level exceeds elevation 776 ft MSL. However, plant impact will only occur if a pathway from the SCR to the Turbine Building (TB) has been opened due to maintenance. The limiting case is to have two 108" Circulating Water (CW) Main Condenser Waterbox discharge valves removed from the system for maintenance at the same time. In this case, water level trending is initiated through the hazard barriers controls program as soon as the breach has been initiated and there is rainfall over the SCR watershed. Therefore, the initiation of rainfall over the SCR watershed when a breach has been initiated is considered the action trigger. To reclose the breach by 777.5 ft MSL, isolation of the breach pathways for the two 108" CW Main Condenser Waterbox discharge valves initiates when the SCR level reaches 776.2 ft MSL. The duration between the onset of rainfall over the SCR watershed and the SCR level reaching 776.2 ft MSL is considered the warning time. This is 19 hours and 53 minutes (19.89 hours) after initiation of PMP rainfall.
9. Due to stop logs in the CW discharge tunnel being topped out at elevation 778 ft MSL and the Electrical and Control Building (ECB) being attached to the Turbine Building with a wall containing non-watertight doors, flood levels in the SCR exceeding 778 ft MSL could impact Key SSCs in the ECB. TR 13.7.34 requires that flood protection be in place by elevation 777.5 ft MSL. It is conservatively estimated to take six hours to reinstall two 108" CW Main Condenser Waterbox discharge valves using two teams performing parallel work. This will have the pathways isolated by 777.5 ft MSL. Plant impact will not occur prior to the SCR level exceeding 778 ft MSL. Therefore, the period of site preparation is from 776.2 ft MSL to 778 ft MSL, which is approximately 7 hours and 43 minutes (7.71 hours). The time estimate of six hours for the reinstallation of the valves, which is the minimum period of site preparation, is allowed to be increased based on input from the work groups that will be performing the work activity, but it is not allowed to be decreased to be less than six hours. If the time estimate is increased, the initiation point for closure of the system would be decreased below 776.2 ft MSL to ensure that pathways are isolated by 777.5 ft MSL.
10. Since peak flood levels do not exceed the site grade level of 810 ft MSL, the SWIS operating deck elevation is 796 ft MSL, and that any CW system maintenance openings which create open pathways from the SCR to the TB must be isolated from the SCR prior to flood levels exceeding elevation 777.5 ft MSL, the plant site is not considered to be inundated by the MSFHI PMF. However, following the definition of flood event duration in Figure 6 of JLD-ISG-2012-05 (Reference 19), the period of inundation is considered the period of time between when flood waters exceed 778 ft MSL until the flood level recedes back below 778 ft MSL. This period is 92.40 hrs during the reevaluated PMF.
11. The period of recession is the duration during recession of flood waters from 778 ft MSL back to 776 ft MSL, which is the LCOAR exit condition for special trending of the SCR per the TRM. This duration is 103.33 hrs during the reevaluated PMF.

12. The effects of the PMF were considered under all Modes of Operation. During power operation, there is no potential impact to Key SSCs other than the SSI Dam or those located in the SWIS. The only potential susceptibility to Key SSCs in other locations is during an outage when a circulating water system component that is located below the PMF stillwater elevation has been removed from the system for maintenance.
13. No other factors were considered.

Table 3 – Flood Mechanism Parameters for LIP

Parameter Description	Values/Discussion
1. Maximum Stillwater Elevation (ft MSL)	810.6 (Note 1)
2. Maximum Wave Run-up Elevation (ft MSL)	N/A (Note 2)
3. Maximum Hydrodynamic/Debris Loading (psf)	Minimal (Note 3)
4. Effects of Sediment Deposition/Erosion	Minimal (Note 4)
5. Other associated effects	N/A (Note 5)
6. Concurrent Site Conditions	N/A (Note 6)
7. Effects on Groundwater (ft MSL)	793/810.6 (Note 7)
8. Warning Time (hours)	N/A (Note 8)
9. Period of Site Preparation (hours)	N/A (Note 8)
10. Period of Inundation (hours)	6.7 (Turbine Building) 0.4 (Safety-related Buildings) (Note 9)
11. Period of Recession (hours)	6.7 (Turbine Building) 0.4 (Safety-related Buildings) (Note 10)
12. Plant Mode of Operations	All (Note 11)
13. Other Factors	N/A (Note 12)

Notes:

1. The maximum MSFHI ponding elevation is listed here as the maximum stillwater elevation (Table 2 of Reference 11).
2. The SWIS and SSI dam are the only safety-related structures subjected to wave action. Wave run-up at these structures under PMF conditions is more limiting than wave run-up under LIP conditions. Wind waves at power block structures occurring coincident with a LIP event were screened out as a potential hazard at the CPNPP site in the FHRR based on the following factors: the shallow water depths near buildings, the direction of the flow velocities (away from buildings), and wind dissipation and fetch length shortening due to buildings and other structures located in and near the power block. Therefore, the wind-wave activity for the water levels coincident to the PMF is considered bounding for the determination of water levels on the safety-related structures and wind waves are not evaluated within the power block for LIP.

3. Hydrodynamic loading is not applicable to LIP. No credit is taken for the power block small diameter (less than 48") underground drainage system due to possible debris blockage of drainage catch basins.
4. Due to the site characteristics described further in the FHRR and the MSA, the effects of sediment deposition and erosion to the site are minimal.
5. No additional associated effects were considered.
6. No concurrent site conditions were considered since there is no procedural response to LIP.
7. The FSAR considered a groundwater elevation of 793 ft MSL at the SWIS and 810 ft MSL at other safety-related buildings (Reference 20). It is conservatively assumed that the LIP increases the peak groundwater level to 810.6 ft MSL at safety-related buildings other than the SWIS. This increase is negligible and well within the design margin provided in the structural integrity analyses. Any potential increase in groundwater at the SWIS due to the MSFHI PMF would also be minimal and within the design margin for the building. The FHRR and the Flooding MSA concluded that the exterior walls and floors, including penetrations, of Seismic Category I buildings, are acceptable to mitigate the potential effects of groundwater intrusion. Any groundwater inleakage would be minor in nature and well within the margins existing in the design basis internal flooding analyses and the internal flooding analysis that was performed for LIP in the Flooding MSA. Therefore, the groundwater levels due to LIP will not prohibit the implementation of key safety functions.
8. CPNPP does not have any site preparation or response procedures for LIP. Therefore, CPNPP does not credit LIP warning time or a period of site preparation.
9. The maximum duration of inflow was determined for the Flooding MSA using the MSFHI flood level of 810.6 ft MSL. The maximum duration of inflow into any building entrance is 404 minutes (6.7 hours) into the Turbine Building equipment ramp, which has a threshold elevation of 809.5 ft MSL (Reference 15). The maximum duration of inflow at door entrances to safety-related building areas which have a threshold entrance elevation of 810.5 ft MSL is ≤ 25 minutes (0.4 hrs) (Reference 15).
10. The period of recession describes when flood waters completely recede from the site and the plant continues to be in a safe and stable state that can be maintained indefinitely. For CPNPP, it is determined that the LIP has receded and does not impact the site after water intrusion into the buildings stops. Therefore, the time at which water stops entering buildings was used as the period of recession; this is the same as the period of inundation and the time of recession is not in addition to the time of inundation (not additive in the timeline).
11. The effects of the MSFHI LIP were considered under all Modes of Operation. There are no mode specific considerations required.
12. No other factors were considered.

6.0 Overall Site Flooding Response

6.1 Description of Overall Site Flooding Response

Key SSCs at CPNPP that support core cooling, spent fuel pool cooling, and containment integrity that may be impacted by LIP or flooding from Streams and Rivers are located in the Auxiliary Building (AB) Electrical and Control Building (ECB), Fuel Building (FB), Safeguards Buildings (SB) 1 & 2, and SWIS. A conservative list of Key SSCs was developed based on site pipe rupture safe shutdown calculations, which evaluated the lowest safety-related SSC susceptible to flooding in each room, and supplemental information. This list includes more SSCs than would be required by the definition of Key SSCs. Other structures that contain Key SSCs (e.g., Containment Buildings and Diesel Generator Buildings) were determined to not be susceptible to flooding from LIP or flooding from Streams and Rivers. Key SSCs located in the FB were screened out based on plant layout and room flood elevations. (Reference 15)

The lowest susceptible SSCs included in the Key SSC list are:

- AB – 480 VAC motor control center and transfer switches in the Boric Acid Pump Transfer Area
- ECB – 125/250 VDC switchboards in the Train C Universal Power Supply and Distribution Rooms
- SB1 – 480V motor control centers in the Train A Switchgear Room
- SB2 – 480V motor control centers in the Train A Switchgear Room and 790 ft MSL Hallway
- SWIS – Station Service Water pumps and associated electrical

The Key SSCs are protected from the effects of LIP and a PMF by incorporated passive and active flood protection features. Passive incorporated flood protection features include onsite natural drainage including the site topography (nominal plant grade is 810.0 ft MSL and floor entryway elevations for all buildings/structures that house safety-related equipment are at elevation 810.5 ft MSL), vault and manhole covers of safety-related structures, the Safe Shutdown Impoundment (SSI) dam, and exterior walls, roofs, and floors of safety-related structures. Incorporated active flood protection features include sump pumps, watertight doors, wall check valves, floor drain check valves, and SCR and SSI water level indication. Temporary passive flood protection features include CW discharge tunnel stop gates at the CW discharge structure when the SCR elevation is less than 778 ft MSL. Additionally, the site procedurally controls the opening of pathways to the SCR to prevent the possibility of a PMF from generating flooding in the Circulating Water system that could backup into the Turbine Buildings and adjacent ECB if a Circulating Water system component below elevation 790 ft MSL was removed from the system for maintenance. It was confirmed in the Focused Evaluation that there are no additional pathways from the SCR to be considered as a result of using an increased flood level of 792.6 ft MSL from the FHRR for the response strategy evaluation.

Though not credited in this evaluation, additional defense-in-depth is provided by FLEX as shown in the Flooding MSA addressing the potential for an extended loss of power occurring coincidently with a LIP or Streams and Rivers flooding event (Reference 13).

6.2 Summary of Plant Modifications and Changes

There are no plans to procure and implement new protection features to prevent or limit accumulation of water in areas with Key SSCs due to the reevaluated LIP or PMF. The site has initiated procedure changes to increase the margin for closure of pathways to the SCR for the PMF and preventative maintenance program changes to ensure that the credited storm drainage piping is adequately maintained and fuel oil storage tank covers are maintained watertight.

7.0 Flood Impact Assessment

7.1 Local Intense Precipitation

7.1.1 Description of Flood Impact

Table 2 in the MSFHI letter identifies the maximum LIP ponding elevation in areas around the power block as 810.6 ft MSL. The revised LIP analysis confirmed that the MSFHI flood elevation of 810.6 ft MSL remains bounding (Reference 12). The inflow volumes determined in the MSA were also determined to be bounding and suitable for use in the Focused Evaluation (Reference 15). LIP generating a maximum ponding level of 810.6 ft MSL would cause ponding water exceeding the building entryway floor elevation of 810.5 ft MSL to enter into buildings containing Key SSCs. The critical flood elevation of the lowest Key SSC in each room was evaluated in Reference 15. The Key SSCs are protected by:

- Onsite natural drainage.
- Vault and manhole covers of safety-related structures.
- Floor drain check valves that prevent flooding that enters an adjacent room from backing up through the floor drain system into watertight compartments.
- Walls, roofs, and floors of the buildings. All Key SSCs are located within Seismic Category I structures.
- Sump pumps in the AB, ECB, FB, SB1, and SB2.
- Check valves in the walls of the safety chiller rooms that allow flow out of the rooms but not into them.
- Watertight doors

An APM of less than 1" is considered small APM for a Key SSC located inside a building. Six such locations were identified (Reference 15). These are:

1. APM of 0.3" for the 480 VAC Motor Control Centers 1EB1-2 and 1EB3-2 in SB1 1-083,
2. APM of 0.3" for the 125/250 VDC Switchboard 1D2 in ECB X-129,
3. APM of 0.6" for the 480V Motor Control Center 2EB1-3 in SB2 2-070,
4. APM of 0.7" for the 480 VAC Motor Control Center 1EB4-1 in AB X-179,
5. APM of 0.8" for the 480 VAC Switchgear 2EB1 in SB2 2-083, and
6. APM of 0.8" for the 125/250 VDC Switchboard 2D2 in ECB X-126.

Reference 15 discusses the conservatisms embedded in the determination of the impact of LIP. These conservatisms include using HMR 52 as opposed to a site-specific PMP analysis, use of a 6-hr event for the LIP analysis versus the definition of LIP being a 1-hr event, not crediting roof storage or attenuation of rainfall from roofs, assuming impervious grading in the power block, and not crediting the underground storm drainage piping in the power block and surface drainage features (e.g., swales and drainage ditches).

An APM of 137,204 ft^3 was determined for protection of the Electrical and Control Building from flooding in the Turbine Buildings (Reference 15). This provides 34% margin on the capacity of the Units 1 and 2 Turbine Building Condenser Hot Well Pits.

Since the maximum flood elevation does not impact any Key SSCs, there are no consequential flood conditions and therefore, there was no need to determine the consequential flood.

7.1.2 Adequate APM Justification and Reliability Flood Protection

The 34% margin on the capacity of the Condenser Pits is considered substantial and adequate, especially considering the conservatisms embedded in the determination of the FHRR calculations, as discussed in Reference 15. The small APMs identified for the six rooms are considered adequate based on a review of the site internal flooding calculations, assessments performed in the MSA of the components, and the conservatisms embedded in the determination of the inflow volumes, as discussed above. Therefore, the APM is considered adequate.

An evaluation of the reliability of the credited storm drainage system determined that it is capable of passing sufficient flow to accommodate the reevaluated flood flow rate while maintaining the flood height not greater than 810.6 ft MSL. The evaluation also assessed the potential for scour and determined that the flows and velocities are approximately the same as those used in the original design. A correction action has been opened to evaluate the lack of scour protection at a storm drainage outfall. As discussed previously, preventative maintenances are being added to ensure adequate maintenance of the credited storm drainage system. The reliability of other credited flood protection features for LIP (Exterior Walls, Roofs, & Floors of Seismic Category I Structures; Vault and Manhole Covers; Sump Pumps; Backflow Prevention Check Valves; Watertight Doors) was assessed and determined to be adequate.

Therefore, APM is considered adequate and flood protection features are considered reliable for LIP noting the exception for the northwest drainage system outlet scour protection that has been entered into the corrective action program. (Reference 15)

7.1.3 Adequate Overall Site Response

This section does not apply since manual actions are not required to implement the protection strategy for Local Intense Precipitation.

7.2 Streams and Rivers Flooding – Squaw Creek Reservoir

7.2.1 Description of Flood Impact

Table 2 in the MSFHI letter identifies the maximum PMF stillwater elevation of 792.7 ft MSL with a maximum wave run-up elevation of 795.8 ft MSL at the SWIS and 794.6 ft MSL at the SSI Dam. The Key SSCs potentially challenged by these flood levels are the SSI Dam, the SWIS, and the Station Service Water System safety-related equipment located in the SWIS. The Key SSCs are protected by the SSI Dam and SWIS exterior walls. The critical flood elevation for the SSI Dam is 796 ft MSL, which is the top of the dam. This correlates to an APM against wave run-up of 1.4 ft and 3.3 ft for stillwater. The operating deck of the SWIS is located at elevation 796 ft MSL. This is the lowest floor elevation of safety-related equipment in the SWIS and the floor elevation for the SSI level transmitters. This results in an APM of 0.2 ft for wave run-up (waves affecting the exterior walls of the structure) and 3.3 ft for stillwater (filling up of the SWIS interior space).

If a circulating water system component located below 792.7 ft MSL is removed from the system for maintenance in the Turbine Building, then there is the potential for flooding of the ECB if a PMF occurs

when a component is removed and if it cannot be reinstalled prior to the PMF stillwater elevation exceeding 778 ft MSL and reaching the elevation of the component. This is prevented through procedural controls, as discussed further in Section 7.2.3.

Occurrence of a flood condition is monitored through the use of multiple water level indicators. There are four SSI level transmitters located in the SWIS that provide indication on the control board in the control room from two indicators. The SSI level transmitters have the same APM as the stillwater APM for the SWIS, which is 3.3 ft. At the CWIS, there is a United States Geological Survey (USGS) gauge recorder station with a satellite uplink that uploads water levels to the USGS website in 15 minute increments. This data is posted to the USGS website every hour under normal conditions and may be posted more frequently for rapidly changing hydrologic conditions. The USGS station can be read locally at the CWIS. There is also a wire gauge located at the CWIS that can be manually operated to determine the SCR level. Both the USGS recorder and the manual wire gauge are located above the operating deck of the CWIS, which has an elevation of 795'-9" MSL. The APM for the water level indication at the CWIS is determined based on accessibility to the CWIS. The maximum wave run-up elevation at the CWIS is 794.9 ft MSL, which may slow down an operator from reading the devices if actual wave run-up exceeded this value but would not inhibit the action. Therefore, the APM is based on the stillwater elevation at the CWIS of 792.6 ft MSL, which yields an APM of 3.2 ft.

Since the maximum flood elevation does not impact any Key SSCs, there are no consequential flood conditions and therefore, there was no need to determine the consequential flood.

7.2.2 Adequate APM Justification and Reliability Flood Protection

The CW discharge tunnel stop gates are a temporary flood protection feature used during maintenance when the SCR elevation is less than 778 ft. The stop gates are designed to isolate the CW discharge tunnel from the SCR up to SCR elevation of 778 ft and are inspected prior to use. Therefore, the stop gates are considered reliable.

An evaluation of the SSI Dam was performed and it was determined that the main potential hazard to the dam is wave action occurring on the slopes. The slopes of the dam were designed to be subjected to wave action. The dam is inspected yearly to evaluate the condition of the dam, including the slope protection. If required, the slope protection will be replaced/restored such that the dam can maintain its function to protect the safe shutdown water inventory. The dam is a Seismic Category I structure. Additionally three feet of freeboard against stillwater levels at levees is generally accepted as adequate to address uncertainties for riverine flooding per Title 44 of the Code of Federal Regulations, Section 65.10 (44 CFR 65.10); the SSI Dam has an APM of 3.3 ft for stillwater. Therefore, the APM is considered sufficient for the dam due to these reasons and the dam is considered reliable.

The evaluation of the SWIS exterior walls to protect the interior equipment from the effects of the PMF determined that the APM of 0.2 ft for wave run-up is adequate and that the structure is reliable due to:

- the conservatisms built into the analysis such as using HMR 52 as opposed to a watershed-specific PMP analysis, using conservative contraction and expansion coefficients, and not numerically modeling wave transformation and propagation, as discussed in Reference 15,
- the margin in the design of the structure as a Seismic Category I structure, and

- the fact that the deck above the trash racks on the exterior of the structure at elevation 796 ft MSL provides separation from the outboard wall of the structure that is adjacent to the pump room and will change the breaking characteristics of the wind waves reducing the wave run-up elevation.

Flood-up of the SWIS interior space results in an APM of 3.3 ft to the floor elevation of 796 ft MSL where safety-related equipment and SSI level transmitters are located. The reevaluated stillwater flood level at the SWIS of 792.7 ft MSL is bounded by the hydrostatic design basis for the structure of 793 ft MSL. The APM of 3.3 ft to safety-related equipment and the SSI level transmitters is considered representative for the structure as opposed to using 0.3 ft for the hydrostatic design basis due to the additional structural margin available in the design calculations for the SWIS that evaluated concurrent PMF and safe shutdown earthquake conditions. The design calculations showed that the static and dynamic loads due to the water elevation of PMF with wave run-up do not comprise the majority of the load for each case. As discussed in the MSA, Section 4.3.2 of the FHRR provides reasonable assurance that the SWIS will maintain its function given a combined events PMF with wave run-up level of 795.95 ft MSL. The discussion includes the acceptability of any hydrodynamic or debris loading effects on the SWIS wall, obstruction of the SWIS intake area due to debris, and sedimentation. The MSFHI PMF with wave run-up level is 795.8 ft MSL and is bounded by the discussion in the FHRR. Therefore, the SWIS will perform its function given the MSFHI PMF.

The evaluation of APM for the SWIS due to stillwater determined a small margin threshold of 0.78 ft using the same methodology as was used to develop the small margin threshold for the CWIS for the Recommendation 2.3 Flooding walkdowns. The APM of 3.3 ft is much greater than 0.78 ft, which shows that the APM for the safety-related equipment and SSI level transmitters located in the SWIS is adequate.

The APM for the USGS gauge recorder and the manual wire gauge located at the CWIS is 3.2 ft. A small margin threshold of 0.99 ft was determined for the Recommendation 2.3 Flooding walkdowns. An APM of 3.2 ft is much greater than the small margin threshold of 0.99 ft, which shows that the APM is adequate.

The use of water level indication for monitoring flood conditions is considered reliable due to the redundancy available by having four SSI level transmitters located in the SWIS with two readouts on the control board, a manual readout of the USGS gauge can be performed at the CWIS, and that there is a manual wire gauge at the CWIS that can be used as backup if the USGS recorder is not functional.

Therefore, APM is considered adequate and reliable for the PMF. (Reference 15)

7.2.3 Adequate Overall Site Response

This evaluation, performed in accordance with NEI 16-05 Appendix C, has demonstrated the overall site response to flooding in Streams and Rivers is adequate. The plant response strategy at the time of FHRR preparation was to implement flood protection procedures and surveillances when the SCR level exceeded 776 ft MSL to protect Key SSCs from inundation due to a circulating water system component located below the PMF elevation being removed from the system for maintenance in the Turbine Building. This procedural approach is being enhanced by modifying the hazard barriers controls program to add in additional controls and increased water level monitoring frequency when a pathway from the SCR to the TB has been created by removal of a CW component and there is rainfall occurring in the

watershed. The revised strategy was evaluated using the criteria in NEI 16-05 Appendix C. The following sections outline the results of evaluation performed in Reference 15.

7.2.3.1 Defining Critical Path and Identifying Time Sensitive Actions (TSAs)

Two TSAs have been identified:

1. Trending of SCR/SSI level and forecasting when the level will exceed 777.5 ft MSL.

2. Closing open pathway(s) to the SCR prior to flood level reaching 777.5 ft MSL.

7.2.3.2 Demonstration all TSAs are Feasible

Trending the SCR level rise can be accomplished by the control room acquiring data from the USGS lake level instrumentation using the USGS gauge or through the SSI level instrumentation. Trending of the SCR level is considered a short duration (minutes) task to execute since procedure controls are being put in place to ensure that the amount of time it takes to establish SCR monitoring is determined such that an operator can be stationed at the CWIS if readings from the CWIS gauge will be implemented instead of using the SSI instrumentation. The manual methods located at the CWIS are considered a backup contingency if trending cannot be accomplished directly from the control room using the SSI instrumentation. Therefore, the TSA to trend the SCR water level rise is judged to be feasible.

The Recommendation 2.3 flooding walkdowns performed a tabletop simulation of the timing to reinstall a 108" condenser discharge valve. The simulation determined that reinstallation was feasible considering the current design basis PMF. Section 7.2.3.7 evaluates the adequacy of the site response strategy, including timing, for the removal of two 108" condenser discharge valves considering the reevaluated PMF.

7.2.3.3 Establishing Unambiguous Procedural Triggers

The procedural trigger for flood response required by the TRM is that the Squaw Creek Reservoir Level is read to be greater than or equal to elevation 776' using USGS data read at the CWIS or using the wire gauge manual method at the CWIS Level Recorder. This is identified in daily shift surveillance forms, the TRM, and ABN-907. The revised hazard barriers controls program requires that an evaluation be completed prior to component removal to determine the required monitoring frequencies of the SCR level when a component is planned to be removed from the system for maintenance. This includes checking the weather forecast prior to removal of a component from the system for maintenance to determine if severe heavy rainfall is forecasted in the watershed area that poses risk to the activity. The determination of the monitoring frequencies includes consideration for how long it will take to reinstall the removed component or otherwise isolate the system. Therefore, the procedural trigger is considered to be unambiguous, objective, and have adequate timeframe for receipt such that the trigger is adequate.

7.2.3.4 Proceduralized and Clear Organizational Response to a Flood

The Operations department has the responsibility for command and control of the procedural response per the ABN-907 and the TRM. The revised hazard barriers controls program provides clear roles and responsibilities related to control of Circulating Water System breaches.

7.2.3.5 Detailed Flood Response Timeline

The revised hazard barriers controls program requires that prior to an outage, engineering preemptively establishes the augmented SCR level monitoring intervals that are applicable to the specific pathway that will be opened in the CW system during an outage. These monitoring intervals are based on the design basis PMF hydrograph and are determined to ensure that the pathways are isolated prior to the SCR level reaching 777.5 ft MSL (0.5 ft MSL of margin to 778 ft MSL, which is the top elevation of the CW discharge tunnel stop logs and the access opening at the operating deck of the CW discharge structure). Operations then uses the augmented SCR level monitoring intervals once a pathway has been breached and rainfall is occurring over the SCR watershed. The engineering evaluation also determines the point when closure of the system breach must begin. An evaluation of the limiting case of re-installing two 108" CW discharge valves removed simultaneously for maintenance was considered in Reference 15. Figure 1 details the timeline of required actions. Plant impacts will not occur until the SCR level exceeds 778 ft MSL. Therefore, the time margin is 1.6 hrs, which is the duration for the SCR level to rise from 777.5 ft MSL to 778.0 ft MSL.

7.2.3.6 Accounting for the Expected Environmental Conditions

Reference 15 evaluated the potential impact of expected environmental conditions, as required in NEI 16-05. These potential conditions include adverse weather, temperatures, conditions hazardous to the health and safety of personnel, lack of lighting, radiation, and noise and vibration. It was determined that none of these conditions would degrade the implementation of procedural actions, surveillances, and isolation of open pathways to the point where flood levels would exceed a critical level for an open pathway prior to its isolation.

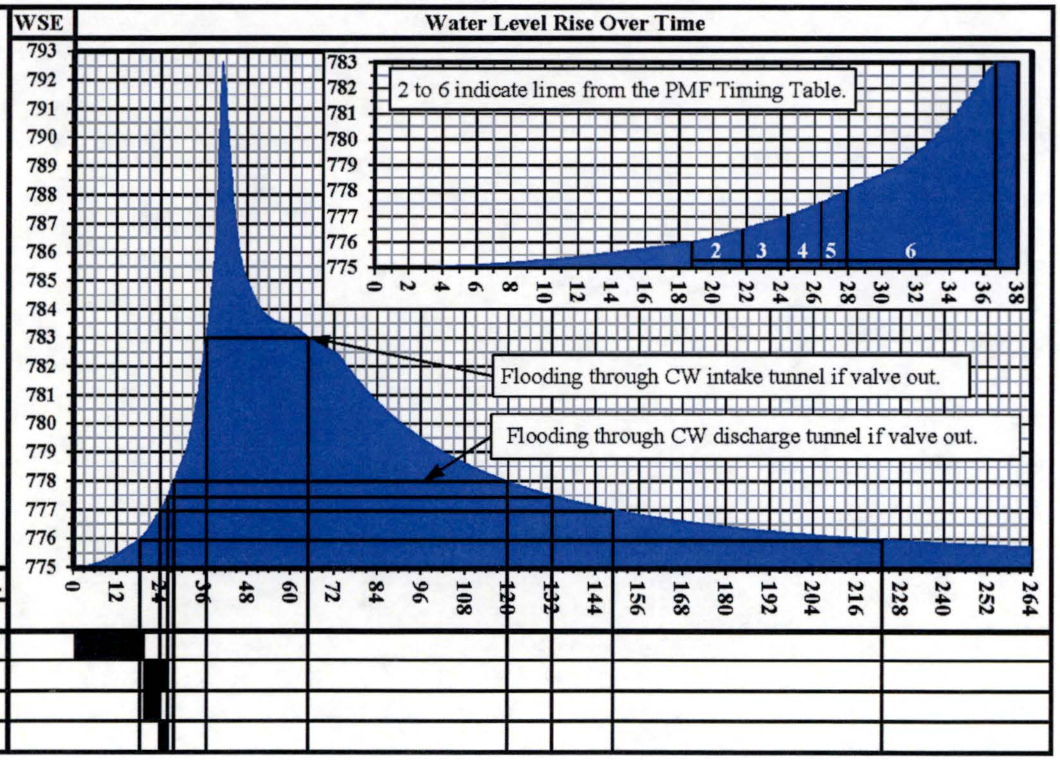
7.2.3.7 Demonstration of Adequate site response

The site response to flooding in Streams and Rivers has been demonstrated as adequate by meeting the guidelines in NEI 16-05 Appendix C. All TSAs were identified and determined to be feasible. The time margin was calculated as 1.6 hours given the time available as 7.6 hours and the time required to execute is less than or equal to 6 hours. The organizational structure and command and control are clearly laid out. Finally, the environmental conditions are not expected to impact the completion of procedural actions.

Figure 1 – PMF Response Strategy Timeline for 108" CW Valve Removal

Reevaluated PMF Timing		
Int.	Elevation (ft MSL)	Time to go Between Elevations (hours)
1	775.0 - 776.0	18.33
2	776.0 - 776.5	3.17
3	776.5 - 777.0	2.44
4	777.0 - 777.5	2.06
5	777.5 - 778.0	1.60
6	778.0 - 783.0	8.85
7	778.0 - 778.0	92.40
8	783.0 - 783.0	29.05
9	783.0 - 778.0	54.50
10	778.0 - 776.0	103.33

ID	Task Names	Dur.	Avail.
-	Tracking of system breach initiated	(hrs)	
1	Montitor SCR/SSI Level Every 2 hours	20.0	N/A
2	Close System Breach	6.0	6.5
3	Montitor SCR/SSI Level Every 1 hour	4.0	N/A
4	Montitor SCR/SSI Level Every 30 min.	2.0	N/A



8.0 Conclusions

The MSFHI Letter showed that two flooding mechanisms were not bounded by the CDB and were required to be evaluated in this FE. The MSFHI letter LIP maximum water level exceeds the elevation of building entryways that that are pathways to Key SSCs. An evaluation of the APM for LIP using Appendix B in NEI 16-05 showed that there is adequate margin for Key SSCs and that LIP flood protection features are reliable, noting the exception for the northwest drainage system outlet scour protection that has been entered into the corrective action program.

The second mechanism that was not bounded by the CDB is flooding from Streams and Rivers. The FE of this hazard demonstrated that the APM for the hazard is adequate and that the flood protection features utilized are reliable by meeting the requirements of Appendix B in NEI 16-05. The FE of this hazard also demonstrated that the site response is adequate by meeting the requirements of Appendix C in NEI 16-05.

Finally, the MSA demonstrated that mitigating strategies (FLEX) will be available to maintain/restore KSFs as a defense-in-depth measure if an extended loss of power occurred coincidently with a LIP or PMF event. Additional information can be found in the Flooding MSA (Reference 13).

This submittal completes the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter without the need for the NRC staff to perform Phase 2 decision making per JLD-ISG-2016-01 and NEI 16-05.