Entergy

**Entergy Operations, Inc.**
River Bend Station
5483 U. S. Hwy. 61
St. Francisville, LA 70775

**Steven P. Vercelli**
General Manager – Plant Operations

RBG-47770

50-458

June 28, 2017

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

SUBJECT: Focused Evaluation of External Flooding
River Bend Station – Unit 1
Docket Nos ~~50-548~~ 50-458
License Nos. NPF-47

Dear Sir or Madam:

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for flooding. One of the required responses in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report (FHRR). Entergy Operations, Inc. submitted the FHRR for River Bend Station (RBS) on March 12, 2014 (Reference 2). Entergy provided response to a request for additional information of the FHRR in Reference 3.

A second required response of Reference 1 directed licensees to submit an Integrated Assessment Report for any flood causing mechanism not bounded by the current design basis. In Reference 4, the NRC affirmed that licensees need to address the reevaluated flooding hazards not bounded by the current design basis by a revised integrated assessment process that applies a graded approach. This requirement was confirmed by the NRC in more detail in Reference 5. Guidance for performing the revised process is included in Reference 6 and endorsed by the NRC in Reference 7. The revised process applicable to RBS is the Focused Evaluation (FE). In Reference 8, the NRC concluded that the reevaluated flood hazards information, as summarized in the enclosure, is suitable input for the FE.

The enclosure to this letter provides the FE for External Flooding at RBS. The Path 2 FE concluded that permanent passive protection is in place for the Streams and Rivers and the Local Intense Precipitation (LIP) flood causing mechanisms. Streams and Rivers flood causing mechanism includes Probable Maximum Flood (PMF) on West Creek and PMF on the Mississippi River. This submittal of the FE completes the actions related to external flooding required by Reference 1.

A010
NRR

This letter contains no new regulatory commitments.

Should you have any questions concerning the content of this letter, please contact Tim Schenk at 225-381-4177.

Designate as original JMS

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 28, 2017.

Sincerely,

SPV / dhw

RBF1-17-0073
Enclosure: 2017 Focused Evaluation for External Flooding at River Bend Station

REFERENCES:

1. NRC letter to Entergy, *Request for Information (RFI) Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the NTTF Review of Insights from the Fukushima Dai-ichi Accident*, dated March 12, 2012 (ML12053A340)
2. Entergy letter to NRC, *Required Response 2 to March 12, 2012, Request For Information, Enclosure 2, Recommendation 2.1;* River Bend Station, Unit 1 Flooding Hazard Re-Evaluation Report, dated March 12, 2014 (RBG-47447) (ML14073A647)
3. Entergy letter to NRC, River Bend Station *Request for Additional Information Regarding Flooding Hazard,* dated May 27, 2015 (RBG-47573) (ML15162A272)
4. *NRC Staff Requirements Memoranda to* COMSECY-15-0019, Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants dated July 28, 2015 (ML15209A682)
5. NRC Letter to Entergy, *Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events*, dated September 1, 2015 (ML15174A257)
6. Nuclear Energy Institute (NEI), *Report NEI 16-05 [Rev 1], External Flooding Assessment Guidelines*, dated June 2016 (ML16165A178)
7. U.S. Nuclear Regulatory Commission, *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 June 11, 2016 (ML16162A301)
8. NRC Letter to Entergy, River Bend Station, Unit 1, *Staff Assessment of Response to 10 CFR 50.54(f) Information Request-Flood Causing Mechanism Reevaluation* dated August 31, 2016 (CAC NO. MF3675) (ML16204A207)

cc: U.S. Nuclear Regulatory Commission
Regional Administrator, Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

U. S. Nuclear Regulatory Commission
ATTN: Lisa Regner
Project Manager
NRR/DORL
Mail Stop 8 H4A
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

NRC Senior Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

U. S. Nuclear Regulatory Commission
ATTN: Mr. Joseph Sebrosky
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation
Mail Stop O-13F15M
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Central Records Clerk
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, TX 78711-3326

Department of Environmental Quality
Office of Environmental Compliance
Radiological Emergency Planning and Response Section
Ji Young Wiley
P.O. Box 4312
Baton Rouge, LA 70821-4312

Enclosure to

RBG-47770

2017 Focused Evaluation for External Flooding at River Bend Station

Entergy

*ENTERGY NUCLEAR*
*Engineering Report Cover Sheet*

**Engineering Report Title:**

**2017 FOCUSED EVALUATION FOR EXTERNAL FLOODING AT RIVER BEND STATION**

**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.** 71168

**Report Origin:** ☐ Entergy ☒ Vendor
Vendor Document No.: ENTCORP043-REPT-004

**Quality-Related:** ☐ Yes ☒ No

Prepared by: See AS / See AS — Date: See AS
Responsible Engineer (Print Name/Sign)

Design Verified: N/A — Date: N/A
Design Verifier (if required) (Print Name/Sign)

Reviewed by: See AS / See AS — Date: See AS
Reviewer (Print Name/Sign)

Approved by: See AS / See AS — Date: See AS
Supervisor / Manager (Print Name/Sign)

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|---|---|---|

| Title: | 2017 FOCUSED EVALUATION FOR EXTERNAL FLOODING AT RIVER BEND STATION | REPORT NO.: ENTCORP043-REPT-004<br>REVISION: 0<br>Client: Entergy<br>Project Identifier: ENTCORP043 |
|---|---|---|

| 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.)<br>**Superseded Project Report No.** _____ | ☐ | ☒ |

**Scope of Revision:**
Initial Issue

**Revision Impact on Results:**
N/A

**Safety-Related** ☐ **Non-Safety-Related** ☒

**Originator:** **Brian Froese** Digitally signed by Brian Froese Date: 2017.06.15 08:52:17 -04'00'

**Design Verifier [1] (Reviewer for Non-Safety-Related):** **Jared Monroe** Digitally signed by Jared Monroe Date: 2017.06.15 09:04:20 -04'00'

**Approver:** **Mike Cymbor** Michael Cymbor 2017.06.15 08:09:38 -05'00' **Date:** **6/15/2017**

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

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|---|---|---|

| 2017 FOCUSED EVALUATION FOR EXTERNAL FLOODING AT RIVER BEND STATION | REPORT NO.: ENTCORP043-REPT-004 |
|---|---|
| | REVISION: 0 |

**PROJECT REPORT REVISION STATUS**

| REVISION | DATE | DESCRIPTION |
|---|---|---|
| 0 | 6/15/2017 | Initial Issue |

**ATTACHMENT REVISION STATUS**

| APPENDIX NO. | NO. OF PAGES | REVISION | ATTACHMENT NO. | NO. OF PAGES | REVISION |
|---|---|---|---|---|---|
| N/A | | | | | |

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# RIVER BEND STATION
# FLOODING FOCUSED EVALUATION SUMMARY

## 1 EXECUTIVE SUMMARY

River Bend Station (RBS) 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 12, 2014 (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 September 4, 2015 (Reference 7). No changes to the flooding analysis have been performed since the issuance of the MSFHI letter and this flooding analysis will serve as input to this Focused Evaluation (FE). There are two (2) mechanisms that were found to exceed the design basis flood level at RBS. These mechanisms are listed below and are included in this FE:

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

Associated effects (AE) and flood event duration (FED) parameters for the LIP and West Creek PMF flood mechanisms were assessed and submitted as a part of the FHRR. These parameters were not developed for the Mississippi River PMF since the maximum flood elevation is well below site grade and any safety-related equipment.

This FE concludes there is 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 RBS, the FHRR was submitted on March 12, 2014 (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 13 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
- 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
- NRC – 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
- RFI – Request for Information
- VBS – Vehicle Barrier System

# 4 FLOOD HAZARD PARAMETERS FOR UNBOUNDED MECHANISMS

The NRC has completed the "Interim Staff Response to Reevaluated Flood Hazards" (Reference 7) which contains the MSFHI related to RBS' 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
- Streams and Rivers

These are the reevaluated flood-causing mechanisms that should be addressed in the external flooding assessment. The two non-bounding flood mechanisms for RBS 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 RBS 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 all demonstrated. |
| 2 | Streams and Rivers | |

# 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 PMF mechanisms' resultant water surface elevations at RBS. For these mechanisms, two-dimensional hydrodynamic computer models were created using the FLO-2D software. These FLO-2D models were developed based on RBS site features including: topography, site location, VBS layout, channels and structures. The results of these FLO-2D evaluations are included in the FHRR. Potential pathways for water intrusion into buildings/structures through gaps in doors were also evaluated in the FHRR.

This FE credits passive protection features to demonstrate that Key SSCs are protected during the two (2) flooding mechanisms. All Key SSCs are located in flood protected areas or are situated at a minimum elevation of 98 feet (ft) MSL per Section 2.3 of the FHRR (Reference 2), thus the site is considered protected from flooding up to 98 ft MSL. For the LIP, this is slightly below the maximum flood elevation of 98.3 ft MSL and location-specific evaluations at three doors were included in the FHRR to ensure Key SSCs are not impacted. These doors are maintained closed and sealed during normal operations per security and operational procedures. For the West Creek PMF, the maximum flood elevation of 95.1 ft MSL is below the protected elevation of 98 ft MSL and Key SSCs are not impacted. The Mississippi River PMF peak elevation of 59.7 ft MSL is significantly (>30 ft) below the site grade elevation of 95 ft MSL and therefore only the West Creek PMF is evaluated in this FE as it is the bounding Streams and Rivers flood.

No manual actions or active components are required by the site to protect Key SSCs for these events. Though not credited in this FE, additional defense-in-depth is provided by FLEX as confirmed in the MSA (Reference 12).

## 5.2 SUMMARY OF PLANT MODIFICATIONS AND CHANGES

None.

# 6 FLOOD IMPACT ASSESSMENT

## 6.1 LOCAL INTENSE PRECIPITATION – PATH 2

### 6.1.1 Description of Flood Impact

The ISR identified a LIP stillwater elevation of 98.3 ft MSL. This is greater than the existing CDB controlling flood elevation of 96 ft MSL, however, equipment in buildings not located in flood protected areas are at a minimum elevation of 98 ft MSL per Section 2.1 of the FHRR (Reference 2). It was determined there are no impacts to Key SSCs at RBS due to the LIP event. LIP flood water levels exceed the minimum protected elevation of 98 ft MSL in two areas at the RBS site, but do not inundate SSCs important to safety as stated in Section 5.2 of the FHRR (Reference 2). Door CB-098-17 may allow water ingress, but Door CB-098-14 prevents flood waters from impacting or inundating SSCs important to safety. Doors AB-098-03 and AB-098-04 will not be compromised by flood elevations based on the evaluation results. There are no manual actions or active components credited in the FHRR.

### 6.1.2 Adequate APM Justification and Reliability of Flood Protection

The three doors discussed in Section 6.1.1 were evaluated for adequate APM. Per Section 5.1.1 of the FHRR (Reference 2), up to 0.3 ft of ponding will occur outside door CB-098-14 after leaking through door CB-098-17. Door CB-098-14 is watertight and per Specification 210.462 (Reference 17), these doors are designed to withstand 28 ft head of water from either side of the doors. Therefore, there is ample APM for Door CB-098-14. Doors AB-098-03 and AB-098-04 were evaluated against the criteria for being "watertight" in EC 49418 (Reference 16). It was determined that with the increased hydrostatic pressure from flooding up to 98.3 ft MSL, the calculated maximum leakage rates are 0.7181 gpm and 1.436 gpm for doors AB-098-03 and AB-098-04, respectively. Based on these leakage rates and the corresponding door hydrographs from the FHRR (Reference 2, Appendix B), the total leakage into the Auxiliary Building is conservatively estimated to be 630 gallons. Based on drawings PID-32-09P (Reference 20), EM-034C (Reference 22), EB-040C (Reference 23), EB-040A (Reference 24), and EB-040B (Reference 25), all of the leakage is expected to end up in floor drain sump tanks DFR-TK5A and DFR-TK5B. The sump tank level is controlled at a maximum of 32 inches (Reference 21). This is approximately half the tank heights, which are 5 ft 4 5/8 inches (References 18 & 19) or 64 5/8 inches. Therefore, each sump tank will have a minimum of half of the 650 gallon design capacity (References 18 & 19) as additional capacity, or 325 gallons each, before the sump level will reach the floor. Thus, the combined additional capacity of both sumps DFR-TK5A and DFR-TK5B is a minimum of 650 gallons. This bounds the 630 gallons of maximum leakage through doors AB-098-03 and AB-098-04 such that all leakage will be fully contained in the sump tanks. Therefore, there is additional APM for these three doors. However, 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 the LIP analysis are conservative, this APM is adequate. The following are examples of conservatisms used in the LIP and PMP analyses (References 9 & 11, respectively):

1. Small openings in each VBS block were conservatively assumed to be blocked (i.e., the VBS is impervious).

2. Conservative HMR-51/52, which determine the greatest rainfall rates theoretically possible for the United States east of the 105$^{th}$ meridian (References 14 & 15), were used for the PMP input. A site-specific study would have reduced LIP results substantially and likely below the protected elevation of 98.0 ft MSL.

3. The site drainage network was assumed to be non-functional. Culverts were considered to be blocked, and storm sewers were not considered. The culverts that convey flow below South Plant Road were considered non-functional.

Per the discussion above, leakage through doorways from hydrostatic forces due to the maximum LIP flood elevation of 98.3 ft MSL was evaluated and determined would be fully contained in the sump tanks. Hydrodynamic and debris loading forces are not applicable to the LIP floods since, as discussed in the MSA (Reference 12), 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 in Section B.2.2.2 in NEI 16-05.

### 6.1.3 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.

## 6.2 Streams and Rivers – Path 2

### 6.2.1 Description of Flood Impact

The PMF on the West Creek will not impact any structures that contain Key SSCs. As discussed in Section 5.1, the Mississippi River PMF is not included in this FE since it is significantly below site grade (>30'), which is taken to be 95 ft MSL (Reference 2, Section 2.1.2) and is bounded by the West Creek PMF. Protection of all Key SSCs is provided by site grade and building external features, which are permanent and passive. There are no manual actions or active components credited in the FHRR.

**Table 2 – West Creek PMF APM**

| West Creek PMF Maximum Reevaluated Elevation | Site Flood Protection Height | APM |
|---|---|---|
| 95.1 ft MSL | 98.0 ft MSL | 2.9 ft |

## 6.2.2 Adequate APM Justification and Reliability of Flood Protection

Protection of all Key SSCs is provided by site topography, the building exterior walls and door seals, which are inherently permanently installed and passive. Per NEI 16-05 Appendix B Section B.1, the APM of 2.9 ft is adequate since the AIMs used in the PMF analysis were conservative. The following are examples of conservatisms used in the PMF analysis (Reference 10):

1. Culverts on West Creek under the access road are assumed to be completely blocked by debris as per guidance in NUREG/CR 7046 (Reference 8). Bridges and culverts upstream of RBS were conservatively ignored.

2. The conservative antecedent rainfall condition (ARC) III curve number (relative to ARC II), which describes runoff potential of the watershed, was used for the PMF simulation.

3. The Louisiana State Highway 10 Bridge over Grants Bayou is conservatively assumed to be 50% blocked by debris. All other bridges downstream of RBS on Grants Bayou were conservatively assumed to be completely blocked by debris. The Louisiana State Highway 10 Bridge is over 1,000 feet long and has an opening that is more than 50 feet high at the centerline of the channel. Significant debris blockage of the bridge is unlikely due to the large size of the bridge opening. Bridges and culverts upstream of RBS were conservatively ignored.

4. Conservative HMR-51/52, which determine the greatest rainfall rates theoretically possible for the United States east of the 105$^{th}$ meridian (References 14 & 15), were used for the PMP input. A site-specific study would have reduced LIP results substantially and likely below grade elevation of 95 ft MSL.

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 PMF. These are already credited as part of the RBS 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. 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. No additional actions or interim evaluations are planned to be taken at this time. The LIP and PMF flood mechanisms were not bounded by the site CDB as indicated in the ISR. For the LIP, the maximum flood elevation of 98.3 ft MSL is slightly above the site protection elevation of 98 ft MSL. Leakage through doorways due to this higher surface water elevation was evaluated in Section 6.1.2 and it was determined that no Key SSCs are impacted. The West Creek PMF maximum elevation of 95.1 ft MSL is below the site protection elevation of 98 ft MSL and just slightly above site grade of 95 ft MSL. Key SSCs are not impacted by this flood mechanism. The West Creek PMF bounds the Mississippi River PMF, which is substantially (>30') below grade.

The site determined that all vulnerabilities due to the LIP and PMF mechanisms are addressed by existing site protection features and APM was demonstrated to be adequate to protect Key SSCs. This FE verified the reliability of the flood protection features using Appendix B of NEI 16-05. This places RBS in Path 2 to address these unbounded flooding mechanisms. Finally, for both flood mechanisms, the Flooding MSA has demonstrated that mitigating strategies developed within FLEX will be available to maintain/restore KSFs as a defense-in-depth measure. Additional information can be found in the Flooding MSA (Reference 12).

This submittal 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.

2. RBG-47447, Response to Request for Information Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2014.

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.

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

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.

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.

7. River Bend Station, Unit 1 – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (TAC No. MF3675), dated September 4, 2015.

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

9. RBS-CS-15-00009, Rev. 000, RBS Fukushima Flooding Hazard Re-Evaluation – Local Intense Precipitation.

10. RBS-CS-15-00012, Rev. 000, RBS Fukushima Flooding Hazard Re-Evaluation – Probable Maximum Flood on Local Streams.

11. RBS-CS-15-00010, Rev. 000, RBS Fukushima Flooding Hazard Re-Evaluation – Probable Maximum Precipitation.

12. RBS-SA-16-00001, Rev. 000, 2016 Mitigating Strategies Assessment for Flooding Documentation Requirements at River Bend Station.

13. 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.

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

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

16. EC 49418, Rev. 000, Evaluate Doors AB098-03 and AB098-04 as Watertight During a Local Intense Precipitation (LIP) to Support Fukushima Flood Reevaluation.

17. Specification No. 210.462, Rev. 1, Pressuretight and Watertight Doors.

18. 0237.700-045-075, Rev. 300, Aux. BLDG. Floor Drain Sump.

19. 0237.700-045-076, Rev. 300, Aux. BLDG. Floor Drain Sump.

20. PID-32-09P, Rev. 011, Engineering P & I Diagram System 609 Drains-Floor & Equipment.

21. DFR*LSY8, Rev. 002, Miscellaneous Set Point Data Sheet.

22. EM-034C, Rev. 008, Mach LOCN Aux BLDGPLANS El 70'-0"&95'.

23. EB-040C, Rev. 005, Floor & EQPT Drain Aux BLDG El 95'-9.

24. EB-040A, Rev. 007, Floor & EQPT Drain Aux BLDG El 70'0".

25. EB-040B, Rev. 009, Floor & EQPT Drain Aux BLDG El 70'-0.