Exelon Generation

10 CFR 50.54(f)

RS-17-027

March 10, 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-63 and NPF-69
NRC Docket Nos. 50-220 and 50-410

Subject: Exelon Generation Company, LLC Response to March 12, 2012, Request for Information Enclosure 2, Recommendation 2.1, Flooding, Required Response 3, Flooding Focused Evaluation Summary Submittal

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. Constellation Energy Nuclear Group, LLC Letter to USNRC, Response to March 12, 2012 Request for Information Enclosure 2, Recommendation 2.1, Flooding, Required Response 2, Flooding Hazard Reevaluation Report, dated March 12, 2013

3. Constellation Energy Nuclear Group, LLC Letter to USNRC, Response to Request for Additional Information Associated with Flood Hazard Reevaluation Report, dated December 19, 2013

4. NRC Letter, Supplemental Information Related to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Flooding Hazard Reevaluations for Recommendation 2.1 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 1, 2013

5. 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

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. Nuclear Energy Institute (NEI) Report, NEI 16-05, Revision 1, External Flooding Assessment Guidelines, dated June 2016

8. U.S. Nuclear Regulatory Commission, JLD-ISG-2016-01, Revision 0, Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation; Focused Evaluation and Integrated Assessment, dated July 11, 2016

9. NRC Letter, Nine Mile Point Nuclear Station, Units 1 and 2 – Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (TAC Nos. MF1104 and MF 1105), dated July 24, 2014

10. NRC Letter, Nine Mile Point Nuclear Station, Units 1 and 2 – Supplement to Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (CAC Nos. MF1104 and MF 1105), dated November 4, 2015

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). For Nine Mile Point Nuclear Station, Units 1 and 2 the FHRR was submitted on March 12, 2013 (Reference 2). Additional information was provided with Reference 3. Per Reference 4, the NRC considers the reevaluated flood hazard to be "beyond the current design/licensing basis of operating plants".

Following the Commission's directive to NRC Staff (Reference 5), the NRC issued a letter to the industry (Reference 6) indicating that new guidance is being prepared to replace the instructions (Reference 5), 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".

The Nuclear Energy Institute (NEI) prepared NEI 16-05, "External Flooding Assessment Guidelines" (Reference 7). The NRC endorsed NEI 16-05 (Reference 8) and recommended changes, which have been incorporated into NEI 16-05, Revision 1. NEI 16-05 indicates that each flood-causing mechanism not bounded by the Design Basis (DB) flood (using only stillwater and/or wind-wave runup 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 Local Intense Precipitation (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. Mechanisms in Paths 4 or 5 require an Integrated Assessment.

The enclosure to this letter provides the Flooding Focused Evaluation Summary Report for the Nine Mile Point Nuclear Station, Units 1 and 2.

The flooding analysis documented in References 9 and 10 (NRC Staff Assessment Report and Supplement) were utilized as input to this Flooding Focused Evaluation. The Flooding Focused Evaluation reaffirms that, pending enhancements to the severe weather procedures and/or meteorological vendor contract forecast periods, Nine Mile Point Nuclear Station's (Units 1 and 2) SSCs that support Key Safety Functions are effectively protected from the non-bounded reevaluated flood-causing mechanism (LIP) with adequate margin. The Nine Mile Point Nuclear Station, Units 1 and 2, requires human actions to protect Key SSCs so an evaluation of the overall site response was conducted and showed the response was adequate.

The Flooding Focused Evaluation follows Path 2 of NEI 16-05, Revision 1 (Reference 7), and utilized Appendix B for guidance on evaluating the site protection features. This submittal completes the actions related to external flooding required by the March 12, 2012 10 CFR 50.54(f) letter.

This letter contains new regulatory commitments, which are identified in Enclosure 2 to this letter. If you have any questions regarding this report, please contact David J. Distel at (610) 765-5517.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 10th day of March 2017.

Respectfully submitted,

James Barstow
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosures: 1. Nine Mile Point Nuclear Station, Units 1 and 2, Flooding Focused Evaluation Summary, dated March 10, 2017

2. Summary of Regulatory Commitments

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region I
NRC Senior Resident Inspector – Nine Mile Point Nuclear Station
NRC Project Manager, NRR – Nine Mile Point Nuclear Station
Ms. Tekia V. Govan, NRR/JLD/JHMB, NRC

Enclosure 1

Nine Mile Point Nuclear Station, Units 1 and 2

Flooding Focused Evaluation Summary

dated March 10, 2017

(18 Pages)

NINE MILE POINT NUCLEAR STATION FLOODING FOCUSED EVALUATION SUMMARY

MARCH 10, 2017
LETTER # RS-17-027
ENCLOSURE

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NINE MILE POINT NUCLEAR STATION FLOODING FOCUSED EVALUATION SUMMARY

1 EXECUTIVE SUMMARY

The Nine Mile Point Nuclear Station (NMP) has reevaluated its flooding hazard in accordance with the Near-Term Task Force (NTTF) Recommendation 2.1 and NRC's 10 CFR 50.54(f) request for information (RFI). 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 reevaluation report (FHRR) on March 12, 2013 and is provided in the NRC "Supplement to Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood Causing Mechanism Reevaluation" letter dated November 4, 2015. No changes to the flooding analysis have been performed since the issuance of the supplemental staff assessment letter and this flooding analysis will serve as the input to this Focused Evaluation (FE). The only mechanism that was found to exceed the current licensing basis (CLB) at NMP is the Local Intense Precipitation. This mechanism was included in the FE.

Associated effects (AE) and flood event duration (FED) parameters were assessed and submitted as a part of the Mitigating Strategies Flood Hazard Assessment (MSFHA) and the FHRR. The FE concludes that during the LIP event, NMP has effective flood protection through the calculation of Available Physical Margin (APM) and the reliability of protection features. This FE followed Path 2 of NEI 16-05, Rev. 1 and utilized Appendix B and C for guidance on evaluating 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.

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 Flood Hazard Reevaluation Report (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 NMP, the FHRR was submitted on March 12, 2013 (Reference 2).

Following the Commission's directive to NRC Staff in Reference 3, the NRC issued a letter to the industry (Reference 4) indicating that new guidance is being prepared to replace the instructions in Reference 3 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 10), which was endorsed by the NRC in Reference 5. 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 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 an 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. NMP follows Path 2 since key SSCs and KSFs are effectively protected from flooding, pending updates to the site's severe weather procedures and/or meteorological vendor contract forecast periods.

3 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. Constellation Energy Nuclear Group, LLC Letter to USNRC, Response to March 12, 2012 Request for Information Enclosure 2, Recommendation 2.1, Flooding, Required Response 2, Flooding Hazard Reevaluation Report, dated March 12, 2013 (FL-13-018).
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. NRC Letter, Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events, dated September 1, 2015.
5. U.S. Nuclear Regulatory Commission, JLD-ISG-2016-01, Revision 0, Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation, Focused Evaluation and Integrated Assessment, dated July 11, 2016.
6. U.S. Nuclear Regulatory Commission, JLD-ISG-2012-01, Revision 1, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events, dated January 22, 2016.
7. NRC Letter to Exelon, "Nine Mile Point Nuclear Station Units 1 and 2 – Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood Causing Mechanism Reevaluation (TAC NOS. MF1104 and MF1105)", dated July 24, 2014.
8. NRC Letter to Exelon, "Nine Mile Point Nuclear Station Units 1 and 2 - Supplement to Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood Causing Mechanism Reevaluation (CAC NOS. MF1104 and MF1105)", dated November 4, 2015.
9. Exelon Generation Company, LLC Letter to USNRC, Mitigating Strategies Flood Hazard Assessment (MSFHA) Submittal, dated December 14, 2016.
10. Nuclear Energy Institute Report NEI 16-05, Revision 1, External Flooding Assessment Guidelines, June 2016.

11. Nine Mile Point Nuclear Station Unit 1 Operating Procedure, N1-OP-64, Revision 01500, Meteorological Monitoring.
12. Nine Mile Point Nuclear Station Unit 2 Operating Procedure, N2-OP-102, Revision 01900, Meteorological Monitoring.
13. Nine Mile Point Nuclear Station, FloodStop Test Fit Report.
14. Nine Mile Point Nuclear Station Unit 1, Calculation S0FLOODF002, Revision 00.00.
15. Nine Mile Point Nuclear Station Unit 2, Calculation WH-C-002, Revision 00.00.

4 TERMS AND DEFINITIONS

- APM – Available Physical Margin
- BDB – Beyond Design Basis
- CLB – Current Licensing Basis
- DB – Design Basis
- FE – Focused Evaluation
- FHRR – Flood Hazard Reevaluation Report
- FLEX – Diverse and Flexible Coping Strategies
- Key SSC – A System, Structure, or Component relied upon to fulfill a Key Safety Function
- KSF – Key Safety Function
- LIP – Local Intense Precipitation
- MDPE – Medium-Density Polyethylene
- MSA – Mitigating Strategies Assessment
- MSFHA – Mitigating Strategy Flood Hazard Assessment
- NEI – Nuclear Energy Institute
- NRC – Nuclear Regulatory Commission
- NTTF – Near-Term Task Force
- PMP – Probable Maximum Precipitation
- RB – Reactor Building
- RFI – Request for Information
- SSC – Structures, Systems, and Components
- TB – Turbine Building
- TSA – Time Sensitive Action

5 FLOOD HAZARD PARAMETERS FOR UNBOUNDED MECHANISMS

NRC has completed the "Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood Causing Mechanism Reevaluation" dated July 24, 2014 (Reference 7) and the "Supplement to Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood Causing Mechanism Reevaluation" dated November 4, 2015 (Reference 8) related to the NMP FHRR (Reference 2). In Reference 8, the NRC states that the "staff has concluded that the licensee's reevaluated flood hazards information 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 Nine Mile Point. Further, the licensee's reevaluated flood hazard information is suitable input for the focused evaluations associated with Near-Term Task Force Recommendation 2.1 'Flooding'." Attachment 1 to Reference 2, and specifically Section 3.0, includes a summary of the current design basis and reevaluated flood hazard parameters, respectively. In Table 1 of the enclosure to Reference 1, 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 4.0-2 of Reference 8, the NRC lists flood hazard information (specifically stillwater elevation and wind-wave run-up elevation) for the Local Intense Precipitation flood-causing mechanism, which is the only mechanism not bounded by the design basis hazard flood level. This non-bounded flood mechanism is described in detail in the Reference 2 FHRR submittal. Table 5-1 below summarizes how the unbounded mechanism was addressed in this external flooding assessment. Table 5-2 below shows the most bounding values of the LIP hazard, which were conservatively used for determination of APM throughout the site.

Table 5-1 – Summary of Flood Impact Assessment

	Flood Mechanism	Summary of Assessment
1	Local Intense Precipitation	Path 2 was determined to be the appropriate path for NMP since key SSCs are protected with temporary passive barriers and available physical margin is adequate to protect KSFs (see FIAP Path Determination Table, Section 6.3.3 of NEI 16-05). Any potential ingress into other areas of the plant does not impact KSFs.

Table 5-2 – LIP Flood Mechanism Parameters

	Parameter Description	Values/Discussion
1	Max Stillwater Elevation	262.2 feet USLS35 (Unit 1) and 262.4 feet USLS35 (Unit 2)
2	Max Wave Run-up Elevation	Not applicable
3	Max Hydrodynamic/Debris Loading	As noted in Section 2.1.3 of Attachment 1, Reference 2, significant debris loading/transportation is not expected due to relatively low velocities (1-2 fps) and flood depths near the key SSCs (not including non-power block areas east of Unit 2). See Table 2.1-6 of Attachment 1, Reference 2. In addition, the debris load for the LIP event is judged to be negligible due to the absence of heavy objects, low flow velocity and security features present at the site.
4	Effects of Sediment Deposition/Erosion	The flow velocities due to the LIP event are determined to be below the suggested velocities for the ground cover type (concrete and gravel) at the plant area. Therefore, significant erosion is not expected for the LIP flood. Similarly, the relatively low velocities and flow depths are not expected to result in sediment transport and cause significant deposition during the LIP flood.

	Parameter Description	Values/Discussion
5	Other Associated Effects	None
6	Concurrent Site Conditions	High winds could be generated concurrent to a LIP event. However, the type of manual actions required to protect the plant from LIP flooding (manual movement of flood barriers) during the storm event would not be affected by high winds. The barriers are braced against the walls of the adjacent structure or are within the structure itself and would not be vulnerable to failure due to high winds.
7	Effects on Groundwater	Most of the plant area is paved or gravel, which would limit the volume of rainfall infiltrated during a short-duration LIP event. Therefore, effects on groundwater is expected to be minimal.
8	Warning Time	The site receives warning from the meteorological vendor for rainfall exceeding 1 in/hr or 6 inches in 24 hrs. However, enhancements to the monitoring procedure are planned to be performed in accordance with NEI 15-05 to provide additional assurance that at least 6.5 hours of warning time is available to install the temporary barriers.
9	Period of Site Preparation	25 hours (72-hour PMP) and <1 hour (6-hour PMP)
10	Period of Inundation	Unit 1 - 19 hours / Unit 2 - 20 hours (72-hour PMP) and 14.5 hours (6-hour PMP)
11	Period of Recession	32.5 hours (72-hour PMP) and 14 hours (6-hour PMP)
12	Plant Mode of Operation	Any

6 OVERALL SITE FLOODING RESPONSE

6.1 DESCRIPTION OF OVERALL SITE FLOODING RESPONSE

Nine Mile Point is a two-unit nuclear power plant located on the southeast shore of Lake

Ontario, in Oswego County, New York. The site consists of approximately 900 acres of partially wooded land. The 900-acres are also occupied by the Fitzpatrick Nuclear Power Plant. The site terrain elevation ranges from 256 feet to 265 feet USLS35.

The following key SSCs are important to safety and are located below site grade elevation of 261 feet USLS35:

- Unit 1 KSF Components
    - Reactor Building Corner Rooms at elevation 196 feet USLS35 house the Core Spray and Containment Spray Pumps.
    - The 261foot elevation USLS35 of the Turbine Building contains the Auxiliary Control Room, the Diesel Generators, and various battery board rooms and electrical distribution equipment. Some portions of the Feedwater System dedicated to High Pressure Core Injection (HPCI) are also located on elevation 261 feet USLS35 of the Turbine Building.
- Unit 2 KSF Components
    - The lowest elevation of the Reactor Building and Auxiliary Bays, at 175 feet USLS35, house the Residual Heat Removal (RHR), Low Pressure Core Spray (LPCS), High Pressure Core Spray (HPCS), and Reactor Core Isolation Cooling (RCIC) Pumps.
    - The 261-foot elevation USLS35 of the Control Building houses major electrical distribution systems and the Safety Related battery rooms.
    - The 261-foot elevation USLS35 of the Diesel Generator Building contains the Diesel Generators.

The site flood protection strategy relies on existing doors (Reactor Building) and temporary passive flood barriers that are installed at selected locations once the rainfall is predicted to exceed 2 inches per hour or 6 inches in 24 hours. The rainfall prediction/warning notification of rainfall exceeding 1 inch per hour or 6 inches in 24 hours is provided by the meteorological vendor. The flood barriers are stored on site and installation of the barriers was simulated to take approximately 6.5 hours. There are no active flood protection features utilized as part of the overall site flooding response.

The site determined that all vulnerabilities due to the LIP flood causing mechanism are addressed by available physical margin, which was deemed adequate to protect key SSCs and maintain KSFs. This places NMP in Path 2 to address this unbounded flooding mechanism. See Section 7 for further discussion on the flood impact assessment.

6.2 SUMMARY OF PLANT MODIFICATIONS AND CHANGES

While the meteorological vendor utilizes radar, current observations, model data and their own algorithms to determine the likelihood of rainfall that would trigger a warning for NMP, a minimum 6.5 hours of warning time cannot be defined with reasonable assurance for LIP. The meteorological vendor estimates that the minimum warning time for more widespread events would be 4 to 6 hours and for more localized events as short as 1 hour. Furthermore, consequential rainfall was approximated by NMP but a more rigorous evaluation will be conducted to better define the rainfall magnitude that could initiate flooding ingress and the action trigger threshold. The following provides a summary of analyses and actions planned to be performed to provide additional assurance that consequential rainfall is accounted for and that NMP has sufficient warning.

- An analysis to more accurately define the consequential rainfall estimate will be performed using the existing FLO-2D model.

- As an optional task, if the consequential rainfall is determined to be low, a site-specific evaluation of storm types and seasonality will be conducted to determine the types of storms that could produce consequential rainfall and the meteorological parameters that could produce such events. This step may not be required if the consequential rainfall is sufficiently large to use available NWS and/or meteorological vendor tools and provide the necessary 6.5 hours of warning time.

- Enhance site procedures to better define a monitoring threshold for longer forecasting periods (3 to 7 days) and the action trigger (per NEI 15-05).

- Modify the flood protection strategy if severe weather procedure enhancements and/or NWS/meteorological vendor contract forecast periods are determined not to be viable once the consequential rainfall and meteorological assessments above are complete.

The results of the above actions will be used to update existing site severe weather procedures and/or modify the meteorological vendor contract to incorporate the monitoring threshold and action trigger.

7 FLOOD IMPACT ASSESSMENT

7.1 LOCAL INTENSE PRECIPITATION – PATH 2

7.1.1 Description of Flood Impact

Unit 1

The maximum reevaluated flood elevation of the BDB LIP event is not bounded by the CDB LIP flood elevation for Unit 1. As shown in Table 5-2, the maximum water surface elevation during the LIP event is 262.2 feet USLS35, which is 1.2 feet above the nominal building floor elevation. The maximum duration of flooding is approximately 19 hours and the period of recession is approximately 32.5 hours (Figure 7-1).

Two of the Reactor Building doors (D-198 and D-52) were assumed to be watertight due to the dual airlock design and ¼-inch of negative air pressure that is maintained inside the Reactor Building. Ingress of floodwaters may occur at the remaining exterior doors. To prevent such ingress into areas of Unit 1 where key SSCs are located, temporary flood protection barriers (FloodStop Modular Barriers consisting of MDPE sections and MDPE multi-hubs connected with connecting keys) are installed prior to the onset of the rainfall event. The location of the temporary barriers is provided in Meteorological Monitoring Operating Procedure N1-OP-64, Attachment 7 (Reference 11) and is also shown in Figure 7-2.

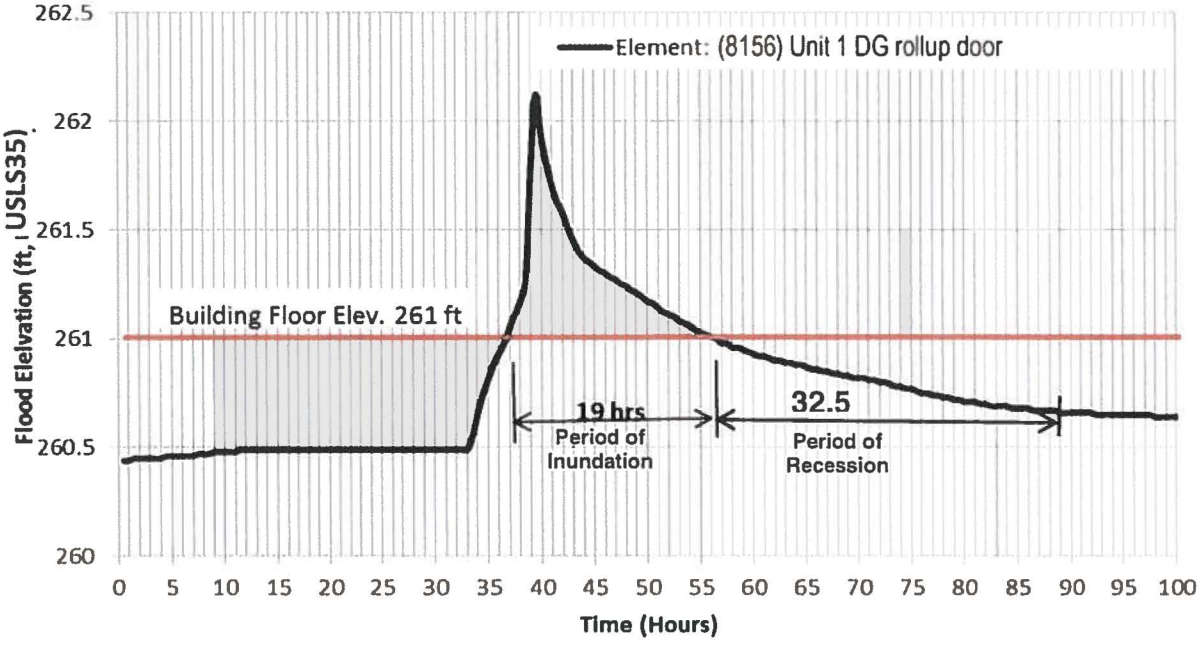

Figure 7-1 - 72-Hour LIP Water Surface Time Series Plot for Unit 1

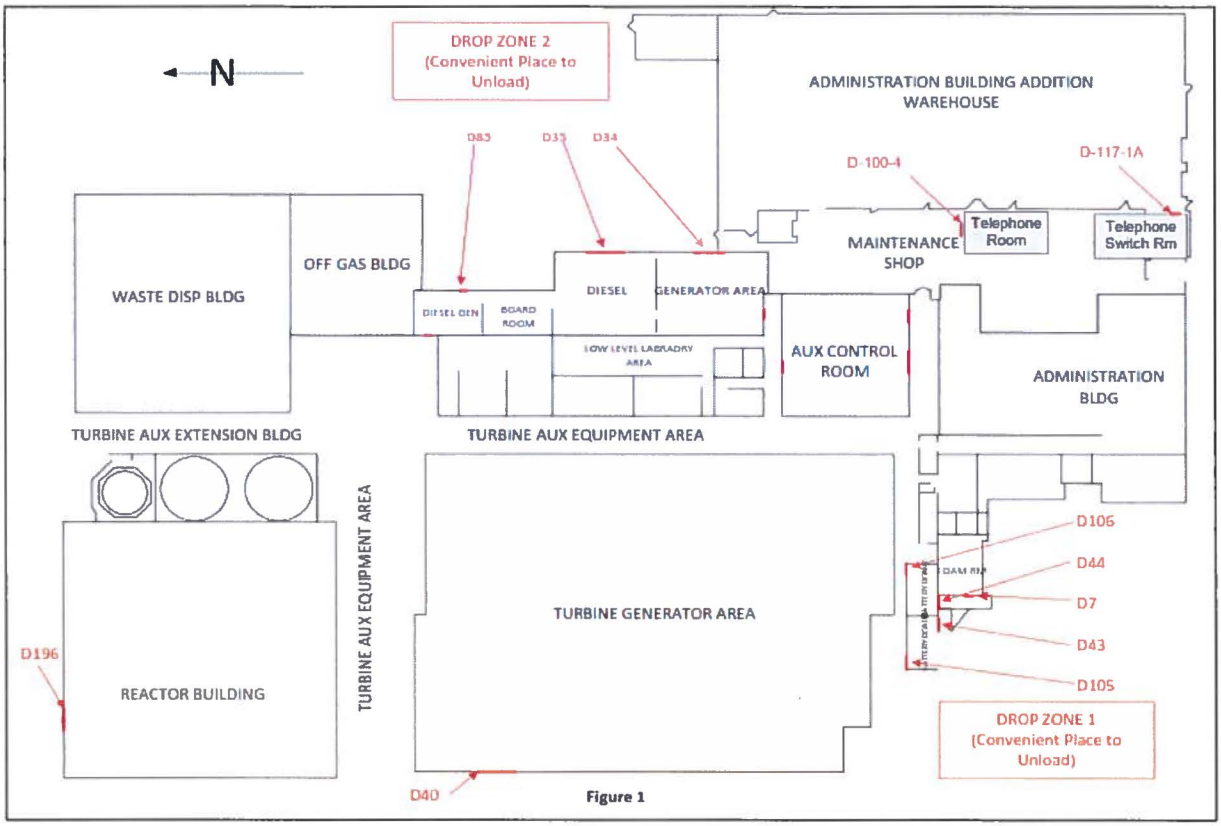

Figure 7-2 – Location of Temporary Flood Protection Barriers in Unit 1

The barriers are installed at specific doors to maintain the flood boundary around areas with key SSCs and to maintain KSFs during the LIP flood event. The flood boundary is established around the following buildings/rooms:

- Battery Board Room
- Foam Room
- Emergency Diesel Generator Room
- Aux Control Room
- Reactor Building

The FloodStop barriers are rated to accommodate a hydrostatic load to the top of the barrier. The barriers are 19.7 inches (1.64 feet) high with a protection elevation of 262.6 feet USLS35, which provide a minimum 0.4-foot of margin at the Unit 1 doorways.

Significant hydrodynamic loads are not expected during the LIP event due to relatively

low velocities (generally less than 1 fps around the power block area) and flood depths. The debris load for the LIP event is judged to be negligible due to the absence of heavy objects, low flow velocity, and security features present at the site. In addition, most of the barriers are located inside the Unit 1 structures providing an additional layer of defense against the hydrodynamic loads.

Unit 2

The maximum reevaluated flood elevation of the BDB LIP event is bounded by the CDB LIP flood elevation for Unit 2; however, the flood duration is not bounded. As shown in Table 5-2, the maximum water surface elevation during the LIP event is 262.4 feet USLS35, which is 1.4 feet above the nominal building floor elevation but 0.1 foot below the CDB LIP flood elevation. The maximum duration of flooding is approximately 20 hours and the period of recession is approximately 32.5 hours (Figure 7-3).

The Reactor Building doors were assumed to be watertight due to the dual airlock design and ¼-inch of negative air pressure that is maintained inside the Reactor Building. Ingress of floodwaters may occur at the remaining exterior doors. To prevent such ingress into areas of Unit 2 where key SSCs are located, temporary flood protection barriers (FloodStop Modular Barriers consisting of MDPE sections and MDPE multi-hubs connected with connecting keys) are installed prior to the onset of the rainfall event. The location of the temporary barriers is provided in Meteorological Monitoring Operating Procedure N2-OP-102, Attachment 11 (Reference 12) and is also shown in Figure 7-4.

The barriers are installed at specific doors to maintain the flood boundary around areas with key SSCs and to maintain KSFs during the flood event. The flood boundary is established around the following buildings/rooms:

- Reactor Building
- Control Building
- Specific Electric Tunnels

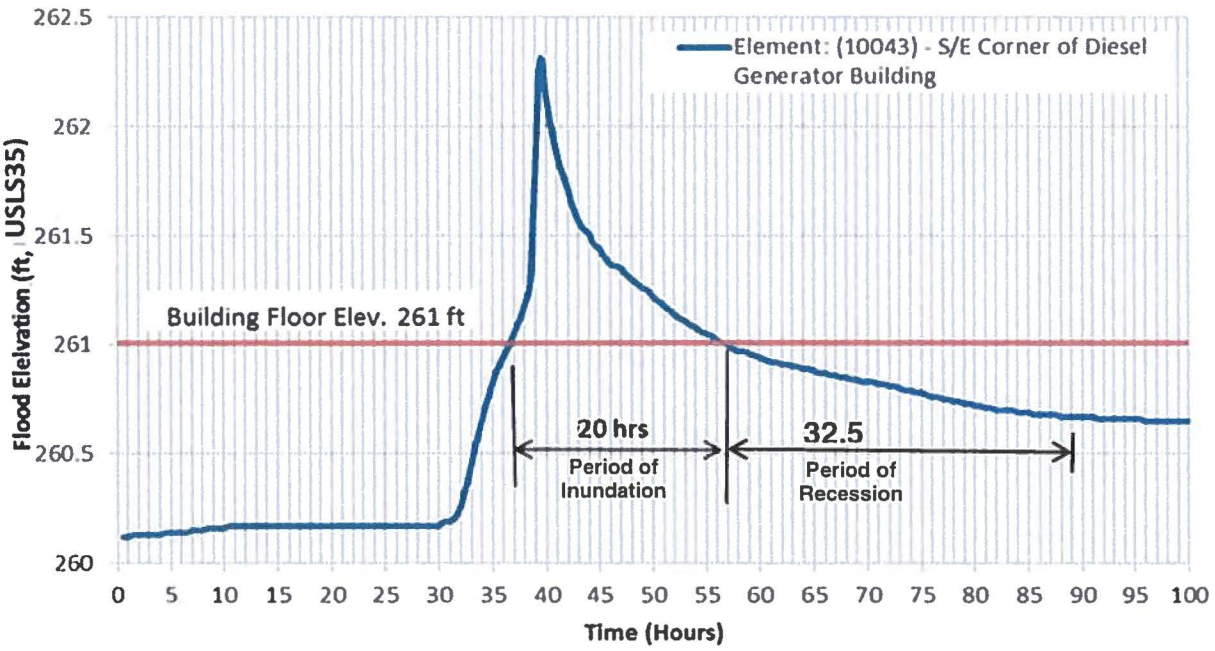

Figure 7-3 - 72-Hour LIP Water Surface Time Series Plot for Unit 2

The FloodStop barriers are rated to accommodate a hydrostatic load to the top of the barrier. The barriers are 19.7 inches (1.64 feet) high with a protection elevation of 262.6 feet USLS35, which provide a minimum 0.2-foot of margin at the Unit 2 doorways.

Significant hydrodynamic loads are not expected during the LIP event due to relatively low velocities (generally less than 1 fps around the power block area) and flood depths. The debris load for the LIP event is judged to be negligible due to the absence of heavy objects, low flow velocity, and security features present at the site. In addition, the barriers are located either in concrete enclosures or inside the Unit 2 structures, limiting the exposure to hydrodynamic loads.

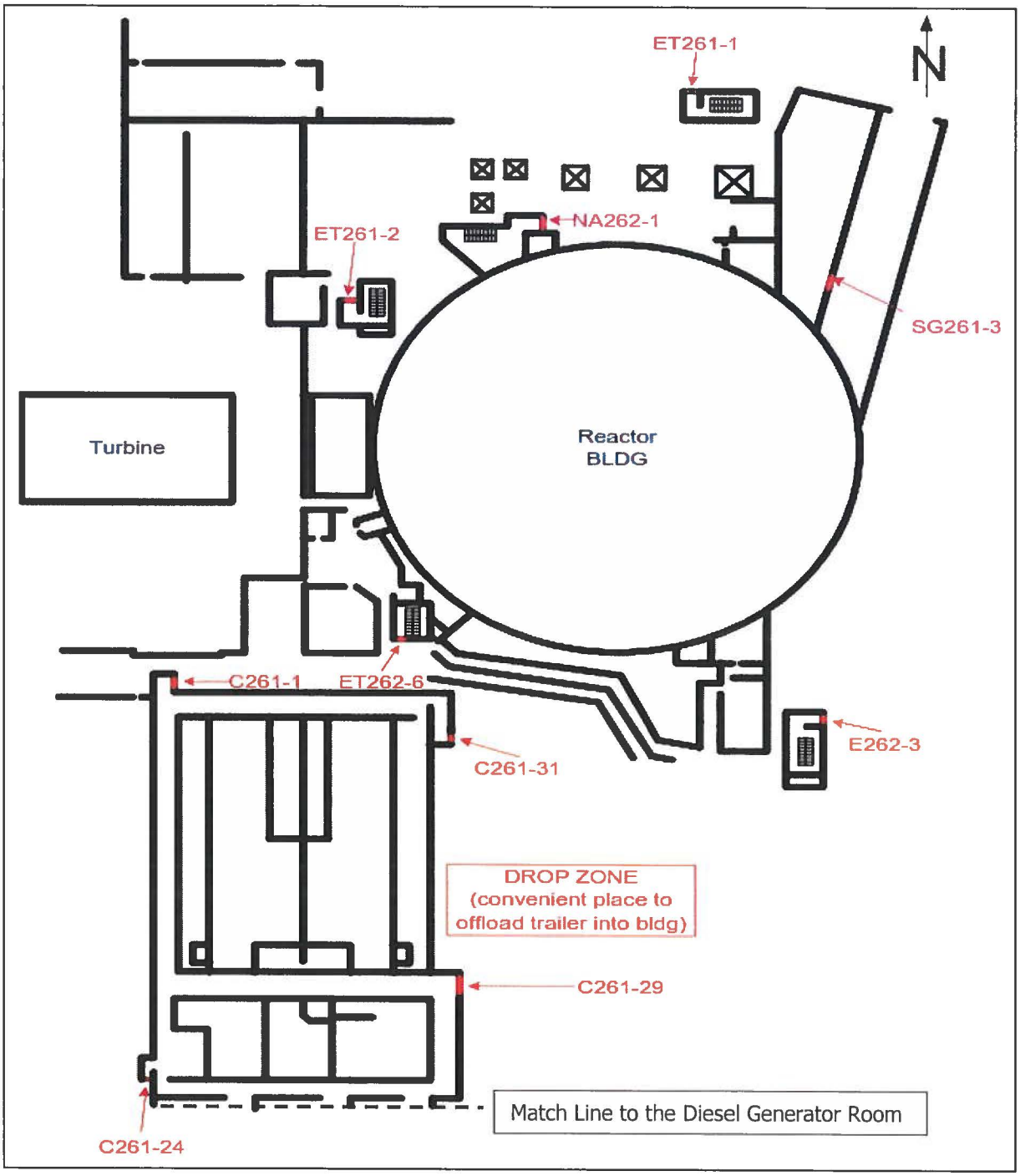

Figure 7-4 - Location of Temporary Flood Protection Barriers in Unit 2

FloodStop Barriers are not deployed to the Diesel Generator Rooms. The external flood protection boundary for the Diesel Generator Rooms is protected at doors DG261-4, 5, and 6 with door thresholds that are elevated to 262.33 feet USLS35, which is just under

0.1 foot below the Unit 2 peak LIP flood level of 262.4 feet USLS35. These doors are designed to be weather stripped, tornado proof, and air tight so leakage is not expected for the 0.1-foot depth of floodwater above the door threshold elevation. The external flood protection boundary along the Diesel Generator Rooms are also protected by removable pre-cast concrete tornado missile logs, sealed with leak-tight dimeric caulk, and are temporarily removed during equipment replacement operations.

7.1.2 Adequate APM Justification and Reliability Flood Protection

In accordance with NEI 16-05, the APM was determined to be adequate at Units 1 and 2, justified by considering the following conservatisms in the LIP analysis in developing the maximum flood elevation:

- The use of HMR-51 and HMR-52 PMP values is generally considered conservative compared to site-specific PMP studies.
- Rainfall loss rates were conservatively not considered in the analysis and the entire model area was assumed to be impervious.
- The use of conservative Manning's n-values.
- Concrete security barriers that restrict flood water from flowing onto the site were conservatively not included in the analysis.
- Culverts that convey flow into the site were included in the 2-dimensional analysis, while culverts that convey flow away from the site were considered blocked.

The temporary FloodStop barriers are considered reliable to withstand the LIP hydrostatic loading because, according to the Manufacture, the barriers are designed to accommodate loads to the top of the barriers. Furthermore, calculations indicate that ingress volumes during the LIP flood, without the FloodStop barriers in place, would not impact key SSCs (Reference 14 and 15).

7.1.3 Adequate Overall Site Response

This evaluation, performed in accordance with NEI 16-05 Appendix C, has demonstrated that the overall site response to LIP is adequate. The site response includes manual actions required to install the temporary flood protection barriers and implement the overall flood protection strategy. The following sections outline the results of evaluating the criteria in NEI 16-05 Appendix C.

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

The overall strategy for protecting NMP consists of relatively simple and straightforward actions, including the installation of temporary flood protection barriers at potential entry points to areas with key SSCs. The critical path actions include:

- Monitor for a severe weather event (using the monitoring and action thresholds) using enhanced site procedures and/or meteorological vendor contract (see Section 6.2).
- If rainfall is predicted to exceed the action trigger, maintenance is directed to install the temporary flood barriers.
- Deploy and install temporary flood barriers.

7.1.3.2 Demonstrating All TSAs Are Feasible

The site performed a reasonable simulation (test fit report) during which the flood protection barriers were assembled at the specific locations and the durations were tracked to determine approximate installation times (Reference 13). Procedures N1-OP-64 (Unit 1) and N2-OP-102 (Unit 2) provide instructions for the temporary flood barrier setup. The reasonable simulation meets the criteria set forth in NEI 12-06 and the TSAs related to installation of the temporary flood protection barriers are feasible and can be performed in 6.5 hours using 4 mechanics, 1 mechanical supervisor, 1 security officer, and 1 senior reactor operator. The estimated setup time accounts for the potential environmental factors.

7.1.3.3 Establishing Unambiguous Procedural Triggers

The site has contracted with a meteorological vendor to perform ongoing weather monitoring and to provide rainfall prediction/warning of rainfall exceeding 1 inch per hour or 6 inches in 24 hours. During the review of the meteorological vendor contractual obligations, it was determined the minimum warning time provided to NMP could be as short as 1 hour for localized events. More widespread events would likely be predicted 4 – 6 hours in advance. Since the estimated time to install all flood barriers is approximately 6.5 hours, additional monitoring and action triggers are required to ensure that the installation of flood barriers can be completed prior to the onset of the rainfall event. The description of planned changes to the monitoring procedure and site commitments are provided in Section 6.2 to remove ambiguities in the existing procedures.

7.1.3.4 Proceduralized and Clear Organizational Response to a Flood

Procedures N1-OP-64 (Unit 1) and N2-OP-102 (Unit 2) provide clear guidance on the responsibilities for all groups involved in the preparation for the rainfall event.

7.1.3.5 Detailed Flood Response Timeline

The flood barriers are stored by the Sea-Van Storage Building inside a white covered trailer. The barriers are dropped off at specific locations as specified in procedures N1-OP-64 (Unit 1) and N2-OP-102 (Unit 2). These procedures also provide the location where the flood barriers should be installed. The installation of the flood barriers was simulated and the actions require no more than 6.5 hours to be completed.

7.1.3.6 Accounting for the Expected Environmental Conditions

The environmental conditions expected during the LIP event include high winds. It is not expected that the manual movement and installation of temporary flood barriers during the LIP event would be affected by high winds. The barriers are braced against the walls of the adjacent structure or are within the structure itself and would not be vulnerable to failure due to high winds. Furthermore, the time estimated to complete the individual actions was conservatively increased by an environmental adjustment factor ranging from 1.5 to 2.

7.1.3.7 Demonstration of Adequate Site Response

The site response to a LIP event has been demonstrated as adequate by meeting the guidelines in NEI 16-05 Appendix C. TSAs were identified and determined to be feasible. Additional measures, however, are required to ensure that sufficient warning time is provided. The additional measures and commitments are described in Section 6.2

8 CONCLUSION

The FHRR concluded that the LIP event is not bounded by the CLB. The LIP was estimated to generate flood levels exceeding the nominal floor elevation by 1.2 feet (Unit 1) and 1.4 feet (Unit 2). To maintain the KSFs, temporary flood barriers are installed at critical pathways. The FE demonstrated that, pending enhancements to the severe weather procedures and/or meteorological vendor contract forecast periods, the protection measures are reliable with adequate margin and the site response to the flood event is adequate. This submittal completes the actions related to External Flooding required by the March 12, 2012, 10 CFR 50.54(f) letter.

Enclosure 2

Nine Mile Point Nuclear Station, Units 1 and 2

SUMMARY OF REGULATORY COMMITMENTS

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
1. Perform an analysis to more accurately define the consequential rainfall estimate using the existing FLO-2D model.	December 31, 2017	Yes	No
2. As an optional task, if the consequential rainfall is determined to be low, a site-specific evaluation of storm types and seasonality will be conducted to determine the types of storms that could produce consequential rainfall and the meteorological parameters that could produce such events. This step may not be required if the consequential rainfall is sufficiently large to use available NWS and/or meteorological vendor tools and provide the necessary 6.5 hours of warning time.	December 31, 2017	Yes	No
3. Enhance site procedures to better define a monitoring threshold for longer forecasting periods (3 to 7 days) and the action trigger (per NEI 15-05). Based on the results of the above actions, existing site severe weather procedures will be updated and/or the meteorological vendor contract will be modified to incorporate the monitoring threshold and action trigger.	June 30, 2018	No	Yes

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
4. Modify the flood protection strategy if severe weather procedure enhancements and/or NWS/meteorological vendor contract forecast periods are determined not to be viable once the consequential rainfall and meteorological assessments described in Commitment Nos. 1 and 2 above are complete.	June 30, 2018	No	Yes