



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

November 4, 2015

Mr. Bryan C. Hanson  
President and Chief Nuclear Officer  
Exelon Generation Company, LLC  
4300 Winfield Rd  
Warrenville, IL 60555

SUBJECT: 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 MECHANISMS REEVALUATION (CAC NOS. MF1104 AND MF1105)

Dear Mr. Hanson:

The purpose of this letter is to transmit a supplement to the U.S. Nuclear Regulatory Commission (NRC) staff's assessment for Nine Mile Point Nuclear Station, Units 1 and 2 (Nine Mile Point) reevaluated flood hazard information that was issued to you by letter dated July 24, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14153A410). The supplement updates the original staff assessment to address changes in the NRC's approach to the steps following the review of the flood hazard reevaluations as directed by the Commission. The letter also addresses the next steps associated with the mitigation strategies assessment with respect to the reevaluated flood hazards.

By letter dated March 12, 2012, the NRC issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The request was issued as part of implementing lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 2 to the 50.54(f) letter requested licensees to reevaluate flood-causing mechanisms using present-day methodologies and guidance. By letters dated June 8, 2012 (ADAMS Accession No. ML12164A369), January 29, 2013 (ADAMS Accession No. ML13030A430), March 12, 2013 (ADAMS Accession No. ML130740943), August 1, 2013 (ADAMS Accession No. ML13214A383), September 6, 2013 (ADAMS Accession No. ML13254A151), December 19, 2013 (ADAMS Accession No. ML14006A003), and January 31, 2014 (ADAMS Accession No. ML14038A122), Exelon Generation Company, LLC (the licensee), previously as Constellation Energy Nuclear Group, LLC, responded to this request for Nine Mile Point. The NRC staff has completed its review of the information provided, as documented in the staff assessment and the enclosed supplement to the staff assessment. This closes out the NRC's efforts associated with CAC Nos. MF1104 and MF1105.

The enclosed supplement to the staff assessment updates the NRC staff's conclusions in accordance with the flood hazard reevaluation approach described in NRC letter dated September 1, 2015 (ADAMS Accession No. ML15174A257), concerning the coordination of requests for information regarding flooding hazard reevaluations and mitigating strategies for beyond-design-basis external events. This letter describes the changes in the NRC's approach to the flood hazard reevaluations that were approved by the Commission in its Staff Requirements Memorandum (ADAMS Accession No. ML15209A682) to

B. Hanson

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COMSECY-15-0019 (ADAMS Accession No. ML15153A104) that described the NRC's mitigating strategies and flooding hazard reevaluation action plan.

As documented in the NRC staff assessment and the enclosed supplement, the NRC staff has concluded that the licensee's reevaluated flood hazard 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 guidance documents currently being finalized by the industry and NRC staff) for Nine Mile Point. Further, the licensee's reevaluated flood hazard information is suitable for other assessments associated with Near-Term Task Force Recommendation 2.1 "Flooding."

The reevaluated flood hazard results for local intense precipitation were not bounded by the current design-basis flood hazard. In order to complete its response to Enclosure 2 to the 50.54(f) letter, the licensee is expected to submit a focused evaluation to address these reevaluated flood hazards, as described in the NRC's September 1, 2015, letter.

If there are any questions, please contact me at (301) 415-6197 or email at Tekia.Govan@nrc.gov.

Sincerely,



Tekia Govan, Project Manager  
Hazards Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket Nos.: 50-220 and 50-410

Enclosure:  
Supplement to Staff Assessment of Flood  
Hazard Reevaluation Report

cc w/enclosure: Distribution via ListServ

SUPPLEMENT TO  
STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO FLOODING HAZARD REEVALUATION REPORT  
NEAR-TERM TASK FORCE RECOMMENDATION 2.3  
RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT  
NINE MILE POINT NUCLEAR STATION, UNITS 1 AND 2  
DOCKET NOS. 50-220 AND 50-410

1.0 INTRODUCTION

This document is a supplement to the U.S. Nuclear Regulatory Commission (NRC) staff assessment that was transmitted by letter dated July, 24, 2014 (NRC, 2014b) to Exelon Generation Company, LLC (the licensee), Previously as Constellation Energy Nuclear Group, LLC for Nine Mile Point Nuclear Station, Units 1 and 2 (Nine Mile Point, NMP). With the exceptions of Table 3.1-1, Table 4.0-2 and the Reference section, this supplement only contains the sections that were changed to address the open items (i.e., action items) and reflect the changes in the NRC's approach to the flood hazard reevaluations that were approved by the Commission in its Staff Requirements Memorandum (SRM) (NRC, 2015a) to COMSECY-15-0019 (NRC, 2015b), which described the NRC's mitigating strategies and flooding hazard reevaluation action plan. Table 3.1-1 and Table 4.0-2 at the end of the supplement are copied from the staff assessment for convenience. Instead of repeating the Reference section in its entirety, only the additions to the list of references are included in the supplement.

2.0 REGULATORY BACKGROUND

2.1 Applicable Regulatory Requirements

There are no changes or updates to this section of the NRC staff assessment.

2.2 Enclosure 2 to the 50.54(f) Letter

By letter dated March 12, 2012 (NRC, 2012a) the NRC issued a request for information Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The 50.54(f) letter requests all power reactor licensees and construction permit holders reevaluate all external flood-causing mechanisms at each site. The reevaluation should apply present-day methods and regulatory guidance that are used by the NRC staff to conduct early site permit (ESP) and combined license (COL) reviews. This

Enclosure

includes current techniques, software, and methods used in present-day standard engineering practice. If the reevaluated flood-causing mechanisms are not bounded by the current plant design-basis for flood hazard, an integrated assessment may be necessary.

#### 2.2.1 Flood-Causing Mechanisms

There are no changes or updates to this section of the NRC staff assessment.

#### 2.2.2 Associated Effects

There are no changes or updates to this section of the NRC staff assessment.

#### 2.2.3 Combined Effect Flood

There are no changes or updates to this section of the NRC staff assessment.

#### 2.2.4 Flood Event Duration

There are no changes or updates to this section of the NRC staff assessment.

#### 2.2.5 Actions Following the Flooding Hazard Reevaluation Report (FHRR)

For the sites where the reevaluated flood hazard is not bounded by the current design-basis flood hazard for all flood-causing mechanisms, the 50.54(f) letter requests licensees and construction permit holders to:

- Submit an Interim Action Plan with the FHRR documenting actions planned or already taken to address the reevaluated hazard
- Perform an integrated assessment subsequent to the FHRR to: (a) evaluate the effectiveness of the current licensing basis (i.e., flood protection and mitigation systems); (b) identify plant-specific vulnerabilities; and (c) assess the effectiveness of existing or planned systems and procedures for protecting against and mitigating consequences of flooding for the flood event duration

After issuance of the 50.54(f) letter, the NRC changed the approach to the steps following the review of the flood hazard reevaluations, as directed by the Commission, to permit use of focused evaluations as an alternative to an integrated assessment. The NRC letter dated September 1, 2015 (NRC, 2015c) describes the changes in the NRC's approach to the flood hazard reevaluations.

If the reevaluated flood hazard is bounded by the current design basis flood hazard for all flood-causing mechanisms at the site, licensees are not required to perform an integrated assessment or a focused evaluation at this time.

### 3.0 TECHNICAL EVALUATION

There are no changes or updates to this section of the NRC staff assessment.

#### 3.1 Site Information

There are no changes or updates to this section of the NRC staff assessment.

#### 3.2 Local Intense Precipitation and Associated Site Drainage

The licensee reported in its FHRR, that the reevaluated flood elevations, including plausible associated effects, for local intense precipitation (LIP) are 262.4 ft (80.0 m) in the immediate vicinity of NMP, Unit 2. This flood-causing mechanism is not described in the licensee's current design-basis for Unit 1. The current design-basis flood elevation for the LIP and associated site drainage hazard for NMP, Unit 2 is 262.5 ft (80.0 m). For NMP, Unit 1, FHRR Section 1.3.1 states that NMP, Unit 1 was designed and built prior to issuance of the SRP [standard review plan] criteria for external floods. The licensee assessed LIP flooding as part of the individual plant evaluation for external (IPEEE) using calculations from NMP, Unit 2 to determine that a probable maximum precipitation (PMP) event was the only flooding scenario of concern with a maximum water surface elevation for NMP, Unit 1 of 261.75 ft (79.8 m).

To provide additional information in support of the summaries and conclusions in the FHRR, the licensee made several calculation packages available to the staff via an electronic reading room. These calculation packages expand upon and clarify the information provided on the docket.

The NRC staff requested additional information from the licensee to supplement the FHRR. The licensee (Korsnick, 2013) provided the additional information, which is discussed below.

The NRC staff reviewed the LIP and associated site drainage, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance.

The licensee followed the hierarchical hazard assessment approach of NUREG/CR-7046 (NRC, 2011e). Specifically, the licensee conservatively adopted the assumption that "the design of the site grade and the passive drainage channels are incapable of routing any flow from the immediate plant site, and therefore, overland flow occurs over the whole plant site during the local intense precipitation event" (e.g., Case 3 in Appendix B of NUREG/CR-7046).

Rather than using the precipitation data associated with the licensing of NMP, Units 1 or 2, the licensee's LIP reevaluations in the FHRR relied on more recent PMP information generated as part of the LIP flooding analysis for the proposed NMP, Unit 3 Combined License Application (COLA) (Unit 3 by UniStar Nuclear Energy, 2009). To be conservative, the licensee assumed zero runoff losses during the LIP event in order to maximize flooding elevation (i.e., no infiltration and no initial abstraction).

FLO-2D, a two-dimensional hydrodynamic computer model, was used to calculate the flooding due to LIP (FLO-2D, 2009). This model is expected to simulate surface runoff in a complex area more accurately than a one-dimensional model.

In Section 1.6.3 of its FHRR, the licensee describes onsite changes after plant operation, including addition of security barriers, relocation of the security fence, and relocation and addition of trailers and the truck unloading area with an inflatable berm. As the FHRR and calculation package did not discuss how these changes were incorporated into the LIP flood analyses, the NRC staff issued a request for additional information (RAI). In response to this RAI (Korsnick, 2013), the licensee provided detailed features of the changes and the assumptions used to model the features in FLO-2D as summarized below:

- Features, such as inflatable berm, security fences, and trailers were not included in FLO-2D, as they have minor or no impacts on the site flood estimations.
- The licensee conservatively omitted concrete security barriers that restrict flood water from flowing onto the site.
- The flood control berms around the powerblock area were modeled as levees in FLO-2D.
- Culverts that convey flow into the site were modeled in FLO-2D, while culverts that convey flow away from the site were considered to be blocked conservatively.

The NRC staff determined that the above assumptions are conservative and acceptable in terms of the current regulatory guidance, and followed the hierarchical hazard assessment approach described in NUREG/CR-7046 (NRC, 2011e). The NRC staff found through a review of the FLO-2D input files that the locations and elevations for control berms and culverts modeled in the FLO-2D are accurate.

The calculated LIP flooding in the FHRR is the result of the PMP centered over the site and its local watershed. Key drainage features include Lakeview Creek to the southwest and two unnamed onsite drainage ditches.

The PMP event described in the FHRR analysis is the same as that for the LIP flooding analysis described in the COL application for proposed reactor NMP, Unit 3 (Unit 3 final safety analysis report (FSAR): UniStar Nuclear Energy, 2009). Hydrometeorological Report (HMR) 51 (National Oceanic and Atmospheric Administration (NOAA), 1978) and HMR 52 (NOAA, 1982) were applied and three PMP durations were evaluated. Total rainfall depths for the 1 mi<sup>2</sup> (2.59 km<sup>2</sup>) area are 16.0 in. (40.6 cm) for the 1-hour PMP, 22.4 in. (56.9 cm) for the 6-hour PMP, and 33.0 in. (83.8 cm) for the 72-hour PMP. Digital elevation data used in FLO-2D were based on a 1999 site topographic map. Manning's roughness coefficient ("n-value") is based on land cover and the FLO-2D guidance (FLO-2D, 2009). Other input to the FLO-2D program included levees (except for portions of the East Berm because they are not connected to the warehouse), a representation of the culvert that conveys flow toward NMP from the Lake Road vicinity, and incorporation of buildings and other features that would impede runoff.

The licensee described in FHRR Section 2.1.2.3, that the 72-hour PMP yields flood elevations up to approximately 0.6 ft (0.18 m) higher than the results from the 6-hour PMP simulation. The 72-hour PMP provides a maximum calculated flood elevation of 260.6 to 262.4 ft (79.4 to 80.0 m), with a maximum water depth of 0.3 to 2.8 ft (0.09 to 0.85 m) in the immediate vicinity of NMP, Units 1 and 2. Flood elevations of up to 263.7 ft (80.4 m) were calculated for non-safety related structures east of NMP, Unit 2. In the licensee's response to a NRC staff issued RAI (Korsnick, 2013), the licensee provided the following flood event duration parameters associated with the 72-hour PMP event: (1) flood warning time of 25 hours; (2) flood inundation duration of approximately 20 hours above elevation 261 ft (79.55 m); and (3) flood recession duration of 32.5 hours for the 72-hour PMP. These flood event duration parameters were identified using an overlay of Figures 2.1-3 and 2.1-23 of the FHRR, which was contained in the RAI response. A similar comparison using FHRR Figures 2.1-3 and 2.1-15 for the 6-hour PMP results in: (1) flood warning time of less than one hour (see FHRR Figure 2.1-15) and (2) a flood inundation duration of 14.5 hours above elevation 261 ft (79.55 m). Therefore, the NRC staff agreed with the licensee's conclusion that the 72-hour PMP event results in the highest water surface elevation and longest period of inundation. However, the NRC staff noted that PMP events shorter than 72-hour PMP (e.g., the 6-hour PMP event identified above) result in potentially significantly shorter warning time and likewise results in a flood above the elevation of openings to plant structures (261 ft; 79.55 m).

The NRC staff notes that a reasonable estimate of the site's LIP PMP is the application of an appropriate NOAA HMR estimate for any rainfall duration used in NUREG/CR-7046, regardless of temporal distribution of the rainfall. The licensee obtained 1-sq. mile PMP depths for durations ranging between 1-hour and 72-hours using HMR-51 and HMR-52. Therefore, the NRC staff confirmed that the licensee selected appropriate rainfall rate values to satisfy the 50.54(f) information request.

From its review of the FHRR and the RAI responses, the NRC staff found that the licensee had not discussed the effects of building roof drain features on the LIP flood estimation, and thus issued an RAI. In the response to this RAI (Korsnick, 2013), the licensee stated that rainfall on buildings is a minor contributor to runoff volume because building surface area represents less than two percent of the contributing watershed area to the site. The licensee further stated, that the impact of building runoff on peak flood surface elevation is not significant because building runoff would occur rapidly compared to the watershed runoff. The NRC staff reviewed the input and output files of the FLO-2D model provided by the licensee. The NRC staff found that runoff from rooftops is assumed to be removed completely from the model domain rather than discharging to the ground surface near the structure or an adjacent area, resulting in a potential underestimation of the maximum LIP flood levels. The NRC staff noted that this modeling deficiency was not addressed in the FHRR, or the response to this RAI (Korsnick, 2013). For the purposes of the 50.54(f) letter response, the identified modeling error is expected to be corrected by the licensee and applied as part of the Nine Mile Point mitigation strategies assessment (MSA).

To summarize, the licensee determined that the maximum LIP flood elevation is caused by a 72-hour PMP and provided a discussion in NMP FHRR Section 2.1.3. Flood elevations would be as much as 262.2 ft (80.0 m) at NMP, Unit 1, which is higher than the current licensing basis LIP flood level of 261.75 ft (79.8 m) as reported in the IPEEE submittal. At NMP, Unit 2, the maximum flood elevation would be 262.4 ft (80.0 m), which is below the current design-basis

LIP flood elevation of 262.5 ft (80.0 m).

The NRC staff noted that the FHRR analysis has the following three important differences compared to the current design-basis flood analysis:

- The current design-basis LIP flood analysis assumed onsite drainage culverts to be 100 percent open, while the FHRR assumed them to be 100 percent blocked or fully open if they are used to discharge water from the surrounding areas into the site.
- The current licensing basis assumed a 20-minute, 9.9-inch (25.2 cm) PMP in contrast to the FHRR analysis of up to 72-hour PMP events.
- Also, in the FHRR, runoff losses were conservatively assumed to be zero.

According to the Unit 2 updated final safety analysis report (UFSAR) (UniStar Nuclear Energy, 2011), building entrance elevations to all Category I Structures are 261 ft (79.6 m). For Unit 1, the maximum flood elevation of 262.2 ft (79.9 m) exceeds the Category 1 Structures entrance elevations for approximately 19 hours during the 72-hour PMP. For NMP, Unit 2, the maximum flood elevation of 262.4 ft (80.0 m) exceeds the Category 1 Structures entrance elevations for approximately 20 hours during the 72-hour PMP.

For NMP, Unit 2, the flood duration above elevation 261 ft (79.6 m) increased, which impacts the amount of water ingress into structures. For NMP, Unit 1, the flood duration as well as the flood elevation height increased relative to previous calculations. For these reasons, the licensee concluded that the reevaluated flooding hazard due to LIP is not bounded by the current design basis for the site.

The licensee's LIP analysis focuses on water above the land surface, with the assumption of no infiltration and blockage of onsite drainage systems by debris or sedimentation. The NRC staff noted that this assumption provides a conservatively high estimate of standing water. The NRC staff considered adverse effects of hydrodynamic forces generated by LIP flood, such as wind effects, groundwater ingress, and other adverse weather conditions, and determined that these effects were conservatively accounted for in the licensee's calculations.

The NRC staff confirmed the licensee's conclusion that the reevaluated flood hazard for LIP and associated site drainage is not bounded by the current design-basis flood hazard. For the purposes of the 50.54(f) letter response, the identified modeling error discussed above is expected to be corrected by the licensee and applied as part of the Nine Mile Point MSA. Therefore, the licensee is expected to submit a focused evaluation for LIP and associated site drainage consistent with the process outlined in COMSECY-15-0019 (NRC, 2015c) and associated guidance that will be issued. Under this approach, the NRC staff anticipates that licensees will perform and document a focused evaluation for LIP and associated site drainage that evaluates the impact of the LIP hazard on the site and implements any necessary programmatic, procedural or plant modifications to address this hazard exceedance. The NRC staff anticipates that licensees will submit letters providing a summary of the evaluation and, if needed, regulatory commitments to implement and maintain appropriate programmatic, procedural or plant modifications to protect against the LIP hazard.



### 3.3 Streams and Rivers

There are no changes or updates to this section of the NRC staff assessment.

### 3.4 Failure of Dams and Onsite Water Control/Storage Structures

There are no changes or updates to this section of the NRC staff assessment.

### 3.5 Storm Surge

There are no changes or updates to this section of the NRC staff assessment.

### 3.6 Seiche

There are no changes or updates to this section of the NRC staff assessment.

### 3.7 Tsunami

There are no changes or updates to this section of the NRC staff assessment.

### 3.8 Ice-Induced Flooding

There are no changes or updates to this section of the NRC staff assessment.

### 3.9 Channel Migrations or Diversions

There are no changes or updates to this section of the NRC staff assessment.

## 4.0 REEVALUATED FLOOD HEIGHT, EVENT DURATION AND ASSOCIATED EFFECTS FOR HAZARDS NOT BOUNDED BY THE CDB

The NRC staff confirmed that the reevaluated hazard result for LIP flooding is not bounded by the current design-basis flood hazard. Therefore, the NRC anticipates that the licensee will perform a focused evaluation of plant response for Nine Mile Point, Units 1 and 2, as described in NRC letter dated September 1, 2015 (NRC, 2015d). For the purposes of the 50.54(f) letter response, the identified LIP modeling error discussed in Section 3.2 is expected to be corrected by the licensee and applied as part of the Nine Mile Point MSA. The NRC staff reviewed the following flood hazard parameters needed to perform the additional assessments or evaluations of plant response:

- Flood event duration (see Table 4.0-1), including warning time and intermediate water surface elevations that trigger actions by plant personnel, as defined in Japan Lessons-Learned Directorate (JLD) Interim Staff Guidance (ISG) JLD-ISG-2012-05.
- Flood height and associated effects, as defined in JLD-ISG-2012-05 (see Table 4.0-2).

The NRC staff requested, via an RAI, the licensee to provide the applicable flood event duration parameters associated with mechanisms that trigger an integrated assessment. The relevant

flood duration parameters include the warning time the site will have to prepare for the event, the period of time the site is inundated, and the period of time necessary for water to recede off the site for the mechanisms that are not bounded by the current design-basis. The licensee's response (Korsnick, 2013) to this RAI is summarized below:

- The LIP-induced flood caused by a 72-hour PMP event results in the highest water surface elevation at the site. Per this flooding mechanism, the maximum flood elevations are 262.2 ft (79.92 m) and 262.4 ft (79.98 m) for NMP, Units 1 and 2, respectively, with the following flood duration parameters:
  - Flood warning time of 25 hours for the 72-hour PMP
  - 
  - Flood inundation duration of 20 hours above the plant grade of 261 ft (79.55 m) for the 72-hour PMP
  - Flood recession duration of 32.5 hours for the 72-hour PMP
- The licensee has an existing contract in place with Accuweather, Inc. that requires notification of forecasts predicting greater than 1 in. /hr (2.5 cm/hr) rainfall or greater than 6 in. (15 cm) of rainfall in a 24 hour period.

The NRC staff agreed with the licensee's conclusion that the 72-hour PMP event results in the highest water surface elevation and longest period of inundation. However, as described in Section 3.2, the NRC staff noted that PMP events shorter than 72-hour PMP result in (potentially significantly) shorter warning time and likewise results in a flood above the elevation of openings to plant structures. For example, a 6-hour PMP event results in an estimated flood warning time of less than one hour with a flood inundation duration of 14.5 hours above elevation 261 ft (79.55 m) (see Figure 4.0-1).

Based upon the preceding analysis, the NRC staff confirmed that the reevaluated flood hazard information defined in the sections above is appropriate input to other assessments or evaluations associated with Near-Term Task Force Recommendations, including the assessment of mitigation strategies developed in response to Order EA-12-049 (i.e., defines the mitigating strategies flood hazard information described in guidance documents currently being finalized by the industry and NRC staff).

## 5.0 CONCLUSION

The NRC staff has reviewed the information provided for the reevaluated flood-causing mechanisms for NMP, Units 1 and 2. Based on its review, the NRC staff concludes that the licensee conducted the hazard reevaluation using present-day methodologies and regulatory guidance used by the NRC staff in connection with ESP and COL reviews.

Based upon the preceding analysis, the NRC staff confirmed that the licensee responded appropriately to Enclosure 2, Required Response 2, of the 50.54(f) letter, dated March 12, 2012. In reaching this determination, the NRC staff confirmed the licensee's conclusions that: (a) the reevaluated flood hazard result for local intense precipitation is not bounded by the current design-basis flood hazard; (b) additional assessments of plant response will be performed for the

local intense precipitation flood-causing mechanisms, and (c) the reevaluated flood-causing mechanism information is appropriate input to additional assessments or evaluations of plant response, as described in the 50.54(f) letter and COMSECY-15-0019 (NRC, 2015b), including the assessment of mitigation strategies developed in response to Order EA-12-049 (i.e., defines the mitigating strategies flood hazard information described in guidance documents currently being finalized by the industry and NRC staff), and (d) for the purposes of the 50.54(f) letter response, the identified LIP modeling error discussed in the Section 3.2 is expected to be corrected by the licensee and applied as part of the Nine Mile Point MSA.

The NRC staff has no additional information needs at this time with respect to the FHRR.

## 6.0 REFERENCES

### U.S. Nuclear Regulatory Commission (NRC) Documents and Publications:

NRC (U.S. Nuclear Regulatory Commission), 2014b, letter from Robert F. Kuntz, NRC,, to Mary G. Korsnick, Chief Nuclear Officer, Constellation Energy Nuclear Group., LLC, "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) July 24, 2014, ADAMS Accession No. ML14153A410.

NRC (U.S. Nuclear Regulatory Commission), 2015a, SRM – COMSECY-15-0019 – Closure Plan for the Reevaluation Of Flooding Hazards for Operating Nuclear Power Plants," COMSECY-15-0019, July 28, 2015, ADAMS Accession No. ML15209A682.

NRC (U.S. Nuclear Regulatory Commission), 2015b, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants," COMSECY-15-0019, June 30, 2015, ADAMS Accession No. ML15153A104.

NRC (U.S. Nuclear Regulatory Commission), 2015c, letter from William M. Dean, Director, to Power Reactor Licensees, "Coordination of Requests for Information for Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events, September 1, 2015, ADAMS Accession No. ML15174A257.

## 6.2 Codes and Standards

There are no changes or updates to this section of the NRC staff assessment.

## 6.3 Other References:

There are no changes or updates to this section of the NRC staff assessment.

**Table 3.1-1: Design Basis (DB) Flood Hazard**

<b>Flooding Mechanism</b>	<b>DB Still-Water Level (ft(m) USLS35)</b>	<b>DB Associated Effects (ft(m))</b>	<b>Current DB Flood Level (ft(m) USLS35)</b>	<b>Reference</b>
Local Intense Precipitation and Associated Drainage	261.75 ft (79.78 m ) for Unit 1 (IPEEE <sup>1</sup> ) 262.5 ft (80.01 m ) for Unit 2	Not Applicable	261.75 ft (79.78 m ) for Unit 1 262.5 ft (80.01 m ) for Unit 2	FHRR 1.3
Streams and Rivers	Not Discussed	Not Discussed in CDB	Not Discussed	FHRR 1.3
Failure of Dams and Onsite Water Control/Storage Structures	Not Discussed	Not Discussed	Not Discussed	FHRR 1.3
Storm Surge	254 ft (77.42 m ) (Unit 2)	7 ft (2.1 m ) due to wave run-up (Unit 2)	261 ft (79.55 m ) (Unit 2)	FHRR 1.3 and UFSAR 2.4
Seiche	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.3 and UFSAR 2.4
Tsunami	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.3 and UFSAR 2.4
Ice-Induced	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.3 and UFSAR 2.4
Channel Migrations or Diversions	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.3 and UFSAR 2.4

Note: The plant grade for the NMP Units 1 and 2 is 261 ft (79.55 m) USLS35.

<sup>1</sup> Table 3.3-1 of the FHRR provides a comparison of the reevaluated flood elevation to the CLB flood elevation. Table 3.3-1 lists elevation "261.75 ft (IPEEE)" for the unit 1 CLB.

**Table 4.0-1: Flood Event Duration for Reevaluated Flood-Causing Mechanisms Not Bounded by the CDB**

<b>Flood-Causing Mechanism</b>	<b>Site Preparation for Flood Event</b> [Time Unit: hrs]	<b>Period of Site Inundation</b> [Time Unit: hrs]	<b>Recession of Water from Site</b> [Time Unit: hrs]
Local Intense Precipitation and Associated Drainage – 72-hour PMP	25 hours	20 hours	32.5 hours
Local Intense Precipitation and Associated Drainage – 6-hour PMP	Less than one hour	14.5 hours	14 hours

**Table 4.0-2: Reevaluated Flood-Causing Mechanisms and Associated Effects Hazards**

<b>Reevaluated Flood-Causing Mechanism</b>	<b>Stillwater Elevation (ft(m) USLS35)</b>	<b>Associated Effects (ft(m))</b>	<b>Reevaluated Flood Hazard (ft(m) USLS35)</b>	<b>Reference</b>
Local Intense Precipitation and Associated Drainage	262.2 (79.92 ) for Unit 1 262.4 (79.98 ) for Unit 2	Wind effect is not applicable	262.2 (79.92 ) for Unit 1 262.4 (79.98 ) for Unit 2	FHRR Section 3.2

Note: Site grade is 261 ft (79.55 m ) USLS35.

**Table 5.0-1: Integrated Assessment Action Items**

Deleted

COMSECY-15-0019 (ADAMS Accession No. ML15153A104) that described the NRC's mitigating strategies and flooding hazard reevaluation action plan.

As documented in the NRC staff assessment and the enclosed supplement, the NRC staff has concluded that the licensee's reevaluated flood hazard 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 guidance documents currently being finalized by the industry and NRC staff) for Nine Mile Point. Further, the licensee's reevaluated flood hazard information is suitable for other assessments associated with Near-Term Task Force Recommendation 2.1 "Flooding."

The reevaluated flood hazard results for local intense precipitation were not bounded by the current design-basis flood hazard. In order to complete its response to Enclosure 2 to the 50.54(f) letter, the licensee is expected to submit a focused evaluation to address these reevaluated flood hazards, as described in the NRC's September 1, 2015, letter. If there are any questions, please contact me at (301) 415-6197 or email at Tekia.Govan@nrc.gov.

Sincerely,

/RA/

Tekia Govan, Project Manager  
 Hazards Management Branch  
 Japan Lessons-Learned Division  
 Office of Nuclear Reactor Regulation

Docket Nos.: 50-220, and 50-410

Enclosure:  
 Supplement to Staff Assessment of Flood  
 Hazard Reevaluation Report

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**\* Concurred via email**

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