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

November 3, 2015

Mr. C. R. Pierce
Regulatory Affairs Director
Southern Nuclear Operating Co., Inc.
Post Office Box 1295 / Bin 038
Birmingham, AL, 35201-1295

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2 – SUPPLEMEMT TO STAFF ASSESSMENT OF RESPONSE TO 10 CFR 50.54(f) INFORMATION REQUEST – FLOOD-CAUSING MECHANISMS REEVALUATION (CAC NOS. MF1117 AND MF1118)

Dear Mr. Pierce:

The purpose of this letter is to transmit a supplement to the U.S. Nuclear Regulatory Commission (NRC) staff's assessment for Vogtle Electric Generating Plant, Units 1 and 2 (Vogtle) reevaluated flood hazard information that was issued to you by letter dated November 6, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14279A352). 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 steps associated with the mitigation strategies assessment with respect to the reevaluated flood hazards.

By letter dated March 12, 2012 (ADAMS Accession No. ML12053A340), 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 March 5, 2013, May 24, 2013 March 6, 2014, and May 28, 2014 (ADAMS Accession Nos. ML13067A283, ML13148A368, ML14072A370, and ML14148A491), Southern Nuclear Operating Company, Inc. (the licensee), responded to this request for Vogtle. By letter dated November 6, 2014, the NRC staff transmitted to the licensee a staff assessment of the information provided in the aforementioned letters. 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. MF1117 and MF1118.

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 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 Vogtle. 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 and failure of upstream dams on the Savannah River 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 revised integrated assessment or focused evaluation(s), as appropriate, to address these reevaluated flood hazards, as described in the NRC's September 1, 2015, letter.

If you have any questions, please contact me at (301) 415-6185 or email at Anthony.Minarik@nrc.gov.

Sincerely,

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

Docket Nos. 50-424 and 50-425

Enclosure:
Staff Assessment of Flood Hazard
Reevaluation Report

cc w/encl: 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 2.1

RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT

VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-424 AND 50-425

1.0 INTRODUCTION

This document is a supplement to the U.S. Nuclear Regulatory Commission (NRC) staff assessment that was transmitted by letter dated November 6, 2014 (NRC, 2014c), to Southern Nuclear Operating Complany, Inc. (the licensee) for Vogtle Electric Generating Plant, Units 1 and 2 (Vogtle, VEGP). With the exceptions of the Table 3.1-1 and the Reference section, this supplement only contains the sections that were changed to resolve the open 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 at the end of the supplement is 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 flooding-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 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 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(s) 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.

3.1.1 Detailed Site Information

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

3.1.2 Design-Basis Flood Hazards

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

3.1.3 Flood-related Changes to the Licensing Basis

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

3.1.4 Changes to the Watershed and Local Area

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

3.1.5 Current Licensing Basis Flood Protection and Pertinent Flood Mitigation Features

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

3.1.6 Additional Site Details to Assess the Flood Hazard

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

3.1.7 Plant Walkdown Activities

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

3.2 Local Intense Precipitation and Associated Drainage

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

3.2.1 Local Intense Precipitation

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

3.2.2 Runoff Analyses

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

3.2.3 Level-Pool Runoff Analysis for Vogtle Electric Generating Plant, Units 1 and 2 Area

In FHRR Section 2.1, the licensee discusses application of the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) model to reevaluate the local intense precipitation (LIP) flood hazard within the area encircled by the VEGP, Units 1 and 2 vehicle barrier system (VBS) as shown on Figure 3.2-1. The licensee initially used a 6-hour duration PMP scenario, as described in the FHRR. The licensee later submitted the result of the maximum LIP flood elevations for three additional PMP durations (e.g., 12-, 24-, and 48-hour) (Pierce, 2014b). This additional information indicates that the predicted maximum water-surface elevations and outflow rates for different PMP durations are nearly identical as they used bounding basin runoffs, but times to peak are different.

The VBS is a concrete barrier encircling the VEGP, Units 1 and 2 powerblock area of approximately 66 acres (0.27 km^2). Currently, the VBS has a double row of barriers, and the second row of barriers was installed after the construction of Units 3 and 4 started. The newer VBS row is mostly located outside the older VBS row. The ground elevations on the VBS area are much lower than the plant grade, so that runoff from the powerblock area would drain away. The height of the older VBS is 3.5 ft (1.1 m), and the minimum elevation of the top of VBS is approximately 218.5 ft (66.6 m). The FHRR states that the area within the perimeter of the double row VBS is modeled as a lumped-parameter reservoir. Because the plant grade is sloped from the center of the powerblock to the perimeter near the VBS, runoff will collect in the inside area of VBS. Eventually, water will overflow the top of VBS, and the VBS will act like a broad-crested weir.

The licensee used several conservative assumptions as part of its LIP flooding reevaluation. The key assumptions are that all storm drains beneath the VBS would be completely blocked by debris and sediment, and that no water would flow through or between gaps on the VBS units (e.g., pedestrian openings and vehicle entrance gates). The NRC staff agrees that these assumptions are conservative. The licensee assumed that flow over the VBS in the licensee's model is represented by a standard weir equation. Where an outer row of VBS causes the inner row to be submerged, the weir representation is corrected for downstream submergence. The licensee provided additional information on the VBS overflow representation, including the calculations of weir flow and simulations of LIP flood on the site using the HEC-HMS (Pierce, 2014a and 2014b).

The maximum level-pool elevation estimated using the HEC-HMS model applied to the VEGP, Units 1 and 2 area is the basis for the licensee's LIP flooding hazard reevaluation. The licensee's model has the following three subbasin components: (1) a subbasin representing the entire VEGP, Units 1 and 2 powerblock area, (2) the VEGP, Units 3 and 4 area which is treated as an inflow hydrograph in the model, and (3) a small watershed discharging into the VEGP, Units 1 and 2 powerblock area. The NRC staff reviewed each subbasin component to determine whether the conceptual model for LIP runoff described by the licensee was appropriately represented or not.

As a result of this review, the NRC staff found that the entire VEGP, Units 1 and 2 powerblock area is modeled by a single subbasin as a reservoir. An external model was used to determine a stage-discharge relation within this subbasin. The licensee assumed that the subbasin is represented by a level-pool conceptual model. The level-pool model is a direct representation of the principle of the conservation of mass, which states the change in storage is equal to the inflow less the outflow. One of the major input variables on the model is runoff created by a PMP

scenario within the powerblock area. The licensee applied a level-pool assumption for water that flows within the subbasin and collects behind the VBS.

The NRC staff reviewed the licensee-provided onsite topography map (Pierce, 2014a). The NRC staff noted that some elevations for the VEGP, Units 1 and 2 area, especially in the central powerblock area near the Reactor Buildings and Turbine Buildings, are higher than the nominal plant grade of 220 ft (67m). The NRC staff found that one uniform water-surface level estimated on the top of the VBS system cannot represent the varying flood elevations at all locations within the VEGP, Units 1 and 2 area, especially at the center of the powerblock area which is where many safety-related buildings are located. The NRC staff noted that this area could be inundated by accumulated runoffs from nearby building roofs and that the LIP flood levels on this area could be higher than the licensee's estimated elevation of 219.3 ft (66.8 m) on top of the VBS, which is lower than the land surface elevations in the powerblock area.

The NRC staff recognized that the level-pool model results in underestimating the maximum LIP flood levels in the center of the VEGP, Units 1 and 2 powerblock area. This underestimation is likely due to the effect of averaging of the spatially-varying LIP floods within the powerblock area using a single subbasin.

3.2.4 Overflow from the VEGP, Units 3 and 4 Area into the VEGP, Units 1 and 2 Area

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

3.2.5 Runoff from VEGP, Units 3 and 4 Area

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

3.2.6 Conclusion

The licensee determined that the reevaluated maximum water-surface elevation in the VEGP, Units 1 and 2 powerblock area would be 219.3 ft (66.84 m), which exceeds the design-basis value.

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. The staff also noted that the flood levels on the powerblock area may change and be higher than the 219.3 ft (66.84 m) if the licensee incorporated the variability of the land surface elevations on the power block area. 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, 2015b) 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

The licensee reported in its FHRR, that the reevaluated PMF elevation, including associated effects, for site flooding due to failure of dams and onsite water control/storage structures is 178.1 ft (54.3 m). This flood-causing mechanism is described in the licensee's current design-basis. The current design-basis hazard for dam failure flooding from streams and rivers is 168 ft (51.2 m).

The licensee stated in its FHRR, that it adopted Section 2.4.4, Dam Failures, of the VEGP, Units 3 and 4 final safety analysis report (FSAR) (SNOC, 2012c) to represent the reevaluation of dam failure flooding for VEGP, Units 1 and 2. The licensee selected 14 major dams in the Savannah River basin. To demonstrate that the site is not inundated by dam failure flooding, the licensee postulated a domino-type failure of two large dams: Russell Dam and J. Strom Thurmond Dam. In addition to the dam failure scenario, the U.S Army Corps of Engineers (USACE) - defined Standard Project Flood (SPF) was simultaneously applied in the HEC River Analysis System (RAS) simulation. In order to create a simplified, yet conservative, dam failure flooding scenario, the storage volume of Russell Dam was increased in the model by adding the sum of the storage volumes of the 12 upstream reservoirs, including Jocassee, Keowee, and Hartwell. Russell Dam was assumed to fail by overtopping during an upstream flood. The licensee considered several breach parameter equations and justified the selected conservative breach parameter set. Using the HEC-RAS model with the above combined scenario, the licensee simulated a peak flood rate of 2,233,000 cfs (63,200 cms) and a maximum flood elevation of 166.8 ft (50.8 m) or a flood level with 2-year wind effects of 178.1 ft (54.3 m).

The NRC staff previously reviewed the above dam failure flood analyses for the VEGP, Units 3 and 4 ESP application (NRC, 2009b and 2012d). Based on a sensitivity analysis with conservative upstream inflows, the NRC staff confirmed that the discharge conservatively estimated using the HEC-RAS steady flow analysis was approximately 5.9 million cfs (0.17 million cms) (NRC, 2009b). Using the increased discharge rate and a 50 percent increase in dam breach areas, the NRC staff produced a conservative peak flood stage of 170.1 ft (51.8 m) which is well below the plant grade.

During its review of the FHRR, the NRC staff found that the dimensions of dams, including heads and storage volumes on FHRR Table 2.4-215, are slightly different from the latest information on the National Inventory of Dams (NID) database (USACE, 2013). The NRC staff noted that the differences are due to the definitions of storage volume: the FHRR incorporates the USACE data used to establish the SPF on the basin while the NID uses the physical maximum properties. Therefore, the NRC staff performed a bounding confirmatory analysis, as discussed below.

From the NID database, the NRC staff identified a total of 725 dams within the river basin. The total storage volume of these reservoirs is 11.3 million acre-feet (ac-ft) (13.9 cubic kilometers (km^3)). Most of the reservoirs are small in terms of storage volumes, and the ten largest reservoirs by storage volume account for over 97 percent of the total storage volume (see Table 3.4-1). This

result indicates that the licensee's selection of 14 major dams is appropriate as they mostly overlap the ten largest dams listed on Table 3.4-1. Using the NID data, the NRC staff calculated the breach peak outflows from each failed reservoir using the peak flow equation by Froehlich (1995) and the United States Bureau of Reclamation (USBR) attenuation equation (1982). Table 3.4-1 lists the estimated peak flows attenuated at the plant site, or a total breach peak flow rate of 1,118,000 cfs (31,600 cms). On this estimation, the NRC staff assumed that the breach outflows are transferred to the plant site instantly and simultaneously without losses. Adding the dam failure peak flow and the PMF discharge of 920,000 cfs (26,000 cms), the NRC staff obtained a combined peak flow rate of 2,038,000 cfs (57,700 cms), and the corresponding stage with 2-year wind effects of 177.3 ft (54 m) (from Figure 3.4-1) which is below the plant grade.

The NRC staff noted that the NRC staff's bounding analysis is conservative because (1) all breach outflows from main river and tributary arrive to the basin outlet instantaneously and simultaneously, and (2) the NRC staff-estimated attenuated peak flows using the USBR attenuation equation are conservative as the equation was developed based on the bounding of historical values (USBR, 1982). As the licensee's dam failure flood elevation is nearly identical to the NRC staff's two bounding analyses discussed above, the NRC staff determined that the licensee's reevaluation of the dam failure flood analysis is acceptable. The NRC staff also determined that other associated effects on the site caused by hydrodynamic loading, debris, sediment, groundwater ingress, or adverse weather conditions are insignificant or not applicable to the dam failure flooding on the Savannah River. The NRC staff notes that there is no onsite water control/storage structures that could cause dam failure related floods.

In summary, the NRC staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from the failure of upstream dams on the Savannah River is not bounded by the current design basis flood hazard. Therefore, the licensee is expected to submit a focused evaluation or an integrated assessment consistent with the process and guidance discussed in COMSECY-15¬0019 (NRC, 2015b) that addresses the failure of upstream dams.

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 CURRENT DESIGN-BASIS

The NRC staff confirmed that the reevaluated hazard results for LIP and failure of upstream dams are not bounded by the current design-basis flood hazard. Therefore, the NRC staff anticipates that the licensee will perform additional assessments (i.e., integrated assessment or focused evaluation) of plant response for VEGP, Units 1 and 2, as described in NRC letter dated September 1, 2015 (NRC, 2015c).

The NRC staff reviewed the following flood hazard parameters needed to perform the additional assessments or evaluations of plant response:.

- A maximum LIP water surface elevation that exceeds the FHRR estimate of 219. 3 feet (66.8 m) in the powerblock area and is above the current design-basis LIP level.
- A maximum dam breach flood level with wind effects of 178.1 ft (54.3 m) on the Savannah River, which is 10.1 ft (3.1 m) above the current design-basis dam breach flood level that includes wave effects but are well below the plant grade.

The NRC staff requested, via a request for addtiontal information (RAI) (NRC, 2014a), the licensee to provide the applicable flood event duration parameters associated with mechanisms. 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 (Pierce, 2014a and 2014b) to this RAI is summarized below:

- For the LIP flooding, warning time of several hours (usually more than 12) based on local forecasts of storm events with the potential for very large precipitation volume.

- For the dam breach flooding, warning time of about 12 hours until the initial flood wave begins to arrive at the site location on the Savannah River and about 34 hours until the peak water level arrives at the site location. The times are based on the travel time for the flood wave to travel down the Savannah River after breach of the J. Strom Thurmond Dam.

- Flood inundation duration and recession time are zero for dam failure floods because the reevaluated flood elevations are below the plant grade.

Based upon the preceding analysis, NRC staff confirmed that the reevaluated flood hazard information defined in the sections above is appropriate input to the 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 VEGP, 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 on the preceding analysis, the NRC staff confirmed that the licensee responded appropriately to Enclosure 2, Required Response 2, of the 50.54(f) letter. In reaching this determination, the NRC staff confirmed the licensee's conclusions that (a) the reevaluated flood hazard result for LIP and dam failure are not bounded by the current design-basis flood hazard, (b) additional assessments of plant response will be performed for the local intense precipitation and the storm dam failure-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).

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), 2014c, letter from Robert F. Kuntz, NRC, to C.R. Prierce, Regulatory Affairs, Southern Nuclear Operating Comampany, Inc.,"Vogtle Electric Generating Plant, Units 1 and 2 – Staff Assessment of Response to 10 CFR 50.54(F) Information Request- Flood-Causing Mechanism Reevaluation (TAC NOS. MF1117 AND MF1118), November 6, 2014, ADAMS Accession No.ML14279A352.

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 Request for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond Design Basis External Events, September 1, 2015, ADAMS Accession No. ML15174A257.

Codes and Standards:

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

Other References:

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

Table 3.0-1: Summary of Controlling Flood-Causing Mechanisms.

Reevaluated Flood-Causing Mechanisms and Associated Effects that May Exceed the Powerblock	ELEVATION (ft (m), MSL)
Local Intense Precipitation and Associated Drainage	219.3 (66.84)

Notes:
(1) Flood Height and Associated Effects as defined in JLD-ISG-2012-05.
(2) The plant nominal design elevation (NDE) for the VEGP, Units 1 and 2 site is 220 ft (67 m) mean sea level (msl), while the post-construction settled elevation for this elevation varied. In FHRR Section 1.1.1 states, that the minimum elevation reported by a recent survey was elevation 219.6 ft (66.9 m) msl for the NDE of 220 ft (67m) msl.
(3) The LIP flood estimation is based on the highest water elevation pooling behind the VBS. Maximum water surface elevations in the center of the powerblock will be higher.

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

Flooding Mechanism	DB Still-Water Level (ft (m) MSL)	DB Associated Effects (ft (m))	Current DB Flood Level (ft (m) MSL)	Reference
Local Intense Precipitation and Associated Drainage	219.1 (66.8)	Not Applicable	219.1 (66.8)	FHRR 1.2
Streams and Rivers/ Savannah River	138 (42.1)	27 (8.2) (Wind Wave)	165 (50.3)	FHRR 1.2, FSAR 2.4.3
Failure of Dams and Onsite Water Control/Storage Structures	141 (43)	27 (8.2) (Wind Wave)	168 (51.2)	FHRR 1.2, FSAR 2.4.4
Storm Surge	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.2
Seiche	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.2
Tsunami	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.2
Ice-Induced	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.2
Channel Migrations or Diversions	No Impact Identified	No Impact Identified	No Impact Identified	FHRR 1.2

Note: FSAR indicates Final Safety Analysis Report for VEGP, Units 1 and 2 (SNOC, 2012a).

Table 4.0-1: Flood Event Duration for Flood-Causing Mechanisms Not Bounded by the Current Design-Basis.

Flood-Causing Mechanism	Site Preparation for Flood Event [Time Unit: hrs]	Period of Site Inundation [Time Unit: hrs]	Recession of Water from Site [Time Unit: hrs]
Local Intense Precipitation and Associated Drainage	Several hours, usually more than 12 hours	The licensee is expected to provide this value as part of a focused evaluation	
Dam Failure Flooding	12 hours until the initial flood wave begins to arrive	Not applicable because site not inundated by the hazard mechanism	

Table 4.0-2: Reevaluated Flood Hazards for Flood-Causing Mechanisms Not Bounded by the Current Design-Basis.

Flood-Causing Mechanism	Stillwater Elevation (ft(m) MSL)	Associated Effects (ft(m))	Reevaluated Flood Hazard (ft(m) MSL)	Reference
Local Intense Precipitation and Associated Drainage	219.3 (66.8)	Assume drain blockages due to sediment, debris, or ice, but no other associate effects including wind, hydrodynamic force, or groundwater effects.	219.3 (66.8)	FHRR Section 2.1
Dam Failure Flooding	166 (50.6)	3.4 (11.3) for wind effects	178.1 (54.3)	FHRR Section 2.3

Table 5.0-1: Integrated Assessment Open Items

Deleted

(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 Vogtle. 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 and failure of upstream dams on the Savannah River 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 revised integrated assessment or focused evaluation(s), as appropriate, to address these reevaluated flood hazards, as described in the NRC's September 1, 2015, letter.

If you have any questions, please contact me at (301) 415-6185 or email at Anthony.Minarik@nrc.gov.

Sincerely,

/RA/

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

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Staff Assessment of Flood Hazard
Reevaluation Report
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