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

May 30, 2018

Mr. Robert Craven
Site Director
NextEra Energy Point Beach, LLC
6610 Nuclear Road
Two Rivers, WI 54241

SUBJECT: POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 – STAFF ASSESSMENT OF FLOODING FOCUSED EVALUATION (CAC NOS. MF9865 AND MF9866; EPID L-2017-JLD-0013)

Dear Mr. Craven:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807). Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). By letter dated March 12, 2015 (ADAMS Accession No. ML15071A413), NextEra Energy Point Beach, LLC (NextEra, the licensee) responded to this request for Point Beach Nuclear Plant, Units 1 and 2 (Point Beach).

After its review of the licensee's response, on December 10, 2015 (ADAMS Accession No. ML15321A063), the NRC issued an interim staff response (ISR) letter for Point Beach. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for Point Beach and were considered as suitable input for the mitigating strategies assessment (MSA). As stated in the letter, because the local intense precipitation (LIP) flood-causing mechanism at Point Beach is not bounded by the plant's CDB, additional assessments of the flood hazard mechanism were necessary.

By letter dated June 22, 2017 (ADAMS Accession No. ML17173A082), the licensee submitted the focused evaluation (FE) for Point Beach. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the ISR letter, that: 1) a flood mechanism is bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response is provided if the unbounded mechanism is local intense precipitation. The purpose of this letter is to provide the NRC's assessment of the Point Beach FE.

As set forth in the attached staff assessment, the NRC staff has concluded that the Point Beach FE was performed consistent with the guidance described in Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). Guidance document NEI 16-05, Revision 1, has been endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). The NRC staff has further concluded that the licensee has demonstrated that a feasible response is provided for the LIP flood mechanism during a beyond-design-basis external flooding event at Point Beach. This closes out the licensee's response for Point Beach associated with the reevaluated flooding hazard portion of the 50.54(f) letter, and the NRC's efforts associated with CAC Nos. MF9865 and MF9866.

If you have any questions, please contact me at 301-415-3809 or by e-mail at Juan.Uribe@nrc.gov.

Sincerely,

Juan F. Uribe, Project Manager
Beyond-Design-Basis Management Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket Nos. 50-266 and 50-301

Enclosure:
Staff Assessment Related to the Flooding Focused Evaluation for Point Beach

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE FOCUSED EVALUATION FOR

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE

RECOMMENDATION 2.1 - FLOODING

(CAC NOS. MF9865 AND MF9866)

1.0 INTRODUCTION

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 of the 50.54(f) letter requested that licensees reevaluate flood hazards for their respective sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). If the reevaluated hazard for any flood-causing mechanism is not bounded by the plant's current design basis (CDB) flood hazard, an additional assessment of plant response would be necessary. Specifically, the 50.54(f) letter stated that an integrated assessment should be submitted, and described the information that the integrated assessment should contain. By letter dated November 30, 2012 (ADAMS Accession No. ML12311A214), the NRC staff issued Japan Lessons-Learned Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding."

On June 30, 2015, the NRC staff issued COMSECY-15-0019, describing the closure plan for the reevaluation of flooding hazards for operating nuclear power plants (ADAMS Accession No. ML15153A104). The Commission approved the closure plan on July 28, 2015 (ADAMS Accession No. ML15209A682). COMSECY-15-0019 outlines a revised process for addressing cases in which the reevaluated flood hazard is not bounded by the plant's CDB. The revised process describes a graded approach in which licensees with hazards exceeding their CDB flood will not be required to complete an integrated assessment, but instead will perform a focused evaluation (FE). As part of the FE, licensees will assess the impact of the hazard(s) on their site and then evaluate and implement any necessary programmatic, procedural, or plant modifications to address the hazard exceedance.

Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178), has been endorsed by the NRC as an appropriate methodology for licensees to perform the focused evaluation in response to the 50.54(f) letter. The NRC's endorsement of NEI 16-05, including exceptions, clarifications, and additions, is described in NRC JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force

Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). Therefore, NEI 16-05, Revision 1, describes acceptable methods to be used in demonstrating that Point Beach Nuclear Plant, Units 1 and 2 (Point Beach, PBNP) has effective flood protection.

2.0 BACKGROUND

This staff assessment provides the final NRC evaluation associated with the information that the licensee provided, in response to the reevaluated flooding hazard portion of the 50.54(f) letter. Therefore, this background section includes a summary description of the reevaluated flood information provided by the licensee and the associated assessments performed by the NRC staff. The reevaluated flood information includes: 1) the flood hazard reevaluation report (FHRR); 2) the mitigation strategies assessment (MSA); and 3) the FE.

Flood Hazard Reevaluation Report

By letter dated March 12, 2015 (ADAMS Accession No. ML15071A413), NextEra Energy Point Beach, LLC (NextEra, the licensee) submitted the FHRR for Point Beach. After reviewing the licensee's response, on December 10, 2015 (ADAMS Accession No. ML15321A063), the NRC issued an interim staff response (ISR) letter for Point Beach. The ISR letter discusses the reevaluated flood hazard mechanisms that exceeded the CDB for Point Beach and parameters that are a suitable input for the MSA. As stated in the ISR letter, because the local intense precipitation (LIP) flood-causing mechanism at Point Beach is not bounded by the plant's CDB, additional assessments of the flood hazard mechanism were necessary.

Mitigation Strategies Assessment

By letter dated November 22, 2016 (ADAMS Accession No. ML16327A099), NextEra submitted the MSA for Point Beach for review by the NRC staff. The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigation strategies for beyond-design-basis external events. By letter dated February 9, 2017 (ADAMS Accession No. ML17018A271), the NRC issued its assessment of the Point Beach MSA. The NRC staff concluded that the Point Beach MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" (ADAMS Accession No. ML16005A625). The NRC's endorsement of NEI 12-06, Revision 2, is described in JLD-ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15357A163). The NRC staff further concluded that the licensee has demonstrated that the mitigation strategies, if appropriately implemented, are reasonably protected from the reevaluated flood hazard conditions for beyond-design-basis external events.

Focused Evaluation

By letter dated June 22, 2017 (ADAMS Accession No. ML17173A082), the licensee submitted the FE for Point Beach. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the ISR letter, that: 1) a flood mechanism is bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response is provided if the only unbounded mechanism is LIP. These three options associated with performing an FE are referred to as Path 1, 2, or 3, as described in NEI 16-05, Revision 1. The purpose of this staff assessment is to provide the results of the NRC's evaluation of the Point Beach FE.

3.0 TECHNICAL EVALUATION

In its FE submittal, NextEra stated that the evaluation strategy of its FE was Path 3 of NEI 16-05, Revision 1, which is to demonstrate a feasible response to the LIP flooding mechanism. The licensee also included an analysis using Path 2, which is to demonstrate effective flood protection, as a "defense-in-depth" approach. The Point Beach FE addresses the LIP flooding mechanism, which was the only flooding mechanism found to exceed the plant's CDB as described in the FHRR and ISR letter. This technical evaluation will address the following topics: characterization of flood parameters; evaluation of flood impact assessments; reliability of flood protection features and mitigation equipment; and feasibility of manual actions.

3.1 Confirmation of Revised Flood Hazard Elevations

For its FE submittal, the licensee revised their LIP flood model (as compared to the one used in the FHRR) in order to incorporate updated site topography, to apply more realistic model parameters, and to use the latest version of the FLO-2D software. The licensee provided in the FE a description of the revised LIP modeling and its results. By letter dated November 6, 2015 (ADAMS Accession No. ML15310A170), the licensee provided additional clarifications regarding the reevaluated flood hazard, updated points of interest, and maps depicting flow depths that were consistent with the revised flood model. These clarifications were provided in response to the audit that was conducted on October 29, 2015 (ADAMS Accession No. ML16160A344).

The licensee stated in its FE submittal that the setup of the revised LIP flooding analysis did not change from the setup developed as part of the FHRR and the MSA, and that one of the main reasons behind the revision was to introduce additional realisms into the LIP analysis and to apply an updated version of the FLO-2D software. The licensee stated in its FE that errors with the FLO-2D version applied as part of the FHRR and MSA, which were corrected in the analysis for the FE, did not impact maximum water surface elevations near safety-related structures as the software error was only associated with the drainage system portion. In any case, the drainage system was not credited in the FHRR and MSA analyses.

For the LIP analysis presented in its FE submittal, the licensee used the software FLO-2D Pro Model (Build No. 14.08.09). The licensee also used site-specific probable maximum precipitation (ssPMP) values, which were developed for the FHRR evaluation and reviewed by the NRC staff as part of the FHRR review. The licensee estimated a 1-hour, 1 square-mile (mi^2) probable maximum precipitation (PMP) depth of 12.8 inches (in.). The licensee introduced several realisms into the FLO-2D model, as compared to the analysis used in the FHRR. After conducting a review of the licensee-provided FLO-2D model input files and following an audit with the licensee (ADAMS Accession No. ML15310A170), the NRC staff identified the following modeling realisms:

- The Yard drain inlet openings were configured at reduced capacity to account for debris blockage during the rainfall event. That is, the inlet grate areas were reduced by 50% and the flow perimeters were reduced by 25%, whereas the FHRR's FLO-2D model assumed 100% blockage.
- Yard drains E2 and E7, which are adjacent to Doors 340 and 336, respectively, were assumed fully functional (i.e., at full capacity of 100% without any blockage), compared to the fully blocked in the FHRR's FLO-2D simulation.

- Surface depressions are simulated in the FE model.
- The FE model reduced the onsite area occupied by temporary structures.
- Temporal distribution in the FE model assumed the rainfall event is a fourth quartile end-peaked scenario. This temporal distribution scenario is similar to the scenario used during the FHRR review.

The licensee submitted four LIP temporal distributions and ten site configuration permutations to the NRC as part of the FHRR review. Model run ID SsSRTSQ4 closely matched the model configuration used by the licensee as part of the FE submittal. The NRC staff performed confirmatory modeling as part of its FE review, including modifying the drainage data in the FLO-2D model run ID SsSRTSQ4 in order to be consistent with changes described by the licensee in their FE submittal. The result of the NRC staff's confirmatory modeling analysis reasonably approximated the licensee's FE values. Specifically, the water depths matched the licensee's values to within 0.5 feet (ft.) at important-to-safety locations around the site.

The FLO-2D model described in the FE submittal assumed that the storm drainage system was partially functional rather than the previously assumed non-functional storm drainage system used during the FHRR and MSA review phase. The licensee used the publicly available references: Electric Power Research Institute (EPRI) Report 3002008113, "Evaluation of Deterministic Approaches to Characterizing Flood Hazards," and NUREG/CR-7046 "Design-Basis Flood Estimation for Site Characterization at Nuclear Power Plants in the United States of America," to justify the assumption of crediting of the storm drainage. The licensee stated in its FE that sediment generation and deposition at the site is not significant. Furthermore, flow velocities during the LIP event are estimated to be between 1 and 3 ft. per second on the west side of the plant and even higher on the east side of the plant. Therefore, the licensee concluded in its FE that with this range of velocities it is reasonable to expect that small debris generated on the site may be transported through the drain system and partially block the system. Moreover, the control and monitoring programs implemented at the site will limit the availability of debris at the site. The NRC staff noted that the realisms implemented in the revised FLO-2D model result in reduced peak water depths across the site.

Table 3.1-1 of this assessment summarizes the peak water depths at key monitoring locations for the LIP flood-causing mechanism. Table 3.1-2 compares peak water depths between the FHRR and the FE submittal. Table 3.2-3 presents the peak water elevations for flood-causing mechanisms that are not bounded by the current design basis. Figure 3.1.1 of this assessment presents the locations of points of interest relevant to the review, such as buildings and doors, provided by the licensee. Figures 3.1.2 and 3.1.3 were generated by the NRC staff during independent confirmatory analyses and present the maximum water surface elevations and maximum flow depths, respectively, resulting from the FE simulation. Figure 3.1.4 show sample hydrographs for Doors 4 and 13 and are generated from the NRC staff's confirmatory analysis and review of information provided with the MSA.

In summary, the NRC staff concludes that the revised maximum flood elevations reported in the FE are acceptable for use, and that the licensee used present-day methodologies and regulatory guidance.

3.2 Characterization of Associated Flood Hazard Parameters

Associated effects (AE) and flood event duration (FED) parameters were assessed by NextEra and have already been reviewed by the NRC, as summarized by letter dated February 9, 2017 (ADAMS Accession No. ML17018A271). NextEra used the AE and FED parameters as input to the Point Beach FE and concluded that the site's flood strategy is effective in protecting structures, systems, and components (SSCs) that support key safety functions ((KSFs) or key SSCs). For reference, Tables 3.2-1 and 3.2-2 provide the AEs and FED parameters for consideration in the Point Beach FE review. NextEra supported its conclusion of adequate flood protection by demonstrating the reliability of flood protection features and mitigation equipment for LIP, and feasibility of manual actions during the LIP response.

The ground surface at Point Beach is gently rolling to flat, with elevations varying from 584.3 to 639.3 ft. relative to the North American Vertical Datum of 1988 (NAVD88). The ground floor elevation of the Units 1 and 2 turbine building is 589.3 ft. NAVD88. The complete details of flooding elevations for all locations of interest are described in Table 3.1-1 of this assessment. The NRC staff notes that the maximum water surface elevation of 609.6 ft. NAVD88 for the FHRR (also described in the ISR letter) was determined to be at Door 159 of Units 1 and 2 Building. The corresponding water surface elevation at the same location in the revised FE analysis is 608.4 ft. NAVD88. The maximum water surface elevation for the FE is 609.3 ft. NAVD88 was determined to be at Door 601 of the Diesel Generator Building. This location is shown on Table 4.2 of the FHRR and Figure 4.5 of the November 6, 2015 NextEra submittal. Therefore, Table 3.2-3 provides a summary of the relevant elevation for the reevaluated LIP flood mechanism using the revised FE analysis.

For the LIP condition, the licensee identifies several local operator actions, which are required by the Point Beach FLEX strategy and may be restricted by floodwaters entering the turbine building and on the FLEX deployment paths. The licensee relies on demonstrating that floodwaters from LIP will have receded to acceptable levels prior to these operator actions being required, and on the reliability of the FLEX equipment in flood conditions. The potential impacts from this flooding-causing mechanism were further evaluated by NextEra as part of the Point Beach FE.

3.3 Evaluation of Flood Impact Assessment

3.3.1 Description of Impact of Unbounded Hazard

The Point Beach FE identified the potential impacts on key SSCs as a result of water ingress due to LIP. The beyond-design-basis LIP event leads to peak flood water surface elevations above the peak heights for the current licensing basis flood at some doors, which provide access to critical equipment, particularly within the turbine building. In order to assess the impacts of the unbounded flood levels, the licensee identified the maximum water surface elevations at the exterior door openings, maximum flood depths above the door threshold, and duration of when the flood levels are above the door threshold. With this information, the licensee assessed the impacts of water ingress and potential for accumulation into rooms housing key SSCs. In addition, the licensee indicated that it analyzed the impact of maximum reevaluated flood levels along the deployment routes and staging locations for Phase 2 and Phase 3 equipment.

The licensee's evaluation indicated that the ingress of flood waters during a LIP event could impair access to some critical areas. Access to these areas is needed in order to allow local operators to implement certain FLEX strategies. The following lists the critical areas where LIP water could impair access, and the associated operator actions:

- Auxiliary Feed Pump (AFP) Room

  - o Local actions to ensure direct current (dc) load shedding
  - o Opening AFP room doors for ventilation and cooling of the turbine-driven auxiliary feed (TDAFW) pumps
  - o Establishing alternate suction for the TDAFW pumps in the event that the condensate storage tank (CST) is damaged by a tornado missile

- Vital Switchgear Room

  - o Establishing alternate suction for the TDAFW pumps in the event that the condensate storage tank (CST) is damaged by a tornado missile

- Area inside the north access gate, south of the FLEX storage building
  - o Equipment deployment routes from the FLEX storage building

- East side of turbine building near Unit 1 doors
  - o Staging and connection of portable diesel generator (PDG)

- North side of circulating water pump house (CWPH)
  - o Staging and connection of portable diesel-driven steam generator injection pump (PDSG)

The licensee concluded in its FE submittal that:

- Flood waters would recede quickly enough that operators would be able to access the AFP room in time to perform dc load shedding and open the AFP room doors in accordance with the licensee's FLEX strategy;

- Aligning an alternate suction source to the TDAFW pumps would only be required during a tornado missile scenario, which can be assumed to not occur concurrently with a LIP event;

- Phase 2 FLEX equipment deployment and staging begins approximately 3 hours after the start of the ELAP [extended loss of alternating current (ac) power] event, when flood water levels would have receded to the point that FLEX equipment can be safely and effectively deployed; and

- Alternate staging and connection areas are available for the FLEX PDG and PDSG, if necessary.

The NRC staff reviewed the information provided by the licensee in order to assure that adequate flood parameters were used for the calculation of water ingress and water accumulation. Specifically, the NRC staff verified that the assumed duration of flooding above threshold elevation was consistent with previous information reviewed by the staff for the Point Beach FHRR (ADAMS Accession No. ML15071A413). Additionally, the staff reviewed Revision 2 of the licensee's Engineering Evaluation 2015-0016, "LIP Flooding Coping Strategies (Flood Levels)," which incorporated additional analysis with more realistic assumptions.

3.3.2 Evaluation of Reliability of Flood Protection Features and Mitigation Equipment

Evaluation of Reliability of Protection Features

The licensee's primary basis of the FE (i.e. Path 3 as described in NEI 16-05) does not rely on any specific permanent or temporary flood protection features in order to demonstrate protection of critical areas for flooding from LIP. Rather, the licensee evaluates the degree and duration of flooding of critical areas based on the maximum water surface elevations at the exterior door openings, maximum flood depths above the door thresholds, and duration of flood levels above the impacted door thresholds; and then demonstrates that the flood waters would drain sufficiently from those critical areas such that operators would be able to perform the required time-sensitive actions in order to effectively carry out the FLEX strategy. In the Point Beach MSA, the licensee notes that the majority of the site is situated 8 ft. to 26 ft. above the nominal level of Lake Michigan, so the volume of flood water from LIP will tend to drain naturally into the lake quickly. The licensee stated that during a LIP event, the most important flood zones are the areas north and south of the Circulating Water Pump House, which provide the ultimate drain path to Lake Michigan for much of the LIP flood waters on site.

After reviewing the information described in the FE and other submittals, the NRC staff agrees that LIP is a short duration event (60 minute duration and water recession of most critical areas within 2 to 4 hours after the LIP event), and that the Phase 2 FLEX equipment deployment and staging is not expected to be impacted. This is because Phase 2 equipment begins approximately 3 hours after the start of the ELAP event, when flood water levels would have receded to the point that FLEX equipment can be safely and effectively deployed. The NRC staff notes that NEI 16-05 does not direct licensees to assess LIP in multiple paths, and considers the availability of the FLEX implementation under a reevaluated LIP event to be sufficient to meet the requested information under the 50.54(f) letter. Nonetheless, the NRC staff also agrees that under a beyond-design-basis LIP scenario, the preferred site response would be Path 2 and conclude that an effective flood protection is provided for the unbounded LIP mechanism. The NRC staff's review of the LIP event following a Path 2 review (using the guidance of NEI 16-05) is described below.

Evaluating the effective flood protection at the site, as a separate and redundant strategy characterized as a defense-in-depth approach in the FE, the licensee demonstrated that passive flood protection features have adequate available physical margin (APM) to assure that KSFs remain available during the LIP, with the exception of emergency ac power.

The licensee identified in its flooding analysis that the "A" train emergency diesel generators (EDGs), located 8 ft. above the nominal level of Lake Michigan, could be inoperable due to the reevaluated LIP flood water elevation. A direct flowpath exists between the "A" train EDGs in the control building (CB) and the outside, with no flood barriers in between. In contrast, the "B" train EDGs are situated 28 ft. above nominal Lake Michigan level, and are not vulnerable to flood water ingress from outside. The licensee states that the "B" train EDGs are only vulnerable to rain intrusion through the exhaust stacks; the existing stack drain valves are maintained normally closed so as to prevent carbon monoxide buildup, so rainfall during a LIP event may accumulate in the exhaust stacks to the point that the EDGs become inoperable. In its FE, the licensee notes that this vulnerability does not impact demonstration of a feasible response using FLEX that would be needed in order to meet the guidance of NEI 16-05. Under Path 3, the approach is to demonstrate that station FLEX procedures will be adequate to assure safe shutdown for an ELAP and the ELAP condition implies that all installed EDGs are unavailable.

The licensee's FE states that the exhaust stack vulnerability issue is being addressed through the Corrective Action Program entry #01745050-11; upon resolution of this issue, both "B" train EDGs at Point Beach can be assumed to be available during a LIP event. In this way, the licensee asserts that the KSF of emergency ac power will remain available throughout the LIP event, pending resolution of the exhaust stack vulnerability issue, and that Path 2 will be a valid approach to meet the guidance of NEI 16-05.

Evaluation of Reliability of Mitigation Equipment

The licensee relies on the robustness of FLEX mitigation equipment to demonstrate the adequacy of its FLEX strategy during a LIP event. Specifically, peak flood levels at a point just inside the site's north access gate, south of the FLEX storage building, may exceed 3 ft. This point is on the Phase 2 FLEX deployment route. The licensee demonstrates that by the time operators deploy FLEX equipment from the FLEX storage building, flood levels at this point would have receded to approximately 6 in. During its onsite audit of the licensee's FLEX strategy, the NRC staff noted that the FLEX towing vehicles and equipment trailers at Point Beach have large-diameter wheels and tires that are capable of traversing the receded flood waters.

Additionally, the primary staging area for the FLEX PDG may be flooded, although flood waters will have receded to less than 1 in. by the time operators are deploying the PDG. The associated cabling reel for the PDG contains 160 ft. of cable length with no splices or connections; therefore, operators can safely deploy this cabling even with low flood water levels.

The NRC staff concludes that the Point Beach mitigation equipment features described above are reliable to maintain KSFs as defined in NEI 16-05, Revision 1.

3.3.3 Feasibility of Manual Actions

The licensee relies on the feasibility of manual actions for its FLEX response during a LIP event, as described in the Point Beach MSA. For those operator actions which require access to areas that experience flooding during a LIP hazard, which are listed above, the licensee provided adequate justification that each operator action can be performed after flood water levels have sufficiently receded, or (in the case of establishing alternate suction to the TDAFW pumps) that this action would not be required during a LIP hazard scenario. Accordingly, in the staff assessment of the MSA, the NRC staff concluded that the licensee's FLEX strategies can be implemented as currently developed in the case of a postulated beyond-design-basis LIP flooding hazard.

4.0 AUDIT REPORT

The July 18, 2017, generic audit plan describes the NRC staff's intention to issue an audit report that summarizes and documents the NRC's regulatory audit of the licensee's FE. The NRC staff's Point Beach audit was limited to the review of the calculations and procedures as described in the corresponding sections of this assessment. The NRC staff notes that it did not rely directly on these calculation packages in its review; and that the information reviewed during the audit was found only to expand upon and clarify the information already provided in the Point Beach FE; therefore they are not docketed or cited. Because this staff assessment appropriately summarizes the results of the audit, the NRC staff concludes a separate audit report is not necessary, and that this document serves as the audit report described in the staff's July 18, 2017, letter.

5.0 CONCLUSION

The NRC staff concludes that NextEra performed the Point Beach FE in accordance with the guidance described in NEI 16-05, Revision 1, as endorsed by JLD-ISG-2016-01, and that the licensee has demonstrated a feasible response to the reevaluated LIP flood hazard as specified in NEI 16-05. The licensee has also demonstrated effective flood protection for the reevaluated flood hazards, pending correction of the "B" train EDG vulnerability discussed above, which the staff finds is an acceptable "defense-in-depth" approach to meeting the guidance of NEI 16-05. Furthermore, the NRC staff concludes that Point Beach screens out of performing an integrated assessment based on the guidance found in JLD-ISG-2016-01. As such, in accordance with Phase 2 of the process outlined in the 50.54(f) letter, additional regulatory actions associated with the reevaluated flood hazard, beyond those associated with mitigation strategies assessment, are not warranted. The licensee has satisfactorily completed providing responses to the 50.54(f) activities associated with the reevaluated flood hazards.

Table 3.1-1. Revised Flood Hazard Values for LIP at the Selected Points.

Building	Door Location	FLO-2D Cell	Scenario A, Test 4, Q4 E2 & E7 Open 50% Drain Openings: Maximum Flow Depth (ft.)	Maximum Water Surface Elevation (ft.-Plant Datum)	Maximum Water Surface Elevation (ft.-NAVD88)
Turbine Building	1	73814	0.7	8.7	590.0
	2	73820	0.7	8.7	590.0
	4	73817	0.7	8.7	590.0
	11	73840	0.7	8.7	590.0
	13	73842	0.7	8.7	590.0
Diesel Generator	600	73220	0.2	26.4	607.7
	601	**72901**	**0.1**	**28.0**	**609.3**
	602	69785	0.4	27.9	609.2
	603	69782	0.2	27.7	609.0
	604	69789	0.6	27.9	609.2
Unit 1 and Unit 2	151	49324	1.1	27.0	608.3
	152	47609	1.2	27.0	608.3
	154	49342	1.3	27.1	608.4
	159	63856	1.3	27.1	608.4
	167	61096	1.1	27.2	608.5
	203	57578	0.9	26.9	608.2
	210	50358	1.2	27.0	608.3
	231	57303	1.2	27.2	608.5
	232	60063	1.7	27.2	608.5
Service Building	310	61353	1.0	26.4	607.7
	311	57911	0.8	26.7	608.0
	312	57912	0.8	26.7	608.0
	313	57921	1.0	26.9	608.2
	314	57923	0.9	26.9	608.2
Circulating Water Pump House (CWPH)	336	80369	1.6	8.5	589.8
	338	78305	1.8	8.7	590.0
	339	78322	1.7	8.7	590.0
	340	80398	1.7	8.7	590.0
G5 Building	G5-01	43119	1.2	27.0	608.3
	G5-02	43118	1.2	27.0	608.3
	G5-03	41392	1.3	27.1	608.4
	G5-04	41386	1.2	27.1	608.4
	G5-05	41377	1.1	27.0	608.3

Source: FE Submittal

Table 3.1-2. Comparison of LIP Flood Depths (ft.) between FHRR and FE, with the Site Maximum Water Surface Elevation Marked in bold.
Scenario A, Test 4, Q4 (Compare to FPL-076-FHRCALC-011 R1 Table 7.11, Columns 7 and 8)

Building	Door Name	FHRR Maximum WSEL (ft.-NAVD88)	FE Maximum WSEL (ft.-NAVD88)	Difference in Maximum Water Surface Elevation (ft.)
Turbine Building	1	591.2	590.0	-1.2
	2	591.2	590.0	-1.2
	4	591.2	590.0	-1.2
	11	591.4	590.0	-1.4
	13	591.4	590.0	-1.4
Diesel Generator	600	607.7	607.7	0.0
	601	**609.3**	**609.3**	**0.0**
	602	609.3	609.2	-0.1
	603	609.1	609.0	-0.1
	604	609.3	609.2	-0.1
Unit 1 & Unit 2	151	609.0	608.3	-0.7
	152	609.3	608.3	-1.0
	154	609.5	608.4	-1.1
	159	609.6	608.4	-1.2
	167	609.5	608.5	-1.0
	209	608.4	608.2	-0.2
	210	609.0	608.3	-0.7
	231	609.5	608.5	-1.0
	232	609.5	608.5	-1.0
Service Building	310	607.7	607.7	0.0
	311	608.0	608.0	0.0
	312	608.1	608.0	-0.1
	313	608.3	608.2	-0.1
	314	608.4	608.2	-0.2
CWPH	336	590.5	589.8	-0.7
	338	591.1	590.0	-1.1
	339	591.3	590.0	-1.3
	340	590.9	590.0	-0.9
G5 Building	G5-01	609.2	608.3	-0.9
	G5-02	609.2	608.3	-0.9
	G5-03	609.3	608.4	-0.9
	G5-04	609.2	608.4	-0.8
	G5-05	609.0	608.3	-0.7

Table 3.2-1. Flood Event Durations for Flood-Causing Mechanisms Not Bounded by the CDB.

Flood-Causing Mechanism	Time Available for Preparation for Flood Event	Duration of Inundation of Site	Time for Water to Recede from Site
Local Intense Precipitation and Associated Drainage	Use NEI 15-05 (NEI, 2015)	1 hour	4.25 hours

Table 3.2-2. Associated Effects Parameters Not Directly Associated with Total Water Height for Flood Causing Mechanisms Not Bounded by the CDB.

Associated Effects Parameter	Local Intense Precipitation and Associated Drainage
Hydrodynamic loading at plant grade	430.5 pounds per feet (lb/ft) at the CWPH (includes 360.7 lb/ft. hydrostatic and 69.9 lb/ft. hydrodynamic)
Debris loading at plant grade	Minimal
Sediment loading at plant grade	Minimal
Sediment deposition and erosion	Minimal
Concurrent conditions, including adverse weather	Minimal
Groundwater ingress	Minimal
Other pertinent factors (e.g., waterborne projectiles)	Minimal

Table 3.2-3. Reevaluated Flood Hazards for Unbounded Flood-Causing Mechanisms for Use in the FE.

Flood Causing Mechanism	Stillwater Elevation (ft. NAVD88)	Waves/Runup (ft.)	Reevaluated Hazard Elevation (ft. NAVD88)
Local Intense Precipitation and Associated Drainage	609.3 (See Table 3.1-2)[1]	Minimal	609.3 (See Table 3.1-2)

[1] The maximum water surface elevation of 609.6 ft. NAVD88 for the FHRR was recorded at Door 159 of Units 1 and 2 Building. The corresponding water surface elevation at the same location with the revised FE analysis is 608.4 ft. NAVD88. The maximum water surface elevation for the FE is 609.3 ft. NAVD88 recorded at Door 601 of the Diesel Generator Building.

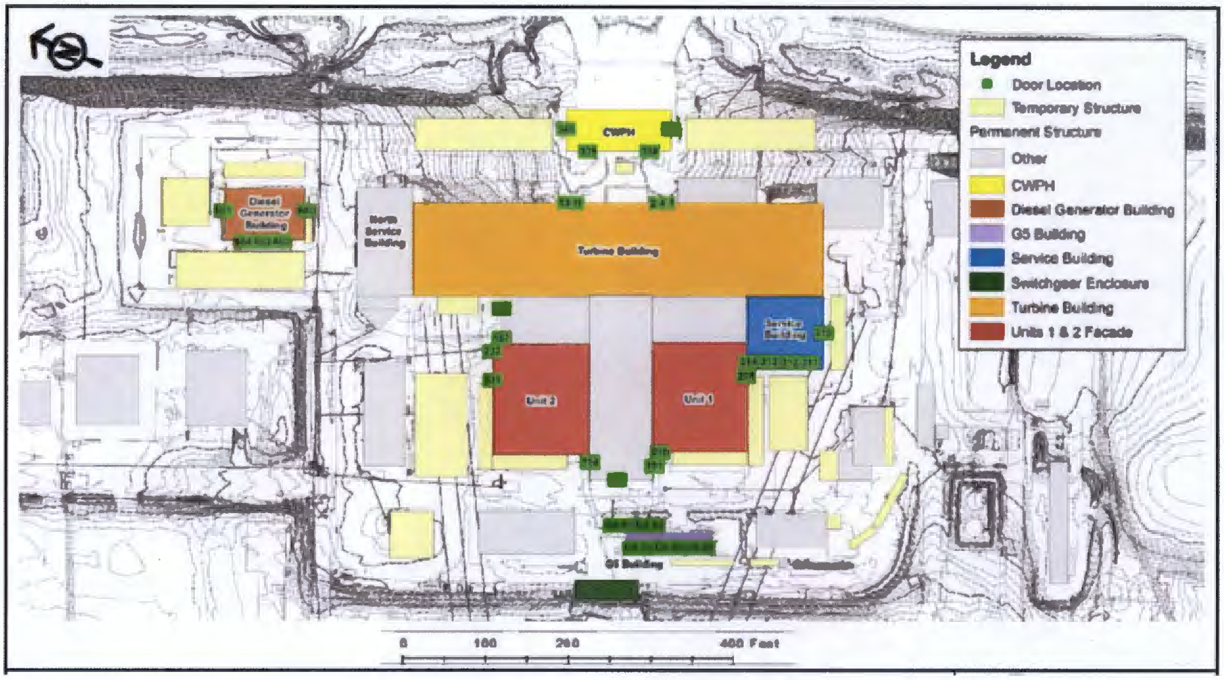


Figure 3.1.1 Location of point of interests for the LIP flood analysis. (Source: Point Beach FHRR Rev 2.

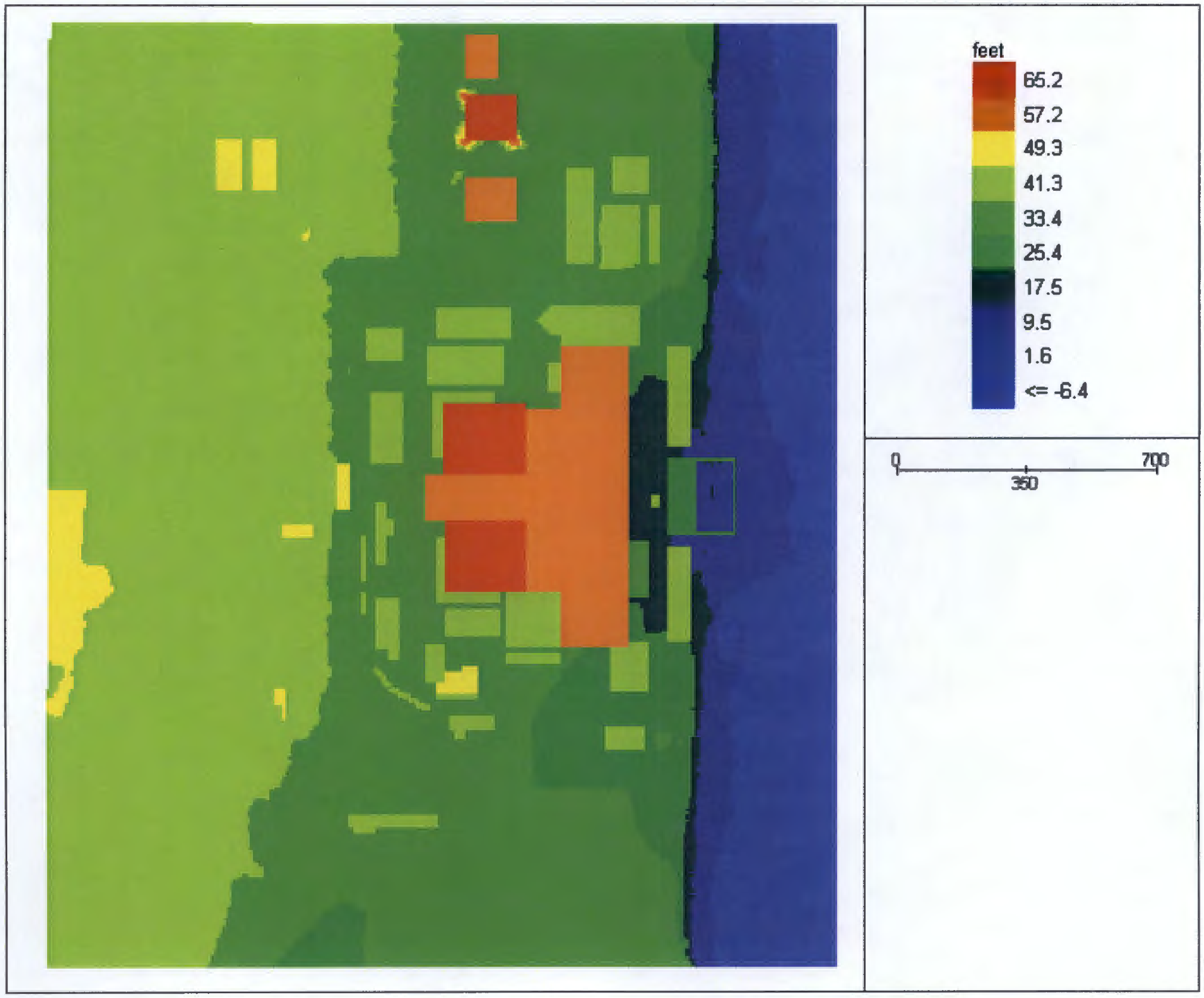


Figure 3.1.2 PBNP LIP Flood Maximum Water Surface Elevation. Elevation is relative to NAVD88 (Source: Staff confirmatory analysis)

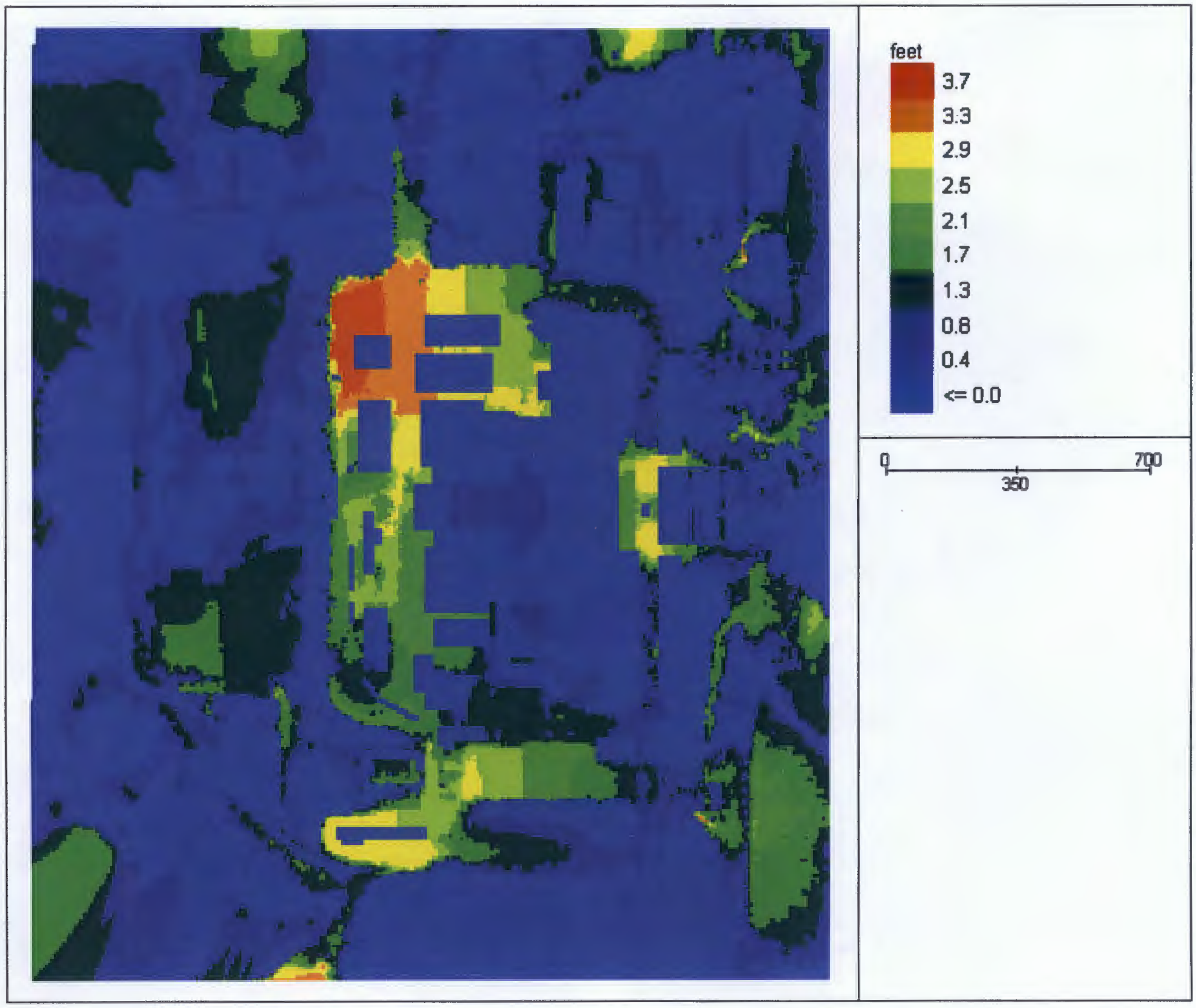
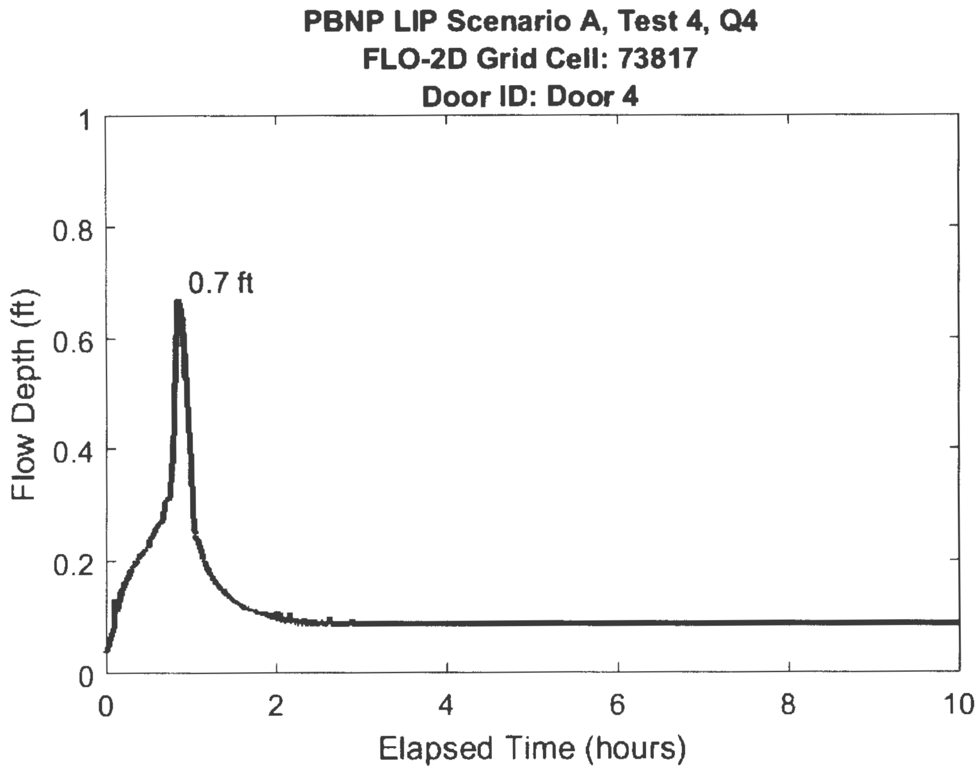


Figure 3.1.3 PBNP LIP Flood Maximum Inundation Depth (Source: Staff confirmatory analysis)



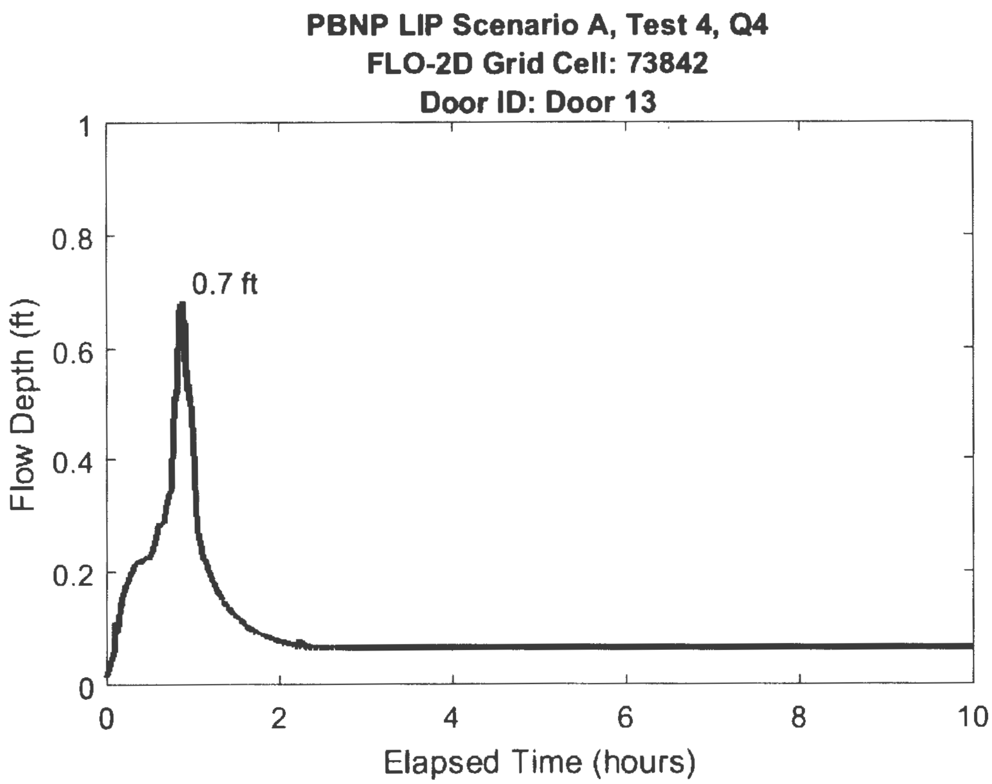


Figure 3.1.4 Sample LIP Flood Hydrographs for Door 4 and Door 13 (Source: Calculation SWK-P17-007 and FLO-2D simulation)

SUBJECT: POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 – STAFF ASSESSMENT OF FLOODING FOCUSED EVALUATION (CAC NOS. MF9865 AND MF9866; EPID L-2017-JLD-0013) DATED May 30, 2018

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