Exelon Generation

Order No. EA-12-049

RS-17-096

August 28, 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Peach Bottom Atomic Power Station, Unit 3
Renewed Facility Operating License No. DPR-56
NRC Docket No. 50-278

Subject: Ninth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

References:

1. NRC Order Number EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
2. NRC Interim Staff Guidance JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Revision 0, dated August 29, 2012
3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2013 (RS-13-024)
6. Exelon Generation Company, LLC First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 28, 2013 (RS-13-127)
7. Exelon Generation Company, LLC Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2014 (RS-14-014)

8. Exelon Generation Company, LLC Third Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 28, 2014 (RS-14-212)
9. Exelon Generation Company, LLC Fourth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 27, 2015 (RS-15-023)
10. Exelon Generation Company, LLC Fifth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 28, 2015 (RS-15-214)
11. Exelon Generation Company, LLC Sixth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 26, 2016 (RS-16-026)
12. Exelon Generation Company, LLC Seventh Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 26, 2016 (RS-16-149)
13. Exelon Generation Company, LLC Eighth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2017 (RS-17-021)
14. NRC letter to Exelon Generation Company, LLC, Peach Bottom Atomic Power Station, Units 2 and 3 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0845 and MF0846), dated November 22, 2013
15. NRC letter to Exelon Generation Company, LLC, Peach Bottom Atomic Power Station, Units 2 and 3 – Report for the Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (TAC Nos. MF0845, MF0846, MF0849 and MF0850), dated September 23, 2015

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial status report regarding mitigation strategies. Reference 5 provided the Peach Bottom Atomic Power Station, Units 2 and 3 Overall Integrated Plan.

Reference 1 requires submission of a status report at six-month intervals following submittal of the Overall Integrated Plan. Reference 3 provides direction regarding the content of the status reports. References 6, 7, 8, 9, 10, 11, 12, and 13 provided the first, second, third, fourth, fifth, sixth, seventh, and eighth six-month status reports, respectively, pursuant to Section IV, Condition C.2, of Reference 1 for Peach Bottom Atomic Power Station. The purpose of this letter is to provide the ninth six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any. The enclosed report also addresses the NRC Interim Staff Evaluation Open and Confirmatory Items contained in Reference 14, and the NRC Audit Report open items contained in Reference 15.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David J. Distel at 610-765-5517.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of August 2017.

Respectfully submitted,

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

Enclosure: Peach Bottom Atomic Power Station, Unit 3 Ninth Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

cc: NRC Regional Administrator - Region I
NRC Senior Resident Inspector – Peach Bottom Atomic Power Station
NRC Project Manager, NRR – Peach Bottom Atomic Power Station
Mr. Peter J. Bamford, NRR/JLD/PPSD/JOMB, NRC
Director, Bureau of Radiation Protection – Pennsylvania Department of Environmental Resources
S. T. Gray, State of Maryland
R. R. Janati, Chief, Division of Nuclear Safety, Pennsylvania Department of Environmental Protection, Bureau of Radiation Protection

Enclosure

Peach Bottom Atomic Power Station, Unit 3

Ninth Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

(31 pages)

Enclosure
Peach Bottom Atomic Power Station Unit 3
Ninth Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

1 Introduction

Peach Bottom Atomic Power Station, Units 2 and 3 developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This enclosure provides an update of milestone accomplishments since submittal of the Overall Integrated Plan, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

- Peach Bottom Unit 3 completed full implementation of FLEX strategies, except for Phase 1 Hardened Vents, before startup from P3R20 Refuel Outage on October 21, 2015.
- Peach Bottom Unit 2 completed full implementation of FLEX strategies, inclusive of Phase 1 Hardened Vents, before startup from P2R21 Refuel Outage on November 10, 2016.

3 Milestone Schedule Status

The following provides an update to Attachment 2 of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60 Day Status Report	Oct 2012	Complete	
Submit Overall Integrated Plan	Feb 2013	Complete	
Contract with RRC		Complete	
Submit 6 Month Updates:			
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Complete	
Update 4	Feb 2015	Complete	
Update 5	Aug 2015	Complete	
Update 6	Feb 2016	Complete	
Update 7	Aug 2016	Complete	
Update 8	Feb 2017	Complete	
Update 9	Aug 2017	Complete with this submittal	
Perform Staffing Analysis	May 2015	Complete	

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Modifications:			
Unit 2 Design Engineering	May 2015	Complete	
Unit 2 Implementation Outage	Nov 2016	Complete	
Unit 3 Design Engineering	Sept 2015	Complete	
Unit 3 Implementation Outage	Oct 2015	Complete	
Storage:			
Storage Design Engineering	Oct 2015	Complete	
Storage Implementation	Oct 2015	Complete	
FLEX Equipment:			
Procure On-Site Equipment	Sept 2015	Complete	
Develop Strategies with RRC	Dec 2014	Complete	
Procedures:			
Create Site-Specific Procedures	Sept 2015 (U3) Oct 2016 (U2)	Complete (U3) Complete (U2)	
Validate Procedures (NEI-12.06, Section 11.4.3)	Sept 2015 (U3) Oct 2016 (U2)	Complete (U3) Complete (U2)	
Create Maintenance Procedures	Oct 2016	Complete	
Training:			
Develop Training Plan	March 2015	Complete	
Training Complete	Oct 2015	Complete	
FLEX Implementation:			
Unit 2 FLEX Implementation	Nov 10, 2016	Complete	
Submit Unit 2 Completion Report	Jan 6, 2017	Complete	
Unit 3 FLEX Implementation	Nov 12, 2017	Started	
Submit Unit 3 Completion Report	Jan 2018	Not Started	
Full Site FLEX Implementation	Jan 2018	Started	

4 Changes to Compliance Method

4.1 Storage, Maintenance and Testing Alternate Approach for Peach Bottom Atomic Power Station

Storage

Exelon proposes an alternate approach to NEI 12-06, Revision 0 for protection of FLEX equipment as stated in Section 5 (seismic), Section 7 (severe storms with high winds) and Section 8 (impact of snow, ice and extreme cold). This alternate approach will be to store "N" sets of equipment in a fully robust building and the +1 set of equipment in a commercial building. Peach Bottom may also elect to store the +1 set of equipment in the robust building with the N sets of equipment. If the +1 set of FLEX equipment is stored in the robust storage building, Peach Bottom will not be using the alternative approach. For all hazards scoped in for the site, the FLEX equipment will be stored in a configuration such that no one external event can reasonably fail the site FLEX capability (N). To ensure that no one external event will reasonably fail the site FLEX capability (N), Exelon will ensure that N equipment is protected in the robust building. To accomplish this, Exelon will develop procedures to address the unavailability allowance as stated in NEI 12-06, Revision 0, Section 11.5.3, (see Maintenance and Testing section below for further details). This section allows for a 90-day period of unavailability. If a piece of FLEX equipment stored in the robust building were to become or found to be unavailable, Exelon will impose a shorter allowed outage time of 45 days. For portable equipment that is expected to be unavailable for more than 45 days, actions will be initiated within 24 hours of this determination to restore the site FLEX capability (N) in the robust storage location and implement compensatory measures (e.g., move the +1 piece of equipment into the robust building) within 72 hours where the total unavailability time is not to exceed 45 days. Once the site FLEX capability (N) is restored in the robust storage location, Exelon will enter the 90-day allowed out of service time for the unavailable piece of equipment with an entry date and time from discovery date and time.

Maintenance and Testing

The unavailability of equipment and applicable connections that directly performs a FLEX mitigation strategy for core, containment, and SFP should be managed such that risk to mitigating strategy capability is minimized.

1. The unavailability of plant equipment is controlled by existing plant processes such as the Technical Specifications. When plant equipment which supports FLEX strategies becomes unavailable, then the FLEX strategy affected by this unavailability does not need to be maintained during the unavailability.
2. The required FLEX equipment may be unavailable for 90 days provided that the site FLEX capability (N) is met. If the site FLEX (N) capability is met but not protected for all of the site's applicable hazards, then the allowed unavailability is reduced to 45 days [1].
3. If FLEX equipment is likely to be unavailable during forecast site specific external events (e.g., hurricane), appropriate compensatory measures should be taken to restore equivalent capability in advance of the event.
4. The duration of FLEX equipment unavailability, discussed above, does not constitute a loss of reasonable protection from a diverse storage location protection strategy perspective.
5. If FLEX equipment or connections become unavailable such that the site FLEX capability (N) is not maintained, initiate actions within 24 hours to restore the site FLEX capability (N) and implement compensatory measures (e.g., use of alternate suitable equipment or supplemental personnel) within 72 hours.

[1] The spare FLEX equipment is not required for the FLEX capability to be met. The allowance of 90-day unavailability is based on a normal plant work cycle of 12 weeks. In cases where the remaining N equipment is not fully protected for the applicable site hazards, the unavailability allowance is reduced to 45 days to match a 6- week short cycle work period. Aligning the unavailability to the site work management program is important to keep maintenance of spare FLEX equipment from inappropriately superseding other more risk-significant work activity.

6. If FLEX equipment or connections to permanent plant equipment required for FLEX strategies are unavailable for greater than 45/90 days, restore the FLEX capability or implement compensatory measures (e.g., use of alternate suitable equipment or supplemental personnel) prior to exceedance of the 45/90 days.

For Section 5, Seismic Hazard, Exelon will also incorporate these actions:

1. Large portable FLEX equipment such as pumps and power supplies should be secured as appropriate to protect them during a seismic event (i.e., Safe Shutdown Earthquake (SSE) level).
2. Stored equipment and structures will be evaluated and protected from seismic interactions to ensure that unsecured and/or non-seismic components do not damage the equipment.

For Section 7, Severe Storms with High Winds, Exelon will also incorporate this action:

- For a 2-Unit site, N+1 set(s) of on-site FLEX equipment are required. The plant screens in per Sections 5 through 9 for seismic, flooding, wind (both tornado and/or hurricane), snow, ice and extreme cold, and high temperatures.
  - To meet Section 7.3.1.1a, either of the following are acceptable:
    - All sets (N=2) in a structure(s) that meets the plant's design basis for high wind hazards, or
    - Two set(s) in a structure(s) that meets the plant's design basis for high wind hazards and one set (+1) stored in a location not protected for a high wind hazard.

For Section 8, Impact of Snow, Ice and Extreme Cold, Exelon will also incorporate this action:

- Storage of FLEX equipment should account for the fact that the equipment will need to function in a timely manner. The equipment should be maintained at a temperature within a range to ensure its likely function when called upon. For example, by storage in a heated enclosure or by direct heating (e.g., jacket water, battery, engine block heater, etc.).

Exelon will meet all the requirements for NEI 12-06, Revision 0 for Section 6.2.3.1 for external flood hazard and Section 9.3.1 for impact of high temperatures.

4.2 Alternate Approach to NEI 12-06, Rev 0, Section 3.2.2

Issue

An alternative is being proposed to the N+1 requirement applicable to hoses and cables as stated in Section 3.2.2 of NEI 12-06.

Background

NEI 12-06, Section 3.2.2 specifically states that a site will have FLEX equipment to meet the needs of each Unit on a site plus one additional spare. This is commonly known as N+1 where N is the number of Units at a given site. The relevant text from NEI 12-06 is as follows:

NEI 12-06, Section 3.2.2 states:

"In order to assure reliability and availability of the FLEX equipment required to meet these capabilities, the site should have sufficient equipment to address all functions at all Units on-site, plus one additional spare, i.e. an N+1 capability, where "N" is the number of Units on-site. Thus, a two-Unit site would nominally have at least three portable pumps, three sets of portable ac/dc power supplies, three sets of hoses & cables, etc."

NEI 12-06, Section 11.3.3 states:

"FLEX mitigation equipment should be stored in a location or locations informed by evaluations performed per Sections 5 through 9 such that no one external event can reasonably fail the site FLEX capability (N)."

Typically those hoses utilized to implement a FLEX strategy are not a single continuous hose but are composed of individual sections of a smaller length joined together to form a sufficient length. In the case of cables, multiple individual lengths are used to construct a circuit such as in the case of 3-phase power.

Proposed Alternative

NEI 12-06 currently requires N+1 set of hoses and cables. As an alternative, the spare quantity of hose and cable is adequate if it meets either of the two methods described below:

<u>Method 1</u>: Provide additional hose or cable equivalent to 10% of the total length of each type/size of hose or cable necessary for the "N" capability. For each type/size of hose or cable needed for the "N" capability, at least 1 spare of the longest single section/length must be provided.

> Example 1-1: An installation requiring 5,000 ft. of 5 in. diameter fire hose consisting of one hundred 50 ft. sections would require 500 ft. of 5 in. diameter spare fire hose (i.e., ten 50 ft. sections).
>
> Example 1-2: A pump requires a single 20 ft. suction hose of 4 in. diameter, its discharge is connected to a flanged hard pipe connection. One spare 4 in. diameter 20 ft. suction hose would be required.
>
> Example 1-3: An electrical strategy requires 350 ft. cable runs of 4/0 cable to support 480 volt loads. The cable runs are made up of 50 ft. sections coupled together. Eight cable runs (2 cables

run per phase and 2 cables run for the neutral) totaling 2800 ft. of cable (56 sections) are required. A minimum of 280 ft. spare cable would be required or 6 spare 50 ft. sections.

Example 1-4: An electrical strategy requires 100 ft. of 4/0 cables, 100 ft. each) to support one set of 4 kV loads and 50 ft. of 4/0 (4 cables, 50 ft. each) to support another section of 4 kV loads. The total length of 4/0 cable is 600 ft. (100 ft. x 4 plus 50 ft. x 4). One spare 100 ft. 4/0 cable would be required representing the longest single section/length.

Method 2: Provide spare cabling and hose of sufficient length and sizing to replace the single longest run needed to support any single FLEX Strategy.

Example 2-1: A FLEX strategy for a two Unit site requires 8 runs each of 500 ft. of 5 in. diameter hose (4000 ft. per Unit). The total length of 5 in. diameter hose required for the site is 8000 ft. with the longest run of 500 ft. Using this method, 500 ft. of 5 in. diameter spare hose would be required.

Basis for an alternative approach:
The NRC has endorsed (ML15125A442) the NEI position paper (ML15126A135) for the above stated alternate approach. If using Method 2, per the endorsement letter, Exelon will ensure that the FLEX pumps and portable generators are confirmed to have sufficient capability to meet flow and electrical requirements when a longer spare hose/cable is substituted for a shorter length. Exelon acknowledges that the NRC staff has not reviewed and is not endorsing the specific examples included in the NEI endorsement request dated May 1, 2015. If necessary, Exelon will provide additional justification regarding the acceptability of various cable and hose lengths with respect to voltage drops, and fluid flow resistance, rather than merely relying on the additional, longest length cable/hose as implied by Example 1-4 in the subject letter.

Hoses and cables are passive devices unlikely to fail provided they are appropriately inspected and maintained. The most likely cause of failure is mechanical damage during handling provided that the hoses and cables are stored in areas with suitable environmental conditions (e.g., cables stored in a dry condition and not subject to chemical or petroleum products). The hoses and cables for the FLEX strategies will be stored and maintained in accordance with manufacturers' recommendations including any shelf life requirements.

Initial inspections and periodic inspections or testing will be incorporated into the site's maintenance and testing program implemented in accordance with Section 11.5 of NEI 12-06. Therefore, the probability of a failure occurring during storage is minimal, resulting in the only likely failure occurring during implementation. Mechanical damage will likely occur in a single section versus a complete set of hose or cable. Therefore, the N+1 alternative addresses the longest individual section/length of hose or cable.

Providing either a spare cable or hose of a length of 10% of the total length necessary for the "N" capability or alternatively providing spare cabling or hose of sufficient length and sizing to replace the single longest run needed to support any single FLEX strategy is sufficient to ensure a strategy can be implemented. Mechanical damage during implementation can be compensated for by having enough spares to replace any damaged sections with margin. It is reasonable to expect that an entire set of hoses or cables would not be damaged provided they have been reasonably protected.

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

No need for relief or relaxation of requirements is expected.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

The following tables provide a summary of the open items documented in the Overall Integrated Plan or the Draft Safety Evaluation (SE) and the status of each item.

Section Reference	Overall Integrated Plan Open Item	Status
Multiple Sections	Item 1) Transportation routes will be developed from the equipment storage area to the FLEX staging areas. An administrative program will be developed to ensure pathways remain clear or compensatory actions will be implemented to ensure all strategies can be deployed during all modes of operation. The location of the storage areas, identification of the travel paths and creation of the administrative program are open items.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
Programmatic Controls (p. 7)	Item 2) An administrative program for FLEX to establish responsibilities, testing and maintenance requirements will be implemented.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
Describe Training Plan (p. 8)	Item 3) Training materials for FLEX will be developed for all station staff involved in implementing FLEX strategies.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
Maintain Spent Fuel Pool Cooling	Item 4) Complete an evaluation of the spent fuel pool area for	Complete

(p. 30)	steam and condensation to determine vent path strategy requirements.	Completion support information is contained in the fifth six month update dated August 28, 2015.
Safety Function Support (p. 38)	Item 5) RCIC room temperature analysis is still in progress.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
Safety Function Support (p.38)	Item 6) Evaluate the habitability of the Main Control Room and develop a strategy to maintain habitability.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
Safety Function Support (p. 38)	Item 7) Develop a procedure to prop open battery room doors and utilize portable fans or utilize installed room supply and exhaust fans upon energizing the battery chargers to prevent a buildup of hydrogen in the battery rooms.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
Sequence of Events (p. 4)	Item 8) Timeline walk through will be completed for the FLEX generator installations when the detailed design and site strategy is finalized. The final timeline will be validated once the detailed designs are developed.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
Sequence of Events (p.4)	Item 9) Timeline walk through will be completed for the FLEX pump installations when the detailed design and site strategy is finalized. The final timeline will be validated once the detailed designs are developed. The results will be provided in a future 6-month update.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.

Sequence of Events (p. 5)	Item 10) Additional analysis will be performed during detailed design development to ensure Suppression Pool temperature will support RCIC operation, in accordance with approved BWROG analysis, throughout the event.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
Sequence of Events (p. 5)	Item 11) Analysis of deviations between Exelon's engineering analyses and the analyses contained in BWROG Document NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines and documentation of results on Att. 1B, "NSSS Significant Reference Analysis Deviation Table." Planned to be completed and submitted with August 2013 Six Month Update.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
Safety Function Support (p. 38)	Item 12) Evaluate the effect of additional load shed on the battery coping time.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.

Draft Safety Evaluation Open Item	**Status**
See Attachments 1, 2, 3, and 4	See Attachments 1, 2, 3, and 4

7 Potential Draft Safety Evaluation Impacts

There are no potential impacts to the Draft Safety Evaluation identified at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Peach Bottom Atomic Power Station Units 2 and 3, Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2013
2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
3. NRC Order Number EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013
4. NRC Order Number EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents," dated March 12, 2012
5. First Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated August 28, 2013
6. NRC Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigating Strategies)," dated November 22, 2013
7. Second Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated February 28, 2014
8. Relaxation of Certain Schedule Requirements for Order EA-12-049 "Issuance of Order to Modify Licenses with regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events," dated April 15, 2014
9. Third Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated August 28, 2014
10. Fourth Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated February 28, 2015
11. Fifth Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated August 28, 2015
12. Sixth Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated February 26, 2016
13. Seventh Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated August 26, 2016

14. Eighth Six-Month Status Report in Response to March 12, 2012 Commission "Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design Basis External Events (Order Number EA-12-049)," dated February 28, 2017
15. Letter to NRC, Report of Full Compliance with March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated January 6, 2017 (RS-17-001) for PBAPS Unit 2

9 Attachments

1. Attachment 1 - Interim Safety Evaluation 4.1 Open Items
2. Attachment 2 - Interim Safety Evaluation 4.2 Confirmatory Items
3. Attachment 3 - Confirmatory Item 3.1.1.1.A Response
4. Attachment 4 - NRC Audit Report Open Items

Attachment 1 - Interim Safety Evaluation 4.1 Open Items

4.1 NRC ISE Open Items	
Open Item	Status
3.2.3.A - Revision 3 to the BWROG EPG/SAG is a Generic Concern because the BWROG has not addressed the potential for the revised venting strategy to increase the likelihood of detrimental effects on containment response for events in which the venting strategy is invoked.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.3.A - Freeze protection has not been discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.4.A - Portable and emergency lighting during an ELAP has not been discussed in the integrated plan or during the Audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.5.A - Access to protected and internal locked plant areas during an ELAP has not been discussed in the Integrated Plan or during the audit process.	Complete. Completion support information is contained in the fifth six month update dated August 28, 2015.

Attachment 2 - Interim Safety Evaluation 4.2 Confirmatory Items

4.2 NRC ISE Open Items	
Confirmatory Item	**Status**
3.1.1.1.A - The method selected for protection of equipment during a BDBEE was not discussed in the Integrated Plan or during the audit process. There was no discussion of the specifications stated in NEI 12-06, Sections 5.3.1, 6.2.3.1, 7.3.1, 8.3.1, and 9.3.1. Also, there was no discussion of securing large portable equipment for protection during a seismic hazard.	Complete Close to NRC Audit Report Open Items: CI 3.1.1.1.A (Completed)
3.1.1.2.A - Deployment routes have not yet been finalized or reviewed for possible impacts due to debris and potential soil liquefaction.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.1.1.2.C - Protection of vehicles used to deploy and re-fuel portable/FLEX equipment during a BDBEE was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.1.1.3.A - Seismic procedural interface consideration NEI 12-06, Section 5.3.3, consideration 1, which considers the possible failure of seismically qualified electrical equipment by beyond- design basis seismic events, was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.1.1.3.B - Seismic procedural interface considerations NEI 12- 06, Section 5.3.3, 2 and 3, which considers flooding from large internal sources and also mitigation of ground water was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.1.1.4.A - Utilization of offsite resources - the local staging area was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.1.2.A - Characterization of the external flooding hazard in terms of warning time and persistence	Complete

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was not discussed in the Integrated Plan or during audit process.	Close to NRC Audit Report Open Items: CI 3.1.2.A (Completed)
3.1.2.1A - Protection of portable/FLEX equipment during a flooding BDBEE was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.1.2.2.A - Movement of equipment and restocking of supplies in the context of a flood with long persistence during a BDBEE was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.1.3.2.A - Availability of debris clearing equipment during a BDBEE was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.1.4.2.A - Snow or ice removal during a BDBEE was not discussed in the Integrated Plan or during the audit process. Additionally, there was no discussion of ice blocking the FLEX pump suctions.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.2.1.1.A - MAAP benchmarks should be identified and discussed which demonstrate that MAAP4 is an appropriate code for the simulation of an ELAP event.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.

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3.2.1.1.B - MAAP Analysis - collapsed level should remain above Top of Active Fuel (TAF) and the cool down rate should be within technical specification limits.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.1.1.C - MAAP4 should be used in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.1.1.D - MAAP modeling parameters. In using MAAP4, the licensee should identify and justify the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP4 Application Guidance, Desktop Reference for Using MAAP4 Software, Revision 2" (Electric Power Research Institute Report 1020236).	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.1.1.E - The specific MAAP4 analysis case that was used to validate the timing of mitigating strategies in the Integrated Plan should be identified and available for review.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.1.2.A - There was no discussion of the assumed recirculation system leakage rates including the recirculation pump seal leakage rates that were used in the ELAP analysis. Questions still remain unanswered regarding pressure dependence of the assumed leakage rates, assumed leakage phase, i.e. single phase liquid, two phase, or steam, and other questions presented in the audit.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.1.4.A - Required flow rates and portable/FLEX pump characteristics were not discussed in the Integrated Plan or during the audit process. Likewise, there was no discussion of the required flow for mitigation strategies and no discussion of the calculations that verify adequate flow.	Complete Close to NRC Audit Report Open Items: CI 3.2.1.4.A (Completed)

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3.2.1.4.B - There was no discussion of the assumptions used in the calculations for battery coping time and to evaluate the effectiveness of dc load reduction including the basis for the assumed minimum battery voltage.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.2.1.4.C - The operability of the RCIC pump at elevated suction temperature was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.2.1.4.D - Water quality issues and guidance on priority of water source usage were not fully addressed in the Integrated Plan or during the audit process and requires further analysis by licensee	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.2.A - Evaluation of the refueling floor SFP area for steam and condensation was not yet completed. Mitigating strategies for a vent pathway were not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.2.A - The impact of high temperature on the operability of RCIC Room electrical and mechanical equipment, including the RCIC turbine speed controller, was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.2.4.2.B - Evaluation of high and low battery temperatures is to be provided during a future six-month-update.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.4.B - Plant communications during an ELAP were not discussed in the Integrated Plan or the audit process. Follow-up of commitments made in the communications assessment (ADAMS Accession No. ML 12306A 199) is necessary.	Complete Close to NRC Audit Report Open Items: CI 3.2.4.4.B (Completed)

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3.2.4.6.A - Initial analysis for accessibility and habitability of critical plant locations as the RCIC Room showed relatively high temperatures. There was no discussion of the effectiveness of ventilation with portable fans. There was no discussion of long term habitability in critical plant locations during an ELAP.	Complete Completion support information is contained in the sixth six month update dated February 26, 2016.
3.2.4.7.A - Emergency Cooling Tower water volume and replenishment was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.8.A - The licensee did not provide sufficient information regarding loading/sizing calculations of portable diesel generator(s) and strategy for electrical isolation for FLEX electrical generators from installed plant equipment.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.2.4.9.A - Details of portable equipment fuel storage transfer were provided during the audit process. However, the method to ensure fuel quality was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.4.A - The program or process to request RRC equipment was not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.
3.4.B - Sizing calculations of RRC FLEX equipment and the compatibility of RRC equipment to plant connection points were not discussed in the Integrated Plan or during the audit process.	Complete Completion support information is contained in the fifth six month update dated August 28, 2015.

Attachment 3 - Confirmatory Item 3.1.1.1.A Response

5.3.1 Protection of FLEX Equipment (Seismic) Complete	
1. FLEX equipment should be stored in one or more of following three configurations:	
a. In a structure that meets the plant's design basis for the Safe Shutdown Earthquake (SSE) (e.g., existing safety-related structure).	FLEX pumps, generators and other equipment are stored in a robust structure designed to survive a SSE.
b. In a structure designed to or evaluated equivalent to ASCE 7- 10, Minimum Design Loads for Buildings and Other.	NA
c. Outside a structure and evaluated for seismic interactions to ensure equipment is not damaged by non-seismically robust components or structures.	NA
2. Large portable FLEX equipment such as pumps and power supplies should be secured as appropriate to protect them during a seismic event (i.e., Safe Shutdown Earthquake (SSE) level).	FLEX pumps, generators and other large equipment will be secured to prevent damage during a SSE.
3. Stored equipment and structures should be evaluated and protected from seismic interactions to ensure that unsecured and/or non-seismic components do not damage the equipment.	The robust FLEX storage structure has been constructed to protect the FLEX equipment from unsecured or non-seismic components during a SSE.
6.2.3.1 Protection of FLEX Equipment (Flooding) Complete	
These considerations apply to the protection of FLEX equipment from external flood hazards:	
1. The equipment should be stored in one or more of the following configurations:	
a. Stored above the flood elevation from the most recent site flood analysis. The evaluation to determine the elevation for storage should be informed by flood analysis applicable to the site from early site permits, combined license applications, and/or contiguous licensed sites.	NA
b. Stored in a structure designed to protect the equipment from the flood.	NA
c. FLEX equipment can be stored below flood level if time is available and plant procedures/guidance address the needed actions to relocate the equipment. Based on the timing of the limiting flood scenario(s), the FLEX equipment can be relocated to a position that is protected from the flood, either by barriers or by elevation, prior to the arrival of the potentially damaging flood levels. This should also consider the conditions on-site during the	FLEX pumps, generators and other equipment are stored below the PMF elevation. Procedures governing actual or predicted high river level or flows include guidance for relocating the equipment to an elevation above the PMF level and prior to a river level that would

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increasing flood levels and whether movement of the FLEX equipment will be possible before potential inundation occurs, not just the ultimate flood height.	prevent transport.
2. Storage areas that are potentially impacted by a rapid rise of water should be avoided.	Events causing a river level exceeding 116 ft. elevation that would prevent transport of FLEX equipment are precipitation events, which would have advanced warning.
7.3.1 Protection of FLEX Equipment (Wind) Complete	
These considerations apply to the protection of FLEX equipment from high wind hazards:	
1. For plants exposed to high wind hazards, FLEX equipment should be stored in one of the following configurations:	
a. In a structure that meets the plant's design basis for high wind hazards (e.g., existing safety-related structure).	FLEX pumps, generators and other equipment are stored in a robust structure that will survive the design basis wind.
b. In storage locations designed to or evaluated equivalent to ASCE 7-10, Minimum Design Loads for Buildings and Other Structures given the limiting tornado wind speeds from Regulatory Guide 1.76 or design basis hurricane wind speeds for the site. Given the FLEX basis limiting tornado or hurricane wind speeds, building loads would be computed in accordance with requirements of ASCE 7-10. Acceptance criteria would be based on building serviceability requirements not strict compliance with stress or capacity limits. This would allow for some minor plastic deformation, yet assure that the building would remain functional.	NA
• Tornado missiles and hurricane missiles will be accounted for in that the FLEX equipment will be stored in diverse locations to provide reasonable assurance that N sets of FLEX equipment will remain deployable following the high wind event. This will consider locations adjacent to existing robust structures or in lower sections of buildings that minimizes the probability that missiles will damage all mitigation equipment required from a single event by protection from adjacent buildings and limiting pathways for missiles to damage equipment.	NA
• The axis of separation should consider the predominant path of tornados in the geographical	NA

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location. In general, tornadoes travel from the West or West Southwesterly direction, diverse locations should be aligned in the North- South arrangement, where possible. Additionally, in selecting diverse FLEX storage locations, consideration should be given to the location of the diesel generators and switchyard such that the path of a single tornado would not impact all locations.	
• Stored mitigation equipment exposed to the wind should be adequately tied down. Loose equipment should be in protective boxes that are adequately tied down to foundations or slabs to prevent protected equipment from being damaged or becoming airborne. (During a tornado, high winds may blow away metal siding and metal deck roof, subjecting the equipment to high wind forces.)	NA
c. In evaluated storage locations separated by a sufficient distance that minimizes the probability that a single event would damage all FLEX mitigation equipment such that at least N sets of FLEX equipment would remain deployable following the high wind event. (This option is not applicable for hurricane conditions).	NA
• Consistent with configuration b., the axis of separation should consider the predominant path of tornados in the geographical location.	NA
• Consistent with configuration b., stored mitigation equipment should be adequately tied down.	NA
8.3.1 Protection of FLEX Equipment (Snow, Ice, Cold) Complete	
These considerations apply to the protection of FLEX equipment from snow, ice, and extreme cold hazards:	
1. For sites subject to significant snowfall and ice storms, portable FLEX equipment should be stored in one of two configurations:	
a. In a structure that meets the plant's design basis for the snow, ice and cold conditions (e.g., existing safety-related structure).	FLEX pumps, generators and other equipment are stored in a robust structure that will survive the design basis for snow, ice, and cold.
b. In a structure designed to or evaluated equivalent to ASCE 7- 10, Minimum Design Loads for Buildings and Other Structures for the snow, ice, and cold conditions from the site's design basis.	NA
c. Provided the N FLEX equipment is located as described in a. or b. above, the N+1 equipment may be stored in an evaluated storage location capable of withstanding	NA

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historical extreme weather conditions and the equipment is deployable.	
2. Storage of FLEX equipment should account for the fact that the equipment will need to function in a timely manner. The equipment should be maintained at a temperature within a range to ensure its likely function when called upon. For example, by storage in a heated enclosure or by direct heating (e.g., jacket water, battery, engine block heater, etc.).	FLEX pumps, generators and/or their storage location include appropriate heating.
9.3.1 Protection of FLEX Equipment (High Temperature) Complete	
The equipment should be maintained at a temperature within a range to ensure its likely function when called upon.	FLEX pumps, generators and/or their storage location include appropriate ventilation such that the equipment is maintained within operating limits.

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Audit Item Reference	Item Description	Response
CI 3.1.2.A	Flood Warning Time and Persistence	Complete The Conowingo TAMS Report information has been entered into site records to fully address the issue.
CI 3.2.1.4.A	Portable/FLEX pump characteristics, required flow rates, and supporting calculations	Complete Exelon has approved Calculation PM-1173, FLEX Makeup Analysis. The purpose of this analysis is to evaluate the ability of the various proposed PBAPS FLEX Mitigation Strategies to provide flow of water from the Emergency Cooling Tower (ECT) basin or the Intake Canal (Ultimate Heat Sink) to the following locations: a) Spent Fuel Pool (SFP): 1) Injection – via existing Residual Heat Removal (RHR) / Fuel Pool Cooling (FPC) piping and / or hose routed through / up stair towers to the Refueling Floor. 2) Over-Spray – via existing RHR / Fuel Pool Cooling piping and / or hose routed through / up stair towers to the Refueling Floor. b) Reactor Pressure Vessel (RPV) – via existing RHR piping. c) Suppression Pool (torus) 1) Injection – via existing RHR piping 2) Spray – via existing RHR piping PM-1173 was performed with computer program Pipe-Flow 2009 to model incompressible flow in the applicable portions of the RHR, FPC, and High Pressure Service Water (HPSW) systems. Godwin Dri-Prime (model HL130M) pumps are the drivers for the PBAPS FLEX strategies. The Godwin model HL130M diesel engine driven pumps can be operated at variable speeds to obtain flow rates from 0 to 1,400 gpm at pressures ranging from 0

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		to 300 psig. PM-1173 confirmed that the proposed Mechanical FLEX Strategies can supply the required make-up flow to the various plant demands, while not exceeding the system piping pressure limitations or the capacity of the diesel engine driven FLEX pumps. Performance Attributes are included in the calculation. The PM-1173 conclusions are: a) SFP: The FLEX pump has the capability to provide the recommended makeup flow to the SFP alone, and concurrently to the RPV and the SFP. b) RPV: The FLEX pump has the capability to provide the recommended makeup flow to the RPV alone, and concurrently to the RPV and the SFP. Suppression Pool (torus): The FLEX pump has the capability to provide makeup flow to the Suppression Pool.
AQ 40	Battery Room Temperature	Complete Based on Battery Room ELAP Temperature Profile calculation PM-1186, the battery room temperature during the summer case peaks at approximately 118 degrees F, prior to doors being opened. This is the highest temperature in the battery rooms prior to connecting the FLEX generator and entering Phase II of the FLEX Strategy. The negative impact of any prolonged elevated temperature is a shorter overall battery life (battery ages quicker) and a corresponding faster replacement cycle. However, these are long-term impacts, and are not a concern during Phase I of an ELAP. In Phase II of the ELAP, the FLEX diesel generators are connected and provide required power, making battery power unessential. In PM-1186 the starting temperature of the battery room is conservatively assumed to be 100 degrees F, which is the set-point of the Main Control Room high temperature

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		alarm. However, the Battery Room HVAC system is sized for a maximum temperature of 122 degrees F. Therefore, the calculated ELAP Phase I maximum temperature is less than the Battery Room HVAC system sizing maximum temperature, and heightened temperature has a negligible adverse impact on the battery's capability to perform its function during an ELAP. For lowered temperatures, the battery room temperature during the winter case is greater than 64 degrees F, which will have a slight reduction in battery capacity during discharge during an ELAP. As calculated in PE-0140, the station batteries during an ELAP can cope for 7.25 hours (435 min.) at a minimum temperature of 60 degrees F. Therefore, the assumed low temperature in PE-0140 is less than the calculated low temperature of the battery rooms; and lowered temperatures have no adverse impact on the battery's capability to perform its function during an ELAP. Calculations PM-1186, Revision 0 and PE-0140, Revision 12, and the FLEX strategy, are available on the Exelon web portal. The time margin between calculated station battery run-time for the FLEX strategy and expected deployment time for FLEX equipment to supply the dc loads is approximately one hour, forty-five minutes (7.25 hours – 5.50 hours).
OIP.9	Timeline walk through will be completed for the FLEX pump installations when the detailed design and site strategy is finalized.	Complete The updated timeline was added to the Fifth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events (Order Number EA-12-049) RS-15-214.

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OIP.11	The 6-month update dated August 28, 2013, indicates the core thermal power used in the Exelon analysis was 3517 MWT (megawatts thermal)(maximum power prior to plant extended power uprate).	Complete Analysis of deviations between Exelon's engineering analyses and the analyses contained in BWROG Document NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines" was completed and documented in the OIP August 2013 Six-Month Update. The information is found as Attachment 3 (page 16 of 17 in the OIP August 2013 Six-Month Update). The OIP August 2013 Six-Month Update compared the NEDC-33771P with the engineering analysis (MAAP) performed under PB-MISC-010 Revision 0 (approved February 13, 2013). Subsequently PB-MISC-010 was revised to Revision 1 (approved March 11, 2015). • Post-EPU core power level is 3951 MWt In addition to the MAAP Analysis described above, the four FLEX calculations to which core power level is an input, have been verified to have post-EPU core power level. Those calculations are: PM-1173, PBAPS FLEX Makeup Hydraulic Analysis; and PM-1174 Spent Fuel Pool Air Space Temperature Profile following an ELAP, Calculation PM-1171, RCIC Room Heat-up Analysis for ELAP (does not use core power level as a direct input – but uses PB-MISC-010-determined torus temperature, which is based on the post-EPU core power level), and Calculation PM-1184, PBAPS FLEX Alternate Hydraulic Analysis (does not use core power level as a direct input – but uses PM-1173-determined flow rate, which is based on the post-EPU core power level).

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SE.10	Provide a detailed discussion on the capability of equipment in primary containment (the SRV locations in particular), the reactor building (RCIC pump room), the main control room, and the electrical switchgear rooms, to perform their expected functions under ELAP conditions (i.e. temperature, pressure, radiation, humidity, etc.) for an indefinite period.	Complete Tech Eval No. 2530982-02 - Evaluation of Certain Drywell Electrical Equipment for Survivability during an ELAP Event at PBAPS, Units 2 and 3.
SE.12	The PBAPS strategy for RPV makeup contains flow paths that do not have the flexibility inherent in NEI 12-06 as specified in Table 3-1 and Appendix C, Table C-1. Specifically, the two identified flow paths are mutually independent in terms of FLEX pump suction source and FLEX pump discharge connections to their respective plant systems. In addition, the flow paths share a common section of piping, as well as a single RPV injection point.	Complete Diverse Makeup "B" RHR Addition Additional flexibility is required to meet the requirements of NRC EA-12-049. The present response timeline requiring injection is based on MAAP Case 16, which includes anticipatory venting. RCIC is capable of providing makeup in excess of 70 hours based on limiting NPSH, temperature, pressure, and operational parameters which are controlled procedurally. The spent fuel pool inventory is assumed to begin to decrease as a result of boiling in 2.3 hours, as identified in hydraulic calculation PM-1173. The pool boil off rate has been calculated to be 137 gpm with irradiated fuel uncovered at 30.3 hours (also from PM-1173). Torus level for NPSH is adequate for the entire 70-hour period with operators maintaining torus pressure as directed by curves in the EOPs. The operators may elect to increase torus inventory due to loss from saturated steam venting. The inventory addition would provide additional margin to NPSH limits while allowing further torus depressurization if desired. The timeline indicates that the portable pumps will be lined up and available for injection in 12 hours which allows adequate margin to the 30.3 hours until spent fuel is uncovered.

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		MAAP Case 16 indicates the reactor vessel inventory makeup requirement at T-12 to be 200 gpm. As described above, the makeup to the spent fuel pool is 137 gpm for a total makeup of 337 gpm if both RPV and SFP were supplied simultaneously (200 gpm and 137 gpm respectively if addressed in a batch makeup manner). The flow path for additional flexibility is as follows: the pumps will take suction from the ECT and discharge through a hose, where it will split. One hose will go to supply the spent fuel pool and the other will go to the B.5.B connection in the RBCCW room and enter the "B" RHR train independently. Additional reactor makeup beyond the required flow rates can be provided through the SBLC system via a hose connection. Calculation PM-1184 (uploaded to the eportal) provides basis for the flow capability assumptions of the lineups. FSGs have been approved and issued to support this additional approach.
CI 3.1.1.1.A	FLEX Building Storage Configuration	Complete NEI 12-06 addresses FLEX Equipment protection against Seismic Hazards (5.3.1), Flood Hazards (6.2.3.1), High Wind Hazards (7.3.1), Extreme Low Temperature Hazards (8.3.1), and Extreme High Temperature Hazards (9.3.1). The Peach Bottom Integrated Plan protects FLEX Equipment from external events in accordance with NEI Guidance such that no one external event can reasonably fail the site FLEX capability (N). The PBAPS strategy is to store and protect N sets of FLEX Equipment in a seismically-protected, temperature controlled, wind-protected structure. The structure is as close to the FLEX Equipment deployment areas as reasonable. Although the structure is not above the flood plain, the PBAPS strategy is to deploy the

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		equipment well before the arrival of any flood that has potential to be of magnitude that could obstruct deployment. The PBAPS strategy is to store and protect +1 sets of FLEX Equipment in a commercial structure located farther from the deployment areas. On a periodic interval, equipment will be rotated and transferred from one structure to the other, such that all N+1 sets of equipment are fully maintained and in ready status. Peach Bottom may also elect to store the +1 set of equipment in the robust building with the N sets of equipment. If the +1 set of FLEX equipment is stored in the robust storage building, Peach Bottom will not be using the alternative approach. 5.3.1 Seismic Hazards The Peach Bottom Integrated Plan protects FLEX equipment from seismic hazards. The FLEX equipment seismic storage building, which protects N sets of equipment, is designed to meet the plant's design basis for the Safe Shutdown Earthquake (SSE). The commercial structure, which protects +1 sets of equipment, is designed to or evaluated equivalent to ASCE 7-10, Minimum Design Loads for Buildings and Other Structures. The FLEX equipment seismic storage building will have equipment tie-down straps to secure major equipment such as generators, pumps, and trailers. These straps will be secured to the concrete floor with Hilti-bolts or equivalent. Other infrastructure in the FLEX equipment seismic storage building, such as fire system (sprinkler) piping is designed to seismic 2-over-1 criteria, such that it cannot fall in a seismic event or otherwise damage FLEX Equipment. 6.2.3.1 External Flood Hazards Although the structure is not above the flood plain, the PBAPS strategy is to deploy the equipment well before the

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		arrival of any flood that has potential to be of magnitude that could obstruct deployment. The FLEX equipment seismic storage building, which protects N sets of equipment, is not above the flood plain. The PBAPS strategy is to deploy the equipment well before the arrival of any flood that has potential to be of magnitude that could obstruct deployment. The commercial structure is well above the flood plain. The PBAPS strategy is to deploy the +1 equipment at same time as N sets, well before the arrival of any flood that has potential to be of magnitude that could obstruct deployment. At the designated deployment locations, FLEX equipment will be protected from ultimate flood height and wind generated waves. The FLEX equipment storage location and deployment paths are not subject to rapid rise of water. 7.3.1 High Wind Hazard The FLEX equipment seismic storage building, which protects N sets of equipment, is designed to meet the plant's design basis for the high winds and tornado missiles. The structure, built to protect +1 sets of equipment, is designed to or evaluated equivalent to ASCE 7-10, Minimum Design Loads for Buildings and Other Structures, in accordance with the limiting tornado wind speeds from Regulatory Guide 1.76 or design basis hurricane wind speeds for the site. At PBAPS, there is no FLEX equipment that will be exposed to the wind. 8.3.1 Extreme Low Temperature Hazard The FLEX equipment seismic storage building, which protects N sets of equipment, is designed to meet the plant's design basis for snow, ice, and cold conditions. The structure, built to protect

		+1 sets of equipment, is designed to or evaluated equivalent to ASCE 7-10, Minimum Design Loads for Buildings and Other Structures for the snow, ice and cold conditions from the site's design basis. The PBAPS UFSAR Section 2.3.4.1 characterizes site temperature conditions as a few winter temperatures in the 5 degree to 10 degree F range. The FLEX equipment seismic storage is a heated enclosure. The FLEX Pump Engine manufacturer documents the limiting pump component is the controller designed for -40 degrees F to 185 degrees F, which bounds Peach Bottom conditions. The FLEX Generator design specification is for 100% full load operation at -25 degrees F, which bounds the Peach Bottom conditions. 9.3.1 Extreme High Temperature Hazard The FLEX equipment high temperature operating capability exceeds the plant's design basis for (high temperature) environmental conditions. PBAPS UFSAR Section 2.3.4.1 states there are occasional readings above 90 degrees F in the summer. The FLEX Pump Engine manufacturer documents the limiting pump component is the controller designed for -40 degrees F to 185 degrees F, which bounds Peach Bottom conditions. The FLEX Generator manufacturer documents the radiator design is based on a 104 degrees F ambient temperature, which bounds Peach Bottom conditions. The alternate strategies for the FLEX building and the +1 equipment have been included in the fifth 6 month update transmitted to the NRC on 8-28-15.
CI 3.2.4.4.B	Communications System Upgrades	Complete The PBAPS plan provides for the installation and connection of EMNet Voice over IP (VoIP) phones and new network switches (Power over Ethernet

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		(PoE) capable) for the MCR to an existing Level 2 network. Four EMNet phone connections have been installed to replace Emergency Response Organization (ERO) hotlines, Nuclear Accident Reporting System (NARS) or dedicated ring downs in the MCR. These phones are located on the Control Room Supervisor's desk, the Plant Reactor Operator's desk with one each on the Unit 2 and Unit 3 Reactor Operators' desks. A network cable has been run to the MCR north office area that can be the location of the temporary TSC when the current TSC, Unit 1 control room, is unavailable. The satellite system uses a fixed mount dish that is installed on the Radwaste building roof. This dish is reasonably protected from winds with mounting designed for 150 mph. The dish can survive winds up to 125 mph. If the permanently mounted dish is damaged during the event, a portable satellite dish is available for setup and use which is stored in the FLEX storage building which is protected. In-plant communications utilizes a duplicate radio repeater system located inside of the Unit 3 reactor building with a deployable antenna to allow operators to use their radios for communication after a BDBEE. The plant radio "Talk Around" is adequate for line of sight communications and extra batteries and chargers are available and stored in the FLEX Robust Building. Three portable satellite phones are available for offsite communications.