Exelon Generation.

RS-15-214

Order No. EA-12-049

August 28, 2015

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

Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Subject: 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)

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)

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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. 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

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, and 9 provided the first, second, third, and fourth 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 fifth 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 10.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of August 2015.

Respectfully submitted,

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

Enclosure:

1. Peach Bottom Atomic Power Station, Units 2 and 3 Fifth 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: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region I
NRC Senior Resident Inspector – Peach Bottom Atomic Power Station, Units 2 and 3
NRC Project Manager, NRR – Peach Bottom Atomic Power Station, Units 2 and 3
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Mr. Jack R. Davis, NRR/DPR/MSD, NRC
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Enclosure

Peach Bottom Atomic Power Station, Units 2 and 3

Fifth 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

(53 pages)

Enclosure

Peach Bottom Atomic Power Station Units 2 and 3 Fifth 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

- Perform Staffing Analysis – completed and submitted to the NRC on May 8, 2015
- Develop Training Plan – completed May 2015

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 with this submittal	
Update 6	Feb 2016	Not Started	
Update 7	Aug 2016	Not Started	
Submit Completion Report	Dec 2016	Not Started	
Perform Staffing Analysis	May 2015	Complete	
Modifications:			
Unit 2 Design Engineering	May 2015	Started	Sept 2015
Unit 2 Implementation Outage	Nov 2016	Not Started	
Unit 3 Design Engineering	June 2014	Started	Sept 2015
Unit 3 Implementation Outage	Oct 2015	Not Started	

Storage:			
Storage Design Engineering	Oct 2015	Started	
Storage Implementation	Oct 2015	Started	

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
FLEX Equipment:			
Procure On-Site Equipment	Sept 2015	Started	
Develop Strategies with RRC	Dec 2014	Complete	
Procedures:			
Create Site-Specific Procedures	Sept 2015	Started	
Validate Procedures (NEI-12.06, Section 11.4.3)	Sept 2015	Started	
Create Maintenance Procedures	Sept 2015	Started	
Training:			
Develop Training Plan	March 2015	Complete	
Training Complete	Oct 2015	Started	
Unit 2 FLEX Implementation	Nov 2016	Not Started	
Unit 3 FLEX Implementation	Oct 2015	Started	
Full Site FLEX Implementation	Nov 2016	Not 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. 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 Specification. 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.
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).

[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.

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 9 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:

Method 1: 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' 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 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 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 in 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.

4.3 Change to OIP Timeline

Strategy refinement has necessitated changes to the timeline submitted with the original OIP. The new timeline is as follows and will be included in the Final Integrated Plan. It is listed as Attachment 1A Sequence of Events Timeline.

Action Item	Elapsed Time	Action	Time Constraint Y/N[1]	Remarks/Applicability
	0	Event Starts.	NA	Plant @ 100% power
1	0	SBO, Reactor Scram.	NA	Automatic Action
2	.5 min	HPCI and RCIC start automatically on – 48 inch signal.	N	This is an approximation – depending on how the event is initiated, RCIC could start automatically or be manually started by the operator.
3	5 min	Operators shut down HPCI.	N	As long as RCIC is in service, HPCI operation is not required. This is not time critical because HPCI could remain in operation if the CST is available, and could be used for makeup if the operator chooses to use it. The operator will secure HPCI if it is not needed for RPV makeup or if CST is not available for use in the CST – CST mode of operation (RPV pressure control).
4	15 min	DC Load Shed commenced.	N	Prolong safety related battery life. Completion of load shed is time critical. SE-11 Att. T

[1] Instructions: Provide justification if No or NA is selected in the remark column
If Yes, include technical basis discussion as required by NEI 12-06 Section 3.2.1.7

5	20 min	Commence cooldown of RPV. Reduce pressure to 500 psig then 100F per hour to 200 psig to 300 psig.	N	Peach Bottom procedures direct RPV depressurization. This is not time critical and is currently part of the PB strategy for coping with an SBO condition. The RPV could remain pressurized to preserve steam driven injection systems required for RPV makeup. Operation above the HCTL may be required if RCIC is in use for RPV makeup.
6	30 min	Commence opening RCIC/HPCI Room doors.	N	Limit heat up of RCIC Room. This is not a time constraint because preliminary analysis indicates that placing a portable fan in service to blow air into the RCIC Room will maintain temperature in the RCIC Room less than 150°F. SE-11 Att. U
7	60 min	Operators enter ELAP procedure.	Y	Time is reasonable approximation based on operating crew assessment of plant conditions.
8	60 min	Commence Deep DC Load Shed.	N	Prolong safety related battery life. Completion of load shed is time sensitive. FSG-012 ELAP DC Load Shed
9	60 min	Commence aligning Nitrogen Bottles to ADS SRVs using Pipe Jumpers around SV- 8(9)130A& B commenced.	N	Not time sensitive due to sufficient accumulator volume for prolonged SRV operation cycles. Prevent exhausting the ADS SRV accumulators by providing a long term supply of nitrogen. FSG -044

10	60 min	Equipment Operators dispatched to the FLEX building to commence debris removal and deploy FLEX equipment.	N	Debris removal to allow transfer of FLEX equipment to required areas. FSG-002
11	60 min	Commence defeat of RCIC trips and isolations.	N	Not time sensitive – Action only defeats trips and isolations to prevent a spurious signal from removing RCIC from service. FSG-043
12	60 min	Commence antenna deployment and opening hatches and doors.	N	The antenna will allow use of operator radios in the plant. Antenna deployment is contingent upon failure of stations radios. The opening of the doors and hatches will help to reduce the temperature rise on the refuel floor. FSG-020; FSG-033.
13	60 min	Commence containment venting with torus pressure greater than 2 psi as required.	Y	Limit Torus temperature rise.
14	90 min	Complete DC Load Shed.	Y	FSG-012 ELAP DC Load Shed and SE-11 Att. T
15	4 hr	Complete deployment of portable fans to supply cooling air flow to the RCIC Rooms.	Y	Prevent RCIC Room temperature from rising above 150°F. Deploying the fan supports maintaining room temperature less than 150°F. FSG-032
16	4 hr	Commence installation of SFP hoses on refuel floor.	N	Completion of this step is time sensitive. FSG-042
17	5 hr	Commence Battery Room ventilation.	N	Maintain temperature in the battery room as required to optimize battery performance. FSG-031

18	5.5 hr	Complete installation of SFP hoses on refuel floor.	Y	Preparation for inventory boil-off is complete. FSG-042
19	5 hr 45 min	Commence Control Room ventilation.	N	Control room ventilation will be lost. Temperature increase is limited and these additional steps improve habitability.
20	6 hr	Commence deployment of FLEX pump.	N	Allow makeup to RPV, Torus and SFP.
21	7 hr	Portable generator is providing power to Safety Related 480VAC.	Y	Provide power to safety related battery chargers.
22	12 hr	Commence makeup to SFP from FLEX Pump (based on lowering SFP level).	Y	Provide makeup to the SFP due to inventory loss from boiling. Inventory loss due to boiling will result in reaching the top of irradiated fuel in 30 hours with no coolant added.
23	30 hr	Commence injection into Torus.	N	Not time sensitive due to RCIC viability in excess of 70 hours. Provide makeup to Torus due to inventory loss from venting. FSG-042
24	24 hrs	Initial equipment from Regional Response Center becomes available.	NA	PBAPS Strategy does not rely on SAFER Equipment

25	24 -72 hrs	Continue to maintain critical functions of core cooling (via RCIC), containment (via hardened vent opening and FLEX pump injection to torus), and SFP cooling (FLEX pump injection to SFP).	NA	

References:

1. SE-11, Loss of Offsite Power, Sheet 5, Rev 14
2. SE-11, Attachment T, DC Load Shed, Rev, 13
3. SE-11, Attachment U, Opening Secondary Containment Doors to Support Long Term HPCI/RCIC Operation, Rev 3
4. SE-11, Attachment X, Defeat of the HPCI and RCIC Temperature Isolation Rev 3
5. T-101, RPV Control, Rev 19
6. T-102, Primary Containment Control, Sheet 1, Rev 20
7. T-225-2&3, Defeating RCIC Low Pressure Isolation, Rev 4
8. T-261-2&3, Placing the Backup Instrument Nitrogen Supply from CAD Tank in Service, Rev 3
9. FSG-030, Establishing Control Room Ventilation and Lighting
10. FSG-031-3, Establishing Battery Room Ventilation and Lighting
11. FSG-044-3, Bypassing Backup Instrument Nitrogen SV- 9130A and SV-9130B
12. FSG-043-3, Defeating RCIC Interlocks
13. FSG-020, Deployment of Alternate Radio Communications Antenna
14. FSG-033-3, Establishing Natural Circulation of the Secondary Containment Atmosphere
15. FSG-032-3, Establishing HPCI, RCIC, Sump Room Ventilation, Lighting and Water Removal
16. FSG-042-3, RPV, Torus, and Fuel Pool Makeup Using the FLEX Pump
17. FSG-010-3, Aligning a FLEX Generator to Panel 3AS1061
18. FSG-011-3, Aligning a FLEX Generator to Panel 3BS1061
19. FSG-013-3, ELAP Electrical Alignment
20. FSG-012 ELAP DC Load Shed

4.4 Diverse Makeup

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, 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 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.

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 flowpath 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 provides basis for the flow capability assumptions of the lineups. FSGs are in development to support this additional approach.

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

No changes from the previous Fourth Six Month Update submittal.

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.	Started FLEX equipment will be deployed from two locations: the robust storage building located adjacent to the LLRW building which will hold the N sets of equipment and the storage building for the +1 set of equipment located on top of the cliff adjacent to the existing salt shed location. Both buildings are currently under construction. The CC-PB-118 document details how deployment from the storage buildings goes along the haul path and through the sally-port entering the protected area. It also provides direction for controls to maintain the deployment path open for all modes of station operation. From this access point, deployment will proceed to the FLEX staging areas. Deployment is possible for

		all modes of operation. SAFER equipment deployment from the RRC to the Site is addressed in the SAFER Playbook document. Completion tracked by ATI 2440131-16-02
Programmatic Controls (p. 7)	Item 2) An administrative program for FLEX to establish responsibilities, testing and maintenance requirements will be implemented.	Started PBAPS developed CC-PB-118 "Peach Bottom Implementation of Diverse and Flexible Coping Strategies (FLEX) and Spent Fuel Pool Instrumentation Program" which includes the following requirements as set forth by NEI 12-06 for developing a program document: - The FLEX strategies and basis will be maintained in an overall site program document. - The normal procedure process will provide the historical change. - The document contains the basis for the ongoing maintenance and testing programs chosen for the FLEX equipment. The Program document also describes site ownership responsibilities, testing requirements, and maintenance of the equipment necessary to implement the PBAPS FLEX and SFPLI strategies. Completion tracked by ATI 2440131-16-02
Describe Training Plan (p. 8)	Item 3) Training materials for FLEX will be developed for all station staff involved in implementing FLEX strategies.	Complete Nantel Basic FLEX CBT has been assigned to all site personnel except Clerical. Nantel Advanced FLEX CBT has been assigned to key ERO personnel (Emergency Directors, Ops Managers and Tech Managers) and licensed operators. FLEX Overview Training has been developed and delivered to all Licensed Operators, Equipment Operators, and key ERO personnel. This training included FLEX strategies and modifications. In addition, Equipment Operators received training on the F750, and the Tugger. In the cycle that started 5/26/15, the Equipment Operators received training on the tractors and debris removal equipment.

		Equipment Operators received further training on FSGs and the Portable Generator in the training cycle that started 7/13/15. Licensed Operators have received one segment of training on TRIP changes (EOPs). Licensed Operators received training on the second segment of TRIPS, and the ELAP Flowchart in the training cycle that started 7/13/15. They also received simulator training associated with a FLEX situation. Any additional Training should it be needed, is expected to be completed prior to the start of the FLEX outage (Fall 2015). Any exceptions will be tracked to completion.
Maintain Spent Fuel Pool Cooling (p. 30)	Item 4) Complete an evaluation of the spent fuel pool area for steam and condensation to determine vent path strategy requirements.	Complete Operator actions are taken early in the event to address the environmental conditions on the refuel floor. Operators are directed to perform FSG-33-3 at the onset of the ELAP declaration. Completion of FSG-33-3 will provide the flowpath to allow natural circulation and remove heat generated from evaporative cooling of the SFP. PM-1174 supports the action taken in FSG-042-3 "RPV, Torus and Fuel Pool Make-up Using a FLEX Pump" which implements a FLEX strategy to provide a source of makeup water to the RPV, torus, and fuel pool from a FLEX pump during a beyond design basis event. This procedure also provides direction for spraying the drywell, torus, and the spent fuel pool. Use of this procedure will be directed by SE-11, "Loss of Off-Site Power" during a beyond design basis event. The timeline actions establish hose deployment before conditions preclude operator actions.
Safety Function Support (p. 38)	Item 5) RCIC room temperature analysis is still in progress.	Started After February 12, 2013 initial issue of the OIP, Peach Bottom approved PM-1159,

		RCIC Room Heat-up Analysis for Extended Loss of AC Power (ELAP) / Extended SBO (Revision 0 approved July 9, 2013). PM-1159 is a GOTHIC (Generation of Thermal- Hydraulic Information for Containments) thermal- hydraulic calculation. The purpose of the calculation is to determine the transient RCIC Room temperature during an ELAP, and demonstrate the effects of postulated compensatory actions. The results of this calculation are a temperature profile, shown as Figure 6.1. From the most conservative initial room temperature of 110 degrees, with the addition of a 5,000 cfm fan at 22.5 hours after T=0, temperature will plateau at approximately 136 degrees F. A temperature of 136 degrees F permits personnel entry. RCIC controls equipment is typically non-EQ. However, RCIC Room LOCA temperature is calculated at a comparative 129 degrees F (Spec. NE-0164). FSG-032-3 installs a much larger 17,000 cfm (42- inch) fan. Currently PM-1159 is undergoing revision to incorporate the larger fan ventilation at an earlier time. PM-1159 was based on a conservative suppression chamber room temperature equal to torus temperature, which was calculated by MAAP Calculation PB-MISC-010 Revision 0. PB-MISC-010 was subsequently revised to incorporate, among other things, a higher Torus temperature profile, EPU power level, and a more aggressive depressurization rate. The in-progress PM-1159 revision will include power level input from PB-MISC-010 Revision 1. PM-1159 revision is tracked by ATI 2440131-52.
Safety Function Support (p.38)	Item 6) Evaluate the habitability of the Main Control Room and develop a strategy to maintain habitability.	Complete The main control room will heat up upon loss of air conditioning and forced air flow. The heat input is from the latent heat

		of the formerly energized equipment, equipment indication and controls that remain, and personnel. The CREV fan will not be energized until after the Unit 2 FLEX mods are installed. FSG 30 is performed at the 345-minute point to provide forced air circulation using portable ventilation equal to the CREV fan value.
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 Calculation PM-0736 Revision 3, Battery Room Hydrogen Concentration, determines the maximum hydrogen concentration in the safety- related Battery Rooms at PBAPS during normal operations and during an Appendix R Fire event, which encompasses loss of power to battery room ventilation fans. PM-0736 demonstrates compliance with Regulatory Guide 1.128. The calculation was prepared at a time when the RG 1.128 maximum allowable hydrogen concentration was 2% (by volume), not the current 1%. PM-0736 demonstrates that during an Appendix R Event, when all Battery Room HVAC is assumed to be lost, the maximum hydrogen concentration in the battery rooms is 0.52% after 72 hours. Key inputs to PM-0736 are the battery's hydrogen generation rates during equalizing charge (0.607 cubic feet/hour) and during float charge (0.279 cubic feet/hour); the equalization charging time (20 hours); and the battery room volume (6300 cubic feet, reduced by 20% to 5040 cubic feet for conservativism). PM-0736 timeline for Appendix R Fire Event is: 1) T = 0 to 1 hour, Appendix R Fire Event, batteries are discharging on loss of power; no hydrogen is generated during discharge. This is analogous to ELAP event from T = 0 to 6 hours, when

		batteries are discharging, prior to re-charging with FLEX generator. 2) T = 1 to 21 hours, maximum hydrogen produced on equalization charge (0.607 cubic feet / hour). Total of 12.14 cubic feet produced, equal to .24% by volume. 3) T = 21 to 72 hours, hydrogen produced on float charge (0.279 cubic feet / hour). 14.23 cubic feet produced on float charge. Total of 26.37 cubic feet produced on both equalization and float charge, equal to .52% by volume. Appendix R Fire Event ends at 72 hours, power restored to normal battery room ventilation system. Extrapolating PM-0736 to a longer ELAP timeline: 1) At T= 72 hours, hydrogen concentration is .52% by volume, remaining margin to revised RG 1.128 value of 1% equals .48% [1% - .52%]. 2) Float charge generation rate (0.279 cubic feet / hour) increases hydrogen concentration by 0.055% per hour [(0.279 cubic feet/hour)/5040 cubic feet]. 3) From 1 and 2, remaining time to RG 1.128 value of 1% is 86 hours [.48% / (.055%/hour)]. 4) Total time to RG 1.128 value of 1% is 158 hours [72 hours + 86 hours], or over 6 ½ days. If the ELAP Phase 2 and 3 Responses extend past 156 hours, temporary ventilation will be provided by FSG-030. The hydrogen exhaust path will be to the Turbine Building general area, which if necessary can be opened to outdoors via roll-up door. By engineering judgment, due to incomparably larger volume in Turbine Building vs. Battery Rooms, opening Turbine Building roll- up door for hydrogen control from battery recharging after 156 hours is not required. After the Unit 2 FLEX modifications in 2016, normal battery room

		ventilation will be restored with the connection of the FLEX generators and portable temporary ventilation will not be required.
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.	Started The timeline for the installation of the diesel generator has been established and validated. The timeline accounts for 1 hour to identify and declare an ELAP, and 2 hours for debris removal. The carts containing the cables will then be taken to the pre-determined connection site. The connections are either the railway bay or the connection point on the west side of the reactor building. The connections are made and the busses energized in accordance with FSG-10/11. The diesels are then started and the AC loads energized in 5.2 hours. This is the point the D1 battery chargers are energized and reliance on the battery is no longer required. The 5.2-hour completion time allows for adequate margin for battery viability.
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.	Started The timeline for establishing the pump includes the declaration of an ELAP, debris removal, and establishing electrical power with the portable diesels. The pumps are then transported to one of two potential locations inside the protected area. Hoses are then connected to and from the pump and subsequently to the plant systems for makeup. The pumps can then be started and injection to the plant systems can occur to either the reactor or the spent fuel pool per FSG -42/50. The RCIC system will remain viable for 7.6 hours, even if the torus vent is not opened , and beyond 12 hours if it is opened by procedure. The spent fuel pool does not start to boil for 5.7 hours. This issue is tracked by ATI 2440131-56
Sequence of Events (p. 5)	Item 10) Additional analysis will be performed during detailed design development to ensure	Started BWROG report on the subject, 0000-0155-

	Suppression Pool temperature will support RCIC operation, in accordance with approved BWROG analysis, throughout the event.	0154- R0, "RCIC Pump and Turbine Durability Evaluation – Pinch Point Study", February 2013 was not distributed in time to be incorporated in initial OIP submittal. Subsequently, the BWROG prepared BWROG-TP-14-018 (Revision 0, December 2014) – Beyond Design Basis RCIC Elevated Temperature Functionality Assessment. The Feasibility Study and the Durability Evaluation contain a significant amount of information that support the conclusion that RCIC is a robust system and capable of preventing core damage during events that are more challenging than the design basis of the equipment. The most significant limiting component from the Durability Evaluation is the turbine journal bearings. The majority of the Functionality Assessment's content provides qualitative analysis from various sources to determine the expected response of the RCIC system journal bearings under extreme temperature conditions. The pump seals are considered fully capable up to 240°F with loss in performance at higher temperatures and a leakage rate of up to 88 gpm at 300°F. The remainder of the paper concludes that the RCIC system can reasonably be expected to prevent fuel damage under assumed ELAP conditions at temperatures greater than 250°F. There is an expected decline in performance and long term reliability due to operation in extreme conditions, but this decline is not expected to impact the ability of the RCIC system to maintain injection to the RPV. The Functionality Assessment concludes that: The body of evidence provides reasonable expectation that RCIC will perform its required function of RPV injection to maintain the core covered at high or low RPV pressures under all steam quality conditions with no expectation of loss of functionality below 215°F. Between 215°F

		to 250°F, there is no expectation of loss of functionality but there may be some degradation in performance and long-term reliability while operating at these temperatures. No significant pump seal leakage is expected at temperatures below 250°F. MAAP Analysis (PB-MISC-010 Revision 1) Case 16 is for the post-Hardened Containment Vent System (HCVS) modification, initiating anticipatory venting at t= 1 hour. In this case, without external injection to the RPV or the Torus, the Suppression Pool reaches a maximum of 237 degrees F, bounded by the Functionality Assessment 250 degrees F, for which there is no expectation of loss of functionality. The Functionality Assessment is applicable to PB RCIC. PB is not making any plant modifications, based on the Functionality Assessment. Other information in the GE white paper regarding operation of RCIC at elevated suction temperatures is captured in the EOP bases and available to the operator. T-102, "Primary Containment Control" Torus temperature leg (revision of Caution #5 wording) will be revised to address the high Torus temperature concern effect on RCIC. The HPCI 180 F limit is unchanged. The T-102 Bases for the Caution is shown below it. 1. HPCI and RCIC lube oil and control oil are cooled by the water being pumped. Operation should be avoided if aligned to the Torus with temperatures above 180°F for HPCI and 215°F for RCIC. Above these temperatures, the Torus water may inadequately cool the lube oil resulting in high lube oil temperatures and possible oil breakdown. However, HPCI or RCIC may be operated if required to maintain ACC. 2. If Torus temperature is above 215°F

		during an event such as an Extended Loss of AC Power (ELAP), the turbine bearing Babbitt material will be softer than normal and more likely to "wipe" at lower speeds during startup and shutdown. For this reason and a concern with intermittently isolating the only RPV injection method, RCIC batch mode operations should be avoided. 3. Likewise, operation of HPCI in batch mode raises the possibility of a system restart failure. However, this is the best mode for maintaining HPCI injection when it is the only injection system available since continuous operation will eventually depressurize the RPV until HPCI can no longer provide make-up. 4. RCIC Pump seal leakage is expected to be as high as 88 gpm at a Torus temperature of 300°F. Issues are tracked with ATI 2437148-17 and 1687735-05
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 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). PB-MISC-010, Revision 1 adds Cases 11 through 19, and a sensitivity run. Cases 12 and 16 most closely reflect expected plant behaviors. Case 12 assumes the wetwell vent opens at torus pressure > 30 psig, which is

		consistent with currently installed hardened vent rupture disc set pressure. Case 16 assumes the wetwell vent opens at 1.1 hours, which will be possible after installation of the Hardened Containment Vent modification including anticipatory venting capability. Both Cases 12 and 16 make the following assumptions: • ELAP at t = 0 • MSIVs close • RCIC starts automatically on low RPV level (about t=30 seconds) with suction from the suppression pool • RCIC trips are bypassed • At t = 5 minutes, operators begin a prompt RPV cooldown to 500 psig using 1 SRV. Then operators commence 100 degrees per hour cooldown using SRVs to 250 psig. RPV pressure is controlled at 200 – 300 psig following the cooldown. • RCS leakage is 42 gpm at 1000 psig conservatively assumed to begin at t = 0. A 16-inch wetwell vent is opened when containment pressure exceeds 60 psig. The containment vent discharge coefficient varies from 0.354 (at 10 psig) to 0.393 (at 60 psig) • No suppression pool makeup available • Initial suppression pool temperature is 95°F • Initial drywell temperature is 135°F • Post-EPU core power level is 3951 MWt These input parameters are consistent with the operation of Peach Bottom. Changes from Rev 1 will be submitted in a future six month update.
Safety Function Support (p. 38)	Item 12) Evaluate the effect of additional load shed on the	Started

	battery coping time.	Division 1 Battery Life (extreme temperature impact): A calculation is being performed for the first 6 hours of the ELAP, to evaluate the impact of extreme environmental temperatures (high and low) on the life of the Division 1 batteries. The time duration that the battery can provide power is in part also dependent on the battery room temperature. Before AC power is partially restored to the emergency busses, i.e., during the initial 5 hours of the postulated ELAP, there is no induced ventilation through the battery rooms because the battery room exhaust fans are not functional (powered) during the initial phases of the ELAP. As such, the battery room temperature is expected to fluctuate due to internal and external heat sources. Calculation PM-1035 "Room Temperature Analysis for the Safeguard Battery and Auxiliary Switchgear Rooms – FSSD" includes a Bechtel proprietary thermal-hydraulic model "CFLUD" whose inputs can be modified to include revised inputs applicable for the ELAP condition (boundary room temperatures, heat loads, battery room ventilation flow rates, etc.). S&L proposes to use the PM-1035 inputs, in part, to generate a GOTHIC model to determine battery room environmental temperature during the postulated ELAP event. The analysis will be developed to determine the minimum and the maximum battery room temperatures given the extreme turbine building boundary condition temperatures. This calculation will evaluate the Division 1 Battery room temperature for both the initial period of time during the postulated ELAP event when the batteries are discharging, as well as the period of time when the batteries are being recharged. During the postulated FLEX event, it is anticipated that the environmental temperature conditions within the turbine building during the

		ELAP event will differ from that included in the design basis, i.e., the turbine building enclosure may be damaged (partially removed); therefore, minimum temperatures outside the Division 1 Battery Room could reach as low as 10°F (Ref. PM-0825) as opposed to 65°F (Ref. NE-00164). As ventilation is required to purge the battery rooms of hydrogen gas during periods when the batteries are being charged to preclude the development of an explosive atmosphere, the resulting battery room temperature may approach a lower value. The new calculation to determine the battery room temperature profile during the postulated ELAP will be performed in accordance with the requirements of CC-AA-309 and CC-AA-309-1001. Discussion: 1. The battery room temperature is maintained at 100°F or less (Ref. ARC-207 20C236L C-2). Per PEAM-5 (under a FSSD event), under the conservative condition of maximum Turbine Building temperature of 103°F, Battery Room temperature will increase no greater than 2°F over a 72-hour time period. Therefore, starting at 100°F, the Battery Room temperature will never increase beyond 102°F over a 72-hour time period. Since the station FLEX strategy requires repowering of the battery chargers before 7 hours, the expected temperature change is a fraction of the change described in PEAM-5. Upon review of IEEE 484, heightened battery temperatures will not have a negative short term impact on battery capacity during the time frame required to restore AC power via the FLEX DGs. 2. The battery room temperature is 65°F or higher (Ref. NE-00164, ARC-207 20C236L C-2). During an

		ELAP, the doors to the battery rooms could be maintained closed until ventilation is required. Therefore, in-leakage into the room is minimal. Per DBD P-S-08G, the minimum temperature in the Turbine Building is maintained no less than 65°F. By similarity using PEAM-5, the expected decrease of the Battery Room temperature is no greater than 2°F over a 72-hour time period (or a fraction of the temperature change within 5 hours). Tech Eval A1913361-49 evaluates the station battery coping time at a battery temperature of 65°F. (d): The loads being shed to increase battery life have been evaluated (including 50.59), and verified per SE 11 att. T, Station Blackout procedure. The deep load shed required for battery life extension during an ELAP, FSG 12, has been reviewed extensively for FLEX strategy impact. Nothing relating to RCIC or ADS, the two systems credited in Phase 1, is being de-energized in an ELAP event. The DC supply for the main generator H2 seal pump is not from an emergency DC source affiliated with ECCS systems. The generator will be vented at the T-30 minute mark in the present timeline while the battery is still viable. Issues tracked by ATI 2440131-54 and 2437148-14

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

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. 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

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

Attachment 1

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 Peach Bottom Emergency Operating Procedures are being revised based on changes in BWROG EPG/SAG Revision 3, including "anticipatory venting" of containment during an ELAP in order to remove decay heat and keep steam-driven injection systems available for makeup to the reactor. Technical information concerning benefits and consequences of "anticipatory venting" of BWR Containments was transmitted to the NRC by NEI on behalf of the BWROG in a paper entitled "BWR Containment Venting" on November 21, 2013 (ADAMS ML13352A057). In a January 9, 2014 letter to NEI (ADAMS ML13358A206), the NRC staff agreed that the changes to the containment venting strategies, described in the BWROG information report, were acceptable for use as part of the strategies proposed in response to Order EA-12-049, on a generic basis. Other provisions in the January 9, 2014 letter concerning the capabilities of the installed vent path, net positive suction head for the reactor coolant system injection pumps, and guidance to prevent negative pressure in containment are addressed as follows. The capabilities of the installed vent path will not be formally evaluated based on Peach Bottom's approved deferral of compliance with the vent portion of the EA-12-049 order. Operation of reactor coolant injection pumps in relation to NPSH requirements and actions to address potential negative pressure conditions in primary containment is addressed in EPG/SAG revision 3 and addressed accordingly in Peach Bottom's EOPs (TRIPs).
3.2.4.3.A Freeze protection has not been discussed in the Integrated Plan or during the audit process.	Complete Freeze protection has been considered for the storage, use and continued operation of FLEX equipment. The storage of the portable equipment will be in the robust storage building. The +1 equipment will be stored in a commercial grade constructed building which has heat and electricity

Attachment 1

	capable of energizing engine block heaters. The FLEX pump suction connections to the plant are at the suction of the plant cooling water pumps downstream of the bar racks and the ECT dry pipe. The suction from the inlet bay is protected from the weather and will not freeze immediately after shutdown during an ELAP. Water will be introduced into the suction side of the pumps when injection to the plant is desired. Diesel oil is from the diesel oil storage tanks that are buried and maintain a constant temperature. One method to retrieve the fuel is to pump directly from the tanks to the fill truck with a submersible fill system. The other method is to pump directly from the new fill system that was installed for FLEX to allow refueling in a flood situation. The potential for oil freeze is discussed in ECR 13-00279.
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 The PIMS lighting evaluation identifies lighting that remains available following an ELAP as well as lighting enhancement when the FLEX diesel restores division one power. The plant personnel will also be supplied with flashlights and other portable lights to address personal lighting deficiencies. Flashlights and head lamps will be stored in the FLEX Robust Building for operators and other support personnel who respond to the event.
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. The existing Peach Bottom procedure SE-11 "Loss of Offsite Power" issues Master Security Keys to Operations personnel for actions requiring access inside the Protected Area.

Attachment 2

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 The design of the structure is in full compliance with requirements set forth in NEI 12-06. The equipment will be tethered to hold points in the base slab of the building to secure it while in storage. The building will have ventilation to provide protection against high temperatures, and heat to protect against freezing. See attachment 3 and alternate approach to meeting the order in Section 4.
3.1.1.2.A Deployment routes have not yet been finalized or reviewed for possible impacts due to debris and potential soil liquefaction.	Started The haul path has now been defined as the location of the robust building protecting the FLEX portable equipment is now known. Debris removal and equipment have been evaluated in the White Paper completed and tracked in ATI 1560443-08 which identifies the deployment route as well as a characterization of the different potential hazards. A liquefaction study has been performed which supports the path and storage structure. At least one of the deployment routes will be through seismic class 1 structures to the connection point. The liquefaction report completion is tracked in ATI 2440131-13.
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 The FLEX portable equipment including the F-750 which will be used to transport fuel for refilling the portable pumps and generators will be housed in the new robust building which is engineered to meet the requirements of NEI 12-06 Sections 11, 5.3.1, 7.3.1, 8.3.1 and 9.3.1. The building design meets the SSE requirements and has heating and ventilation appropriate with the design requirements. See Attachment 3 for additional detail.
3.1.1.3.A Seismic procedural interface consideration NEI 12-06, Section 5.3.3, consideration 1, which considers the possible	Complete The site seismic evaluation has been completed

Attachment 2

failure of seismically qualified electrical equipment by beyond- design basis seismic events, was not discussed in the Integrated Plan or during the audit process.	and submitted per the Expedited Seismic Evaluation Process (ESEP). Plant operators can obtain necessary instrument readings to support the implementation of the coping strategy, including control room and non-control room readouts, through FSG-045-3 which provides guidance on how and where to measure key instrument readings at containment penetrations, where applicable, using a portable instrument (e.g., a Fluke meter). The procedure provides a list of Primary instrumentation parameters that are DC powered and required during a beyond design basis event. For each primary process parameter, an alternate backup method has been developed to obtain each parameter.
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 Section 5.3.3, 2 and 3 state: There are four procedural interface considerations that should be addressed. Consideration should be given to the impacts from large internal flooding sources that are not seismically robust and do not require ac power (e.g., gravity drainage from lake or cooling basins for non-safety-related cooling water systems). For sites that use ac power to mitigate ground water in critical locations, a strategy to remove this water will be required. For item (3), PBAPS does not use seismically supported ac power to mitigate ground water in critical locations. The PBAPS safety-related structures are ground-water protected by use of passive external flood seals up to a minimum elevation of 135'. The Current Licensing Basis maximum flood still water elevation is 131.5', which provides margin for potential flood wave run-up. Specification NE-075, "Penetration Seals in Hazard Barriers at PBAPS and LGS," defines the requirements for sealing penetrations in hazard barriers. For item (2) PBAPS does not have any large

	internal flooding sources that are not seismically robust and do not require ac power (e.g., gravity drainage from lake of cooling basins for non-safety related cooling water systems). PBAPS Topical Design Baseline Document (DBD) P-T-12, Internal Hazards, identifies the following for Internal Flooding: **Internal Flooding** Internal Flooding analyses are performed on the compartments which contain Emergency Core Cooling System components and the Circulating Water Pump Structure which contains the High Pressure Service Water and Emergency Service Water Pump Rooms. These analyses are performed to ensure that these systems are adequately protected against the effects of flooding. This protection, where possible, is achieved by basic station component arrangement and separation of multiple trains of equipment. Compartmentalized design of the individual compartments is also used to minimize the effects of internal flooding on these areas. **Internal Flooding Analysis** Internal flooding analyses are performed for (1) the ECCS Compartments, and (2) the center portion of the Circulating Water Pump Structure to ensure that safety related systems and components within these structures are protected from a single flooding event. These analyses also demonstrate that the following internal flooding design basis is satisfied: • Leakage from the ECCS piping complex will be contained within the affected room • The Torus Cavity and all ECCS pump. rooms will be of a leak-tight construction up to at least one foot above the normal Torus water level. • Failure of Non-Class I equipment within the Circulating Water Pump Structure. The following is a discussion of the results of the analyses used to protect safety related equipment in the ECCS Compartments and the Circulating Water Pump Structure from the effects of internal

Attachment 2

	flooding. (1) ECCS Compartment Flooding The High Pressure Coolant Injection (HPCI), Core Spray (CS), Residual Heat Removal (RHR), and Reactor Core Isolation Cooling (RCIC) equipment rooms are flood protected to a level of at least one foot above the normal water level in the Torus. All partitions are watertight and access doors are quick acting watertight bulkhead doors. All penetrations below Elevation 111 feet are sealed and stainless steel bellows expansion joints are provided to accommodate pipe movement. (2) Circulating Water Pump Structure Flooding The HPSW and ESW Pump Rooms are located in the central portion of the Circulating Water Pump Structure. These rooms are the backup location for FLEX discharge; however, motive force is from the FLEX pumps, and no active system components are required. These rooms are separated from Class II portions of the building by watertight interior partitions and flood doors. The compartments which contain the Unit 2 and Unit 3 HPSW Pumps and the redundant ESW Pumps are watertight to elevation 135 feet and are each equipped with watertight flood doors.
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.	Started The local staging area, "AREA B", is located adjacent to the haul path from the robust storage structure near the MAF sally-port. The alternate location is next to the N+1 building, on the hill west of the plant. A Croman Corporation representative has endorsed the locations as suitable for helicoptering in equipment if necessary. A liquefaction analysis has verified the viability of the onsite area in the event of a seismic issue. The area on a hill adjacent to the plant is used for flooding events. Completion tracked by ATI 2440131-16 and 33
3.1.2.A. Characterization of the external flooding hazard in terms of warning time and persistence was not discussed in the Integrated Plan or during audit process.	Complete. The Conowingo TAMS Report information has been entered into site records to fully address the

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	issue.
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.	Started SE-4 also identifies the flood level at which the FLEX equipment will be staged in accordance with FSG-003, Pre-staging FLEX equipment. This pre-staging will also move the +1 equipment for staging as well should an ELAP occur at a later point in time. Completion tracked by 2440131-16.
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 There are four primary procedures that provide logistical consideration for flood conditions. These procedures are: • AO 28.2 RESPONSE TO HIGH/LOW RIVER LEVEL • SE-4 FLOOD • OP-PB-108-111-1001 PREPARATON FOR SEVERE WEATHER • OP-AA-108-111-1001 SEVERE WEATHER AND NATURAL DISASTER GUIDELINES AO 28.2, RESPONSE TO A HIGH/LOW RIVER LEVEL, contains initial actions and directions for rising flood waters at Peach Bottom. This direction prioritizes the plant operating condition and establishes communication with Conowingo and the Power Team. This establishes the logistical consideration for plant operations and communications. This procedure also directs the user to SE-4 if necessary. SE-4 FLOOD describes the actions to secure the Units and provide site control information in the event of a flood. In addition to the detailed steps to secure the operating Units and prepare the physical site for flood waters, there are considerations for relocation of B.5.b equipment, portable emergency equipment, staffing the TSC, and emergency notifications to all personnel of site accessibility. OP-PB-108-111-1001, PREPARATON FOR SEVERE WEATHER, provides action to be implemented to prepare the station for severe weather and additional guidance to be used with

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	OP-AA-108-111-1001 SEVERE WEATHER AND NATURAL DISASTER GUIDELINES. Section 4.12 directs the user to the Emergency equipment locker for mattresses, blankets that may be required. Attachment 1, step 19 has Operations establish food and water plans for the site. This step is also duplicated in Attachment 3, step 5 for Maintenance Facilities. Also on Attachment 3 is step 6 to ensure potable water is available at key locations. OP-AA-108-111-1001, SEVERE WEATHER AND NATURAL DISASTER GUIDELINES, provides additional logistical considerations during severe weather and natural disasters which includes flooding. Step 4.2.4 directs the user to work with Contract Services to establish food plans for the site, and step 4.2.6 states "If a major storm is forecasted that may require personnel to remain on-site for extended periods of time, COORDINATE with Supply and associated Department personnel to make arrangements for food, over-staffing for reliefs, and sleeping considerations." This would be done in advance of the flooding event. Details listed in ATTACHMENT 1, Hurricane/ Blizzard/ Flooding Guidelines - Logistics/Procurement are: Order additional supplies of bottled water, portable toilets, and so forth; and arrange for cafeteria services. Prepare to issue personal hygiene packages. Acquire cots, pillows, and sleeping bags. Designate specific sleeping areas to ensure sufficient crew rest. Obtain food bars such as Power Bars, and stage them in a location that will be accessible during the storm.
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. The primary debris removal apparatus is the F 750 truck with a blade on the front for moving debris from the travel path. The robust storage facility will, in addition to the F 750, contain two tractors with debris removal attachments, chain saws for wood and BROCO torch for quick metal cutting. The tractors will be used for towing the portable equipment to the plant locations and the lifting

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	capability is such that a Jersey barrier can be moved if necessary. The time required for debris removal supports the timeline for deployment and connection of FLEX equipment. The vehicle and equipment used to clear debris will be stored in the FLEX building.
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.	Started. The vehicle and equipment used for snow and ice removal will be stored in the FLEX building. The site program document will include direction for the areas to be addressed for snow removal to accommodate FLEX equipment. ATI 2440131-16
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 Generic response provided in EPRI Technical Report 3002002749, "Technical Basis for Establishing Success Timelines in Extended Loss of AC Power Scenarios in Boiling Water Reactors Using MAAP4". Also reference EPRI Technical Report 3002001785, "Use of Modular Accident Analysis Program (MAAP) in Support of Post-Fukushima Applications".
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 The most bounding post hardened vent ELAP response is modeled in MAAP Case 16. The initial conditions are a Unit trip with the EPU 100% power level. RCIC starts and continues to run. The operator depressurizes the reactor to 500 psig reactor pressure and then continues the cooldown to 200 psig – 300 psig at the rate not to exceed 100°F per hour. The torus vent is opened at one hour. The cooldown rate does not exceed 100°F per hour and the reactor water level does not reach TAF.
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 MAAP analysis for Peach Bottom was carried out in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper, EPRI Technical Report 3002001785, "Use of Modular Accident Analysis Program (MAAP) in Support of Post-Fukushima Applications". Preparation and Review of the MAAP analysis is conducted under engineering training certification guide ENANRM08. Reference PM- MISC-014

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	Revision 0 Section 2.0 item (3).
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 (a) Nodalization – the reactor vessel nodalization is fixed by MAAP code and cannot be altered by the user, with the exception of the detailed core nodalization. The Peach Bottom MAAP 4.0.6 parameter divides the core region into 7 equal volume regions and 28 axial regions. The axial nodalization represents 10 equal-sized fueled nodes, 1 unfueled node at the top, and 2 unfueled nodes at the bottom. Containment nodalization is defined by the user. The standard nodalization scheme is used in the Peach Bottom MAAP 4.0.6 parameter file and represents the individual compartments: 1. Reactor pedestal region 2. Drywell 3. Drywell vents to torus 4. Torus (wetwell) (b) General two-phase flow modeling – General two-phase flow from the reactor vessel is described in EPRI Technical Report 3002002749. In the case of the scenario outlined in the integrated plan, flow can exit the RPV via the open SRV(s) and from the assumed recirculation pump seal leakage. Flow from the SRV(s) will be single-phase steam and flow from the recirculation pump seal or other RPV leakage will be single-phased liquid due to location of the break low in the RPV, with the RPV level maintained above TAF. Upon exiting the RPV, the seal leakage will flash a portion of the flow to steam based on saturated conditions in the drywell, creating a steam source and a liquid water source to the drywell. As described in the EPRI Technical Report 3002002749, "Technical Basis for Establishing Success Timelines in Extended Loss of AC Power Scenarios in Boiling Water Reactors Using MAAP4 – A Guide to MAAP Thermal-Hydraulic Models", there are two parameters that can influence the two-phase level in the RPV – FCO (void concentration factor) and FCHTUR (churn-turbulent critical velocity

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	coefficient). The parameter values used in the Peach Bottom MAAP analysis match the EPRI recommended values for these parameters. (c) Modeling of heat transfer and losses – Modeling of heat transfer and losses from the RPV are described in EPRI Technical Report 3002002749. The MAAP parameters that control these processes are identified along with their specific Peach Bottom values, in PB-MISC-014 Revision 0, Section 2, item 3b. (d) Choked flow – Choked flow from the SRV and the recirculation pump seal leakage is discussed in EPRI Technical Report 3002002749. The parameters that impact the flow calculation are listed along with their specific Peach Bottom values, in PB-MISC-014 Revision 0, Section 2, item 3c. (e) Vent line pressure losses – Vent line pressure loss can be represented two ways. The actual piping flow area can be input with a discharge coefficient. An alternative method would be to calculate the effective flow area given the estimated piping losses, and input a loss coefficient of 1.0. For the Peach Bottom analysis, the vent area is input based on a 16" diameter pipe and a discharge coefficient of 0.75 was selected. (f) Decay heat (fission products / actinides / etc.) – The decay heat calculation is discussed in EPRI Technical Report 3002002749. The input parameters used to compute the decay heat are listed along with their specific Peach Bottom values, in PB-MISC-014, Revision 0, Section 2, item 3e.
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 The timeline structure satisfies 2 MAAP Cases: 12 and 16. Case 12 is more limiting as it is modeled to represent the plant response prior to the hardened vent modification. The present plant design has a rupture disk that bursts at 30 psig, allowing use of the torus vent at that point. RCIC is viable to 250°F torus temperature which occurs at 7.6 hours.

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	In MAAP Case 16, the torus is vented at 1 hour. Venting at this point will reduce peak torus temperature less than 250°F, supporting RCIC operation. In both Cases, it is necessary to provide power from the diesel generator to keep the battery charged and useful.
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 The MAAP Analysis used RCS leakage of 42 gpm, conservatively assumed to begin at t= 0. This includes 18 gpm per pump seal leakage, 5 gpm unidentified RCS leakage, and 1 gpm identified RCS leakage. The leakage is modeled as a hole of fixed size which yields 42 gpm leakage at 1000 psig. General two-phase flow modeling – General two-phase flow from the reactor vessel is described in EPRI Technical Report 3002002749 "Technical Basis for Establishing Success Timelines in Extended Loss of AC Power Scenarios in Boiling Water Reactors Using MAAP4 – A Guide to MAAP Thermal-Hydraulic Models". In the case of the scenario outlined in the integrated plan, flow can exit the RPV via the open SRV(s) and from the assumed recirculation pump seal leakage. Flow from the SRV(s) will be single-phase steam and flow from the recirculation pump seal or other RPV leakage will be single-phased liquid due to location of the break low in the RPV, with the RPV level maintained above TAF. Upon exiting the RPV, the seal leakage will flash a portion of the flow to steam based on saturated conditions in the drywell, creating a steam source and a liquid water source to the drywell. As described in the EPRI Technical Report 3002002749, there are two parameters that can influence the two-phase level in the RPV: FCO (void concentration factor) and FCHTUR (churn-turbulent critical velocity coefficient). The parameter values used in the Peach Bottom MAAP analysis match the EPRI recommended values for these parameters. Choked flow – Choked flow from the SRV and the recirculation pump seal leakage is discussed in

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	EPRI Technical Report 3002002749. The parameters that impact the flow calculation are listed along with their specific Peach Bottom values, in PB-MISC-014, Revision 0, Section 2, item 3c.
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.	Started Exelon has approved Calculation PM-1173, Revision 0, Peach Bottom Atomic Power Station (PBAPS) FLEX Makeup Analysis in Response to NRC Order EA-12-049. 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 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

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	diesel engine driven FLEX pumps. The acceptance criteria, listed below, are consistent with NEI 12-06 Performance Attributes: d) SFP: e) Injection > 200 gpm f) Over-Spray > 250 gpm g) RPV > 300 gpm direct injection, RPV Pressure (minimum = 64.7 psia, maximum = 164.7 psia) h) Suppression Pool (torus) > 300 gpm direct injection, Containment Pressure (minimum = 14.7 psia, maximum = 74.7 psia) The PM-1173 conclusions are: i) 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 j) 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. ATI 2440131-71
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.	Started Division 1 Battery Life (extreme temperature impact): A calculation is being performed for the first 6 hours of the ELAP, to evaluate the impact of extreme environmental temperatures (high and low) on the life of the Division 1 batteries. The time duration that the battery can provide power is in part also dependent on the battery room temperature. Before AC power is partially restored to the emergency busses, i.e., during the initial 5 hours of the postulated ELAP, there is no induced ventilation through the battery rooms because the battery room exhaust fans are not functional (powered) during the initial phases of the ELAP. As such, the battery room temperature is expected to fluctuate due to internal and external heat sources. Calculation PM-1035 "Room Temperature

	Analysis for the Safeguard Battery and Auxiliary Switchgear Rooms – FSSD" includes a Bechtel proprietary thermal- hydraulic model "CFLUD" whose inputs can be modified to include revised inputs applicable for the ELAP condition (boundary room temperatures, heat loads, battery room ventilation flow rates, etc.). S&L proposes to use the PM-1035 inputs, in part, to generate a GOTHIC model to determine battery room environmental temperature during the postulated ELAP event. The analysis will be developed to determine the minimum and the maximum battery room temperatures given the extreme turbine building boundary condition temperatures. This calculation will evaluate the Division 1 Battery Room temperature for both the initial period of time period during the postulated ELAP event when the batteries are discharging, as well as the period of time when the batteries are being recharged. During the postulated FLEX event, It is anticipated that the environmental temperature conditions within the turbine building during the ELAP event will differ from that included in the design basis, i.e., the turbine building enclosure may be damaged (partially removed); therefore, minimum temperatures outside the Division 1 Battery Room could reach as low as 10°F (Ref. PM-0825) as opposed to 65°F (Ref. NE-00164). As ventilation is required to purge the battery rooms of hydrogen gas during periods when the batteries are being charged to preclude the development of an explosive atmosphere, the resulting battery room temperature may approach a lower value. The new calculation to determine the battery room temperature profile during the postulated ELAP will be performed in accordance with the requirements of CC-AA-309 and CC-AA-309-1001. Discussion: 1. The battery room temperature is maintained at 100°F or less (Ref. ARC-207 20C236L C-2). Per PEAM-5 (under a FSSD event), under the conservative condition of maximum Turbine Building temperature of 103°F, Battery Room temperature will increase no greater than 2°F over a 72-hour time period.

	Therefore starting at 100°F, the Battery Room temperature will never increase beyond 102°F over a 72-hour time period. Since the station FLEX strategy requires repowering of the battery chargers before 5 hours, the expected temperature change is a fraction of the change described in PEAM-5. Upon review of IEEE 484, heightened battery temperatures will not have a negative short term impact on battery capacity during the time frame required to restore AC power via the FLEX DGs. 2. The battery room temperature is 65°F or higher (Ref. NE-00164, ARC- 207 20C236L C-2). During an ELAP, the doors to the battery rooms could be maintained closed until ventilation is required. Therefore in-leakage into the room is minimal. Per DBD P-S-08G, the minimum temperature in the Turbine Building is maintained no less than 65°F. By similarity using PEAM-5, the expected decrease of the Battery Room temperature is no greater than 2°F over a 72-hour time period (or a fraction of the temperature change within 5 hours). Tech Eval A1913361-49 evaluates the station battery coping time at a battery temperature of 65°F. (d): The loads being shed to increase battery life have been evaluated (including 50.59), and verified per SE 11 att. T, Station Blackout procedure. The deep load shed required for battery life extension during an ELAP, FSG 12, has been reviewed extensively for FLEX strategy impact. Nothing relating to RCIC or ADS, the two systems credited in Phase 1, is being de-energized in an ELAP event. The DC supply for the main generator H2 seal pump is not from an emergency DC source affiliated with ECCS systems. The generator will be vented at the T-30 minute mark in the present timeline while the battery is still viable. Battery room temperature calculation tracked in 2440131-54.
3.2.1.4.C The operability of the RCIC pump at elevated suction temperature was not discussed in	Started

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the Integrated Plan or during the audit process.	BWROG report on the subject, 0000-0155-0154-R0, "RCIC Pump and Turbine Durability Evaluation – Pinch Point Study", February 2013 was not distributed in time to be incorporated in the initial OIP submittal. Subsequently, the BWROG prepared BWROG-TP-14-018 (Revision 0, December 2014) – Beyond Design Basis RCIC Elevated Temperature Functionality Assessment. The Feasibility Study and the Durability Evaluation contain a significant amount of information that support the conclusion that RCIC is a robust system and capable of preventing core damage during events that are more challenging than the design basis of the equipment. The most significant limiting component from the Durability Evaluation is the turbine journal bearings. The majority of the Functionality Assessment's content provides qualitative analysis from various sources to determine the expected response of the RCIC system journal bearings under extreme temperature conditions. The pump seals are considered fully capable up to 240°F with loss in performance at higher temperatures and a leakage rate of up to 88 gpm at 300°F. The remainder of the paper concludes that the RCIC system can reasonably be expected to prevent fuel damage under assumed ELAP conditions at temperatures greater than 250°F. There is an expected decline in performance and long term reliability due to operation in extreme conditions, but this decline is not expected to impact the ability of the RCIC system to maintain injection to the RPV. The Functionality Assessment concludes that: The body of evidence provides reasonable expectation that RCIC will perform its required function of RPV injection to maintain the core covered at high or low RPV pressures under all steam quality conditions with no expectation of loss of functionality below 215°F. Between 215°F to 250°F, there is no expectation of loss of functionality but there may be some degradation in performance and long-term reliability while

	operating at these temperatures. No significant pump seal leakage is expected at temperatures below 250°F. • MAAP Analysis (PB-MISC-010 Revision 1) Case 16 is for the post- Hardened Containment Vent System (HCVS) modification, initiating anticipatory venting at t= 1 hour. In this case, without external injection to the RPV or the Torus, the Suppression Pool reaches a maximum of 237 degrees F, bounded by the Functionality Assessment 250 degree F, for which there is no expectation of loss of functionality. • The Functionality Assessment is applicable to PB RCIC. • PB is not making any plant modifications, based on the Functionality Assessment. • Other information in the GE white paper regarding operation of RCIC at elevated suction temperatures is captured in the EOP bases and available to the operator. • T-102, "Primary Containment Control" Torus temperature leg (revision of Caution #5 wording) will be revised as shown below to address the high Torus temperature concern effect on RCIC. The HPCI 180 F limit is unchanged. The T-102 Bases for the Caution is shown below it. 1. HPCI and RCIC lube oil and control oil are cooled by the water being pumped. Operation should be avoided if aligned to the Torus with temperatures above 180°F for HPCI and 215°F for RCIC. Above these temperatures, the Torus water may inadequately cool the lube oil resulting in high lube oil temperatures and possible oil breakdown. 2. However, HPCI or RCIC may be operated if required to maintain ACC. If Torus temperature is above 215°F during an event such as an Extended Loss of AC Power (ELAP), the turbine bearing Babbitt material will be softer than normal and more likely to "wipe" at lower speeds during startup and shutdown. For this reason, and a concern with intermittently

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	isolating the only RPV injection method, RCIC batch mode operations should be avoided. Likewise, operation of HPCI in batch mode raises the possibility of a system restart failure. However, this is the best mode for maintaining HPCI injection when it is the only injection system available since continuous operation will eventually depressurize the RPV until HPCI can no longer provide make-up. RCIC Pump seal leakage is expected to be as high as 88 gpm at a Torus temperature of 300°F.
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	Completed. The initial RCIC makeup for the reactor is from the CST. The CST is not a robust structure, so reactor makeup from the torus will be used if the CST is lost, via an auto transfer of the RCIC suction valves. FLEX pump makeup is from either the intake structure directly or the ECT which also contains river grade water. BWROG and Exelon Corporate have provided input concerning the effects of raw water, as well as using the best water quality possible as the event transpires. Peach Bottom has adopted that position and provides direction to that effect in the EOPs.
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 The response in OIP 4 satisfies this question.
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.	Started This item was closed prior to the NRC audit to Audit Question AQ.13 by the NRC. The impact of high temperature on RCIC is addressed in the BWROG report on the subject, 0000-0155-0154-R0, "RCIC Pump and Turbine Durability Evaluation - Pinch Point Study," February 2013, and BWROG-TP-14-018, "Beyond Design Basis RCIC Elevated Temperature Functionality Assessment." A Gothic evaluation for the RCIC room temperature is being performed to confirm the capability of the mechanical and electrical equipment. This item along with additional RCIC system viability items is tracked under 1687735-05.

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3.2.4.2.B Evaluation of high and low battery temperatures is to be provided during a future six-month-update.	Started Battery room calc is being tracked in 2437148-14 and 2440131-54.
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.	Started. The PBAPS plan provides for the installation and connection of EMNet Voice over IP (VoIP) phones and new network switches (Power over Ethernet (PoE) capable) for the MCR to an existing Level 2 network. Three EMNet phone connections will be considered to replace Emergency Response Organization (ERO) hotlines, Nuclear Accident Reporting System (NARS) or dedicated ring downs in the MCR. These phones will be located on the Plant Reactor Operators desk and one each on the Unit 2 and Unit 3 Reactor Operators desks. A network cable will be run to the MCR north office area that will be the location of the temporary TSC when the current TSC, Unit 1 control room, is unavailable. This area will have a portable network switch available for use for additional VoIP phones and laptop connections to the satellite network when connected. The satellite system uses a fixed mount dish that is installed on the Unit 3 reactor building south wall above the Rad Waste building roof. This dish is reasonably protected from winds with mounting designed for 150 mph and a dish survivability 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 EDG 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. Three satellite phones are available for offsite communications. The plant radio "Talk Around" is adequate for line of sight communications and extra batteries and chargers are available and will be stored in the FLEX Robust Building.
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	Started RCIC Room Peach Bottom approved PM-1159, RCIC Room Heat-up Analysis for Extended Loss of AC Power

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discussion of long term habitability in critical plant locations during an ELAP	(ELAP) / Extended SBO (Revision 0 approved July 9, 2013). PM-1159 is a GOTHIC (Generation of Thermal-Hydraulic Information for Containments) thermal-hydraulic calculation. The purpose of the calculation is to determine the transient RCIC Room temperature during an ELAP, and demonstrate the effects of postulated compensatory actions. The results of this calculation are a temperature profile, shown as Figure 6.1. From the most conservative initial room temperature of 110 degrees F, at 72 hours room temperature will reach 207.1 degree F. With the addition of a 5,000 cfm fan at 22.5 hours, temperature will fall to approximately 136 degrees F. A temperature of 136 degrees F permits personnel entry. RCIC controls equipment is typically non-EQ. However, RCIC Room LOCA temperature is calculated at a comparative 129 degrees F (Spec. NE-0164). FSG-032-3 installs a much larger 17,000 cfm (42-inch) fan. Currently, PM-1159 is undergoing revision to incorporate the larger fan ventilation at an earlier time. PM-1159 was based on a conservative suppression chamber room temperature equal to torus temperature, which was calculated by MAAP Calculation PB-MISC-010 Revision 0. PB-MISC-010 was subsequently revised to incorporate, among other things, post-EPU power levels, higher torus temperature, and faster depressurization rate. The in-progress PM-1159 revision will include power level input from PB-MISC-010 Revision 1. PM-1159 revision is tracked by Action Request 2440131 Assignment 52. Refuel Floor Peach Bottom approved PM-1174, Spent Fuel Pool (SFP) Air Space Transient Temperature Profile following ELAP (Revision 0 approved May 6, 2015). PM-1174 is a GOTHIC thermal-hydraulic calculation. The purpose of the calculation is to determine the transient temperature profile of the Refueling Floor air space following an ELAP. The results of this calculation are a temperature profile, shown in Section 7. For all Cases, SFP boiling occurs at approximately 5.7 hours, at which time temperature increases rapidly. For Case 1 (pre-boiling) and Case 4 (post-boiling), the 7.5 square

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	foot roof hatch is opened at two hours. In these Cases, refuel floor airspace temperature is 114 degrees F at 4 hours, and 122 degrees F at 5.7 hours. After boiling begins, temperature increases rapidly and reaches steady state at approximately 212 degrees F. A temperature of less than 114 degrees F permits personnel entry. Once hatch is opened and hoses routed to the SFP, personnel re-entry into the space will NOT be required. Hose valves will be manipulated from outside the refuel floor. Also outside the refuel floor will be a manifold that can be adjusted to allow direct flow into or spray over the SFP. FSG-033-3 opens the refuel floor ceiling hatch. FSG-042-3 deploys hoses on the refuel floor for makeup to and spray over the SFP. Main Control Room Calculation PM-0426, Control Room Heat-up during Station Blackout, determines the transient temperature profile of the Main Control Room following a Station Blackout. The results of this calculation are that temperature reaches 132 degrees F at 8 hours, when temperature approximately reaches a plateau, for the worst case with RPS re-energized. If ceiling tiles are removed at 1 hour, the 8-hour plateau temperature is approximately 119 F; and if ceiling tiles are removed at 1 hour and RPS is not re-energized, the 8-hour plateau temperature is approximately 118F. FSG-030 installs a 20-inch fan, and opens the roll-up door in the adjacent turbine building. Currently, another Main Control Room Heat- up Calculation is being prepared to include the fan ventilation and to extend the transient beyond 8 hours. The new Main Control Room ELAP Heat-up Calculation preparation is tracked by Action Request 2440131 Assignment 03. Issues tracked in 2440131-52; 2440131 - 22; 2440131 - 28; 2440131 - 05
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 The volume of the ECT (3.4E6 gallons) is such that additional water supply can be obtained in the

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	event more water is required at some later point. The volume of the tank is sufficient for FLEX pump operation for 4.03 days. Additional pumps and hoses have been identified to be brought in per the SAFER playbook to allow further ECT makeup when it arrives.
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 E-0301 documents the loading/sizing of the FLEX portable generators. ECR 13-00507 documents the plant modifications installed to allow the FLEX portable generators to backfeed into the Division 1 AC Electrical Distribution System.
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 The diesel fuel for the generators will be pumped from the EDG storage tanks during the event. The fuel quality is maintained by accepted programs to meet required standards. Fuel in equipment tanks will be periodically replaced as part of the equipment PM program. ATI 2440131-26 tracked the completion of the refill procedure. If more diesel fuel is required in the event, Contract # 00460805 has been established with Petroleum Trader Corporation for delivery.
3.4.A The program or process to request RRC equipment was not discussed in the Integrated Plan or during the audit process.	Complete ERO Position Checklists will be used to direct activation of the SAFER notification. Specified SAFER equipment and deployment routes from the RRC Centers to the site are detailed in the SAFER Playbook for PBAPS. FSG-060 "Transitioning from FLEX Equipment to SAFER Equipment" provides guidance on connections for the Phase 3 support equipment from SAFER.
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 PE-0301 documents the loading/sizing of the FLEX portable generators. ECR 13-00507 documents the plant modifications installed to allow the FLEX portable generators to backfeed into the Division 1 AC Electrical Distribution System. All of the generic interface equipment has been ordered or received and site specific equipment has been identified. Reference NRC endorsement of SAFER/NEI Paper (ML 14259A223) NRC endorsement (ML 14265A107)

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5.3.1 Protection of FLEX Equipment (Seismic)	
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 will be 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 will be designed to protect the FLEX equipment from unsecured or non-seismic components during a SSE
6.2.3.1 Protection of FLEX Equipment (Flooding)	
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 increasing flood levels and whether movement of the FLEX equipment will be possible before potential	FLEX pumps, generators and other equipment will be stored below the PMF elevation. Procedures governing actual or predicted high river level or flows will include guidance for relocating the equipment to an elevation above the PMF level and prior to a river level that would prevent transport.

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inundation occurs, not just the ultimate flood height.	
2. Storage areas that are potentially impacted by a rapid rise of water should be avoided.	Events causing a river level exceeding 116' elevation that would prevent transport of FLEX equipment are precipitation events, which would have advanced warning.
7.3.1 Protection of FLEX Equipment (Wind)	
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 will be 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 location. In general, tornadoes travel from the West or West Southwesterly direction, diverse locations should be aligned in the North- South arrangement,	NA

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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)	
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 will be 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 historical extreme weather conditions and the equipment is deployable.	NA
2. Storage of FLEX equipment should account for the fact that the equipment will need to function in a timely manner. The	FLEX pumps, generators and their storage location will include

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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.).	appropriate heating.
9.3.1 Protection of FLEX Equipment (High Temperature)	
The equipment should be maintained at a temperature within a range to ensure its likely function when called upon.	FLEX pumps, generators and their storage location will include appropriate ventilation such that the equipment will be maintained within operating limits.