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

February 12, 2015

Mr. Bryan Hanson
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3 - INTERIM STAFF EVALUATION RELATING TO OVERALL INTEGRATED PLAN IN RESPONSE TO PHASE 1 ORDER EA-13-109 (SEVERE ACCIDENT CAPABLE HARDENED VENTS) (TAC NO. MF4416 AND MF4417)

Dear Mr. Hanson:

By letter dated June 6, 2013, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-13-109, "Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A334). By letter dated June 30, 2014 (ADAMS Accession No. ML14181A301), Exelon Generation Company, LLC (Exelon) submitted its Overall Integrated Plan (OIP) for Peach Bottom Atomic Power Station, Units 2 and 3 (PBAPS) in response to Phase 1 of Order EA-13-109. By letter dated December 19, 2014 (ADAMS Accession No. ML14353A125), Exelon submitted its first six-month status report for PBAPS in response to Order EA-13-109. Any changes to the compliance method described in the OIP dated June 30, 2014, will be reviewed as part of the ongoing audit process.

Exelon's OIP for PBAPS appears consistent with the guidance found in Nuclear Energy Institute (NEI) 13-02, as endorsed, in part, by the NRC's Japan Lessons-Learned Project Directorate (JLD) Interim Staff Guidance (ISG) JLD-ISG-2013-02, as an acceptable means for implementing the requirements of Phase 1 of Order EA-13-109. This conclusion is based on satisfactory resolution of the open items detailed in the enclosed Interim Staff Evaluation (ISE). This ISE only addresses consistency with the guidance. Any plant modifications will need to be conducted in accordance with the plant engineering change process and be consistent with the plant's licensing basis.

If you have any questions, please contact Charles Norton, Project Manager, at 301-415-7818 or at Charles.Norton@nrc.gov.

Sincerely,

Mandy K. Halter

Mandy K. Halter, Acting Chief
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No. 50-277 and 50-278

Enclosure:
Interim Staff Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
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INTERIM STAFF EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO ORDER EA-13-109 PHASE 1, MODIFYING LICENSES

WITH REGARD TO RELIABLE HARDENED

CONTAINMENT VENTS CAPABLE OF OPERATION UNDER

SEVERE ACCIDENT CONDITIONS

EXELON GENERATION COMPANY, LLC

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

By letter dated June 6, 2013, the U.S. Nuclear Regulatory Commission (NRC, or Commission) issued Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions" [Reference 1]. The order requires licensees to implement its requirements in two phases. In Phase 1, licensees of boiling-water reactors (BWRs) with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the wetwell (WW) during severe accident conditions. In Phase 2, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the drywell under severe accident conditions, or, alternatively, those licensees shall develop and implement a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions.[1]

The purpose of the NRC staff's review, as documented in this interim staff evaluation (ISE) is to provide an interim evaluation of the Overall Integrated Plan (OIP) for Phase 1 of Order EA-13-109. Phase 1 of Order EA-13-109 requires that BWRs with Mark I and Mark II containments design and install a severe accident capable hardened containment vent system (HCVS) that provides venting capability from the wetwell during severe accident conditions, using a vent path

[1] This ISE only addresses the licensee's plans for implementing Phase 1 of Order EA-13-109. While the licensee's OIP makes reference to Phase 2 issues, those issues are not being considered in this evaluation. Issues related to Phase 2 of Order EA-13-109 will be considered in a separate interim staff evaluation at a later date.

Enclosure

from the containment wetwell to remove decay heat, vent the containment atmosphere (including steam, hydrogen, carbon monoxide, non-condensable gases, aerosols, and fission products), and control containment pressure within acceptable limits. The HCVS shall be designed for those accident conditions (before and after core damage) for which containment venting is relied upon to reduce the probability of containment failure, including accident sequences that result in the loss of active containment heat removal capability or extended loss of alternating current (ac) power (ELAP).

By letter dated June 30, 2014 [Reference 2], Exelon Generation Company, LLC (Exelon, the licensee) provided the OIP for Peach Bottom Atomic Power Station, Units 2 and 3 (PBAPS) for compliance with Phase 1 of Order EA-13-109. The OIP describes the licensee's currently proposed modifications to systems, structures, and components, new and revised guidance, and strategies that it intends to implement in order to comply with the requirements in Phase 1 of Order EA-13-109.

2.0 REGULATORY EVALUATION

Following the events at the Fukushima Dai-ichi nuclear power plant on March 11, 2011, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF was tasked with conducting a systematic and methodical review of the NRC regulations and processes and determining if the agency should make improvements to these programs in light of the events at Fukushima Dai-ichi. As a result of this review, the NTTF developed a set of recommendations, documented in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 [Reference 3]. These recommendations were enhanced by the NRC staff following interactions with stakeholders. Documentation of the NRC staff's efforts is contained in the Commission's Staff Requirements Memorandum (SRM) SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011 [Reference 4] and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 [Reference 5].

As directed by the Commission's SRM for SECY-11-0093 [Reference 6], the NRC staff reviewed the NTTF recommendations within the context of the NRC's existing regulatory framework and considered the various regulatory vehicles available to the NRC to implement the recommendations. SECY-11-0124 and SECY-11-0137 established the NRC staff's prioritization of the recommendations based upon the potential safety enhancements.

On February 17, 2012, the NRC staff provided SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami" [Reference 7], to the Commission, including the proposed order to implement the installation of a reliable HCVS for Mark I and Mark II containments. As directed by SRM-SECY-12-0025 [Reference 8], the NRC staff issued Order EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents" [Reference 9], which requires licensees to install a reliable HCVS for Mark I and Mark II containments.

While developing the requirements for Order EA-12-050, the NRC acknowledged that questions remained about maintaining containment integrity and limiting the release of radioactive materials if the venting systems were used during severe accident conditions. The NRC staff presented options to address these issues for Commission consideration in SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments" [Reference 10]. In the SRM for SECY-12-0157 [Reference 11], the Commission directed the staff to issue a modification to Order EA-12-050, requiring licensees with Mark I and Mark II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions." The NRC staff held a series of public meetings following issuance of SRM SECY-12-0157 to engage stakeholders on revising the order. Accordingly, by letter dated June 6, 2013, the NRC issued Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Performing under Severe Accident Conditions."

Order EA-13-109, Attachment 2, requires that BWRs with Mark I and Mark II containments have a reliable, severe-accident capable HCVS. This requirement shall be implemented in two phases. In Phase 1, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the wetwell during severe accident conditions. Severe accident conditions include the elevated temperatures, pressures, radiation levels, and combustible gas concentrations, such as hydrogen and carbon monoxide, associated with accidents involving extensive core damage, including accidents involving a breach of the reactor vessel by molten core debris. In Phase 2, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the drywell under severe accident conditions, or, alternatively, those licensees shall develop and implement a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions.

On November 12, 2013, the Nuclear Energy Institute (NEI) issued NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0 [Reference 12] to provide guidance to assist nuclear power reactor licensees with the identification of measures needed to comply with the requirements of Phase 1 of the HCVS order. On November 14, 2013, the NRC staff issued Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2013-02, "Compliance with Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Performing under Severe Accident Conditions" [Reference 13], endorsing in part NEI 13-02, Revision 0, as an acceptable means of meeting the requirements of Phase 1 of Order EA-13-109, and published a notice of its availability in the *Federal Register* [78 FR 70356]. Licensees are free to propose alternative methods for complying with the requirements of Phase 1 of Order EA-13-109.

By letter dated May 27, 2014 [Reference 14], the NRC notified all BWR Mark I and Mark II licensees that the staff will be conducting audits of the implementation of Order EA-13-109. This letter described the audit process to be used by the staff in its review of the information contained in licensee's submittals in response to Phase 1 of Order EA-13-109.

3.0 TECHNICAL EVALUATION

PBAPS units 2 and 3 are General Electric BWRs with Mark I primary containment systems and independent reactor buildings. To implement Phase 1 (HCVS) of Order EA-13-109, the licensee will upgrade the existing HCVS on each unit. The existing HCVS wetwell vent is routed from the suppression pool to a point above the top of the reactor building. There are no HCVS components shared between units. The OIP describes plant modifications, strategies and guidance under development for implementation by the licensee to upgrade the existing HCVS. As part of its review of the submitted OIP, the NRC staff held clarifying discussions with Exelon in evaluating the licensee's plans for addressing wetwell venting during beyond-design-basis external events (BDBEEs) and severe accidents.

3.1 GENERAL INTEGRATED PLAN ELEMENTS AND ASSUMPTIONS

3.1.1 Evaluation of Extreme External Hazards

Extreme external hazards for PBAPS were evaluated in the PBAPS OIP in response to Order EA-12-049 (Mitigation Strategies) [Reference 15]. In the PBAPS ISE relating to Mitigation Strategies [Reference 16], the NRC staff documented an analysis of Exelon's extreme external hazards evaluation. The following extreme external hazards screened in: Seismic; External Flooding; Severe Storms with High Winds; Snow, Ice and Extreme Cold; and High Temperature. No external hazards screened out. Based on PBAPS not excluding any external hazard from consideration, the NRC staff determined that Exelon appears to have identified the appropriate external hazards for consideration in the HVCS design.

3.1.2 Assumptions

On page 5 of the PBAPS OIP, Exelon adopted a set of generic assumptions associated with Order EA-13-109 Phase 1 actions. The staff determined that the set of generic assumptions appear to establish a baseline for the HCVS evaluation consistent with the guidance found NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02.

In its OIP for PBAPS, Exelon also proposed one plant-specific HCVS-related assumption, as follows:

> PBAPS -1 EA-12-049 (FLEX) actions to restore power are sufficient to ensure continuous operation of non-dedicated containment instrumentation.

The staff determined that the plant-specific assumption does not appear to deviate from the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02.

3.1.3 Compliance Timeline and Deviations

Page 4 of the OIP states the following:

> Compliance will be attained for PBAPS to the guidelines in JLD-ISG-2013-02 and NEI 13-02 for each phase as follows:

- Unit 2 Phase 1 (wetwell): by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Currently scheduled for 4^{th} Quarter 2016.

- Unit 3 Phase 1 (wetwell): by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Currently scheduled for 4^{th} Quarter 2017.

- Unit 3 Phase 2: (drywell): by the startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. Currently scheduled for 4^{th} Quarter 2017.

- Unit 2 Phase 2 (drywell): by the startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. Currently scheduled for 4^{th} Quarter 2018.

The current design of the circuits for the in-board PCIV [primary containment isolation valve] used in the torus vent pathway requires the installation of jumpers to by-pass the containment high drywell pressure isolation logic. The jumpers also bypass the reactor low level, Reactor Building (RB) and Refuel Floor vent exhaust hi-rad, and Main Stack hi-rad isolations. The use of jumpers may be retained in the design of the HCVS if is determined that redesign of the safety-related logic is not feasible or is considered a less conservative approach with respect to compliance with design basis requirements. If the use of jumpers is retained, a technical justification and basis will be included in a future six month update.

If other deviations are identified at a later date, then the deviations will be communicated in a future 6 month update following identification.

PBAP's implementation schedule appears to comply with the requirements of the order. The licensee identified that the current design of the circuits for the in-board PCIV used in the torus vent pathway requires the installation of jumpers to by-pass the containment high drywell pressure isolation logic. The licensee also indicated that if the use of jumpers is retained in the final design, that a technical justification and basis would be included in a future six month update. Thus, this issue will be tracked as an open item in this ISE, pending NRC review of the licensee's justification. In the OIP discussion of vent path and discharge, the licensee identified that the HCVS discharge point is 5 feet below the release point of the reactor building ventilation discharge. The licensee also indicated that the HCVS stack does not have the tornado protection described in the NEI guidance. These issues with the vent path and discharge are discussed in ISE section 3.2.2.3. At this time the staff has not identified additional deviations from the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02 as an acceptable method to implement the requirements of Order EA-13-109.

Open Item: Make available for NRC staff audit a technical justification for the use of jumpers in the HCVS strategy.

Summary, Section 3.1:

The licensee's described approach to General Integrated Plan Elements and Assumptions if implemented, as described in Section 3.1, and assuming acceptable resolution of any open items identified here or as a result of licensee alterations to their proposed plans, appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109.

3.2 BOUNDARY CONDITIONS FOR WETWELL VENT

3.2.1 Sequence of Events (SOE)

Order EA-13-109, Sections 1.1.1, 1.1.2, and 1.1.3, state that:

> 1.1.1 The HCVS shall be designed to minimize the reliance on operator actions.
>
> 1.1.2 The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system.
>
> 1.1.3 The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response.

Page 7 of the OIP states the following:

> The operation of the HCVS will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1 [of the OIP]. Immediate operator actions will be completed by plant personnel and will include the capability for remote-manual initiation from the HCVS control station. A list of the remote manual actions performed by plant personnel to open the HCVS vent path can be found in the following table (2-1 [of the OIP]). A HCVS Extended Loss of AC Power (ELAP) Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4 [of the OIP].

The NRC staff reviewed the remote manual actions (Table 2-1 of the OIP) and concluded that these actions appear to consider minimizing the reliance on operator actions. The actions appear consistent with the types of actions described in the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02. The NRC staff reviewed the Wetwell HCVS Failure Evaluation Table (Attachment 4 of the OIP) and determined the actions described appear to adequately address all the failure modes listed in the guidance provided by NEI 13-02, which include: loss of normal ac power, long term loss of batteries, loss of normal pneumatic supply, loss of alternate pneumatic supply, and solenoid operated valve (SOV) failure.

The staff reviewed the three cases contained in the SOE timeline [Attachment 2 of the OIP] and determined that the three cases appropriately bound the conditions for which the HCVS is required. These cases include: successful FLEX implementation with no failure of reactor core isolation cooling (RCIC); late failure of RCIC leading to core damage; and failure of RCIC to inject at the start of the event. The timelines accurately reflect the progression of events as described in the PBAPS FLEX OIP [Reference 17], SECY-12-0157 [Reference 10], and State-of-the-Art Reactor Consequence Analyses (SOARCA) [Reference 18].

The NRC staff reviewed the licensee discussion of time constraints on page 8 of the OIP and confirmed that the time constraints identified appear to be appropriately derived from the time lines developed in Attachment 2 of the OIP, consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02. The time constraints establish when the HCVS must be initiated and when supplemental compressed gas for motive power and supplemental electrical power (FLEX) must be supplied. Based on the information provided in the licensee's submittal, the time constraints specified appear to be reasonably achievable, subject to the open item specified below.

The NRC staff reviewed the discussion of radiological and temperature constraints on page 9 of the OIP and determined that Exelon addressed radiological and temperature considerations at the locations identified to date where manual actions are necessary to operate HCVS. However, PBAPS has not identified all locations where operator actions need to be performed; therefore, the staff has not completed its review at this time.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.2 Vent Characteristics

3.2.2.1 Vent Size and Basis

Order EA-13-109, Section 1.2.1, states that:

> 1.2.1 The HCVS shall have the capacity to vent the steam/energy equivalent of one (1) percent of licensed/rated thermal power (unless a lower value is justified by analyses), and be able to restore and then maintain containment pressure below the primary containment design pressure and the primary containment pressure limit.

Page 11 of the OIP states the following:

> The HCVS WW [wetwell] vent path was designed for venting steam/energy at a nominal capacity of 1 [percent] % of 3293 MWt [megawatt thermal] thermal power at a pressure of 60 psig [pounds per square inch gauge]. The original PBAPS WW vents were oversized for these nominal conditions, and had sufficient margin for previous PBAPS Stretch Power Uprate (to 3458 MWt in 1994/1995) and Measurement Uncertainty Recapture (MUR) Power Uprate (to 3514 MWt in 2002). PBAPS Calculation PM-0546 demonstrates adequacy for current station power rating of 3514 MWt at a PCPL [Primary Containment Pressure Limit] rating of 60 psig, with flow margins of 42% on Unit 2 and 45% on Unit 3.

> PM-0546 tabulates flow for a variety of pressures between 10 psig and 60 psig, which encompasses the design pressure rating of 56 psig. PM-0546 concludes that at torus pressures of 20 psig or greater, the vent flow exceeds flow required to assure depressurization. PBAPS Extended Power Uprate (EPU), to be implemented in 2014 and 2015, will raise thermal power to 3951 MWt, an increase of approximately 12.4%. Calculation PM-0546 appears to have sufficient margin, which will be validated per EPU ECRs 10-00409, 10-00478, and/or 13-00243.
>
> The nominal diameter of the WW penetration piping is 18-inches until the branch line for the HCVS, which is 16-inches nominal diameter.

The PBAPS OIP describes that the existing HCVS was designed to remove 1 percent of the rated thermal power at the time of installation (prior to the various uprates that have been approved since original installation). The OIP indicates that the HCVS has been shown to be adequately sized for a plant rating of 3514 Megawatts-thermal (MWt) with flow margins of 42-45 percent. For the most recent plant uprate (to 3951 MWt – approximately 12.4 percent higher than the analysis of record as of the date of the licensee's OIP submission), the licensee still needs to provide an updated analysis showing acceptable vent sizing results regarding the capability to vent 1 percent of the current uprated thermal power; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit analyses demonstrating that the HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.

3.2.2.2 Vent Capacity

Order EA-13-109, Section 1.2.1, states that:

> 1.2.1 The HCVS shall have the capacity to vent the steam/energy equivalent of one (1) percent of licensed/rated thermal power (unless a lower value is justified by analyses), and be able to restore and then maintain containment pressure below the primary containment design pressure and the primary containment pressure limit.

Page 11 of the OIP states the following:

> The PBAPS WW pressure suppression capacity is sufficient to absorb the decay heat generated beyond the first 8 to 10 hours, by which time decay heat is well below 1 % thermal power. The vent is not needed in this initial period to prevent containment pressure from increasing above the containment design pressure. PBAPS has used the Modular Accident Analysis Program (MAAP) to support its FLEX /HCVS strategy. PB-MISC-010 lists three cases applicable to the 16" WW

vents at PBAPS:

Case 1: RPV [reactor pressure vessel] rapid cooldown to 500 psig then 80° F/hr cooldown with SRVs to 125 psig; WW vent opened when torus pressure exceeds 60 psig.

Case 7: RPV 80° F/hr cooldown with SRVs to 125 psig starting at t = 20 min; WW vent opened when torus pressure exceeds 60 psig.

Case 10: RPV 80° F/hr cooldown with SRVs to 200 psig starting at t = 20 min; WW vent opened when torus temperature exceeds 200° F.

For the three cases, Case 7 is bounding for containment pressure. There is sufficient capacity such that the WW vent can remain closed for greater than 10 hours and containment pressure would still not exceed containment design pressure.

PBAPS Calculation PM-0428, Primary Containment Conditions during Station Blackout [SBO], makes assumptions that are slightly different from the MAAP runs, but its conclusion is similar: containment pressure is approximately 44 psig after 8 hours, lower than containment design pressure of 56 psig. The calculation result is very comparable to the MAAP pressure value graph at T = 8 hours.

PBAPS Vendor Document G-080-VC-314, PBAPS Units 2 and 3 - GE SIL 636 Evaluation Project - Containment Response During SBO Event, results in a peak containment airspace pressure of 46 psig during an 8 hour coping period, which is comparable to both the PM-0546 and the MAAP runs.

The three independent analytical methods yield similar results, and affirm that suppression pool capacity is sufficient to absorb decay heat generated during the first three hours.

The PBAPS OIP cites three independent analyses that appear to affirm that that the suppression pool has sufficient capacity to absorb the decay heat generated following shutdown without the need for venting prior to the decay heat diminishing to 1 percent. Validation that the suppression pool and vent have sufficient capacity to restore and then maintain containment pressure below the primary containment design pressure and the primary containment pressure limit following power uprates is not available at this time; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.

3.2.2.3 Vent Path and Discharge

Order EA-13-109, Sections 1.1.4 and 1.2.2, states that:

> 1.1.4 The HCVS controls and indications shall be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of ac power, and inadequate containment cooling.
>
> 1.2.2 The HCVS shall discharge the effluent to a release point above main plant structures.

Page 12 of the OIP states the following:

> The current PBAPS HCVS vent path consists of a WW vent on each unit. The flow path starting at the second PCIV is dedicated to the HCVS and there is no sharing of any component with the other unit. The only interconnected system is the SGTS [standby gas treatment system] which is isolated by a PCIV. The WW vent is routed horizontally above the top of the torus, exits the torus room roof (secondary containment) at 135' [135 feet], and then runs vertically on the outside of the RB to a point above the top of the RB. The vertical run is on the west side of the RB.
>
> The HCVS discharge point is above any building in the PBAPS protected area. The RB roof parapet is 294'. The HCVS discharge point is at 300'. The only higher structure in the protected area is the RB ventilation exhaust discharge point at 305', on the east side of the RB, approximately 150 feet away (east-west). The RB ventilation exhaust fans will not be powered during an ELAP; however, chimney effect would preclude an inward pressure gradient. The HCVS release point is away from Control Room ventilation system intake, which is below 177'. The PBAPS Main Stack is at a higher elevation, but it not in the PBAPS protected area. The HCVS discharge does not adversely impact any ventilation intake or exhaust openings, MCR [main control room] location, location of HCVS portable equipment, access routes required following an ELAP and BDBEE, or emergency response facilities.
>
> The following is provided for information purposes regarding the layout of the plant. On each unit, the HCVS vent vertically runs up the RB west side, which faces a steeply rising slope of exposed bedrock. The slope width encompasses both RBs in the North-South direction. The slope base begins at approximately elevation 135' and 70 feet west of the RB. At approximately elevation 200' and 100 feet west of the RB, the slope becomes more gradual, to approximately elevation 240' and 200 feet west of the RB; and then even more gradual to elevation 270' and 300 feet west of the RB. Above this elevation, the slope continues an even more gradual ascent. top of the slope, to the north, is PBAPS's north transmission substation. The top of the slope, including the substation, is an Owner Controlled Area. There is no other industrial facility or residence in this area. The protected area and substation are procedurally controlled against potential severe weather missiles. If forecasts are for hurricanes, or severe storms with winds in excess of 40 mph, or tornado

warnings issued for the immediate area; then trailers and staged equipment are removed from the protected area and substations, and any trailers not removed are tied down.

The RB is a Seismic Category I structure, which provides its own wind and missile protection for the portion of the WW vent inside the RB. Peach Bottom has reviewed the portion of the WW vent outside of the RB per the guidance of NEI 12-06 as endorsed by JLD-ISG-12-001 for Order EA-12- 049 and concluded that reasonable protection from tornado wind and tornado missiles is provided. The existing piping, external to the RB is designed for tornado wind speed of 300 mph vs. FLEX Overall Integrated Plan peak tornado wind speed of 165 mph. Therefore, tornado wind loading is not a concern.

For tornado missiles, per NEI 12-06 section 7.3, tornados travel from the West or West Southwesterly direction. NEI 12-06 section 7.3 requires either 1) tornado missile protection for a single FLEX Equipment Storage Building; or 2) multiple (diverse) unprotected FLEX Equipment Storage Buildings that are axially separated in the North-South direction. The PBAPS DG [diesel generator] Building is a Seismic Category I structure, protected against tornado missiles. The PBAPS DG Building and the WW vents are axially separated in the North-South direction, by a distance of approximately 300 feet for the U2 WW vent and 600 feet for the U3 WW vent. The corridor between the RB and the bedrock slope is approximately 70 feet wide in the due north-south direction.

The reasonable protection guidance of NEI 12-06, afforded by this North-South separation, is applicable to the tornado missile-protected DG Building and the WW vents. Per NEI 12-06 guidance, it is unreasonable that tornado missiles could impact an unprotected FLEX Storage Building and then travel north-south to impact a second FLEX Storage Building. By similarity, it is unreasonable that tornado missiles could impact the protected DG Building to initiate the ELAP, and then travel due north to impact a seismically supported WW vent. Therefore, the existing PBAPS WW vents are partially within a Seismic Category I structure and otherwise are reasonably protected against potential tornado missiles.

The PBAPS OIP describes the routing and discharge point of the HCVS that appear consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02, with two exceptions: (1) The HCVS discharge point, at 5 feet below the release point of the reactor building ventilation discharge is not in accordance with Order EA-13-109, Section 1.2.2, and, (2) Tornado missile protection for HCVS is not in accordance with the NEI guidance for the HCVS. Details not available at this time include: the environmental and radiological effects on HCVS controls and indications and on the personnel controlling and monitoring HCVS during ELAP or severe accident conditions, details of reactor building ventilation to support the licensee justification for the HVAC release point being 5 feet below and 150 feet from the reactor building ventilation release point, and sufficient justification for deviating from the HCVS tornado protection standards provided in the guidance; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

Open Item: Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.

Open Item: Make available for NRC staff audit descriptions or diagrams of reactor building ventilation including exhaust dampers failure modes to support the licensee justification for the HVAC release point being 5 feet below and 150 feet from the reactor building ventilation release point.

Open Item: Make available for NRC staff audit details to justify the deviation from the tornado protection standards provided in NEI 13-02 or make available a description of how the HCVS will comply with the tornado protection standards provided in NEI 13-02.

3.2.2.4 Power and Pneumatic Supply Sources

Order EA-13-109, Sections 1.2.5 and 1.2.6, state that:

> 1.2.5 The HCVS shall, in addition to meeting the requirements of 1.2.4, be capable of manual operation (e.g., reach-rod with hand wheel or manual operation of pneumatic supply valves from a shielded location), which is accessible to plant operators during sustained operations.
>
> 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of ac power.

Page 13 of the OIP states the following:

> The electrical circuit for the existing HCVS PCIVs is powered from the Station IE battery that will be maintained by the FLEX generator. Electrical power required for operation of HCVS components will be from a dedicated HCVS DC [direct current] battery source with permanently installed capacity for the first 24 hours and design provisions for recharging to maintain sustained operation. The design will allow repowering this circuit from the HCVS in the unlikely case that the FLEX generator fails to maintain the Station 1 E battery charged.
>
> Motive (pneumatic) power to the HCVS valves will be provided by the SGIG [Safety Grade Instrument Gas]. This is an existing safety grade system located within a Seismic Class I structure. The initial stored motive power will allow for a

minimum of 12 vent cycles for the HCVS valves for the first 24 hours. The 12 vent cycles is defined as initially opening all valves in the WW flow path, and then shutting and reopening one of the valves in the flow paths 11 times. PBAPS Calculation PM-0375 shows the SGIG tank has sufficient supply to meet HCVS opening and closing cycles.

1. The HCVS flow path valves are air-operated valves (AOV) with air-to-open and spring-to-shut. Opening the valves from the HCVS control panel located in the MCR requires energizing DC powered SVs [safety valves] and Instrument Air or SGIG pneumatic supply.

2. An assessment of temperature and radiological conditions will be performed to ensure that operating personnel can safely access and operate controls at the ROS [Remote Operating Station] based on time constraints listed in Attachment 2 of the OIP.

3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (i.e., DC power and motive force [pressurized N2]) will be located in areas reasonably protected from defined hazards listed in Part 1 [of the OIP].

4. All valves required to open the flow path will be designed for remote manual operation following an ELAP, such that the primary means of valve manipulation does not rely on use of a handwheel, reach-rod or similar means that requires close proximity to the valve (FAQ HCVS-03). The preferred method is opening from the MCR through the control switch that energizes the AOVs' SVs. The back-up method is from the ROS by repositioning valves on the pneumatic line; this allows opening and closing of a valve from the ROS without reliance on any electrical power or control circuit. Accessibility to the ROS will be verified during the detailed design.

5. Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards listed in Part 1 of this OIP.

6. Access to the locations described above will not require temporary ladders or scaffolding.

The PBAPS OIP contains system feature descriptions such as a dedicated battery and a method to operate HCVS valves without reliance on electrical power that appear to make the system reliable consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02. Design details not available at this time includes: documentation of an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment, and the final sizing for HCVS battery/battery charger including documentation of incorporating HCVS electrical sources into the FLEX DG loading calculations; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

3.2.2.5 Location of Control Panels

Order EA-13-109, Sections 1.1.1, 1.1.2, 1.1.3, and 1.1.4 state that:

> 1.1.1 The HCVS shall be designed to minimize the reliance on operator actions.
>
> 1.1.2 The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system.
>
> 1.1.3 The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response.
>
> 1.1.4 The HCVS controls and indications shall be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of ac power, and inadequate containment cooling.

Order EA-13-109, Sections 1.2.4 and 1.2.5 state that:

> 1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.
>
> 1.2.5 The HCVS shall, in addition to meeting the requirements of 1.2.4, be capable of manual operation (e.g., reach-rod with hand wheel or manual operation of pneumatic supply valves from a shielded location), which is accessible to plant operators during sustained operations.

Page 14 of the OIP states the following:

> The HCVS design allows initiating and then operating and monitoring the HCVS from the MCR and in addition, opening valves from the ROS in case of a DC circuit failure. The tentative location for the ROS is the Cooling Water Equipment Room on RB elevation 116' (Unit 2 Room 105 and Unit 3 Room 162). The MCR location is protected from adverse natural phenomena and the normal control point for Plant Emergency Response actions. The ROS will be evaluated to ensure acceptable temperature and dose consequences.

The PBAPS OIP describes HCVS control locations that appear to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: documentation that demonstrates adequate communication between remote HCVS operation locations and HCVS operational decision makers, evaluations of the environmental and radiological effects on HCVS controls and indications, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.

Open Item: Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.2.6 Hydrogen

Order EA-13-109, Sections 1.2.10, 1.2.11, and 1.2.12 state that:

> 1.2.10 The HCVS shall be designed to withstand and remain functional during severe accident conditions, including containment pressure, temperature, and radiation while venting steam, hydrogen, and other non-condensable gases and aerosols. The design is not required to exceed the current capability of the limiting containment components.
>
> 1.2.11 The HCVS shall be designed and operated to ensure the flammability limits of gases passing through the system are not reached; otherwise, the system shall be designed to withstand dynamic loading resulting from hydrogen deflagration and detonation.
>
> 1.2.12 The HCVS shall be designed to minimize the potential for hydrogen gas migration and ingress into the reactor building or other buildings.

Page 15 of the OIP states the following:

> Order EA-13-109, Section 1.2.11, requires that the HCVS must be designed such that it is able to either provide assurance that oxygen cannot enter and mix with flammable gas in the HCVS (so as to form a combustible gas mixture), or it must be able to accommodate the dynamic loading resulting from a combustible gas

detonation. Several configurations are available which will support the former (e.g., purge, mechanical isolation from outside air, etc.) or the latter (design of potentially affected portions of the system to withstand a detonation relative to pipe stress and support structures).

PBAPS will determine the approach or combination of approaches the plant will take to address the combustible gas mixture. PBAPS intends to follow the guidance in HCVS-WP-03, Hydrogen/CO Control Measures [Reference: ADAMS Accession No. ML14302A066].

A description of the final design for hydrogen control is not available at this time including a description of the final design of the HCVS to address hydrogen detonation and deflagration (licensee identified) and a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings; therefore, the staff has not completed its review.

Open Item: Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.

Open Item: Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.

3.2.2.7 Unintended Cross Flow of Vented Fluids

Order EA-13-109, Sections 1.2.3 and 1.2.12, states that:

1.2.3 The HCVS shall include design features to minimize unintended cross flow of vented fluids within a unit and between units on the site.

1.2.12 The HCVS shall be designed to minimize the potential for hydrogen gas migration and ingress into the reactor building or other buildings.

Page 15 of the OIP states the following:

Although the existing wetwell HCVS at each Peach Bottom unit has a containment penetration that is shared with the SGTS, the SGTS is isolated by its PCIV. The HCVS flow path does not have any other connected systems and does not share any flow path with the opposite unit. The discharge from each unit is routed above each unit's RB roof. The HCVS discharge points, from unit to unit, are separated by approximately 300 feet in the North-South direction.

The PBAPS OIP describes design features that appear to limit the potential for unintended cross flow within a unit to only the SGTS, isolated from HCVS by a PCIV. A description of specific design details including: (1) details that ensure the SGTS PCIV will limit unintended cross flow during ELAP and severe accident conditions, and (2) a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings, are not available at this time; therefore, the staff has not completed its review.

Open Item: Make available for NRC audit documentation confirming that HCVS will remain isolated from the standby gas treatment system during ELAP and severe accident conditions.

Open Item: Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.

3.2.2.8 Prevention of Inadvertent Actuation

Order EA-13-109, Section 1.2.7 states that:

> 1.2.7 The HCVS shall include means to prevent inadvertent actuation.

Page 15 of the OIP states the following:

> EOP/ERG [emergency operating procedure/emergency response guideline] operating procedures provide clear guidance that the HCVS is not to be used to defeat containment integrity during any design basis transient or accident. In addition, the HCVS is designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error such that any credited containment accident pressure (CAP) that would provide net positive suction head to the emergency core cooling system (ECCS) pumps will be available, inclusive of a design basis loss-of-coolant accident (DBLOCA). However the ECCS pumps will not have power available because of the starting boundary conditions of an ELAP. Note that PBAPS currently does credit CAP for operation of Residual Heat Removal (RHR) and Core Spray (CS) pumps during a variety of events, which are bounded by a DBLOCA. However, post-EPU modifications, CAP credit for RHR and CS will be completely eliminated. There is no CAP credit for operation of the HPCI [high pressure coolant injection]or the RCIC pumps. However, PB procedure T-102 sheet 3 provides RCIC pump NPSH [net positive suction head] limits at elevated torus temperature and pressure.
>
> The features that prevent inadvertent actuation are two PCIVs in series, procedural controls, key-lock switches, and circuits with fuses removed. In addition, a downstream rupture disc exists in the current configuration, and is provided to maintain secondary containment under design basis events. PBAPS is evaluating the option of retaining the rupture disc or replacing it with a Secondary Containment Isolation Valve (SCIV). The downstream PCIV and the rupture disc/SCIV are dedicated to the HCVS. All PCIVs and the SCIV are fail-shut AOVs. They are air to open, spring to shut AOVs that require energizing a SV to allow the motive air to open the valve. Current PBAPS design features and procedural controls that prevent inadvertent venting will be maintained.

Similar design features (and procedural controls) will be incorporated at the ROS to prevent inadvertent venting from that location.

The PBAPS OIP provides a description of methods to prevent inadvertent HCVS initiation that includes: key lock switches, circuits with fuses removed, and procedural controls. This appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

3.2.2.9 Component Qualifications

Order EA-13-109, Section 2.1, states that:

> 2.1 The HCVS vent path up to and including the second containment isolation barrier shall be designed consistent with the design basis of the plant. Items in this path include piping, piping supports, containment isolation valves, containment isolation valve actuators and containment isolation valve position indication components.

Page 16 of the OIP states the following:

> HCVS components up to the secondary containment pressure boundary are safety-related. The containment system limits the leakage or release of radioactive materials to the environment to prevent offsite exposures from exceeding the guidelines of 10 CFR 100. During normal or design basis operations, secondary containment is the pressure boundary to prevent release of radioactive material. HCVS components outside of the RB secondary containment pressure boundary (i.e., outside the RB) are not required to be safety-related.
>
> Except for the existing PCIV s, the other HCVS components will be powered from a normally de-energized, dedicated power supply that will not be safety-related but will be Augmented Quality. However, any HCVS electrical or controls component that interfaces with Class IE power sources will be considered safety-related up to and including appropriate isolation devices such as fuses or breakers, as their failure could adversely impact a safety-related power source. Electrical and controls components will have the ability to handle harsh environmental conditions, although they will not be considered part of the site Environmental Qualification (EQ) program. Unless otherwise required to be safety-related, Augmented Quality requirements will be applied to the components installed in response to this Order.
>
> HCVS instrumentation performance (e.g., accuracy and precision) need not exceed that of similar plant installed equipment. Additionally, radiation monitoring instrumentation accuracy and range will be sufficient to confirm flow of radionuclides through the HCVS. The HCVS instruments, including valve position indication, process instrumentation, radiation monitoring, and support system monitoring, will be qualified by using one or more of the three methods described in the ISG, which include:

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO 9001) where the procurement specifications include the applicable seismic requirements, design requirements, and applicable testing.

2. Demonstration of seismic reliability via methods that predict performance described in IEEE [Institute of Electrical and Electronics Engineers]344-2004

3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

Instrument	**Qualification Method***
HCVS Process Temperature	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Pressure	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Radiation Monitor	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Valve Position	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Pneumatic Supply Pressure	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Electrical Power Supply Availability	ISO9001 / IEEE 344-2004 / Demonstration

* The specific qualification method(s) used for each required HCVS instrument will be reported in future 6 month status reports.

The PBAPS OIP describes component qualification methods that appear to be consistent with the design basis of the plant and the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: information regarding specific containment instrumentation, which will be used by operators to make containment venting decisions, descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions, and design details that confirm existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting; therefore, the NRC staff has not completed its review.

Open Item: Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.

Open Item: Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.

Open Item: Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.

3.2.2.10 Monitoring of HCVS

Order EA-13-109, Sections 1.1.4, 1.2.8, and 1.2.9, state that:

1.1.4 The HCVS controls and indications shall be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of AC power, and inadequate containment cooling.

1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of ac power.

1.2.9 The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of ac power.

Page 17 of the OIP states the following:

The PBAPS WW HCVS will be capable of being remote-manually operated during sustained operations from a control panel located in the MCR and will meet the requirements of Order element 1.2.4. The MCR is a readily accessible location with no further evaluation required. Additionally, to meet the intent for a secondary control location of section 1.2.5 of the Order, a readily accessible ROS will also be incorporated into the HCVS design as described in NEI 13-02 section 4.2.2.1.2.1. The controls and indications at the ROS location will be accessible and functional under a range of plant conditions, including SA [severe accident] conditions with due consideration to source term and dose impact on operator exposure, ELAP, and inadequate containment cooling. An evaluation will be performed to determine accessibility to the location, habitability, staffing sufficiency, and communication capability with Vent-use decision makers.

The WW HCVS will include means to monitor the status of the vent system in the MCR and to monitor DC power and N2 pressure at the MCR or ROS. The existing design for the HCVS includes control switches in the MCR with valve position indication. The new HCVS controls will meet the environmental and seismic requirements of the Order for the SA with an ELAP. The ability to open/close these valves multiple times during the event's first 24 hours will be provided by the SGIG and DC power. Beyond the first 24 hours, the ability to maintain these valves open or closed will be maintained by sustaining the motive air and DC power.

The WW HCVS will include indications for vent pipe pressure, valve position, temperature, and effluent radiation levels at the MCR. Other important information on the status of supporting systems (i.e., DC power source status and pneumatic supply pressure) will also be included in the design and located to support HCVS operation.

The design will rely on existing containment pressure and WW level indication in the MCR to monitor containment parameters. This monitoring instrumentation provides the indication from the MCR as per Requirement 1.2.4. This instrumentation is not required to validate HCVS function and is therefore not powered from the dedicated HCVS batteries. However, these instruments are expected to be available since the FLEX DG supplies the station battery charger for these instruments and will be installed prior to depletion of the station batteries.

The PBAPS OIP provides a description of HCVS monitoring and control that appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: descriptions of all instrumentation and controls (existing and planned) including qualification methods, evaluations of the environmental and radiological effects on HCVS controls and indications, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.

Open Item: Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.2.11 Component Reliable and Rugged Performance

Order EA-13-109, Section 2.2, states that:

> 2.2 All other HCVS components shall be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. These items include electrical power supply, valve actuator pneumatic supply and instrumentation (local and remote) components.

Page 18 of the OIP states the following:

> The HCVS components and components that interface with the HCVS are routed in seismically qualified structures. Newly installed piping and valves will be seismically qualified to handle the forces associated with the PBAPS Safe Shutdown Earthquake (SSE) back to their isolation boundaries. New electrical and controls components will be seismically qualified.
>
> The HCVS downstream of the second containment isolation valve, including piping and supports, electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) components, will be designed/analyzed to conform to the requirements consistent with the applicable design codes (e.g., Non-safety, Seismic Category 1, B31.1) for the plant and to ensure functionality following a design basis earthquake.
>
> Additional modifications required to meet the Order will provide reliability at the postulated vent pipe conditions (temperature, pressure, and radiation levels). The instrumentation/power supplies/cables/connections (components) will be qualified for temperature, pressure, radiation level, total integrated radiation dose appropriate for that location (e.g., near the effluent vent pipe or at the HCVS ROS location).
>
> Conduit and cable trays will be installed to the applicable Seismic Class 1 criteria.
>
> If the instruments are purchased as commercial-grade equipment, they will be qualified to operate in the SA environment as required by NRC Order EA-13-109 and the guidance of NEI 13-02. The equipment will be qualified seismically, environmentally (IEEE 323-1974), and for electro-magnetic compatibility.
>
> For the dedicated HCVS instruments required after a potential seismic event, the following methods will be used to verify that the design and installation is reliable / rugged and thus capable of ensuring HCVS functionality following a seismic event. Applicable instruments are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated SA conditions in the area of instrument component use using one or more of the following methods:

- demonstration of seismic motion will be consistent with that of existing design basis loads at the installed location;

- substantial history of operational reliability in environments with significant vibration with a design envelope inclusive of the effects of seismic motion imparted to the instruments proposed at the location;

- adequacy of seismic design and installation is demonstrated based on the guidance in IEEE Standard 344, IEEE Recommended Practice for Seismic Qualification of Class 1 E Equipment for Nuclear Power Generating Stations, or a substantially similar industrial standard;

- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or

- seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

The PBAPS OIP provides descriptions for component reliable and rugged performance that appear to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. As discussed in section 3.2.2.3 of this ISE, PBAPS described tornado missile protection for the HCVS that is not in accordance with the applicable NEI guidance and provided a justification that will require further review.

3.2.3 Beyond-Design-Basis External Event Venting

3.2.3.1 First 24-Hour Coping

Order EA-13-109, Section 1.2.6, states that:

> 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of AC power.

Page 20 of the OIP states the following:

> The operation of the HCVS will be designed to minimize the reliance on operator actions for response to an ELAP and BDBEE hazards identified in Part 1 of this OIP. Immediate operator actions can be completed by Operators from the HCVS control stations, and include remote-manual initiation. The operator actions required to open a vent path are as described in Table 2-1 of the OIP.
>
> Remote-manual is defined in this report as a non-automatic power operation of a component that does not require the operator to be at or in close proximity to the

component. No other operator actions are required to initiate venting under the guiding procedural protocol.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR. This location minimizes plant operators' exposure to adverse temperature and radiological conditions and is protected from hazards assumed in Part 1 of the OIP.

Permanently installed and dedicated power capability will be available to support operation and monitoring of the HCVS for the first 24 hours.

System control:

i. Active: The HCVS will be procedurally operated to control containment pressure. The HCVS will be designed for 12 vent cycles under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted under new and revised guidelines and/or procedures.

ii. Passive: Inadvertent actuation protection is provided by:
A key lock switch for the dedicated downstream PCIV located in the MCR, locked controls at the ROS, and controlled by procedures, AND

Disabling the HCVS DC power to the SV and disabling the motive power (pressurized N2) for the dedicated PCIV except when required by procedures to initiate containment venting.

The PBAPS OIP describes a first 24 hour BDBEE coping strategy that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. The licensee has identified an open item to provide guidelines and procedures for HCVS operation. Other details not available at this time include the final sizing evaluation for the HCVS batteries/battery charger, including incorporation into FLEX DG loading calculation; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit guidelines and procedures for HCVS operation.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

3.2.3.2 Greater Than 24-Hour Coping

Order EA-13-109, Section 1.2.4, states that:

1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.

Page 21 of the OIP states the following:

> Before the end of the 24 hours initial phase, available personnel will be able to sustain HCVS operation. Connections for supplementing electrical power required for HCVS will be located in accessible areas with reasonable protection per NEI 12-06 that minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections will be pre-engineered quick disconnects to minimize manpower resources.
>
> FLEX is credited to sustain power for a BDBEE ELAP to containment instruments used to monitor the containment (e.g., pressure and WW level). It will also provide the preferred power to the PCIV circuit. The response to NRC Order EA-12-049 will demonstrate the capability for FLEX efforts to maintain the power source. The dedicated HCVS power source will be available as a back-up.
>
> These actions provide long term support for HCVS operation for the period beyond 24 hours to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the units to provide needed action and supplies.

The PBAPS OIP describes a greater than 24 hour BDBEE coping strategy, that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include the final sizing evaluation for the HCVS batteries/battery charger, including incorporation into FLEX DG loading calculation; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

3.2.4 Severe Accident Event Venting

3.2.4.1 First 24 Hour Coping

Order EA-13-109, Section 1.2.6, states that:

> 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of AC power.

Page 23 of the OIP states the following:

> The operation of the HCVS will be designed to minimize the reliance on operator actions for response to an ELAP and SA. SA assumes that specific core cooling actions from the FLEX strategies identified in the response to Order EA-12-049 were not successfully initiated. Access to portions of the RB, including the torus room, will be restricted as determined by the RPV water level and core damage

conditions. Immediate actions will be completed by Operators in the MCR and will include remote-manual actions. The ROS provides back-up capability to open HCVS valves in case of a valve circuit or SV failure. The operator actions required to open a vent path were previously listed in the BDBEE Venting Part 2 section [of the OIP] (Table 2-1).

Permanently installed power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Specifics are the same as for BDBEE Venting Part 2.

System control:

i. Active: Same as for Part 2 BDBEE Venting.

ii. Passive: Same as for Part 2 BDBEE Venting.

The PBAPS OIP describes a first 24 hour severe accident coping strategy that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.4.2 Greater Than 24 Hour Coping

Order EA-13-109, Sections 1.2.4, and 1.2.8, states that:

1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.

1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of ac power.

Page 24 of the OIP states the following:

> Specifics are the same as for Part 2 BDBEE Venting. PBAPS FLEX strategy assumes the ability to cope for as long as required (in FLEX Phase 2, reliance on on-site portable equipment) using FLEX equipment.

The PBAPS OIP describes greater than 24 hour severe accident coping strategy that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.5 Support Equipment Functions

3.2.5.1 BDBEE

Order EA-13-109, Sections 1.2.8 and 1.2.9, state that:

> 1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of ac power.
>
> 1.2.9 The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of ac power.

Page 25 of the OIP states the following:

> All containment venting functions will be performed from the MCR or ROS.
>
> Venting to prevent containment over-pressurization will be maintained by permanently installed equipment. The HCVS dedicated DC power source is adequate for the first 24 hours, but it can be replenished to support sustained operation.

> Existing safety related station batteries will provide sufficient electrical power for MCR containment instrumentation and the existing PCIV circuits for greater than 5.5 hours. Before station batteries are depleted, portable FLEX diesel generators, as detailed in the response to Order EA-12-049, will be credited to charge the station batteries and maintain DC bus voltage after 5.0 hours.

The PBAPS OIP describes BDBEE supporting equipment functions that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

3.2.5.2 Severe Accident Venting

Order EA-13-109, Sections 1.2.8 and 1.2.9, state that:

> 1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of ac power.
>
> 1.2.9 The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of ac power.

Page 25 of the OIP states the following:

> The same support functions that are used in the BDBEE scenario would be used for SA venting. The ROS (the location of the HCVS DC power source and motive force) will be evaluated to confirm accessibility under SA conditions.

The PBAPS OIP describes support equipment functions for severe accident venting that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include the final sizing evaluation for HCVS batteries/battery charger, including incorporation into FLEX DG loading calculation and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.6 Venting Portable Equipment Deployment

Order EA-13-109, Section 3.1, states that:

> 3.1 The licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during an extended loss of AC power.

Page 27 of the OIP states the following:

> Deployment pathways developed for compliance with Order EA-12-049 are acceptable without further evaluation needed except in areas around the RB or in the vicinity of the HCVS piping.
>
> Before the end of the initial 24-hour period, replenishment of the HCVS dedicated DC power will occur at the ROS. The selection of the ROS location will take into account the SA temperature and radiation condition to ensure access to the ROS is maintained. The design will allow replenishment with minimal actions.

The PBAPS OIP describes venting portable equipment that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

3.2.7 NRC Summary of Boundary Conditions for Wetwell Vent

The licensee's approach to Boundary Conditions for Wetwell Vent, if implemented as described in Section 3.2, and assuming acceptable resolution of any open items identified here or as a result of licensee alterations to their proposed plans, appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109.

3.3 BOUNDARY CONDITIONS FOR DRYWELL VENT

The Drywell Vent will be evaluated during Phase 2 of Order EA-13-109. Interim Staff Guidance for Phase 2 will be provided by April 30, 2015. Licensees will submit an updated OIP to address Phase 2 of Order EA-13-109 by December 31, 2015.

3.4 PROGRAMMATIC CONTROLS, TRAINING, DRILLS AND MAINTENANCE

3.4.1 Programmatic Controls

Order EA-13-109, Sections 3.1 and 3.2, state that:

> 3.1 The licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during an extended loss of ac power.
>
> 3.2 The licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during an extended loss of ac power.

Page 30 of the OIP states the following:

> <u>Program Controls:</u>
>
> The HCVS venting actions will include:
>
> - Site procedures and programs are being developed in accordance with NEI 13-02 to address use and storage of portable equipment relative to the Severe Accident defined in NRC Order EA-13-109 and the hazards applicable to the site per Part 1 of the OIP.
> - Routes for transporting portable equipment from storage location(s) to deployment areas will be developed as the response details are identified and finalized. The identified paths and deployment areas will be accessible during all modes of operation and during severe accidents.

Procedures:

Procedures will be established for system operations when normal and backup power is available, and during ELAP conditions.

The HCVS procedures will be developed and implemented following the plant's process for initiating or revising procedures and contain the following details:

- appropriate conditions and criteria for use of the HCVS
- when and how to place the HCVS in operation
- the location of system components
- instrumentation available
- normal and backup power supplies
- directions for sustained operation, including the storage location of portable equipment
- training on operating the portable equipment, and
- testing of portable equipment

PBAPS currently does credit CAP for its Residual Heat Removal (RHR) and Core Spray (CS) pumps for a variety of events, bounded by a DBLOCA. However, post-EPU modifications implementation, CAP credit for RHR and CS will be completely eliminated. There is no CAP credit for operation of the HPCI or the RCIC pumps. However, PB procedure T-102 sheet 3 provides RCIC pump NPSH limits at elevated torus temperature and pressure.

PBAPS will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in a PBAPS specific controlling document.

The provisions for out-of-service requirements for HCVS functionality are applicable in Modes 1, 2 and 3.

- If for up to 90 consecutive days, the primary or alternate means of HCVS operation are nonfunctional, no compensatory actions are necessary.
- If for up to 30 days, the primary and alternate means of HCVS operation are non-functional, no compensatory actions are necessary.
- If the out of service times exceed 30 or 90 days as described above, the following actions will be performed:
    - The condition will entered into the corrective action system,
    - The HCVS functionality will be restored in a manner consistent with plant procedures,
    - A cause assessment will be performed to prevent future loss of function for similar causes,
    - Initiate action to implement appropriate compensatory actions.

The PBAPS OIP describes programmatic controls that appear to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. The NRC staff determined that procedure development appears to be in accordance with existing industry protocols. The provisions for out-of-service requirements appear to reflect consideration of the probability of an ELAP requiring severe accident venting and the consequences of a failure to vent under such conditions. The licensee identified the need to develop the site specific controlling document for HCVS out of service and compensatory measures; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the site specific controlling document for HCVS out of service and compensatory measures.

3.4.2 Training

Order EA-13-109, Section 3.2, states that:

> 3.2 The licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during an extended loss of ac power.

Page 31 of the OIP states the following:

> Personnel expected to perform direct execution of the HCVS will receive necessary training in the use of plant procedures for system operations when normal and backup power is available and during ELAP conditions. The training will be refreshed on a periodic basis and as any changes occur to the HCVS. Training content and frequency will be established using the Systematic Approach to Training process.
>
> In addition, (reference NEI 12-06) all personnel on-site will be available to supplement trained personnel [applies only to FLEX].

The PBAPS OIP describes HCVS training requirements that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. The systematic approach to training process has been accepted by the NRC as appropriate for developing training for nuclear plant personnel.

3.4.3 Drills

Order EA-13-109, Section 3.1, states that:

> 3.1 The licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during an extended loss of ac power.

Page 32 of the OIP states the following:

> PBAPS will utilize the guidance provided in NEI 13-06 and 14-01 for guidance related to drills, tabletops, or exercises for HCVS operation. In addition, PBAPS will integrate these requirements with compliance to any rulemaking resulting

from the NTTF Recommendations 8 and 9.

The PBAPS OIP describes an approach to drills that appear to be in accordance with NEI 13-06, “Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents” and Events and NEI 14-01, “Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents.” This approach appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

3.4.4 Maintenance

Order EA-13-109, Section 1.2.13, states that:

> 1.2.13 The HCVS shall include features and provisions for the operation, testing, inspection and maintenance adequate to ensure that reliable function and capability are maintained.

Page 32 of the OIP states the following:

> PBAPS will utilize the standard EPRI [Electric Power Research Institute] industry PM process (similar to the Preventive Maintenance Basis Database) for establishing the maintenance calibration and testing actions for HCVS components. The control program will include maintenance guidance, testing procedures and frequencies established based on type of equipment and considerations made within the EPRI guidelines.
>
> PBAPS will implement the following operation, testing and inspection requirements for the HCVS to ensure reliable operation of the system.

Table 4-1 [of the OIP]: Testing and Inspection Requirements

Description	**Frequency**
Cycle the HCVS valves and the interfacing system valves not used to maintain containment integrity during operations.	Once per operating cycle
Perform visual inspections and a walk down of HCVS components.	Once per operating cycle
Test and calibrate the HCVS radiation monitors.	Once per operating cycle
Leak test the HCVS.	(1) Prior to first declaring the system functional; (2) Once every three operating cycles thereafter; and (3) Post-maintenance test after restoration of any breach of system boundary within the buildings

Validate the HCVS operating procedures by conducting an open/close test of the HCVS control logic from its control panel and ensuring that all interfacing system valves move to their proper (intended) positions.	Once per every other operating cycle

The PBAPS OIP describes an approach to maintenance that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

The licensee's approach to Programmatic Controls, Training, Drills, and Maintenance, if implemented as described, appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109.

4.0 OPEN ITEMS

This section contains a summary of the open items identified to date as part of the technical evaluation. Open items, whether NRC or licensee identified, are topics for which there is insufficient information to fully resolve the issue, for which the NRC staff requires clarification to ensure the issue is on a path to resolution, or for which the actions to resolve the issue are not yet complete. The intent behind designating an issue as an open item is to highlight items that the staff intends to review further. The NRC staff has reviewed the licensee OIP for consistency with NRC policy and technical accuracy. NRC and licensee identified open items have been identified in Section 3.0 and are listed in the table below.

List of Open items

Open Item	Action	Comment
1.	Make available for NRC staff audit guidelines and procedures for HCVS operation.	Section 3.2.3.1
2.	Make available for NRC staff audit the site specific controlling document for HCVS out of service and compensatory measures.	Section 3.4.1
3.	Make available for NRC staff audit a technical justification for the use of jumpers in the HCVS strategy.	Section 3.1.3
4.	Make available for NRC staff audit analyses demonstrating that the HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.	Section 3.2.2.1 Section 3.2.2.2

5.	Make available for NRC staff audit descriptions or diagrams of reactor building ventilation including exhaust dampers failure modes to support the licensee justification for the HVAC release point being below and 150 feet from the reactor building ventilation release point.	Section 3.2.2.3
6.	Make available for NRC staff audit details to justify the deviation from the tornado protection standards provided in NEI 13-02 or make available a description of how the HCVS will comply with the tornado protection standards provided in NEI 13-02.	Section 3.2.2.3
7.	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	Section 3.2.2.5
8.	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Section 3.2.2.6
9.	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Section 3.2.1 Section 3.2.2.3 Section 3.2.2.4 Section 3.2.2.5 Section 3.2.2.10 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.2 Section 3.2.6
10.	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Section 3.2.2.9 Section 3.2.2.10
11.	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6
12.	Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Section 3.2.2.3 Section 3.2.2.5 Section 3.2.2.9 Section 3.2.2.10
13.	Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.	Section 3.2.2.9

14.	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	Section 3.2.2.6 Section 3.2.2.7
15.	Make available for NRC audit documentation confirming that HCVS will remain isolated from the standby gas treatment system during ELAP and severe accident conditions.	Section 3.2.2.7

5.0 SUMMARY

As required by Order EA-13-109, the licensee has provided an OIP for designing and installing Phase 1 of a severe accident capable HCVS that provides venting capability from the wetwell during severe accident conditions, using a vent path from the containment wetwell to remove decay heat, vent the containment atmosphere (including steam, hydrogen, carbon monoxide, non-condensable gases, aerosols, and fission products), and control containment pressure within acceptable limits. The OIP describes a HCVS wetwell vent designed for those accident conditions (before and after core damage) for which containment venting is relied upon to reduce the probability of containment failure, including accident sequences that result in the loss of active containment heat removal capability or ELAP.

The NRC staff finds that the licensee's OIP for Phase 1 of Order EA-13-109 describes: plan elements and assumptions; boundary conditions; provisions for programmatic controls, training, drills and maintenance; and an implementation schedule that appear consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing Phase 1 requirements of Order EA-13-109, subject to acceptable closure of the above open items.

6.0 REFERENCES

1. Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," June 6, 2013 (ADAMS Accession No. ML13143A321).

2. Letter from Exelon to NRC, Exelon's Overall Integrated Plan for Peach Bottom Atomic Power Station in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions Phase 1 (Order EA-13-109)," dated June 30, 2014 (ADAMS Accession No. ML14181A301).

3. SECY-11-0093, "The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi", (ADAMS Accession No. ML111861807).

4. SRM-SECY-11-0124, "Recommended Actions to be taken Without Delay from the Near-Term Task Force Report", (ADAMS Accession No. ML112911571).

5. SRM-SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned", (ADAMS Accession No. ML113490055).

6. SRM-SECY-11-0093, "Staff Requirements – SECY-11-0093 – Near-Term Report and Recommendations for Agency Actions following the Events in Japan," August 19, 2011 (ADAMS Accession No. ML112310021).

7. SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," February 17, 2012 (ADAMS Accession No. ML12039A103).

8. SRM-SECY-12-0025, "Staff Requirements – SECY-12-0025 - Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," March 9, 2012 (ADAMS Accession No. ML120690347).

9. Order EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents," March 9, 2012 (ADAMS Accession No. ML12054A694).

10. SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," November 26, 2012 (ADAMS Accession No. ML12325A704).

11. SRM-SECY-12-0157, "Staff Requirements - SECY-12-0157, "Consideration Of Additional Requirements For Containment Venting Systems For Boiling Water Reactors With Mark I And Mark II Containments", March 19, 2013 (ADAMS Accession No. ML13078A017).

12. NEI-13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0, November 12, 2013 (ADAMS Accession No. ML13316A853).

13. JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident conditions," November 14, 2013 (ADAMS Accession No. ML13304B836).

14. Nuclear Regulatory Commission Audits Of Licensee Responses To Phase 1 of Order EA-13-109 to Modify Licenses With Regard To Reliable Hardened Containment Vents Capable Of Operation Under Severe Accident Conditions (ADAMS Accession No. ML14126A545).

15. Order EA-12-049, "Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (ADAMS Accession No. ML12054A735).

16. Peach Bottom Atomic Power Station Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (ADAMS Accession No. ML13220A105).

17. Letter from Exelon to NRC, Exelon Overall Integrated Plan for the Peach Bottom Atomic Power Station 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 (ADAMS Accession No. ML13059A305).

18. NUREG-1935, State-of-the-Art Reactor Consequence Analyses (SOARCA) Report (ADAMS Accession No. ML12332A058).

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Sincerely,

/RA/

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Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

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