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

February 11, 2015

Mr. Peter M. Orphanos
Site Vice President – Nine Mile Point Nuclear Station
Exelon Generation Company, LLC
348 Lake Road
Oswego, New York 13126

SUBJECT: NINE MILE POINT NUCLEAR STATION UNIT 2 - INTERIM STAFF EVALUATION RELATING TO OVERALL INTEGRATED PLAN IN RESPONSE TO PHASE 1 OF ORDER EA-13-109 (SEVERE ACCIDENT CAPABLE HARDENED VENTS) (TAC NO. MF4482)

Dear Mr. Orphanos:

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 27, 2014 (ADAMS Accession No. ML14184B340), Exelon Generation Company, LLC. (Exelon) submitted its Overall Integrated Plan (OIP) for Nine Mile Point Nuclear Station, Unit 2 (NMP2) in response to Phase 1 of Order EA-13-109. By letter dated December 16, 2014 (ADAMS Accession No. ML14356A192), Exelon submitted its first six-month status report for NMP2 in response to Order EA-13-109. Any changes to the compliance method described in the OIP will be reviewed as part of the ongoing audit process.

Exelon's OIP for NMP2 appears consistent with the guidance found in Nuclear Energy Institute 13-02, Revision 0, 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. This evaluation only addressed consistency with the guidance. Any plant modifications performed will need to be conducted in accordance with plant engineering change processes and consistent with the licensing basis.

If you have any questions, please contact Charles H. 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. 50-410

Enclosure:
Interim Staff Evaluation

cc w/encl: Distribution via Listserv

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

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

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 during severe accident (SA) 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 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

[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.

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 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 27, 2014 [Reference 2], Exelon Generation Company, LLC (Exelon, the licensee) provided the OIP for Nine Mile Point Nuclear Station, Unit 2 (NMP2) 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 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 shall 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* (FR) [78 FR 70356]. Licensees are free to propose alternate 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

NMP2 is a General Electric BWR with a Mark II primary containment system. NMP2 is on a common site with Nine Mile Point Nuclear Station, Unit 1(NMP1). To Implement Phase 1 (HCVS) of Order EA-13-109, Exelon plans to utilize existing containment purge system piping from the suppression chamber. New piping will be attached to route the HCVS effluent outside the reactor building and up to a point above the reactor building roof. The OIP describes plant modifications, strategies and guidance under development for implementation by the licensee to install 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 NMP2 were evaluated in the NMP2 OIP in response to Order EA-12-049 (Mitigation Strategies) [Reference 15]. In the NMP2 ISE relating to Mitigation Strategies [Reference 16], NRC staff documented an analysis of Exelon's extreme external hazards evaluation. The following extreme external hazards screen in: Seismic, External Flooding, Tornado, Extreme Cold Temperature, Extreme High Temperature, and Ice/Snow. The following extreme external hazard screens out: Straight Wind. Based on NMP2 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 design of HCVS.

3.1.2 Assumptions

On page 5 of the NMP2 OIP, Exelon adopted a set of generic assumptions associated with Order EA-13-109 Phase 1 actions.

The staff reviewed the NMP2 plant-specific HCVS related assumptions stated below:

NMP2-1 GDC-56 Exemption Request has been approved to allow relocation of the inboard containment isolation valve from the inside of containment to outside of containment.

NMP2-2 EA-12-049 (FLEX) actions to restore power are sufficient to ensure continuous operation of non-dedicated containment instrumentation identified on page 15 of the OIP.

NMP2-3 Modifications that allow a FLEX generator to be connected to a 600 volt safety related bus are assumed to have been installed such that a FLEX generator can be credited for HCVS operation beyond the initial 24 hour sustained operational period.

In review of assumption NMP2-1, NEI 13-02, Section 4.1.2.1.1.1.1 states, "although GDC 56 stipulates that one valve should be inside containment and the other outside containment, both [primary containment isolation valves] PCIVs on each HCVS containment penetration may be installed outside containment and as close as reasonably possible to the penetration." By letter dated June 27, 2014 (ADAMS Accession No. ML14184B342), Exelon submitted a request for exemption from the requirements of 10 CFR 50, Appendix A, General Design Criterion (GDC) 56, Primary Containment Isolation for NMP2. Specifically, the exemption will modify containment isolation requirements to eliminate the need to maintain an inboard containment isolation valve (CIV) and adding a second outboard CIV to provide the redundancy needed to prevent inadvertent releases of radioactive material to the environment. As stated in the NMP2 OIP as assumption NMP2-1, the licensee assumes that the GDC-56 exemption request has been approved. However, the staff's review of the June 27, 2014, exemption request is ongoing. The vent configuration at NMP will be required to be in compliance with the approved licensing basis.

Regarding assumptions NMP2-2 and NMP2-3, the staff determined that these plant specific assumptions for NMP2 do not appear to deviate 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.

3.1.3 Compliance Timeline and Deviations

Page 4 of the OIP states the following:

> Compliance will be attained for Nine Mile Point Unit 2 (NMP2) with no known deviations to the guidelines in JLD-ISG-2013-02 and NEI 13-02 for each phase as follows:
>
> - Phase I (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 2nd quarter 2016
>
> - Phase 2: by the startup from first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. Currently scheduled for 2nd quarter 2018
>
> If deviations are identified at a later date, then the deviations will be communicated in a future 6 month update following identification.

NMP2's schedule for Phase 1 and Phase 2 of Order EA-13-109 complies with the requirements of the order without deviation. Regarding other deviations, neither Exelon nor the NRC staff identified any at this time. Therefore, the staff concludes that it appears NMP2 will attain compliance with Phase 1 of Order EA-13-109 with no known deviations from the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 an acceptable means for implementing applicable requirements of Order EA-13-109.

<u>Summary, Section 3.1:</u>

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 action in response to hazards listed in Part 1 [of the OIP]. Immediate operator actions will be completed by trained 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 Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4 [of the OIP].

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 as an acceptable means for implementing applicable requirements of Order EA-13-109. 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 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 NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. 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. The licensee identified the need to ensure the HCVS batteries as sized correctly and incorporated into the FLEX diesel generator (DG) loading calculation.

The NRC staff reviewed the discussion of radiological and temperature constraints on page 9 of the OIP and determined that Exelon considers radiological and temperature conditions at the locations identified to date where manual actions are necessary to operate HCVS. Specific evaluations of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and equipment outside the MCR are not available at this time; 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.

3.2.2 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:

> NMP2 is licensed to operate at a thermal power of 3988 MW due to a recent extended power uprate project. There are no current plans to further increase the power level.

> HCVS wetwell path is designed for venting steam/energy at a minimum capacity of 1 percent of 3988 MW thermal power at pressure of 38 psig (Open Item 2 [of the OIP]). This pressure is the lower of the containment design pressure (45 psig) and the [primary containment pressure limit] PCPL value 38 psig). This size of the wetwell portion of the HCVS is ≥ 12 inches in diameter which provides adequate capacity to meet or exceed the order criteria.

The NMP2 OIP describes installation of a new vent sized to meet or exceed 1 percent or greater current licensed thermal power. The licensee has identified an open item to perform a final vent path calculation for the HCVS piping confirming 1 percent minimum capacity. In addition to the licensee identified open item, an analysis that demonstrates 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 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 (1) 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 1 % value at NMP2 assumes that the suppression pool has sufficient capacity to absorb the decay heat generated for a minimum of 3 hours without allowing containment pressure to exceed 38 psig (PCPL) after which point decay heat is less than or equal to 1 %. The vent would then be able to prevent containment pressure from increasing above the PCPL. The duration of suppression pool decay heat absorption capability had been confirmed (Reference 30 [of the OIP]).

The NMP2 OIP assumes that until decay heat is less than or equal to 1 percent, the suppression pool must absorb the decay heat generated and prevent containment pressure from increasing above the containment design pressure until the 1 percent containment vent is able to restore and maintain primary containment pressure below the primary containment design pressure and the primary containment pressure limit. Design analysis confirming the suppression pool has the capacity to absorb the decay heat generated until the decay heat rate within HCVS capacity 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 (1) 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 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.
>
> 1.2.2 The HCVS shall discharge the effluent to a release point above main plant structures.

Page 11 of the OIP states the following:

> The HCVS vent path at NMP2 utilizes existing Containment Purge System piping from the suppression chamber and drywell up to the Standby Gas Treatment System isolation valves (2GTS*AOV101 and 2GTS*SOV102). The inboard primary containment isolation valves (PCIV) for both the suppression chamber and drywell lines will be relocated from inside the containment to outside the containment. The outboard PCIVs will be relocated to provide room for the inboard valves. The suppression chamber piping exits the containment into the Reactor Building and continues for approximately 140 feet until it ties into a combined Drywell/Wetwell 20 inch header. New 18 inch piping will tie into this header upstream of 2GTS*AOV101/SOV102. A new air-operated valve will be provided in this piping, which will serve as both the primary method to control HCVS flow, therefore controlling containment pressure, and as secondary containment isolation. The discharge piping will exit through the Reactor Building wall approximately 60 feet above ground elevation and will be routed up the Northwest side of the Reactor Building to a discharge point approximately 3 feet above the highest point of the Reactor Building roof. The NMP2 vent path is completely separate from the NMP1 vent path.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Design details not available at this time include: the seismic and tornado missile final design criteria for the HCVS stack, evaluations of the environmental and radiological effects on HCVS controls and indications, and documentation of an evaluation of temperature 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 seismic and tornado missile final design criteria for the HCVS stack.

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.

3.2.2.4 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 12 of the OIP states the following:

> All electrical power required for operation of HCVS components will be provided by dedicated HCVS batteries with a minimum capacity capable of providing power for 24 hours without recharging. A preliminary sizing evaluation has been completed. A final evaluation will be completed as part of the detailed design process when selection of electrical components is finalized (Open Item #1 [in the OIP]). A battery charger is provided that requires a 240 VAC supply. This will be provided by a dedicated 600 VAC to 120/240 VAC transformer, which will be powered from a 600 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. In addition, a connection point that utilizes standard electrical connections will be provided for a portable generator for sustained operation of the HCVS.

For the first 24 hours following the event, the motive supply for the AOVs will be nitrogen gas bottles that will be pre-installed and available. These bottles will be sized such that they can provide motive force for 12 cycles of a vent path (2 PCIVs and 1 PCV). A preliminary sizing evaluation has been completed. A final evaluation will be completed as part of the detailed design process when selection of the system AOVs is finalized.

Supplemental motive force (e.g., additional nitrogen gas bottles, air compressor), portable generators, and enough fuel for an additional 48 hours of operation will be stored on site in an area that is reasonably protected from assumed hazards consistent with the requirements of NEI 12-06. Pre-engineered quick disconnects will be provided to connect the supplemental motive force supply.

1. The HCVS flow path valves are AOV that are air-to-open and spring-to-shut. Opening the valves requires energizing a DC [direct current] powered solenoid operated valve (SOV) and providing motive air/gas. A backup means of operation is also available that does not require energizing or repositioning the SOV.

2. An assessment of temperature and radiological conditions will be performed to ensure 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 (electric power, N2/air) will be located in areas reasonably protected from the hazards listed in Part 1 of this report [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 requiring close proximity to the valve (reference FAQ [frequently asked question] HCVS-03[14]). In addition, the PCV will have a handwheel as an optional means of operation. 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 the OIP.

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

The NMP2 OIP contains system feature descriptions 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. The licensee identifies the need to perform the final sizing evaluation for HCVS pneumatic supply. Other design details not available at this time include: the final sizing for HCVS battery/battery charger including documentation of incorporating HCVS electrical sources into the FLEX DG loading calculations, and documentation of an evaluation of temperature 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 of the HCVS nitrogen pneumatic system design including sizing and location.

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.

3.2.2.5 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 13 of the OIP states the following:

> The HCVS design allows for initiation, operation, and monitoring of the HCVS from the MCR or the ROS. The MCR location is protected from adverse natural phenomena and is the normal control point for HCVS operation and Plant Emergency Response actions.

> The ROS will be located in the Reactor Building Track Bay. This location is protected from adverse natural phenomena and is shielded from the HCVS piping by the Reactor Building. While the Reactor Building Track Bay is not a seismic category 1 structure, the adjoining Reactor Building and Standby Gas Treatment Buildings are both seismic category 1 structures and the Reactor Building Track Bay structure was built to the same general specifications. Confirmation that the Reactor Building Track Bay is seismically rugged will be evaluated during the detailed engineering and design phase (Open Item #4 [of the OIP]).

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. The licensee has identified that seismic evaluation is needed for ROS location in the reactor building track bay. Other design details not available at this time include: documentation demonstrating 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 review documentation of a determination of seismic adequacy for the ROS location in the reactor building track bay.

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 13 of the OIP states the following:

> As is required by Order EA-13-109, Section 1.2.11, 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. Piping upstream of the HCVS pressure control valve (PCV) will be protected by preventing the mix of oxygen with flammable gases. Several methods are available to protect piping downstream of the PCV. Methods being considered include installation of a purge system, installation of a flow-check valve at the end of the piping, or designing the piping and PCV for gas detonation. Final determination of the method to be used for the PCV and downstream piping is an open item.

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 state 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 13 of the OIP states the following:

> The HCVS for NMP2 is fully independent of NMP1 with separate discharge points. Therefore, the capacity at each unit is independent of the status of the other unit's HCVS. The only interfacing system with the HCVS is the Standby Gas Treatment System (SGTS). There are two parallel interface isolation valves separating the SGTS and the HCVS discharge piping (one 20 inch air operated butterfly valve and one 2 inch AC solenoid operated globe valve).
>
> The interface valves between the HCVS and the SGTS are normally-closed, fail-closed (spring operated) valves. Upon initiation of an ELAP and associated loss of instrument air, the valves would automatically shut due to spring pressure. Therefore, no additional power is necessary. Environmental conditions in which the valve will be expected to remain functional will be assessed during the detailed engineering and design phase and upgraded valve internals installed if required. Connection points will be added to the HCVS to facilitate Appendix J type testing of the interface valves. Testing and maintenance will be performed to ensure that the valves remain leak-tight within established leakage criteria. This reduces the potential for inter-system leakage through valves and dampers.

The NMP2 OIP describes design features to minimize unintended cross flow of vented fluids that appear 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. The only HCVS interfacing system is SBGT. The interfacing valves between HCVS and SGBT fail closed during ELAP conditions. The licensee identified the need to assess the functionality of the interfacing valves during 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.

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 13 of the OIP states the following:

> EOPs [emergency operating procedures] /Emergency Response Guidelines provide clear guidance that the HCVS is not to be used to defeat containment integrity during and design basis transients and accident. In addition, the HCVS is designed to provide features that prevent in advertent HCVS flow path actuation due to a design error, equipment malfunction, or operator error. These design features include two normally closes/fail closed, in-series CIVs that are air-to-open and spring-to-shut. A DC SOV must be energized to allow the motive air to open the valve. Although the same DC and motive air source will be used, separate control circuits including key-locked switches will be used for the two redundant valves to address single point vulnerabilities that may cause the flow path to inadvertently open. Manual valves that can bypass the SOVs will be locked closed and a bypass jumper will be removed from the system.

The NMP2 OIP provides a description of methods to prevent inadvertent HCVS initiation that includes: key lock switches, valves in series that are air-to-open spring-to-shut and procedural guidance. This 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.

3.2.2.9 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 14 of the OIP states the following:

> The HCVS components downstream of the second containment isolation valve are located in seismically qualified structures except those components located in the Reactor Building Track Bay, including the ROS, pneumatic supply station, HCVS batteries, and HCVS battery charger. For those components, the structure will be analyzed for seismic ruggedness to ensure that any potential failure would not adversely impact the function of the HCVS (i.e., seismic category II/I criteria).

HCVS components that directly interface with the pressure boundary, up to and including the PCV and SGTS interface valve will be classified as safety-related since the existing system is safety-related. Likewise, any electrical or controls component which interfaces with Class 1E power sources will be classified as safety related up to applicable isolation devices (e.g., fuses, breakers), as their failure could adversely impact containment isolation and/or a safety-related power source. All safety-related components will be seismically and environmentally qualified in accordance with the design basis of the plant. Additional functionality evaluations for severe accident/boundary conditions specified in NEI 13-02 will be performed.

Interfacing HCVS components will be classified as augmented quality.

Qualification includes consideration of environmental conditions specified in NEI 13-02. HCVS components will be evaluated to ensure functionality following a design basis earthquake. Components that interface with the HCVS will be routed in seismically qualified structures or the structure will be analyzed for seismic ruggedness to ensure that any potential failure would not adversely impact the function of the HCVS or other safety related structures or components.

Instrumentation and controls components will also be evaluated for environmental qualification to conditions postulated for a severe accident, although these evaluations will not be considered part of the site Environmental Qualification (EQ) program.

HCVS instrumentation performance (e.g., accuracy and precision) need not exceed that of similar plant installed equipment. Radiation monitoring equipment accuracy 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 [JLD-ISG-2013-02], which includes:

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO9001) 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 x IEEE [Institute of Electrical and Electronic 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 NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. The licensee identified the need to complete an evaluation for environmental and seismic qualifications of HCVS components. Documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under ELAP and severe accident conditions is not available at this time; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.

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 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.

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 15 of the OIP states the following:

> The NMP2 wetwell HCVS will be capable of being 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. MCR dose associated with HCVS operation conforms to GDC 19/Alternate Source Term (AST). 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 at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, ELAP, and inadequate containment cooling.
>
> The wetwell HCVS will include indications for HCVS valve position, vent pipe pressure, temperature, and effluent radiation levels to aid operator verification of HCVS function. Other important information on the status of supporting systems, such as power source status and pneumatic supply pressure, will also be included in the design and located to support HCVS operation. This instrumentation will be powered from the dedicated HCVS batteries, which provide a minimum of 24-hour supply.
>
> Other instrumentation that supports HCVS function will be provided nearby in the MCR. This includes existing containment pressure and wetwell level indication. 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 DG that supports HCVS battery charger

> function after 24-hours also supplies the battery charger for these instruments and will be installed prior to depletion of the station batteries. (Reference 1 [of the OIP])
>
> The HCVS instruments, including valve position indication, process instrumentation, radiation monitoring, and support system monitoring, will be qualified as previously described.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Design 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 16 of the OIP states the following:

> The HCVS vent path components that directly interface with the pressure boundary, up to and including the PCV and SGTS interface valves, will be classified as safety-related since the existing system is safety-related. In addition, any electrical or controls component which interfaces with Class 1E

power sources will be classified as safety related, as their failure could adversely impact containment isolation and/or a safety-related power source. All safety-related components will be seismically qualified in accordance with the NMP2 design basis. All other HCVS components, including piping and supports, electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) will be designed for reliable and rugged operation performance that is capable of ensuring HCVS functionality following a design basis earthquake as required per Section 2.2 of Order EA-13-109.

For the HCVS instruments that are required after a potential seismic event, the following methods will be used to verify that the design and installation is reliable / rugged and therefore 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 severe accident event conditions in the area of instrument component use using one or more of the following methods:

- demonstration of seismic motion 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 Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference [28] 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)

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

HCVS components are located in the Reactor Building, Control Building, and Reactor Building Track Bay. The Reactor Building and Control Building are safety-related, seismic class I structures. The Reactor Building Track Bay will be evaluated for the external hazards, including seismic hazards, that screen in for the plant as defined in guidance NEI 12-06 as endorsed, by JLD-ISG-12-01 for Order EA-12-049.

The instrumentation/power supplies/cables/connections (components) will be qualified for temperature, pressure, radiation level, and total integrated dose radiation for the Effluent Vent Pipe and HCVS ROS location. The qualification for

> the equipment by the supplier will be validated by NMP2 for the specific location at NMP2 to ensure that the bounding conditions envelope the specific plant conditions.
>
> Conduit design will be in accordance with Seismic Class 1 criteria. Both existing and new barriers (if required) will be used to provide a level of protection from missiles when equipment is located outside of seismically qualified structures.
>
> Augmented quality requirements will be applied to the components installed in response to this Order unless higher quality requirements apply.

The NMP2 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 an acceptable means for implementing applicable requirements of Order EA-13-109. The licensee has identified that seismic evaluation is needed for ROS location in the reactor building track bay.

Open Item: Make available for NRC staff review documentation of a determination of seismic adequacy for the ROS location in the reactor building track bay.

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 18 of the OIP states the following:

> The operation of the HCVS will be designed to minimize reliance on operator actions for response to an ELAP and severe accident events. Immediate operator actions will be completed by qualified plant personnel from either the MCR or the HCVS ROS using remote-manual actions. 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 and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting.
>
> The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR and will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report.

Permanently installed electrical power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24-hours. Power will be provided by installed batteries for up to 24 hours before generators will be required to be functional.

System control:

i. Active: PCIVs are operated in accordance with EOPs/ SAPs [standard operating procedure] to control containment pressure. The HCVS is designed for a minimum of 12 open/close cycles of the vent path under ELAP conditions over the first 24-hours following an ELAP. Controlled venting will be permitted in the revised EOPs.

ii. Passive: Inadvertent actuation protection is provided by use of key-locked switches for both the HCVS power supply actuation and valve operation. The normal state of the system is de-energized and isolated.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Design details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation and the final nitrogen pneumatic system design including sizing and location; 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

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 19 of the OIP states the following:

Actions required to extend venting beyond 24 hours include replenishment of pneumatic supplies and replenishment of electrical supply.

The pneumatic supply station will be installed in the Reactor Building Track Bay and will include a nitrogen bottle station with additional connections for extra nitrogen bottles or connection of a portable air compressor. Connections will utilize pre-engineered quick disconnect fittings. The location of the pneumatic supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and fueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for up to 72-hours following the ELAP event.

The HCVS batteries and battery charger will also be installed in the Reactor Building Track Bay. The UPS [uninterruptable power supply] will include battery capacity sufficient for 24 hour operation. The normal power supply to the UPS will be provided by a dedicated 600 VAC to 120/240 VAC transformer, which in turn is powered from a 600 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. A design change to install portable generator connections to this bus is being completed in support of Order EA-12-049 (reference FLEX OIP). In the event that power is not restored to the bus, a local 240 VAC connection to the UPS will allow the UPS to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Design details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation and the final nitrogen pneumatic system design including sizing and location; 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

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 21 of the OIP states the following:

> The operation of the operation of the HCVS will be designed to minimize reliance on operator actions for response to an ELAP and severe accident events. Progression of the ELAP into a severe accident assumes that the FLEX strategies identified in the response to Order EA-12-049 have not been effective. Immediate operator actions will be completed by Reactor Operators from either the MCR or the HCVS ROS using remote-manual actions. The operator actions required to open a vent path are as described in Table 2-1. Remote-manual is defined in this plan as a non-automatic power operation of a component and 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 primary procedural protocol.
>
> The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR and will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report. A preliminary evaluation of travel pathways for dose and temperature concerns has been completed and travel paths identified (Open Item #7 [of the OIP]). A final evaluation of environmental conditions will be completed as part of detailed design for confirmation.
>
> Permanently installed electrical power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Power will be provided by installed batteries for up to 24 hours before generators will be required to be functional.
>
> *System control:*
>
> i. Active: PCIVs are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS is designed for a minimum of 12 open/close cycles of the vent path under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EOPs. The configuration of the new pneumatic supplies allows the HCVS system controls to override the containment isolation circuit on the PCIVs needed to vent containment.
>
> ii. Passive: Inadvertent actuation protection is provided by use of key-locked switches for both the HCVS power supply actuation and valve operation. The normal state of the system is de-energized and closed.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Design details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified); 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

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 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.
>
> 1.2.8 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 22 of the OIP states the following:

> Actions required to extend venting beyond 24 hours include replenishment of pneumatic supplies and replenishment of electrical supply.
>
> The pneumatic supply station will be installed in the Reactor Building Track Bay and will include a nitrogen bottle station with additional connections for extra nitrogen bottles or connection of a portable air compressor. Connections will utilize pre-engineered quick disconnect fittings. The location of the pneumatic supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and fueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for up to 72 hours following the ELAP event.
>
> The HCVS batteries and battery charger will also be installed in the Reactor Building Track Bay. The UPS will include battery capacity sufficient for 24 hour operation. The normal power source for the UPS is a dedicated 600 VAC to 120/240 VAC transformer, which will be powered from a 600 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. A design

change to install portable generator connections to this bus is being completed in support of EA-12-049 (reference FLEX OIP). In the event that power is not restored to the 600 VAC bus, a local 240 VAC connection to the UPS will allow the UPS to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

Both the pneumatic supply station and the HCVS batteries/battery charger are located in the Reactor Building Track Bay on the Northeast side of the Reactor Building. The track bay is outside of the secondary containment boundary. The HCVS piping will exit the Reactor Building on the west-northwest side of the Reactor Building. Therefore, the Reactor Building provides shielding for the Reactor Building Track Bay. A preliminary evaluation of radiological and temperature concerns was completed (Open Item #8 [of the OIP]). A final evaluation will be completed when the location of the ROS is finalized.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified); 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

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 24 of the OIP states the following:

> Venting will require support from the HCVS batteries, battery charger, and pneumatic supply station being installed. These provide a minimum of 24-hour operation on installed supplies and provide connection points for additional pneumatic supplies (nitrogen bottles or compressor) and electrical supplies (portable generator).
>
> Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the MCR or ROS.
>
> The pneumatic supply station will be installed in the Reactor Building Track Bay and will include a nitrogen bottle station with additional connections for extra nitrogen bottles or connection of a portable air compressor. Connections will utilize pre-engineered quick disconnect fittings. The location of the pneumatic supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and fueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for up to 72 hours following the ELAP event.
>
> The HCVS batteries and battery charger will also be installed in the Reactor Building Track Bay. The UPS will include battery capacity sufficient for 24 hour operation. The normal power source for the UPS is a dedicated 600 VAC to 120/240 VAC transformer, which will be powered from a 600 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. A design change to install portable generator connections to this bus is being completed in support of EA-12-049 (reference FLEX OIP). In the event that power is not restored to the 600 VAC bus, a local 240 VAC connection to the UPS will allow the UPS to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Design details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation and the final nitrogen pneumatic system design including sizing and location; 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

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 24 of the OIP states the following:

> The same support functions that are used in the BDBEE scenario would be used for severe accident venting.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. Other information that is not available for review yet include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified); 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

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 26 of the OIP states the following:

> Venting actions using portable equipment include the following:
>
> - Replacement and replenishment of pneumatic supply sources. This includes the option of replacing nitrogen bottles or connecting a portable air compressor. Equipment sufficient for an additional 48 hours of vent operation beyond the 24-hour installed supply would be pre-staged in the FLEX storage building. Installation of the HCVS includes installation of a pneumatic supply header that includes pneumatic regulators and utilizes standard pneumatic connections.
>
> - Establishing temporary power to repower the battery charger. Option 1 is to connect the FLEX DG to 2EJS*US1, which provides power to EHS*MCC102 that in turn powers the HCVS transformer and battery charger. Option 1 would be completed as part of the FLEX response strategy and occurs to the east and inside the NMP2 Control Building. Option 2, to be taken if the FLEX DG cannot be connected to 2EJS*US1, is to connect a small portable generator (approximately 2kW) to the battery charger. Option 2 would be taken locally at the battery charger. Either of these actions will also require the generators to be refueled. A one line diagram of the electrical system to be installed is included in Attachment 3[of the OIP].

The NMP2 OIP describes venting portable equipment deployment functions that appear to be in accordance 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. Design details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, 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 documentation of the HCVS nitrogen pneumatic system design including sizing and location.

Open Item: Provide documentation of an assessment of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

Summary, Section 3.2:

The licensee's approach to Boundary Conditions for Wet Well 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 DRY WELL VENT

Summary, Section 3.3:

Dry Well Vent will be evaluated during Phase 2 of Order EA-13-109. The ISG 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 29 of the OIP states the following:

> *Program Controls:*
>
> 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 this 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.
NMP2 will utilize the industry developed guidance from the Owners Groups, EPRI [Electric Power Research Institute], and NEI Task team to develop/enhance site specific procedures or guidelines to address the criteria in NEI 13-02. These procedures and/or guidelines will support existing symptom based command and control strategies in the current EOPs and will contain the following details:

- appropriate conditions and criteria for use of the HCVS
- when and how to place the HCVS in operation
- location of system components
- instrumentation available
- normal and backup power supplies
- directions for sustained operation (reference NEI 13-02), including the storage and location of portable equipment
- location of the remote control HCVS operating station (panel)
- training on operating the portable equipment
- testing of portable equipment

Provisions will be established for out-of-service requirements of the HCVS and compensatory measures that comply with the criteria from NEI 13-02.

NMP2 will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in the HCVS Program Document:

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

- If for up to 90 consecutive days, the primary or alternate means of HCVS operation are non-functional, 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,

- o The HCVS availability will be restored in a manner consistent with plant procedures,
- o A cause assessment will be performed to prevent future unavailability for similar causes.
- o Actions will be initiated to implement appropriate compensatory actions.

The NMP2 OIP describes programmatic controls that 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. 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.

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 30 of the OIP states the following:

> The Systematic Approach to Training (SAT) will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. As determined by the SAT process, the training will consider system operations when normal and backup power is available, and during ELAP conditions. Required training will be completed prior to placing the HCVS in service.

The NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. 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 30 of the OIP states the following:

> The site 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, the site will integrate these requirements with compliance to any rulemaking resulting from the NTTF Recommendations 8 and 9.

The NMP2 OIP describes an approach to drills that appears 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 as an acceptable means for implementing applicable requirements of Order EA-13-109.

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 31 of the OIP states the following:

> The site will utilize the standard EPRI 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.
>
> NMP2 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) 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 NMP2 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 as an acceptable means for implementing applicable requirements of Order EA-13-109.

Summary, Section 3.4:

The licensee's approach to Programmatic Controls Training, Drills and Maintenance, if implemented as described in Section 3.4, 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.

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 the seismic and tornado missile final design criteria for the HCVS stack.	Section 3.2.2.3
2.	Make available for NRC staff review documentation of a determination of seismic adequacy for the ROS location in the reactor building track bay.	Section 3.2.2.5 Section 3.2.2.11

3.	Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one (1) 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
4.	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Section 3.2.2.6
5.	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
6.	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
7.	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
8.	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Section 3.2.1 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
9.	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	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
10.	Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.	Section 3.2.2.9

11.	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Section 3.2.2.10
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 3.2.2.7 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

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 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 CENG to NRC, Exelon's Overall Integrated Plan for Nine Mile Point Nuclear Station, Unit 2 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 27, 2014 (ADAMS Accession No. ML14184B340).

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, 'Severe Accident Reliable Hardened Containment Vents,'" 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. Nine Mile Point Nuclear Station, Unit 2 Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (ADAMS Accession No. ML13338A664).

17. Letter from CENG to NRC, CENG Overall Integrated Plan for the Nine Mile Point Nuclear Station, Unit 2 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. ML13074A056).

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

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Date: February 11, 2015

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Sincerely,

/RA/

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

Docket No. 50-410

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Interim Staff Evaluation

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