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

December 22, 2017

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 - REPORT FOR THE AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATIONS OPEN ITEMS RELATED TO NRC ORDER EA-13-109 TO MODIFY LICENSES WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE OF OPERATION UNDER SEVERE ACCIDENT CONDITIONS (CAC NOS. MF4456 AND MF4457; EPID L-2014-JLD-0050)

Dear Mr. Hanson:

On June 6, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A334), 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 Condition," to all Boiling Water Reactor licensees with Mark I and Mark II primary containments. The order requirements are provided in Attachment 2 to the order and are divided into two parts to allow for a phased approach to implementation. The order required licensees to submit for review overall integrated plans (OIPs) that describe how compliance with the requirements for both phases of Order EA-13-109 will be achieved.

By letter dated June 30, 2014 (ADAMS Accession No. ML14184A016), Exelon Generation Company, LLC. (the licensee) submitted its Phase 1 OIP for LaSalle County Station, Units 1 and Unit 2 (LaSalle). By letters dated December 17, 2014, June 30, 2015, December 16, 2015 (which included the combined Phase 1 and Phase 2 OIP), June 30, 2016, December 14, 2016, and June 29, 2017 (ADAMS Accession Nos. ML14351A450, ML15181A226, ML15352A109, ML16182A394, ML16349A439, and ML17180A391, respectively), the licensee submitted its 6-month updates to the OIP. The NRC staff reviewed the information provided by the licensee and issued interim staff evaluations (ISEs) for Phase 1 and Phase 2 of Order EA-13-109 for LaSalle by letters dated March 31, 2015 (ADAMS Accession No. ML15084A180), and August 2, 2016 (ADAMS Accession No. ML16110A368), respectively. When developing the ISEs, the staff identified open items where the staff needed additional information to determine whether the licensee's plans would adequately meet the requirements of Order EA-13-109.

The NRC staff is using the audit process described in letters dated May 27, 2014 (ADAMS Accession No. ML14126A545), and August 10, 2017 (ADAMS Accession No. ML17220A328), to gain a better understanding of licensee activities as they come into compliance with the order. As part of the audit process, the staff reviewed the licensee's closeout of the ISE open items.

The NRC staff conducted a teleconference with the licensee on December 14, 2017. The enclosed audit report provides a summary of that aspect of the audit.

If you have any questions, please contact me at 301-415-1025 or by email at Rajender.Auluck@nrc.gov.

Sincerely,

R Auluck

Rajender Auluck, Senior Project Manager
Beyond-Design-Basis Engineering Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATIONS OPEN ITEMS

RELATED TO ORDER EA-13-109 MODIFYING LICENSES

WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE OF

OPERATION UNDER SEVERE ACCIDENT CONDITIONS

EXELON GENERATION COMPANY, LLC

LASALLE COUNTY STATION, UNITS 1 AND 2

DOCKET NOS. 50-373 AND 50-374

BACKGROUND

On June 6, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A334), 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 Condition," to all Boiling Water Reactor (BWR) licensees with Mark I and Mark II primary containments. The order requirements are divided into two parts to allow for a phased approach to implementation.

Phase 1 of Order EA-13-109 requires license holders of BWRs with Mark I and Mark II primary containments to design and install a Hardened Containment Vent System (HCVS), 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 power (ELAP). The order required all applicable licensees, by June 30, 2014, to submit to the Commission for review an overall integrated plan (OIP) that describes how compliance with the Phase 1 requirements described in Order EA-13-109 Attachment 2 will be achieved.

Phase 2 of Order EA-13-109 requires license holders of BWRs with Mark I and Mark II primary containments to design and install a system that provides venting capability from the containment drywell under severe accident conditions, or, alternatively, to 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. The order required all applicable licensees, by December 31, 2015, to submit to the Commission for

review an OIP that describes how compliance with the Phase 2 requirements described in Order EA-13-109 Attachment 2 will be achieved.

By letter dated June 30, 2014 (ADAMS Accession No. ML14184A016), Exelon Generation Company, LLC. (the licensee) submitted its Phase 1 OIP for LaSalle County Station, Units 1 and Unit 2 (LaSalle). By letters dated December 17, 2014, June 30, 2015, December 16, 2015 (which included the combined Phase 1 and Phase 2 OIP), June 30, 2016, December 14, 2016, and June 29, 2017 (ADAMS Accession Nos. ML14351A450, ML15181A226, ML15352A109, ML16182A394, ML16349A439, and ML17180A391, respectively), the licensee submitted its 6-month updates to the OIP, as required by the order.

The NRC staff reviewed the information provided by the licensee and issued interim staff evaluations (ISEs) for Phase 1 and Phase 2 of Order EA-13-109 for LaSalle by letters dated March 31, 2015 (ADAMS Accession No. ML15084A180), and August 2, 2016 (ADAMS Accession No. ML16110A368), respectively. When developing the ISEs, the staff identified open items where the staff needed additional information to determine whether the licensee's plans would adequately meet the requirements of Order EA-13-109.

The NRC staff is using the audit process in accordance with the letters dated May 27, 2014 (ADAMS Accession No. ML14126A545), and August 10, 2017 (ADAMS Accession No. ML17220A328), to gain a better understanding of licensee activities as they come into compliance with the order. The staff reviews submitted information, licensee documents (via ePortals), and preliminary Overall Program Documents (OPDs)/OIPs, while identifying areas where additional information is needed. As part of this process, the staff reviewed the licensee closeout of the ISE open items.

AUDIT SUMMARY

As part of the audit, the NRC staff conducted a teleconference with the licensee on December 14, 2017. The purpose of the audit teleconference was to continue the audit review and provide the NRC staff the opportunity to engage with the licensee regarding the closure of open items from the ISEs. As part of the preparation for these audit calls, the staff reviewed the information and/or references noted in the OIP updates to ensure that closure of ISE open items and the HCVS design are consistent with the guidance provided in Nuclear Energy Institute (NEI) 13-02, Rev. 1 and related documents (e.g. white papers (ADAMS Accession Nos. ML14126A374, ML14358A040, ML15040A038 and ML15240A072) and frequently asked questions (FAQs), (ADAMS Accession No. ML15271A148)) that were developed and reviewed as part of overall guidance development. The NRC staff audit members are listed in Table 1. Table 2 is a list of documents reviewed by the staff. Table 3 provides the status of the ISE open item closeout for LaSalle. The open items are taken from the Phase 1 and Phase 2 ISEs issued on March 31, 2015, and August 2, 2016, respectively.

FOLLOW UP ACTIVITY

The staff continues to audit the licensee's information as it becomes available. The staff will issue further audit reports for LaSalle, as appropriate.

Following the licensee's declarations of order compliance, the licensee will provide a final integrated plan (FIP) that describes how the order requirements are met. The NRC staff will evaluate the FIPs, the resulting site-specific OPDs, as appropriate, and other licensee documents, prior to making a safety determination regarding order compliance.

CONCLUSION

This audit report documents the staff's understanding of the licensee's closeout of the ISE open items, based on the documents discussed above. The staff notes that several of these documents are still preliminary, and all documents are subject to change in accordance with the licensee's design process. In summary, the staff has no further questions on how the licensee has addressed the ISE open items, based on the preliminary information. The status of the NRC staff's review of these open items may change if the licensee changes its plans as part of final implementation. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:
1. Table 1 – NRC Staff Audit and Teleconference Participants
2. Table 2 – Audit Documents Reviewed
3. Table 3 – ISE Open Item Status Table

Table 1 - NRC Staff Audit and Teleconference Participants

Title	Team Member	Organization
Team Lead/Sr. Project Manager	Rajender Auluck	NRR/DLP
Project Manager Support/Technical Support – Containment / Ventilation	Brian Lee	NRR/DLP
Technical Support – Containment / Ventilation	Bruce Heida	NRR/DLP
Technical Support – Electrical	Kerby Scales	NRR/DLP
Technical Support – Balance of Plant	Kevin Roche	NRR/DLP
Technical Support – I&C	Steve Wyman	NRR/DLP
Technical Support – Dose	John Parillo	NRR/DRA

Table 2 – Audit Documents Reviewed

L-004114, "125 VDC Battery Sizing Calculation For Hardened Containment Vent System for 24 Hour Duty Cycle," Revision 0
EC 396062, Revision 4, DCS Section 4.1.35 – Electrical Requirements
EC 396069, Revision 3, DCS Section 4.1.35 – Electrical Requirements
L-004117, "HCVS Nitrogen Pressure Regulator Set Point & Bottle Capacity," Revision 0 (Unit 2)
L-004184, "HCVS Nitrogen Pressure Regulator Set Point & Bottle Capacity," Revision 0 (Unit 1)
L-004115, "HCVS Phase 1 Dose Assessment," Revision 2
EC 392353, Revision 5, DCS Section 4.1.14 – Environmental Conditions and Impacts
L-004097, "Hardended Containment Vent Capacity," Revision 3 (Unit 2)
L-004149," Hardened Containment Vent Capacity," Revision 0 (Unit 1)
L-004092, "Evaluation of Reactor Building Exterior Structural Steel Tower," Revision 2A
LOA-FSG-010, "FLEX Communications," Revision 3
LGA-VQ-202, "Emergency Containment Vent," Revision 1
LOP-PC-09, " Hardened Containment Vent System (HCVS) Argon/Nitrogen Supply Operation," Revision 4
L-004137, "Hardened Containment Vent Purge System Design Calculation," Revision 0 (Unit 2)
L-004185, "Hardened Containment Vent Purge System Design Calculation," Revision 0 (Unit 1)
L-003953, "Seismic Qualification of FLEX Transfer Switch," Revision 1B
L-004138, "Seismic Qualification of HCVS Battery System," Revision 0
L-004139, "Seismic Qualification of General Atomics RD-2B Detector/Shield Assmebly," Revision 0A
L-004140, "Sesmic Qualification of HCVS Isolation Vavles, Actuators and Wetwell Vent Valve Limit Swtches," Revsion 1
L-004141, " Seismic Qualification of Rosemount 3152N Pressure Transmitter in HCVS ROS Instrument Rack," Revision 0A
L-004142, " Seismic Qualification of ASCO 3-Way Solenoid Valve with 3/8" NPT Ports, Model No. NP8316A54E 125 VDC," Revision 0A
L-004143, "Seismic Qualification of Various Components for the Hardened Containment Vent System Modifications," Revision 0
L-004144, "Seismic Qualification of Continental Disc Corp. (CDC) HPX Rupture," Revision 0A
L-004145, "Sesimic Qualificaiton of Argon System 2-Way Leakoff Isolation Valve," Revision 0A
L-004146, "Seismic Qualification of Supervisory Master Station Panel 0PM08J and Internal Components associated with the Hardened Containment Vent System," Revision 0
L-004161, "Seismic Qualification of RTD – Weed Model N9002D-1A-60-12," Revision 0A
L-004162, "Seismic Qualification of Kunkle Relief Valve Model 0541-A02AKM0150 For The Hardened Containment Vent System Modifications," Revision 0A
L-004163, "Seismic Qualification of AVCO Speed Control Valve Model U200A-45," Revision 0A
L-004164, "Seismic Qualification of Atkomatic Solenoid Valve 12430-003HPKEK1E," Revision 0A
L-004165, "Seismic Qualification of TESCOM Pressure Regulating Valves," Revision 0A
L-004166, "Seismic Qualification of Panels and Components Installed in Radiation Monitor Cabinets 1(2)PC321," Revision 1
EC 392353, Revision 5, DCS Section 4.1.36 – Instrument and Controls Requirements

L-004151, "HCVS FLEX Activities and Phase II Dose Assessment for Unit 1 and 2," Revision 0
BWROG-TP-008, "Severe Accident Water Addition Timing"
BWROG-TP-011, "Severe Accident Water Management Supporting Evaluations"

LaSalle County Station, Units 1 and 2
Vent Order Interim Staff Evaluation Open Items:

Table 3 - ISE Open Item Status Table

ISE Open Item Number Requested Action	Licensee Response – Information provided in 6 month updates and on the ePortal	NRC Staff Close-out notes	Safety Evaluation (SE) status Closed; Pending; Open (need additional information from licensee)
Phase 1 ISE OI 1 Make available for NRC staff audit documentation of a method to disable HCVS during normal operation to provide assurances against inadvertent operation that also minimizes actions to enable HCVS operation following an ELAP.	Complete for Unit 2. The motive and purge gas systems will be isolated by at least one locked-closed manual valve in each system during normal operation. Main Control Room (MCR) controls will be via key-locked switches with power normally de-energized. PCIVs [primary containment isolation valve] are air-to-open, spring/fail closed. Ref. 9 (DCS 4.1.19, 4.1.33, 4.1.35, 4.1.36) and procedure LGA-VQ-202 provide direction for these actions and are available on ePortal. In-progress for Unit 1 following the concept described for Unit 2, above.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Per the Phase 1/Phase 2 OIP (December 2015), EOP/EPG operating procedures provide clear guidance that the HCVS is not to be used to defeat containment integrity during any design-basis transients or accidents. In addition, inadvertent actuation prevention features include two PCIVs in series and a downstream rupture disc. These valves are fail-closed air operated valves (AOVs) (air-to-open, spring-to-close) that require energizing an SOV to allow the motive air/gas to open the valve. Each PCIV is controlled by its own key-locked switch. In addition, the direct current (dc) power to the solenoid-operated valve (SOV) and the motive gas supply, and purge gas supply will normally be disabled to prevent inadvertent operation.	Closed [Staff evaluation to be included in SE Section 3.1.2.7]

		No follow-up questions.	
Phase 1 ISE OI 2 Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG [diesel generator] loading calculation.	Complete. Calculation L-004114 performs the sizing evaluation of the common HCVS batteries and associated charger. The results show a margin of approximately 7% after 24 hours with all Unit 1 and Unit 2 HCVS loads drawing maximum current. The FLEX DG loading evaluations in ECs 396062 (DCS 4.1.35) and 396069 (DCS 4.1.35) show a margin on the more limited DG of 337 amps for future loads. The HCVS battery charger rated input current is 8 amps per Ref. 9 (DCS 4.1.35). Therefore, there is sufficient margin in either FLEX DG to power the HCVS battery charger. L-004114, Revision 0, the Design Consideration Summaries (DCSs) of the final revisions of ECs 396062 and 396069, and Ref. 9 & 12 are available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee stated that all electrical power required for operation of HCVS components is provided by the 125 volt (V) dc battery/battery charger. The battery sizing calculation (L-004114) confirmed that the HCVS batteries have a minimum capacity capable of providing power for 24 hours without recharging, and therefore is adequate. The licensee provided DCS Section 4.1.35 for EC's 396062 and 396069, which discusses re-powering of the HCVS battery charger using a FLEX DG. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]
Phase 1 ISE OI 3 Make available for NRC staff audit documentation of the HCVS argon pneumatic system design including sizing and location.	Complete. Pneumatic system motive force changed to nitrogen; see Section 4 of this document, Ref. 9 (DCS 4.1.33), and calculations L-004117 and L-004184 L-004117, L-004184 and Ref. 9 are available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. EC 392353, DCS Section 4.1.33 discusses the pneumatic design and sizing. Calculations L-004117 and L-004184, "HCVS Nitrogen Pressure Regulator Set Point & Bottle Capacity," Revision 0 assumes the volume of nitrogen to cycle both vent valves once	Closed [Staff evaluation to be included in SE Section 3.1.2.6]

		and the outboard 7 additional times, which is sufficient to operate the HCVS for 24 hours. No follow-up questions.	
Phase 1 ISE OI 4 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.	Complete. The radiological evaluation in calculation L-004115 and temperature evaluation in Ref. 9 & 12 (DCS 4.1.14) show no additional shielding or high temperature mitigation is required to safely access and operate controls and equipment. L-004115 and Ref. 9 & 12 are available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. EC 392353, Revision 5, DCS Section 4.1.14, Environmental Conditions and Impacts, addresses the radiological and temperature conditions in the MCR, Remote Operating Station (ROS), and 4160-V Switchgear area. Calculation L-003969, Rev. 0, "U1/U2 Transients Heat-Up Analysis for the Control Room, AEERs, Div. 1, and Div. 2 Switchgear Rooms following a BDBEE [beyond-design-basis external event]", was performed for Order EA-12-049. It determined that the Control Room, without mitigating actions, would not exceed 110°F until 40 hours into the event. With mitigating actions the Control Room would be at 108°F at 72 hours into the event. The environmental evaluation in EC 392353 is a conservative maximum temperature for the ROS. A "toolbox" approach will be used by operators as	Closed [Staff evaluation to be included in SE Sections 3.1.1.2 and 3.1.1.3]

		necessary for extreme temperature conditions (e.g.: ice vests, small portable fans, etc.) per plant procedure LOA-FSG-005. In addition, operator stay time in the ROS will be limited. Continuous occupancy of the ROS is not required. Calulation L-004115, "HCVS Phase 1 Dose Assessment," Revision 2 was performed to determine the integrated radiation dose due to HCVS operation. Temperature and radiological conditions should not inhibit operator actions needed to initiate and operate the HCVS during an ELAP with severe accident conditions. No follow-up questions.	
Phase 1 ISE OI 5 Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained	Complete. Calculation L-004097 and L-004149 show that the HCVS has the capacity to vent the steam/energy equivalent of 1 % of rated thermal power while maintaining containment pressure below containment design pressure and PCPL [Primary Containment Pressure Limit]. L-004097 and L-004149 are available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculations L-004097 and L-004149 used a rated thermal power of 4,068 MWt. The assumed containment pressure at start of venting is 38.1 per square inch gauge (psig), which is less than the drywell/wetwell design pressure of 45 psig or the PCPL of 60 psig. The minimum 1% thermal power venting capacity is 150,650 lbm/hr. The calculated venting capacity at 38.1 psig is	Closed [Staff evaluation to be included in SE Section 3.1.2.1]

below the primary containment design pressure and the primary containment pressure limit.		154,600 lbm/hr, which provides a 2.7% flow margin. No follow-up questions.	
Phase 1 ISE OI 6 Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Complete. LaSalle design complies with the reasonable tornado protection criteria of Reference 6. The seismic and tornado missile protection design is described in Ref. 9 (DCS 4.1.38) and evaluated in calculation L-004092. Ref. 9 and L-004092 are available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. EC 392353, DCS Section 4.1.38 addresses the HCVS seismic qualification and tornado missile design. The licensee evaluated the entire HCVS system to Seismic Catergory I, which is consistent with the plants seismic design-basis. For the tornado missile design the licensee performed Calculation L-004092, "Evaluation of Reactor Building Exterior Structural Steel Tower," Revision 2A. Based on the structural requirements for the support tower to withstand design basis wind generated missiles, the HCVS exiting the Reactor Building at greater than 30' above grade, and administrative controls controlling laydown of items which may become potential wind generated missiles, the licensee considers the HCVS has reasonable protection from wind generated missiles. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.2.2]

Phase 1 ISE OI 7 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.	Complete. Reference 9 & 12 (DCS 4.1.14) include the temperature and humidity evaluations and calculation L-004115 evaluates the radiological conditions. Ref. 9 & 12 and L-004115 are available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. EC 392353, DCS Section 4.1.14 discusses the environmental conditions during an accident at the locations containing I&C components. The staff's review indicated that the environmental qualification met the order requirements. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.1.4]
Phase 1 ISE OI 8 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.	Complete. FLEX communications strategies and equipment (as described in procedure LOA-FSG-010) will be utilized for HCVS. These methods are adequate for HCVS implementation. LOA-FSG-010 is available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The communication methods are the same as accepted in Order EA-12-049. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.1.1]
Phase 1 ISE OI 9 Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Complete. An argon purge system is provided which is designed to purge the vent piping of a detonable mixture of hydrogen and oxygen after each vent cycle. Installed capacity is provided for the first 24 hours after ELAP, and additional argon bottles are stored in a FLEX building to continue operation past 24 hours.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Licensee uses Argon to purge the HCVS piping of hydrogen to limit the possibility of a hydrogen deflagration/detonation. Calculations L-0014137 and L-004185 assumes the volume of	Closed [Staff evaluation to be included in SE Section 3.1.2.11]

	Calculation L-004137 & L-004185 and Ref. 9 & 12 (DCS 4.1.33), are available on ePortal.	Argon to burst the rupture disk and 8 purges in the first 24 hours. The licensee's design is consistent with Option 3 of the endorsed white paper HCVS-WP-03. No follow-up questions.	
Phase 1 ISE OI 10 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.	Complete. LaSalle wetwell vent line has a dedicated HCVS flowpath from the wetwell penetration to the outside with no interconnected system. The discharge point meets the guidance of HCVS-FAQ-04 (Att. J of Reference 3). See Ref. 9 (Dwg. M-138 Sheet 3), available on ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The HCVS wetwell pipe in each each unit provides a dedicated HCVS flowpath from the wetwell penetration PCIVs to the outside with no interconnected downstream piping. The staff's review of the proposed system indicates that the licensee's design appears to maintain hydrogen below flammability limits. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.12]
Phase 1 ISE OI 11 Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.	Complete for Unit 2. See calculations L-003953, L-004138 through L-004146, L-004161 through L-004166. All above calculations are available on ePortal. In-progress for Unit 1; design will follow the same concept as Unit 2.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licesee provided several reports which demonstrate the seismic adequacy of the HCVS components. The staff reviewed these reports and confirmed that the components required for HCVS venting remain functional	Closed [Staff evaluation to be included in SE Section 3.2.2]

		following a design basis earthquake. No follow-up questions.	
Phase 1 ISE OI 12 Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Complete for Unit 2; Unit 1 design will follow the same concept as Unit 2, but not calculation are approved. New instrumentation and controls are described in Reference 9 & 12 (DCS 4.1.36), and qualification methods are per calculations shown in the table below. All referenced documents are available on ePortal. Existing instruments relied upon for initiation, operation, and monitoring of HCVS are qualified or evaluated to Regulatory Guide 1.97 and include the following: Dryweil pressure (1(2)PI-CM029), Wetwell pressure (1(2)PI-CM056), Wetwell level (1 (2)LI-CM1 92), Wetwell water temperature (1(2)TI-CM037), and Reactor pressure (1 (2)C61 -RO1 1). (Ref. 9, DCS 4.1.14)	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The existing plant instuments required for HCVS (i.e. wetwell level instruments and drywell pressure instruments) meet the requirements of RG 1.97. EC 392353, DCS Section 4.1.36 discusses the qualifications for new HCVS I&C components. The staff's review indicated that the qualification met the order requirements. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.8]
Phase 1 ISE OI 13 Make available for NRC staff audit guidelines and procedures for HCVS operation.	Complete for Unit 2. Procedures LGA-VQ-202 and LOP-PC-09 contain all instructions for operation of the HCVS. Above procedures are available on ePortal. In-progress for Unit 1; design will follow the same concept as Unit 2.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The guidelines and procedures for HCVS operation are complete and consistent with the guidance in NEI 13-02. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 5.1]
Phase 2 ISE OI 1	Actions taken within the first hour (prior to start of core damage) from the start of the ELAP are acceptable from an	The NRC staff reviewed the information provided in the 6-	Closed

Licensee to confirm through analysis the temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	environmental and radiological perspective without further evaluation. Actions performed within the MCR are acceptable for the entire period of Sustained Operation per HCVS-FAQ-06 Assumption 049-21. For actions within the Reactor Building and between 1 and 7 hours, a quantitative evaluation of expected dose rates has been performed per HCVS-FAQ-12 and found the dose rates at deployment locations including ingress/egress paths are acceptable. See calculation L-004151, available on ePortal. Note that no actions in the Reactor Building are planned for the unit in a severe accident after the first hour post-ELAP. For ingress and egress paths outside the Reactor Building between 7 hours and 7 days, when SAWA is being utilized, a quantitative evaluation of expected dose rates has been performed per HCVS-WP-02 and found the dose rates at deployment locations including ingress/egress paths are acceptable. See L-004151.	month updates and on the ePortal. For temperature review of the MCR and ROS see Open Item-4 above. Actions outside the MCR or the ROS are performed at the Remote Shutdown Panel, in the Diesel Generator Building Corridors, and outside of the Diesel Corridors. As noted in Open Item-4, above, operators will use a "toolbox" approach as needed to address extreme temperature conditions per procedure LOA-FSG-005. Calculation L-004151, "HCVS FLEX Activities and Phase II Dose Assessment for Unit 1 and 2," Revision 0 was performed to determine the integrated radiation dose due to HCVS operation. Temperature and radiological conditions should not inhibit operator actions or SAWA equipment and controls needed to initiate and operate the HCVS during an ELAP with severe accident conditions. No follow-up questions.	[Staff evaluation to be included in SE Sections 4.1.1.4 and 4.2.1.4]
Phase 2 ISE OI 2 Licensee to evaluate the SAWA [severe accident water addition] equipment and controls, as well as ingress	The location of SAWA equipment and controls including ingress and egress paths will be the same or similar as FLEX and will be bounded by the FLEX evaluations for temperature and humidity.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. EC 392353, Revision 5, DCS Section 4.1.14 – Environmental	Closed [Staff evaluation to be included in SE Sections 4.1.1.4 and 4.2.1.4]

and egress paths for the expected severe accident conditions (temperature, humidity, radiation) for the sustained operating period.		Conditions and Impacts along with calculations L-004151 shows that temperature and radiological conditions should not inhibit operator actions or SAWA equipment and controls needed to initiate and operate the HCVS during an ELAP with severe accident conditions. No follow-up questions.	
Phase 2 ISE OI 3 Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions.	The wetwell vent has been designed to meet NEI 13-02 Rev 1 guidance, which will ensure that it is adequately sized to prevent containment overpressure under severe accident conditions. The SAWM strategy will ensure that the wetwell vent remains functional for the period of sustained operation. LaSalle will follow the guidance (flow rate and timing) for SAWA/SAWM described in BWROG-TP-15-008 and BWROG-TP-15-011. These documents have been posted to the ePortal for NRC staff review. The wetwell vent will be opened prior to exceeding the PCPL value of 60 PSIG. Therefore, containment over-pressurization is prevented without the need for a drywell vent.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. BWROG-TP-15-008 demonstrates that adding water to the reactor vessel within 8-hours of the onset of the event will limit the peak containment drywell temperature significantly reducing the possibility of containment failure due to temperature. Drywell pressure can be controlled by venting the suppression chamber through the suppression pool. BWROG-TP-011 demonstrates that starting water addition at a high rate of flow and throttling after approximately 4-hours will not increase the suppression pool level to that which could block the suppression chamber HCVS. As noted under Phase 1, the vent is sized to pass a minimum steam	Closed [Staff evaluation to be included in SE Sections 4.1 and 4.2]

		flow equivalent to 1% rated core power. This is sufficient venting capacity to maintain containment below the lower of PCPL or of design pressure. No follow-up questions.	
Phase 2 ISE OI 4 Licensee to demonstrate how the plant is bounded by the reference plant analysis that shows the SAWM strategy is successful in making it unlikely that a drywell vent is needed.	***Reference Plant*** Torus freeboard volume is 525,000 gallons, SAWA flow is 500 GPM [gallons per minute] at 8 hours followed by 100 GPM from 12 hours to 168 hours, ***LaSalle*** Torus freeboard volume is 977,404 gallons, SAWA flow is 500 GPM at 8 hours followed by 100 GPM from 12 hours to 168 hours. The above parameters for LaSalle compared to the reference plant that determine success of the SAWM strategy demonstrate that the reference plant values are bounding. Therefore, the SAWM strategy implemented at LaSalle makes it unlikely that a drywell vent is needed to prevent containment overpressure related failure.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The staff compared the parameters from the reference plant to those of LaSalle. The staff concurs that it is unlikely the suppression chamber could become blocked leading to a successful SAWA/SAWM strategy. Therefore, it is unlikely a drywell vent would be required to maintain containment integrity. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.2.1.1]
Phase 2 ISE OI 5 Licensee to demonstrate that there is adequate communication between the main control room (MCR) and the operator at the FLEX pump during severe accident conditions.	LaSalle utilizes handheld radios in the talk-around mode to communicate between the MCR and the operator at the FLEX pump. This communication method is the same as accepted in Order EA-12-049. These items will be powered and remain powered using the same methods as evaluated under EA-12-049 for the period of sustained operation, which may be longer than identified for EA-12-049.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The communication methods are the same as accepted in Order EA-12-049. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.1]
Phase 2 ISE OI 6	For locations outside the Reactor Building between 7 hours and 7 days when SAWA	The NRC staff reviewed the information provided in the 6-	Closed

Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions.	is being utilized, a quantitative evaluation of expected dose rates has been performed per HCVS-WP-02 and found the dose rates at deployment locations including ingress/egress paths are acceptable (Ref. calculation L-004151, available on ePortal). The selected instrument is designed for the expected flow rate, temperature and pressure for SAWA over the period of sustained operation (Ref. 13, DCS 4.1.14). Ref. 13 is available on ePortal. **SAWA Flow Instrument** 80 to 2300 GPM, Up to 125 °F, 0 to 300 PSI **Expected SAWA Parameter Qualification Range** 100 to 500 GPM, -25 to 101 °F, 0 to 250 PSI	month updates and on the ePortal. EC 392353, DCS Section 4.1.36 discusses the SAWM flow instrumentation qualification. The NRC staff reviewed the information and determined that the accuracy of the flow meter and the environmental qualifications related to the performance of the flow meter meet the intent of Order EA-13-109. No follow-up questions.	[Staff evaluation to be included in SE Sections 4.1.1.3 and 4.2.1.3]

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 - REPORT FOR THE AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATIONS OPEN ITEMS RELATED TO NRC ORDER EA-13-109 TO MODIFY LICENSES WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE OF OPERATION UNDER SEVERE ACCIDENT CONDITIONS
DATED December 22, 2017

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