



Order No. EA-13-109

RS-18-036

May 9, 2018

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

LaSalle County Station, Unit 1  
Renewed Facility Operating License No. NPF-11  
NRC Docket No. 50-373

Subject: Report of Full Compliance with Phase 1 and Phase 2 of June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

References:

1. NRC Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013
2. Exelon Generation Company, LLC's Answer to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 26, 2013
3. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated April 2015
4. NEI 13-02, "Industry Guidance for Compliance With Order EA-13-109, BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions", Revision 1, dated April 2015
5. Exelon Generation Company, LLC Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 30, 2014 (RS-14-059)
6. Exelon Generation Company, LLC First Six-Month Status Report Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 17, 2014 (RS-14-303)

7. Exelon Generation Company, LLC Second Six-Month Status Report Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 30, 2015 (RS-15-149)
8. Exelon Generation Company, LLC Third Six-Month Status Report Phase 1 (Updated) and Phase 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 16, 2015 (RS-15-300)
9. Exelon Generation Company, LLC Fourth Six-Month Status Report For Phases 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 30, 2016 (RS-16-107)
10. Exelon Generation Company, LLC Fifth Six-Month Status Report For Phases 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 14, 2016 (RS-16-233)
11. Exelon Generation Company, LLC Sixth Six-Month Status Report For Phases 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 29, 2017 (RS-17-065)
12. Exelon Generation Company, LLC Seventh Six-Month Status Report For Phases 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 15, 2017 (RS-17-152)
13. NRC letter to Exelon Generation Company, LLC, LaSalle County Station, Units 1 and 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 Nos. MF4456 and MF4457), dated March 31, 2015
14. NRC letter to Exelon Generation Company, LLC, LaSalle County Station, Units 1 and 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC Nos. MF4456 and MF4457), dated August 2, 2016
15. NRC letter to Exelon Generation Company, LLC, 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

On June 6, 2013, the 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) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to require their BWRs with Mark I and Mark II containments to take certain actions to ensure that these facilities have a hardened containment vent system (HCVS) to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in loss of active containment heat removal capability while maintaining the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP). Specific requirements are outlined in Attachment 2 of Reference 1. Reference 2 provided EGC’s initial answer to the Order.

Reference 3 provided the NRC interim staff guidance on methodologies for compliance with Phases 1 and 2 of Reference 1 and endorsed industry guidance document NEI 13-02, Revision 1 (Reference 4) with clarifications and exceptions. Reference 5 provided the LaSalle County Station, Unit 1 Phase 1 Overall Integrated Plan (OIP), which was replaced with the Phase 1 (Updated) and Phase 2 OIP (Reference 8). References 13 and 14 provided the NRC review of the Phase 1 and Phase 2 OIP, respectively, in an Interim Staff Evaluation (ISE).

Reference 1 required submission of a status report at six-month intervals following submittal of the OIP. References 6, 7, 8, 9, 10, 11, and 12 provided the first, second, third, fourth, fifth, sixth, and seventh six-month status reports, respectively, pursuant to Section IV, Condition D.3, of Reference 1 for LaSalle County Station, Unit 1.

The purpose of this letter is to provide the report of full compliance with Phase 1 and Phase 2 of the June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109) (Reference 1) pursuant to Section IV, Condition D.4 of the Order for LaSalle County Station, Unit 1.

LaSalle County Station, Unit 1 has designed and installed a venting system that provides venting capability from the wetwell during severe accident conditions in response to Phase 1 of NRC Order EA-13-109. LaSalle County Station, Unit 1 has implemented a reliable containment venting strategy that makes it unlikely that the plant would need to vent from the containment drywell before alternative reliable containment heat removal and pressure control is reestablished in response to Phase 2 of NRC Order EA-13-109. The information provided herein documents full compliance for LaSalle County Station, Unit 1 with NRC Order EA-13-109.

LaSalle County Station, Unit 1 Phases 1 and 2 OIP Open Items have been addressed and closed as documented in References 8, 12, and as provided below, and are considered complete per Reference 15.

EGC’s response to the NRC Interim Staff Evaluation (ISE) Phase 1 Open Items identified in Reference 13 have been addressed and closed as documented in Reference 12 and as provided below, and are considered complete per Reference 15. The following table provides completion references for each OIP and ISE Phase 1 Open Item.

Reference 15 provided the results of the audit of ISE Open Item closure information provided in Reference 12. All Phase 1 and Phase 2 ISE Open Items are statused as closed in Reference 15.

<p>OIP Phase 1 Open Item No. 1</p> <p>Determine how Motive Power and/or HCVS Battery Power will be disabled during normal operation.</p>	<p>Deleted (Closed to ISE Open Item No. 1 below)</p>
<p>OIP Phase 1 Open Item No. 2</p> <p>Confirm that the Remote Operating Station (ROS) will be in an accessible area following a Severe Accident (SA).</p>	<p>Deleted (Closed to ISE Open Item No. 4 below)</p>
<p>OIP Phase 1 Open Item No. 3</p> <p>Determine wetwell line size to meet 1% venting criteria.</p>	<p>Deleted (Closed to ISE Open Item No. 5 below)</p>
<p>OIP Phase 1 Open Item No. 4</p> <p>Confirm suppression pool heat capacity.</p>	<p>Closed per Reference 8.</p>
<p>OIP Phase 1 Open Item No. 5</p> <p>Determine the approach for combustible gases.</p>	<p>Deleted (Closed to ISE Open Item No. 9 below)</p>
<p>OIP Phase 1 Open Item No. 6</p> <p>Provide procedures for HCVS Operation.</p>	<p>Deleted (Closed to ISE Open Item No. 13 below)</p>
<p>OIP Phase 1 Open Item No. 7</p> <p>Perform radiological evaluation for Phase 1 vent line impact on ERO actions.</p>	<p>Closed per Reference 12.</p>

<p>ISE Phase 1 Open Item No. 1</p> <p>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.</p>	<p>Complete</p> <p>The motive and purge gas systems will be isolated by at least 1 locked closed manual valve in each system during normal operation. Main Control Room (MCR) controls will be via key lock switches with power normally de-energized. PCIVs are gas to open, spring/fail closed. LOP-PC-08 identifies the standby lineup for the HCVS preventing inadvertent operation and LGA-VQ-102 describes the venting operation of the HCVS. Both procedures are available in ePortal.</p>
<p>ISE Phase 1 Open Item No. 2</p> <p>Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 3</p> <p>Make available for NRC staff audit documentation of the HCVS argon pneumatic system design including sizing and location.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 4</p> <p>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.</p>	<p>Closed per Reference 12.</p>

<p>ISE Phase 1 Open Item No. 5</p> <p>Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 6</p> <p>Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 7</p> <p>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, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 8</p> <p>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.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 9</p> <p>Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.</p>	<p>Closed per Reference 12.</p>

<p>ISE Phase 1 Open Item No. 10</p> <p>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.</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 1 Open Item No. 11</p> <p>Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.</p>	<p>Complete</p> <p>Refer to Reference 12. Calculations L-004143 Revision 0A and L-004146 Revision 0A are approved.</p> <p>Calculations are available on ePortal.</p>
<p>ISE Phase 1 Open Item No. 12</p> <p>Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.</p>	<p>Complete</p> <p>Refer to Reference 12. Calculations L-004143 Revision 0A and L-004146 Revision 0A are approved.</p> <p>Calculations are available on ePortal.</p>
<p>ISE Phase 1 Open Item No. 13</p> <p>Make available for NRC staff audit the procedures for HCVS operation.</p>	<p>Complete</p> <p>Procedures LGA-VQ-102 Rev 1, LOP-PC-08 Rev 3, and LOP-PC-09 Rev 6 contain all instructions for operation of the HCVS.</p> <p>Above procedures are available on ePortal.</p>

EGC's response to the NRC ISE Phase 2 Open Items identified in Reference 14 have been addressed and closed as documented in Reference 12, and are considered complete per Reference 15. The following table provides completion references for each ISE Phase 2 Open Item.

<p>OIP Phase 2 Open Item No. 1</p> <p>Evaluate feasibility of strategy due to radiological conditions.</p>	<p>Closed per Reference 12.</p>
<p>OIP Phase 2 Open Item No. 2</p> <p>Verify required modifications to support SAWA/SAWM.</p>	<p>Closed per Reference 12.</p>

<p>ISE Phase 2 Open Item No. 1</p> <p>Licensee to confirm through analysis the temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment. (ISE Section 3.3.1)</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 2 Open Item No. 2</p> <p>Licensee to evaluate the ingress and egress paths for the expected severe accident conditions (temperature, humidity, radiation) for the sustained operating period. (ISE Section 3.3.2.3)</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 2 Open Item No. 3</p> <p>Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions. (Section 3.3.3)</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 2 Open Item No. 4</p> <p>Licensee shall demonstrate how the plant is bounded by the reference plant analysis that shows the SAWM strategy is successful in making it unlikely that a DW vent is needed. (ISE Section 3.3.3.1)</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 2 Open Item No. 5</p> <p>Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX pump during severe accident conditions. (Section 3.3.3.4)</p>	<p>Closed per Reference 12.</p>
<p>ISE Phase 2 Open Item No. 6</p> <p>Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions. (Section 3.3.3.4)</p>	<p>Closed per Reference 12.</p>



**MILESTONE SCHEDULE – ITEMS COMPLETE**

**LaSalle County Station, Unit 1 - Phases 1 and 2 Specific Milestone Schedule**

<b>Milestone</b>	<b>Target Completion Date</b>	<b>Activity Status</b>	<b>Comments</b>
Submit Phase 1 Overall Integrated Plan	<b>Jun. 2014</b>	Complete	
Submit Phase 2 Overall Integrated Plan	<b>Dec. 2015</b>	Complete	
<b>Submit 6 Month Updates:</b>			
Update 1	<b>Dec. 2014</b>	Complete	
Update 2	<b>Jun. 2015</b>	Complete	
Update 3	<b>Dec. 2015</b>	Complete	Simultaneous with Phase 2 OIP
Update 4	<b>Jun. 2016</b>	Complete	
Update 5	<b>Dec. 2016</b>	Complete	
Update 6	<b>Jun. 2017</b>	Complete	
Update 7	<b>Dec. 2017</b>	Complete	
<b>Phase 1 Specific Milestones</b>			
<b>Phase 1 Modifications:</b>			
Hold preliminary/conceptual design meeting	<b>Jun. 2014</b>	Complete	
Unit 1 Design Engineering On-site/Complete	<b>Mar. 2017</b>	Complete	
Unit 1 Implementation Outage	<b>Feb. 2018</b>	Complete	
Unit 1 Walk Through Demonstration/Functional Test	<b>Feb. 2018</b>	Complete	
<b>Phase 1 Procedure Changes</b>			
Operations Procedure Changes Developed	<b>Mar. 2018</b>	Complete	
Site Specific Maintenance Procedure Developed	<b>Mar. 2018</b>	Complete	
Procedure Changes Active	<b>Mar. 2018</b>	Complete	

<b>Milestone</b>	<b>Target Completion Date</b>	<b>Activity Status</b>	<b>Comments</b>
<b>Phase 1 Training:</b>			
Training Complete	<b>Mar. 2018</b>	Complete	
<b>Phase 1 Completion</b>			
Unit 1 HCVS Implementation	<b>Mar. 2018</b>	Complete	
<b>Phase 2 Specific Milestones</b>			
<b>Phase 2 Modifications:</b>			
Hold preliminary/conceptual design meeting	<b>May 2016</b>	Complete	
Unit 1 Design Engineering On site/Complete	<b>Jul. 2017</b>	Complete	
Unit 1 Walk Through Demonstration/Functional Test	<b>Nov. 2017</b>	Complete	
Unit 1 Implementation Outage	<b>Nov. 2017</b>	Complete	Phase 2 modifications were non outage mods and completed prior to the Phase 1 modifications performed in the Feb / March 2018 Unit 1 refueling outage (L1R17)
<b>Phase 2 Procedure Changes</b>			
Operations Procedure Changes Developed	<b>Mar. 2018</b>	Complete	
Site Specific Maintenance Procedure Developed	<b>Mar. 2018</b>	Complete	
Procedure Changes Active	<b>Mar. 2018</b>	Complete	
<b>Phase 2 Training:</b>			
Training Complete	<b>Mar. 2018</b>	Complete	
<b>Phase 2 Completion</b>			
Unit 1 HCVS Implementation	<b>Mar. 2018</b>	Complete	
<b>Submit Unit 1 Phases 1 and 2 Completion Report</b>	<b>May 2018</b>	Complete with this submittal.	

### **ORDER EA-13-109 COMPLIANCE ELEMENTS SUMMARY**

The elements identified below for LaSalle County Station, Unit 1, as well as the Phase 1 (Updated) and Phase 2 OIP response submittal (Reference 8), and the 6-Month Status Reports (References 6, 7, 8, 9, 10, 11, and 12), demonstrate compliance with NRC Order EA-13-109. The LaSalle County Station, Units 1 and 2 Final Integrated Plan for reliable hardened containment vent Phase 1 and Phase 2 strategies will be provided upon full compliance for LaSalle County Station, Unit 2 (Spring 2019).

#### **HCVS PHASE 1 AND PHASE 2 FUNCTIONAL REQUIREMENTS AND DESIGN FEATURES – COMPLETE**

The LaSalle County Station, Unit 1, Phase 1 HCVS provides a vent path from the wetwell to remove decay heat, vent the containment atmosphere, and control containment pressure within acceptable limits. The Phase 1 HCVS will function for those accident conditions 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 during an extended loss of alternating current power.

The LaSalle County Station, Unit 1, Phase 2 HCVS provides a reliable containment venting strategy that makes it unlikely that the plant would need to vent from the containment drywell before alternative reliable containment heat removal and pressure control is reestablished. The LaSalle County Station, Unit 1, Phase 2 HCVS strategies implement Severe Accident Water Addition (SAWA) with Severe Accident Water Management (SAWM) as an alternative venting strategy. This strategy consists of the use of the Phase 1 wetwell vent and SAWA hardware to implement a water management strategy that will preserve the wetwell vent path until alternate reliable containment heat removal can be established.

The LaSalle County Station, Unit 1, Phase 1 and Phase 2 HCVS strategies are in compliance with Order EA-13-109. The modifications required to support the HCVS strategies for LaSalle County Station, Unit 1 have been fully implemented in accordance with the station processes.

#### **HCVS PHASE 1 AND PHASE 2 QUALITY STANDARDS – COMPLETE**

The design and operational considerations of the Phase 1 and Phase 2 HCVS installed at LaSalle County Station, Unit 1 complies with the requirements specified in the Order and described in NEI 13-02, Revision 1, "Industry Guidance for Compliance with Order EA-13-109". The Phase 1 and Phase 2 HCVS has been installed in accordance with the station design control process.

The Phase 1 and Phase 2 HCVS components including piping, piping supports, containment isolation valves, containment isolation valve actuators and containment isolation valve position indication have been designed consistent with the design basis of the plant. All other Phase 1 and Phase 2 HCVS components including electrical power supply, valve actuator pneumatic supply and instrumentation have been designed for

reliable and rugged performance that is capable of ensuring Phase 1 and Phase 2 HCVS functionality following a seismic event.

**HCVS PHASE 1 AND PHASE 2 PROGRAMMATIC FEATURES - COMPLETE**

Storage of portable equipment for LaSalle County Station, Unit 1 Phase 1 and Phase 2 HCVS use provides adequate protection from applicable site hazards, and identified paths and deployment areas will be accessible during all modes of operation and during severe accidents, as recommended in NEI 13-02, Revision 1, Section 6.1.2.

Training in the use of the Phase 1 and Phase 2 HCVS for LaSalle County Station, Unit 1 has been completed in accordance with an accepted training process as recommended in NEI 13-02, Revision 1, Section 6.1.3.

Operating and maintenance procedures for LaSalle County Station, Unit 1 have been developed and integrated with existing procedures to ensure safe operation of the Phase 1 and Phase 2 HCVS. Procedures have been verified and are available for use in accordance with the site procedure control program.

Site processes have been established to ensure the Phase 1 and Phase 2 HCVS is tested and maintained as recommended in NEI 13-02, Revision 1, Sections 5.4 and 6.2.

LaSalle County Station, Unit 1 has completed validation in accordance with industry developed guidance to assure required tasks, manual actions and decisions for HCVS strategies are feasible and may be executed within the constraints identified in the HCVS Phases 1 and 2 OIP for Order EA-13-109 (Reference 8).

LaSalle County Station, Unit 1 has completed evaluations to confirm accessibility, habitability, staffing sufficiency, and communication capability in accordance with NEI 13-02, Revision 1, Sections 4.2.2 and 4.2.3.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 9<sup>th</sup> day of May 2018.

Respectfully submitted,



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cc: Director, Office of Nuclear Reactor Regulation  
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