

DEC 19 2016

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

10 CFR 2.202

**SUSQUEHANNA STEAM ELECTRIC STATION
FIFTH SIX-MONTH STATUS REPORT 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)
PLA-7550**

**Docket Nos. 50-387
and 50-388**

References:

1. *NRC Order Number EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, dated June 6, 2013.*
2. *NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 2013 (Accession No. ML13304B836 and JLD-ISG-2015-01, Revision 0, dated April 2015 (Accession No. ML15104A118)).*
3. *NRC Endorsement of industry "Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109) Rev 0" (Accession No. ML14128A219).*
4. *NEI 13-02, "Industry Guidance for Compliance with NRC Order EA-13-109, "To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," Revisions 0 and 1.*
5. *PPL Letter (PLA-7180), "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 26, 2014.*
6. *PPL Letter (PLA-7269) T. S. Rausch (PPL Susquehanna, LLC) to U.S. NRC, "First Six-Month Status Report 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 23, 2014.*
7. *Susquehanna Letter (PLA-7345) T. S. Rausch (Susquehanna Nuclear, LLC) to U.S. NRC, "Second Six-Month Status Report 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 23, 2015.*

8. *NRC Endorsement of industry "Hardened Containment Venting System (HCVS) Phase 1 and 2 Overall Integrated Plan Template," Revision 1, dated September 22, 2015, and Frequently Asked Questions (FAQs) 10, 11, 12, and 13 (Accession No. ML15273A141).*
9. *Susquehanna Letter (PLA-7421), "Combined Phase 1 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 23, 2015.*
10. *Susquehanna Letter (PLA-7488) T. S. Rausch (Susquehanna Nuclear, LLC) to U.S. NRC, "Fourth Six-Month Status Report 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, 2016.*

On June 6, 2013, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to PPL Susquehanna, LLC (PPL). Reference 1 was immediately effective and directs Susquehanna to install a primary containment venting capability in accordance with the requirements outlined in Attachment 2 of Reference 1.

The Order (EA-13-109) requires that licensees of BWR facilities with Mark I and Mark II containment designs ensure that these facilities have a reliable hardened containment vent system (HCVS). The HCVS must be able to remove decay heat from the containment and maintain control of containment pressure within acceptable limits following events that result in the loss of active containment heat removal capability. The HCVS must maintain the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP).

The Order requirements are applied in a phased approach where:

- "Phase 1 involves upgrading the venting capabilities from the containment wetwell to provide reliable, severe accident capable hardened containment vents to assist in preventing core damage and, if necessary, to provide containment venting capability during severe accident conditions." (Completed "no later than startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first.")
- "Phase 2 involves providing additional protections for severe accident conditions through installation of a reliable, severe accident capable drywell vent system or the development of a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions." (Completed "no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first.")

The NRC provided an acceptable approach for complying with Order EA-13-109 through Interim Staff Guidance (JLD-ISG-2013-02 issued in November 2013 and JLD-ISG-2015-01 issued in April 2015). The ISGs endorse the compliance approach presented in

NEI 13-02 Revisions 0 and 1, *Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents*, with clarifications. Except in those cases in which a licensee proposes an acceptable alternative method for complying with Order EA-13-109, the NRC staff will use the methods described in the ISGs to evaluate licensee compliance as presented in submittals required in Order EA-13-109.

The Order also requires submittal of an overall integrated plan which will provide a description of how the requirements of the Order will be achieved (Reference 8). Susquehanna submitted a Combined Phase 1 and Phase 2 Overall Integrated Plan (OIP) for complying with Order EA-13-109 using the methods described in NEI 13-02 and endorsed by NRC JLD-ISG-2013-02 and JLD-ISG-2015-01 (Reference 9).

Reference 1 requires submission of status reports at six-month intervals following submittal of the Combined Phase 1 and Phase 2 Overall Integrated Plan. References 2 and 4 provide direction regarding the content of the status reports. The purpose of this letter is to provide the fifth six-month status report pursuant to Section IV, Condition D, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed Status Report provides an update of milestone accomplishments since submittal of the Combined Phase 1 and Phase 2 Overall Integrated Plan and the fourth six-month status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

This letter contains no new regulatory commitments.

Should you have any questions regarding this submittal, please contact Mr. Jason Jennings, Manager – Nuclear Regulatory Affairs at (570) 542-3155.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 12/19/2016

T. S. Kausch



Enclosure: Susquehanna Nuclear, LLC's Fifth Six-Month Status Report in Response to 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)

cc: Director, Office of Nuclear Reactor Regulation
NRC Region I
Mr. Rajender Auluck, NRR/JLD/PSB, NRC
Mr. Brian Lee, NRR/JLD/JOMB, NRC
Mr. J. E. Greives, NRC Sr. Resident Inspector
Ms. T. E. Hood, NRC Project Manager
Mr. W. D. Reckley, NRR/JLD/PSB, NRC
Mr. M. Shields, PA DEP/BRP

Enclosure to PLA-7550

**Fifth Six-Month Status Report
In Response to 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)**

Susquehanna Nuclear, LLC's Fifth Six Month Status Report for the Implementation of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

1 Introduction

Susquehanna Nuclear, LLC developed an Overall Integrated Plan (Reference 1, all references mentioned in this enclosure are in Section 8 of this enclosure), documenting the installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2. This six month status report provides updates of milestone accomplishments based on the Combined Phase 1 and 2 Overall Integrated Plan dated December 23, 2015 (Reference 8) since submittal of the fourth six month status report (Reference 11).

Susquehanna Nuclear, LLC developed an updated and Combined Phase 1 and 2 Overall Integrated Plan (Reference 8 in Section 8), documenting:

1. The installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2.
2. An alternative venting strategy that makes it unlikely that a drywell vent is needed to protect the containment from overpressure related failure under severe accident conditions, including those that involve a breach of the reactor vessel by molten core debris, in response to Reference 2.

This Enclosure provides an update of milestone accomplishments since submittal of the fourth six month status report (Reference 11), including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any. The information in this update is current as of November 18, 2016.

2 Milestone Accomplishments

The following milestone(s) have been completed since the submittal of the fourth six month status report (Reference 11), and are current as of November 18, 2016.

- Unit 2 Phase 1 installation has started.
- Phase 2 Open Item # 2 was completed.

3 Milestone Schedule Status

The following provides an update to the Milestone Schedule presented in Part 5 of the Combined Phase 1 and 2 Overall Integrated Plan (Reference 8). It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

The revised milestone target completion dates do not impact the order implementation date.

Milestone	Target Completion Date	Activity Status	Comments {Include date changes in this column}
Phase 1 and 2 HCVS Milestone Table			
Submit Overall Integrated Plan	Jun 2014	Complete	
Submit 6 Month Updates:			
Update 1	Dec. 2014	Complete	
Update 2	Jun. 2015	Complete	
Update 3	Dec. 2015	Complete	Simultaneous with Phase 2 OIP
Update 4	Jun. 2016	Complete	
Update 5	Dec. 2016	Complete with this submittal	
Update 6	Jun. 2017	Not Started	
Update 7	Dec. 2017	Not Started	
Update 8	Jun. 2018	Not Started	
Update 9	Dec. 2018	Not Started	
Phase 1 Specific Milestones			
Phase 1 Modifications:			
Hold preliminary/conceptual design meeting	June 2014	Complete	
Unit 2 Design Engineering Complete	Apr. 2016	Complete	
Unit 2 Implementation Outage	Mar. 2017	Not Started	Non-outage installation scope has started.
Unit 2 Walk Through Demonstration/Functional Test	Apr. 2017	Not Started	
Unit 1 Design Engineering Complete	Mar. 2017	Started	
Unit 1 Implementation Outage	Mar. 2018	Not Started	
Unit 1 Walk Through Demonstration/Functional Test	Apr. 2018	Not Started	
Phase 1 Procedure Changes Active			
U2 Operations Procedure Changes Developed	Dec. 2016	Started	
U2 Maintenance Procedure Changes Developed	Dec. 2016	Started	
U2 Procedure Changes Active	Apr. 2017	Started	
U1 Operations Procedure Changes Developed	Dec. 2017	Not Started	
U1 Maintenance Procedure Developed	Dec. 2017	Not Started	
U1 Procedure Changes Active	Apr. 2018	Not Started	Changed from Mar. 2018 per outage schedule

Milestone	Target Completion Date	Activity Status	Comments {Include date changes in this column}
Phase 1 and 2 HCVS Milestone Table			
Phase 1 Training:			
U2 Training Complete	Apr. 2017	Not Started	
U1 Training Complete	Apr. 2018	Not Started	
Phase 1 Completion			
Unit 2 HCVS Implementation	Apr. 2017	Started	
Unit 1 HCVS Implementation	Apr. 2018	Started	
Full Site HCVS Implementation	Apr. 2018	Started	
Submit Phase 1 Completion Report	Jun. 2018	Not Started	60 days after Phase 1 compliance
Phase 2 Specific Milestones			
Phase 2 Modifications:			
Hold preliminary/conceptual design meeting	Oct. 2015	Complete	
Unit 1 Design Engineering On-site/Complete	Dec. 2016	Started	
Unit 1 Implementation Outage	Mar. 2018	Not Started	
Unit 1 Walk Through Demonstration/Functional Test	Apr. 2018	Not Started	
Unit 2 Design Engineering On-site/Complete	Dec. 2017	Started	
Unit 2 Implementation Outage	Mar. 2019	Not Started	
Unit 2 Walk Through Demonstration/Functional Test	Apr. 2019	Not Started	
Phase 2 Procedure Changes Active			
Unit 1 Operations Procedure Changes Developed	Apr. 2018	Not Started	
Unit 1 Maintenance Procedure Changes Developed	Apr. 2018	Not Started	
Unit 1 Procedure Changes Active	Apr. 2018	Not Started	
Unit 2 Operations Procedure Changes Developed	Apr. 2019	Not Started	
Unit 2 Maintenance Procedure Changes Developed	Apr. 2019	Not Started	
Unit 2 Procedure Changes Active	Apr. 2019	Not Started	
Phase 2 Training:			
U1 Training Complete	Apr. 2018	Not Started	
U2 Training Complete	Apr. 2019	Not Started	
Training Complete	Apr. 2019	Not Started	
Phase 2 Completion			
Unit 1 HCVS Implementation	Apr. 2018	Started	
Unit 2 HCVS Implementation	Apr. 2019	Started	

Milestone	Target Completion Date	Activity Status	Comments {Include date changes in this column}
Phase 1 and 2 HCVS Milestone Table			
Full Site HCVS Implementation	Apr. 2019	Started	
Submit Completion Report	Jun. 2019	Not Started	60 days after full site compliance

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the Combined Phase 1 and 2 Overall Integrated Plan (Reference 8).

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

Susquehanna Nuclear, LLC expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Combined Phase 1 and 2 Overall Integrated Plan and Interim Staff Evaluations

The following tables provide a summary of the open items documented in the Combined Phase 1 and 2 Overall Integrated Plan or the Interim Staff Evaluation (ISE) and the status of each item.

Combined Phase 1 and 2 OIP Open Item		Status
Phase 1 Open Items		
1	Confirm suppression pool heat capacity.	Complete
2	Deployment under severe accident conditions will be confirmed for the deployment of the FLEX generators credited to re-energize battery chargers.	Started
3	Deployment under severe accident conditions will be confirmed for deployment of the supplemental gas bottles.	Started
4	The gas supply will be sized to support HCVS operation for a minimum of 24 hours (a minimum of 8 valve cycles of valve operation is assumed, consistent with recommendations in HCVS-WP-02). This design assumption will require future validation in the design phase of this project.	Complete
5	An assessment of temperature and radiological conditions will be performed to ensure that operating personnel can safely access and operate controls at the remote operating station, based on time constraints listed in Attachment 2 of the Overall Integrated Plan.	Complete

Combined Phase 1 and 2 OIP Open Item		Status
6	Evaluate viable options to address Hydrogen detonation concerns in HCVS piping to meet the requirements of EA-13-109, Section 1.2.11 and incorporate in HCVS design. SSES will determine the method to be deployed once NRC review of HCVS-WP-03 is complete.	Complete
7	An evaluation will be performed to confirm the HCVS power supply can support HCVS operation for a minimum of 24 hours.	Complete
Phase 2 Open Items		
1	Revise EC-016-1043 to include simultaneous SAWA and FLEX case.	Complete
2	Ensure the SAWA flow instrument will operate in the conditions expected.	Complete

Phase 1 Interim Staff Evaluation Open Item		Comment	Status
1	Make available for NRC staff audit an evaluation that confirms that all load stripping to support HCVS operation can be accomplished within forty five minutes of event initiation.	Section 3.1.2	Complete
2	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	Complete
3	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	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	Complete

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.	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	Complete
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 below the primary containment design pressure and the primary containment pressure limit.	Section 3.2.2.1 Section 3.2.2.2	Complete
6	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Section 3.2.2.3	Started
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, electronic, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Section 3.2.2.3 Section 3.2.2.5 Section 3.2.2.9 Section 3.2.2.10	Started
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.	Section 3.2.2.5 Section 3.2.2.10	Started
9	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Section 3.2.2.6	Complete
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.	Section 3.2.2.6	Started
11	Provide a justification for deviating from the instrumentation seismic qualification guidance specified 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.	Section 3.2.2.9	Complete
12	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	Started

Phase 2 Interim Staff Evaluation Open Item		Comment	Status
	No final ISE Open Items have been provided by the NRC at this time.		

7 Interim Staff Evaluation Impacts

There are no potential impacts to the Interim Staff Evaluation(s) identified at this time.

8 References

The following references support the updates to the Combined Phase 1 and 2 Overall Integrated Plan described in this Enclosure.

1. PLA-7180, Susquehanna, LLC's 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 26, 2014.
2. NRC Order Number EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated June 6, 2013.
3. NEI 13-02, “Industry Guidance for Compliance with NRC Order EA-13-109, ‘To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,’ Revision 1, dated April 2015.
4. NRC Interim Staff Guidance JLD-ISG-2013-02, “Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” Revision 0, dated November 2013 (Accession No. ML13304B836).
5. NRC Endorsement of industry “Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109) Rev 0” (Accession No. ML14128A219).
6. PPL Letter (PLA-7269) T. S. Rausch (PPL Susquehanna, LLC) to U.S. NRC, “First Six-Month Status Report 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 23, 2014.
7. Susquehanna Letter (PLA-7345) T. S. Rausch (Susquehanna Nuclear, LLC) to U.S. NRC, “Second Six-Month Status Report 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 23, 2015.

8. Susquehanna Letter (PLA-7421), Susquehanna, LLC's Combined Phase 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 23, 2015. (Also the Third Six-Month Update.)
9. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 of 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 (Accession No. ML15104A118).
10. NRC Endorsement of industry "Hardened Containment Venting System (HCVS) Phase 1 and 2 Overall Integrated Plan Template," Revision 1, dated September 22, 2015, and Frequently Asked Questions (FAQs) 10, 11, 12, and 13 (Accession No. ML15273A141).
11. Susquehanna Letter (PLA-7488) T. S. Rausch (Susquehanna Nuclear, LLC) to U.S. NRC, "Fourth Six-Month Status Report 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, 2016.