



William R. Gideon  
Vice President  
Brunswick Nuclear Plant  
P.O. Box 10429  
Southport, NC 28461

o: 910.832.3698

May 29, 2018

Serial: BSEP RA-18-0017

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

Subject: Brunswick Steam Electric Plant (BSEP), Unit No. 1  
Renewed Facility Operating License Nos. DPR-71  
NRC Docket No. 50-325  
Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable  
Hardened Containment Vents Capable of Operation Under Severe Accident  
Conditions

References:

1. Nuclear Regulatory Commission (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, Agencywide Documents Access and Management System (ADAMS) Accession Number ML13143A321.
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 14, 2013, ADAMS Accession Number ML13304B836.
3. 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 30, 2015, ADAMS Accession Number ML15104A118.
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, ADAMS Accession Number ML15113B318.
5. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *Duke Energy's 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 17, 2013, ADAMS Accession Number ML13191A567.
6. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 26, 2014, ADAMS Accession Number ML14191A687.
7. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 17, 2014, ADAMS Accession Number ML14364A029.

8. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 25, 2015, ADAMS Accession Number ML15196A035.
9. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 11, 2015, ADAMS Accession Number ML16020A064.
10. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 28, 2016, ADAMS Accession Number ML16190A111.
11. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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)*, dated December 15, 2016, ADAMS Accession Number ML16365A007.
12. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *Sixth 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 19, 2017, ADAMS Accession Number ML17171A383.
13. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *Seventh 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 20, 2017, ADAMS Accession Number ML17354A248.
14. NRC Letter, *Brunswick Steam Electric Plant, 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. MF4467 and MF4468)*, dated March 10, 2015, ADAMS Accession Number ML15049A266.
15. NRC Letter, *Brunswick Steam Electric Plant, 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) (CAC Nos. MF4467 and MF4468)*, dated August 17, 2016, ADAMS Accession Number ML16223A725.
16. NRC Letter, *Brunswick Steam Electric Plant, 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. MF4467 and MF4468; EPID L-2014-JLD-0041)*, dated March 22, 2018, ADAMS Accession Number ML18068A627.

Ladies and Gentlemen:

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued 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* (i.e., Reference 1) to Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. Reference 1 was immediately effective and directed all boiling water reactors (BWRs) with Mark I and Mark II containments to take certain actions to ensure that these facilities have a hardened containment venting system (HCVS) to support strategies for controlling containment pressure and preventing core damage following an event that causes a loss of heat removal systems, such as an Extended Loss of AC Power (ELAP), while ensuring the venting functions are also available during severe accident (SA) conditions. BSEP, Unit Nos. 1 and 2, have Mark I containments. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an Overall Integrated Plan (OIP) by June 30, 2014, for Phase 1 of the Order, and by December 31, 2015, for Phase 2 of the Order. The interim staff guidance (i.e., References 2 and 3) provided direction regarding the content of the OIP for Phase 1 and Phase 2. Reference 4 endorsed industry guidance document NEI 13-02, Revision 1 with clarifications and exceptions identified in Reference 3. Reference 5 provided the Duke Energy initial status report. Reference 6 provided the BSEP, Units 1 and 2, Phase 1 OIP.

References 7, 8, 9, 10, 11, 12 and 13 provided the first, second, third, fourth, fifth, sixth, and seventh six-month status reports pursuant to Section IV, Condition D.3 of Reference 1 for BSEP, Units 1 and 2, respectively. Reference 9 and the six-month status reports thereafter, included both the six-month status report for Phase 1 of the Order pursuant to Section IV, Condition D.3, of Reference 1, and Phase 2 of the Order pursuant to Section IV, Condition D.2 of Reference 1, for BSEP, Units 1 and 2, in a combined Phase 1 and Phase 2 OIP.

References 14 and 15 provide the NRC Interim Staff Evaluations relating to the Phase 1 OIP and Phase 2 OIP, respectively. Reference 16 provides the NRC Report for the Audit of Licensee Responses to Interim Staff Evaluations Open Items Related to NRC Order EA-13-109.

The purpose of this letter is to provide the notification required by Item IV.D.4 of Order EA-13-109 that full compliance (i.e., Phase 1 and Phase 2) with the requirements described in Attachment 2 of the Order has been achieved for BSEP, Unit No. 1.

This letter contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Lee Grzeck, Manager - Regulatory Affairs, at (910) 832-2487.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 29, 2018.

Sincerely,



William R. Gideon

Enclosure:

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

cc (with enclosure):

U.S. Nuclear Regulatory Commission, Region II  
ATTN: Ms. Catherine Haney, Regional Administrator  
245 Peachtree Center Ave, NE, Suite 1200  
Atlanta, GA 30303-1257

U.S. Nuclear Regulatory Commission  
ATTN: Mr. Dennis Galvin (Mail Stop OWFN 8B1A)  
11555 Rockville Pike  
Rockville, MD 20852-2738

U.S. Nuclear Regulatory Commission  
ATTN: Mr. Peter Bamford (Mail Stop OWFN 8B3)  
11555 Rockville Pike  
Rockville, MD 20852-2738

U.S. Nuclear Regulatory Commission  
ATTN: Mr. Gale Smith, NRC Senior Resident Inspector  
8470 River Road  
Southport, NC 28461-8869

Chair - North Carolina Utilities Commission (**Electronic Copy Only**)  
P.O. Box 29510  
Raleigh, NC 27626-0510

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

## 1 Introduction

Note: References are provided in Section 6 of this enclosure.

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued 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 (i.e., Reference 1) to Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. Reference 1 was immediately effective and directed all boiling water reactors (BWRs) with Mark I and Mark II containments to take certain actions to ensure that these facilities have a hardened containment venting system (HCVS) to support strategies for controlling containment pressure and preventing core damage following an event that causes a loss of heat removal systems, such as an Extended Loss of AC Power (ELAP), while ensuring the venting functions are also available during severe accident (SA) conditions. BSEP, Unit Nos. 1 and 2, have Mark I containments. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an Overall Integrated Plan (OIP) by June 30, 2014, for Phase 1 of the Order, and by December 31, 2015, for Phase 2 of the Order. The interim staff guidance (i.e., References 2 and 3) provided direction regarding the content of the OIP for Phase 1 and Phase 2. Reference 4 endorsed industry guidance document NEI 13-02, Revision 1 with clarifications and exceptions identified in Reference 3. Reference 5 provided the Duke Energy initial status report. Reference 6 provided the BSEP, Units 1 and 2, Phase 1 OIP. Reference 9 provided the BSEP, Units 1 and 2, Phase 2 OIP.

References 7, 8, 9, 10, 11, 12 and 13 provided the first, second, third, fourth, fifth, sixth, and seventh six-month status reports pursuant to Section IV, Condition D.3 of Reference 1 for BSEP, Units 1 and 2, respectively. Reference 9 and the six-month status reports thereafter, included the six-month status report for Phase 1 of the Order pursuant to Section IV, Condition D.3, of Reference 1, and Phase 2 of the Order pursuant to Section IV, Condition D.2 of Reference 1, for BSEP, Units 1 and 2, in a combined Phase 1 and Phase 2 OIP.

References 14 and 15 provided the NRC Interim Staff Evaluation relating to the OIP in response to Phase 1, and Phase 2, respectively. Reference 16 provided the NRC Report for the Audit of Licensee Responses to Interim Staff Evaluations Open Items Related to NRC Order EA-13-109.

The information provided herein, as well as the implementation of the OIP (i.e., Phase 1 in Reference 5 and Phase 2 in Reference 6), documents full compliance for the BSEP, Unit No. 1 in response to NRC Order EA-13-109 (i.e., Reference 2).

## 2 Milestone Accomplishments

- The BSEP Unit No. 1, Phase 1 Overall Integrated Plan Milestones are complete.
- The BSEP Unit No. 1, Phase 2 Overall Integrated Plan Milestones are complete.

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

Phase 1 Milestone Schedule	Target Completion Date	Activity Status	Comments and Date Changes
Hold preliminary/conceptual design meeting.	Jun. 2014	Complete	Date not revised.
Submit Overall Integrated Plan. (i.e., Reference 6)	Jun. 2014	Complete	Date not revised.
Submit (first) 6 Month Status Report. (i.e., Reference 7)	Dec. 2014	Complete	Date not revised.
Submit (second) 6 Month Status Report. (i.e., Reference 8)	Jun. 2015	Complete	Date not revised.
Submit (third) 6-Month Status Report. (i.e., Reference 9)	Dec. 2015	Complete	Simultaneous with Phase 2 OIP.
Submit (fourth) 6-Month Status Report. (i.e., Reference 10)	Jun. 2016	Complete	Date not revised.
Operations Procedure Changes Developed.	Dec. 2017	Complete	Date not revised.
Site Specific Maintenance Procedure Developed.	Jan. 2017	Complete	Date not revised.
Submit (fifth) 6-Month Status Report. (i.e., Reference 11)	Dec. 2016	Complete	Date not revised.
Training Complete.	Nov. 2016	Complete	Date not revised.
Procedure Changes Active.	Mar. 2017	Complete	Date not revised.
U1 Design Engineering On-site/Complete.	Mar. 2017	Complete	Date not revised.
Submit (sixth) 6-Month Status Report. (i.e., Reference 12)	Jun. 2017	Complete	Date not revised.
Submit (seventh) 6-Month Status Report. (i.e., Reference 13)	Dec. 2017	Complete	Date not revised.
U1 Implementation Outage.	Feb. 2018	Complete	Date not revised.
U1 Walk Through Demonstration/Functional Test.	Mar. 2018	Complete	Date not revised.
Submit Completion Report.	May 2018	Complete	Date not revised.

Phase 2 Milestone Schedule	Target Completion Date	Activity Status	Comments and Date Changes
Hold preliminary/conceptual design meeting.	Oct. 2015	Complete	Date not revised.
Submit Overall Integrated Implementation Plan. (i.e., Reference 9)	Dec. 2015	Complete	Third 6-month update added Phase 2 OIP.
Submit (fourth) 6-Month Status Report. (i.e., Reference 10)	Jun. 2016	Complete	Date not revised.
Submit (fifth) 6-Month Status Report. (i.e., Reference 11)	Dec. 2016	Complete	Date not revised.
Submit (sixth) 6-Month Status Report. (i.e., Reference 12)	Jun. 2017	Complete	Date not revised.
U1 Design Engineering On-site/Complete.	Mar. 2017	Complete	Date not revised.
Submit (seventh) 6-Month Status Report. (i.e., Reference 13)	Dec. 2017	Complete	Date not revised.
Operations Procedure Changes Developed.	Mar. 2018	Complete	Date not revised.
Site Specific Maintenance Procedure Developed.	Mar. 2018	Complete	Date not revised.
Training Complete.	Feb. 2018	Complete	Date not revised.
U1 Implementation Outage.	Mar. 2018	Complete	Date not revised.
Procedure Changes Active.	Mar. 2018	Complete	Date not revised.
U1 Walk Through Demonstration/Functional Test.	Jan. 2018	Complete	Date not revised.
Submit Completion Report.	May 2018	Complete	Date not revised.

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

**3 Open Items from Phase 1 Overall Integrated Plan and Phase 1 Interim Staff Evaluation**

Phase 1 Open Items were identified in the Phase 1 OIP (i.e., Reference 6) and in the NRC Phase 1 Interim Staff Evaluation (ISE) (i.e., Reference 14). The following tables (Table 6a provides the Phase 1 OIP Open Items, and Table 6b provides the Phase 1 ISE Open Items) provide completion references and a summary of the closure action for Open Items not previously completed.

<b>Table 6a - Overall Integrated Plan Open Items</b>		
#	Open Item	Status
1	Evaluate, design, and implement missile protection as required for the HCVS piping external to the reactor building.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (ADAMS Accession No. ML16365A007) (i.e., Reference 11).	
2	Finalize location of the Remote Operating Station (ROS).	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11).	
3	Finalize and design means to address flammable gases in the HCVS.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11).	
4	Evaluate location of FLEX DG for accessibility under Severe Accident conditions.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11).	
5	Develop procedures for BDBEE and severe accident vent operation (i.e., load shedding, power supply transfer, and vent valve operation from the Main Control Room and ROS), vent support functions for sustained operation and portable equipment deployment (FLEX DG supply to the 24/48 VDC battery system, and makeup to the nitrogen backup system).	Complete
	Information provided in the December 2017 Six-Month Status Report by letter dated December 20, 2017 (i.e., ADAMS Accession No. ML17354A248) (i.e., Reference 11).	
6	Confirm suppression pool heat capacity. Initial results from GE report 0000-0165-0656-R0 for BSEP indicate the suppression pool reaches the heat capacity temperature limit (HCTL) in 2.11 hours.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11).	
7	Finalize location of supplemental N2 bottle connection.	Deleted
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11).	
8	Establish programs and processes for control of HCVS equipment functionality, out-of-service time, and testing.	Complete
	Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383)(i.e., Reference 12).	
9	Confirm Wetwell vent capacity is sufficient at the containment design pressure (62 psig). Existing calculation 0D12-0009 calculates a wetwell vent capacity at the primary	Complete

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

Table 6a - Overall Integrated Plan Open Items		
#	Open Item	Status
	containment pressure limit (PCPL, 70 psig).	
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11).	

Table 6b – Phase 1 Interim Staff Evaluation Open Items (Phase 1)		
#	Open Item	Status
1	Make available for NRC staff audit the site-specific controlling document for HCVS out of service and compensatory measures.	Complete
	Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	
2	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 (i.e., 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.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	
3	Make available for NRC staff audit confirmation of the time it takes the suppression pool to reach the heat capacity temperature limit during ELAP with RCIC in operation.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	
4	Make available for NRC staff audit a description of the final ROS location.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	
5	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and the HCVS decision makers during ELAP and severe accident conditions.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e.,	



Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

<b>Table 6b – Phase 1 Interim Staff Evaluation Open Items (Phase 1)</b>		
#	Open Item	Status
	ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
6	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
7	Make available for NRC staff audit seismic and tornado missile final design criteria for the HCVS stack.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
8	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
9	Make available for NRC staff audit documentation of HCVS incorporation into the FLEX diesel generator loading calculation.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
10	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate control and support equipment.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Open per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b> <b><i>BSEP performed a radiation dose calculation EC 412141 "Integrated Dose Calculation for Hardened Vent Remote Operating Station (ROS) - Fukushima" which shows the integrated radiation dose due to HCVS operation will not inhibit operator actions needed to initiate and operate the HCVS during an ELAP with severe accident conditions. The integrated dose calculation is provided on the eportal for</i></b>	

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

<b>Table 6b – Phase 1 Interim Staff Evaluation Open Items (Phase 1)</b>		
#	Open Item	Status
	<b><i>NRC review. BSEP considers this item Closed.</i></b>	
11	Make available for NRC staff audit descriptions of all instrumentation and controls (i.e., existing and planned) necessary to implement this order including qualification methods.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
12	Clarify whether the seismic reliability demonstration of instruments, including valve position indication, vent pipe temperature instrumentation, radiation monitoring, and support system monitoring will (be) via methods that predict performance described in IEEE-344-2004 or provide justification for using a different revision of the standard.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
13	Make available for NRC staff audit a justification for not monitoring HCVS system pressure as described in NEI 13-02.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b>	
14	Make available for NRC staff audit the descriptions of local conditions (i.e., temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (e.g., 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.	Complete (FIP)
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b><i>Pending per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b> <b><i>The NRC staff reviewed the table provided on the eportal. The staff anticipates a similar table in the Final Integrated Plan (FIP) (i.e., on the docket) to close the item. The FIP will be provided with the Unit 2 Closeout (i.e., both Units closeout) submittal after completion of Unit 2 Phase 2 HCVS in March 2019.</i></b>	
15	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.	Complete
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e.,	

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

Table 6b – Phase 1 Interim Staff Evaluation Open Items (Phase 1)		
#	Open Item	Status
	ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	
16	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
	Information provided in the December 2016 Six-Month Status Report by letter dated December 15, 2016 (i.e., ADAMS Accession No. ML16365A007) (i.e., Reference 11). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	

#### 4 Open Items from Phase 2 Overall Integrated Plan and Phase 2 Interim Staff Evaluation

There were no open items reported in the Phase 2 OIP (i.e., Reference 9). The Phase 2 NRC Interim Staff Evaluation (ISE) Open Items (i.e., Reference 15) are addressed and documented in subsequent Order EA-13-109 six-month status reports and are considered complete pending NRC closure. Table 7 provides completion references for each ISE Phase 2 Open Item and a summary of the closure action for Open Items not previously completed.

Table 7 – Interim Staff Evaluation Phase 2 Open Items		
#	Open Item	Status
1	Licensee to confirm through analysis, the temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Complete
	Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12). <b>Open per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16).</b> <b>See Phase 1 Open Item #10 response.</b>	
2	Licensee to provide the site-specific MAAP evaluation that establishes the initial SAWA flow rate.	Complete
	Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12). <b>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</b>	
3	Licensee to demonstrate how instrumentation and equipment being used for SAWA and supporting equipment is capable to perform for the sustained operating period under the expected temperature and radiological conditions.	Complete (FIP)

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

Table 7 – Interim Staff Evaluation Phase 2 Open Items		
#	Open Item	Status
	<p>Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12).</p> <p><b><i>Pending per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b></p> <p><b><i>The NRC staff reviewed the SAWA flow instrument qualifications for temperature and radiation. The staff anticipates a table in the Final Integrated Plan (FIP) (i.e., on the docket) to close the item. The (FIP will be provided with the Unit 2 Closeout (i.e., both Units closeout) submittal after completion of Unit 2 Phase 2 HCVS in March 2019.</i></b></p>	
4	Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions.	Complete
	<p>Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12).</p> <p><b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b></p>	
5	Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX pump during severe accident conditions.	Complete
	<p>Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12).</p> <p><b><i>Closed per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b></p>	
6	Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions.	Complete (FIP)
	<p>Information provided in the June 2017 Six-Month Status Report by letter dated June 19, 2017 (i.e., ADAMS Accession No. ML17171A383) (i.e., Reference 12).</p> <p><b><i>Pending per NRC Audit Report of ISE Open Item Responses by letter dated March 22, 2018 (i.e., ADAMS Accession No. ML18068A627) (i.e., Reference 16)</i></b></p> <p><b><i>The NRC staff reviewed the SAWA flow instrument qualifications for temperature and radiation. The staff anticipates a table in the FIP (on the docket) to close the item. The Final Integrated Plan (FIP) will be provided with the Unit 2 Closeout (i.e., both Units closeout) submittal after completion of Unit 2 Phase 2 HCVS in March 2019.</i></b></p>	

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

## **5 Order EA-13-109 Compliance Elements Summary**

The elements identified below for BSEP Unit No. 1 as well as the HCVS Phase 1 and Phase 2 OIP (i.e., Reference 9), the 6-Month Status Reports (i.e., References 10-13) demonstrate compliance with Order EA-13-109.

### **HCVS Phase 1 and Phase 2 Functional Requirements and Design Features – Complete**

The BSEP Unit No. 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 BSEP Unit No. 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 BSEP Unit No. 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 BSEP Unit No. 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 BSEP Unit No. 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 BSEP Unit No. 1 comply 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 Programmable Features – Complete**

Storage of portable equipment for BSEP Unit No. 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.

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

Training in the use of the Phase 1 and Phase 2 HCVS for BSEP Unit No. 1 has been completed in accordance with an accepted training process as recommended in NEI 13-02, Revision 1, Section 6.1.3.

Operating procedures for BSEP Unit No. 1 have been developed and integrated with existing procedures to ensure safe operation of the Phase 1 and Phase 2 HCVS. Operating procedures have been verified and are available for use in accordance with the site procedure control program. Maintenance procedures that are needed in the short-term have been developed. Procedures that will be needed in the future are scheduled to be developed in accordance with station processes and will be issued prior to their first scheduled use.

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 6.1.2 and 6.2.

BSEP Unit No. 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 Phase 1 and 2 OIP for Order EA-13-109 (i.e., References 6 and 9).

BSEP Unit No. 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.

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

## 6 References

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

1. Nuclear Regulatory Commission (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, Agencywide Documents Access and Management System (ADAMS) Accession Number ML13143A321.
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 14, 2013, ADAMS Accession Number ML13304B836.
3. 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 30, 2015, ADAMS Accession Number ML15104A118.
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, ADAMS Accession Number ML15113B318.
5. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *Duke Energy's 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 17, 2013, ADAMS Accession Number ML13191A567.
6. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 26, 2014, ADAMS Accession Number ML14191A687.
7. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 17, 2014, ADAMS Accession Number ML14364A029.
8. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 25, 2015, ADAMS Accession Number ML15196A035.
9. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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 11, 2015, ADAMS Accession Number ML16020A064.

Brunswick Steam Electric Plant (BSEP), Unit No. 1, Completion of Required Action for NRC Order EA-13-109, Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

10. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, 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 28, 2016, ADAMS Accession Number ML16190A111.
11. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *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)*, dated December 15, 2016, ADAMS Accession Number ML16365A007.
12. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *Sixth 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 19, 2017, ADAMS Accession Number ML17171A383.
13. Duke Energy Letter, BSEP, Unit Nos. 1 and 2, *Seventh 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 20, 2017, ADAMS Accession Number ML17354A248.
14. NRC Letter, *Brunswick Steam Electric Plant, 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. MF4467 and MF4468)*, dated March 10, 2015, ADAMS Accession Number ML15049A266.
15. NRC Letter, *Brunswick Steam Electric Plant, 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) (CAC Nos. MF4467 and MF4468)*, dated August 17, 2016, ADAMS Accession Number ML16223A725.
16. NRC Letter, *Brunswick Steam Electric Plant, 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. MF4467 and MF4468; EPID L-2014-JLD-0041)*, dated March 22, 2018, ADAMS Accession Number ML18068A627.