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June 28, 2016

Serial: BSEP 16-0042

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

Subject: Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
NRC Docket Nos. 50-325 and 50-324
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)

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.

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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. 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.
11. Letter from Jack R. Davis, Office of Nuclear Reactor Regulation, to Joseph E. Pollock, Nuclear Energy Institute, Endorsement of the document entitled *Hardened Containment Venting System (HCVS) Phase 1 and 2 Overall Integrated Plan Template,* Revision 1, dated October 8, 2015, ADAMS Accession Number ML15271A148.
12. Nuclear Energy Institute Document entitled *Hardened Containment Venting System (HCVS) Phase 1 and 2 Overall Integrated Plan Template,* Revision 1, dated September 22, 2015, ADAMS Accession Number ML15272A336.

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 directs 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 requires submission of an Overall Integrated Plan (OIP) by June 30, 2014, for Phase 1 of the Order, and an OIP by December 31, 2015, for Phase 2 of the Order. The interim staff guidance (i.e., References 2 and 3) provides direction regarding the content of the OIP for Phase 1 and Phase 2. Reference 3 endorses industry guidance document NEI 13-02, Revision 1 (i.e., Reference 4), with clarifications and exceptions identified in Reference 3. Reference 5 provided the Duke Energy initial status report regarding reliable hardened containment vents capable of operation under severe accident conditions. Reference 6 provided the BSEP, Units 1 and 2, Phase 1 OIP. References 7 and 8 provided the first and second six-month status reports pursuant to Section IV, Condition D.3 of Reference 1 for BSEP, Units 1 and 2, respectively.

Reference 9 provided both the third six-month status report for Phase 1 of the Order pursuant to Section IV, Condition D.3, of Reference 1, and the OIP for Phase 2 of the Order pursuant to Section IV, Condition D.2 of Reference 1, for BSEP, Units 1 and 2. The third six-month status report for Phase 1 of the Order is incorporated into the HCVS Phase 1 and Phase 2 OIP document, which provides a complete updated Phase 1 OIP, a list of the Phase 1 OIP open items, and addresses the NRC Interim Staff Evaluation open items for Phase 1 contained in Reference 10. This six-month status report, and any subsequent reports, will provide the updates for both Phase 1 and Phase 2 OIP implementation in a single status report.

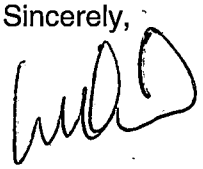
The purpose of this letter is to provide the fourth six-month status report pursuant to Section IV, Condition D.3 of Reference 1 for BSEP, Units 1 and 2.

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) 457-2487.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on June 28, 2016.

Sincerely,



William R. Gideon

Enclosure:
Brunswick Steam Electric Plant (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)

cc (with enclosure):

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BSEP 16-0042 Enclosure

Brunswick Steam Electric Plant (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)

Brunswick Steam Electric Plant (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)

## 1 Introduction

Note: References are provided in Section 8 of this enclosure.

Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2, developed an Overall Integrated Plan (OIP) (i.e., Reference 1) documenting the installation of a Hardened Containment Vent System (HCVS) in response to NRC Order EA-13-109 (i.e., Reference 2). The OIP was submitted to the NRC on June 6, 2014. The first six-month status report was submitted to the NRC on December 17, 2014 (i.e., Reference 4). The second six-month status report was submitted to the NRC on June 25, 2015 (i.e., Reference 5). The third six-month update was submitted to the NRC on August 28, 2014 (i.e., Reference 6). Reference 6 provided both the third six-month status report for Phase 1 of the Order and the OIP for Phase 2 of the Order, for BSEP, Units 1 and 2.

This enclosure provides an update of milestone accomplishments including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any, for both Phase 1 and Phase 2 OIP implementation that occurred during the period between November 30, 2015, and May 31, 2016, hereafter referred to as the update period.

## 2 Milestone Accomplishments

The following milestones were completed during the update period:

- Submit 6-Month Status Report (Phase 1)
- Submit Overall Integrated Implementation Plan (Phase 2).

## 3 Milestone Schedule Status

The following provides an update to the Milestone Schedule of the OIP. 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.

| Phase 1 Milestone Schedule | Target Completion Date | Activity Status | Comments and Date Changes |
|---|---|---|---|
| **Indicates a change since last 6-month update* | | | |
| Hold preliminary/conceptual design meeting. | Jun. 2014 | Complete | |
| Submit Overall Integrated Plan. | Jun. 2014 | Complete | |
| Submit 6 Month Status Report. | Dec. 2014 | Complete | |

Brunswick Steam Electric Plant (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)

| Phase 1 Milestone Schedule | Target Completion Date | Activity Status | Comments and Date Changes |
|---|---|---|---|
| **Indicates a change since last 6-month update* | | | |
| Submit 6 Month Status Report. | Jun. 2015 | Complete | |
| Submit 6-Month Status Report. | Dec. 2015 | Complete | Simultaneous with Phase 2 OIP. |
| U2 Design Engineering On-site/Complete. | ***Jun. 2016** | Started | ***Date change from Mar. 2016 to Jun. 2016.** |
| ***Storage Plan.** | ***Dec. 2016** | ***Started** | ***New milestone.** |
| ***Staffing analysis completion.** | ***Dec. 2016** | ***Started** | ***New milestone.** |
| ***Long term use equipment acquisition timeline.** | ***Dec. 2016** | ***Started** | ***New milestone.** |
| Submit 6-Month Status Report. | Jun. 2016 | ***Started** | |
| Operations Procedure Changes Developed. | Dec. 2016 | ***Started** | |
| Site Specific Maintenance Procedure Developed. | Dec. 2016 | ***Started** | |
| Submit 6-Month Status Report. | Dec. 2016 | Not Started | |
| Training Complete. | Feb. 2017 | ***Started** | |
| U2 Implementation Outage. | ***Mar. 2017** | Not Started | ***Date change from Feb. 2017 to Mar. 2017.** |
| Procedure Changes Active. | Mar. 2017 | Not Started | |
| U2 Walk Through Demonstration/Functional Test. | Mar. 2017 | Not Started | |
| U1 Design Engineering On-site/Complete. | Mar. 2017 | Not Started | |
| Submit 6-Month Status Report. | Jun. 2017 | Not Started | |
| Submit 6-Month Status Report. | Dec. 2017 | Not Started | |
| U1 Implementation Outage. | Feb. 2018 | Not Started | |
| U1 Walk Through Demonstration/Functional Test. | Mar. 2018 | Not Started | |
| Submit Completion Report. | May 2018 | Not Started | |

Brunswick Steam Electric Plant (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)

| Phase 2 Milestone Schedule | Target Completion Date | Activity Status | Comments and Date Changes |
|---|---|---|---|
| *Indicates a change since last 6-month update | | | |
| Hold preliminary/conceptual design meeting. | Oct. 2015 | Complete | |
| Submit Overall Integrated Implementation Plan. | Dec. 2015 | *Complete | *Third 6-month update included Phase 2 OIP (Reference 6). |
| Submit 6-Month Status Report. | Jun. 2016 | *Started | |
| Submit 6-Month Status Report. | Dec. 2016 | Not Started | |
| Submit 6-Month Status Report. | Jun. 2017 | Not Started | |
| U1 Design Engineering On-site/Complete. | Mar. 2017 | Not Started | |
| Submit 6-Month Status Report. | Dec. 2017 | Not Started | |
| Operations Procedure Changes Developed. | *Dec. 2017 | *Started | *Date change from Sep. 2017 to Dec. 2017. |
| Site Specific Maintenance Procedure Developed. | *Dec. 2017 | Not Started | *Date change from Sep. 2017 to Dec. 2017. |
| Training Complete. | *Feb. 2018 | Not Started | *Date change from Dec. 2017 to Feb. 2018. |
| U1 Implementation Outage. | Mar. 2018 | Not Started | |
| Procedure Changes Active. | Mar. 2018 | Not Started | |
| U1 Walk Through Demonstration/Functional Test. | Mar. 2018 | Not Started | |
| U2 Design Engineering On-site/Complete. | Mar. 2018 | Not Started | |
| Submit 6-Month Status Report. | Jun. 2018 | Not Started | |
| Submit 6- Month Status Report. | Dec. 2018 | Not Started | |
| U2 Implementation Outage. | Mar. 2019 | Not Started | |
| U2 Walk Through Demonstration/Functional Test. | Mar. 2019 | Not Started | |
| Submit Completion Report. | July 2019 | Not Started | |

Brunswick Steam Electric Plant (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)

## 4 Changes to Compliance Method

The following summarizes changes to the compliance method as documented in the Phase 1 OIP (i.e., Reference 1). No changes to the Phase 2 OIP (i.e., Reference 6) have been made.

**Change - Electrical Design**

a. Removed the 120 VAC HCVS inverter and power panels as well as the divisional panels. All power for HCVS support will be 24 VDC directly from a 24 VDC station battery.

b. The HCVS power transfer switches previously on separate power panels will be moved to the same panel as the existing HCVS Radiation Monitor in the Main Control Room (MCR) back-panel area. The HCVS pipe temperature test jack and the 24VDC battery voltage indicator will also be located on the same panel as the Radiation Monitor.

c. Changed HCVS Radiation Monitor to 24 VDC input power to match the battery 24 VDC voltage due to elimination of the inverter.

d. Removing the inverter also removes backup power to the valve solenoids. The Remote Operating Station (ROS) pneumatic station remains capable of opening the CAC-V7 and CAC-V216 without any electrical power.

e. Placed test jacks on the HCVS valve cabinet to allow reading CAC-V7 and CAC-V216 limit switches with a handheld meter since the valve circuit may not have power for the position lights.

Justification

a. This change simplifies the operator actions in that no load stripping or actions in the battery room are required to assure 24 hours electrical power supply without makeup.

b. This change simplifies the operator actions in that they are not required to enter the locked computer room nor go to the battery rooms to perform any actions as all equipment (except for the ROS) is in the MCR back-panel area.

c. This change matches the new Radiation Monitor to the electrical power supplied by the 24 VDC battery.

d. This change simplifies maintenance and enhances reliability by eliminating the inverter and additional electrical panels that were required. It also reduces the load on the 24 VDC battery supplying HCVS components, thereby adding margin to its 24-hour capacity requirement.

e. The valve position lights are powered from the same circuit as the valve solenoids. Since the solenoid circuit will not be provided with backup power, this change restores the

operators' ability to determine CAC-V7 and CAC-V216 valve position using a handheld meter and test jacks on the HCVS valve cabinet without having to open any cabinets or determine any terminal points.

Documentation

- Engineering Change (EC) 290407

**Change - Mechanical Design**

a. Moved the HCVS check valve from above to below the Reactor Building roof, still near the end of the pipe and within HCVS-WP-03, Hydrogen/Carbon Monoxide Control Measures, guidance.

b. Provided test connections on the refueling floor for testing the check valve and the HCVS pipe integrity.

Justification

a. This change simplifies the seismic design in that the check valve is not above the building, but is inside near existing supports.

b. This change simplifies testing and makes it safer in that operators are not required to go to the Reactor Building roof to perform periodic testing, but can perform periodic testing from the refueling floor with no scaffold or ladders required.

Documentation

- Engineering Change (EC) 290408

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

There are no changes to the need for relief/relaxation during this fourth update period. BSEP expects to comply with the order implementation date.

## 6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

Tables 6a and 6b provide a summary status of Open Items. Table 6a provides the open items that were previously identified in the original OIP (i.e., Reference 1) submitted on June 6, 2014. Table 6b provides the open items that were previously identified in the Phase 1 Interim Staff Evaluation (ISE) (i.e., Reference 3). No new open items are identified or added during this update period.

Brunswick Steam Electric Plant (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)

Table 6a. Phase 1 Overall Integrated Plan Open Items

| Table 6a - Overall Integrated Plan Open Items | | |
|---|---|---|
| **#** | **Open Item** | **Status** |
| ***Indicates a change since last 6-month update** | | |
| 1e | Evaluate, design, and implement missile protection as required for the HCVS piping external to the reactor building. | ***Complete.** |
| | ***Evaluation of the pipe robustness was performed in EC 299559 Attachment Z01R0. This evaluation concluded that the pipe is robust with respect to all applicable hazards including wind-borne missiles. This evaluation was submitted as part of the response to order EA-12-049. The staff's review of this evaluation was documented in Reference 7, paragraph 3.4, stating that the analogous open item for EA-12-049 was closed. As part of the additional modifications being performed for EA-13-109, the piping modifications are being designed to two times the safe shutdown seismic acceleration (2XSSE).** | |
| 2 | Finalize location of the Remote Operating Station (ROS). | ***Started.** |
| 3 | Finalize and design means to address flammable gases in the HCVS. | ***Started.** |
| 4 | Evaluate location of FLEX DG for accessibility under Severe Accident conditions. | ***Started.** |
| 5 | Develop procedures for BDBEE and severe accident vent operation (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 24/48VDC battery system, and makeup to the nitrogen backup system). 24/48VDC | ***Started.** |
| 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.** |
| | ***Calculation BNP-MECH-FLEX-0002 demonstrates that, with RCIC in operation per approved BSEP procedures, HCTL will be reached in about 3.2 hours. This is based on an RPV pressure of 300 psig which is the high end of the range operators maintain during an ELAP with RCIC in operation.** | |
| 7 | Finalize location of supplemental N2 bottle connection. | ***Deleted.** |
| | ***The FLEX air compressor will be used for pneumatic makeup per the OIP revision. The FLEX air compressors are connected to the backup nitrogen system for long-** | |

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| Table 6a - Overall Integrated Plan Open Items | | |
|---|---|---|
| **#** | **Open Item** | **Status** |
| ***Indicates a change since last 6-month update** | | |
| | ***term makeup for pneumatics. The FLEX primary and alternate makeup connection locations were evaluated to be robust with respect to the external hazards as part of EA-12-049 response and were found acceptable. The primary connection point will be evaluated for personnel access during a severe accident. The FLEX air compressor has adequate pressure and capacity to supply the HCVS valves and the FLEX strategy includes equipment refueling procedures for sustained (long-term) equipment operation.*** | |
| 8 | Establish programs and processes for control of HCVS equipment functionality, out-of-service time, and testing. | ***Started.** |
| 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 containment pressure limit (PCPL, 70 psig). | ***Started.** |

Table 6b. Interim Staff Evaluation Open Items (Phase 1)

| Table 6b - Interim Staff Evaluation Open Items (Phase 1) | | |
|---|---|---|
| **#** | **Open Item** | **Status** |
| ***Indicates a change since last 6-month update** | | |
| 1 | Make available for NRC staff audit the site specific controlling document for HCVS out of service and compensatory measures. | ***Started.** |
| 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 (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. | ***Started.** |
| 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** |

Brunswick Steam Electric Plant (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)

| Table 6b - Interim Staff Evaluation Open Items (Phase 1) | | |
|---|---|---|
| **#** | **Open Item** | **Status** |
| ***Indicates a change since last 6-month update*** | | |
| | ***Calculation BNP-MECH-FLEX-0002 demonstrates that with RCIC in operation per approved BSEP procedures, HCTL will be reached in about 3.2 hours. This is based on an RPV pressure of 300 psig which is the high end of the range operators maintain during an ELAP with RCIC in operation.*** | |
| 4 | Make available for NRC staff audit a description of the final ROS location. | ***Started.*** |
| 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.*** |
| | ***BSEP primarily utilizes an 800 MHz radio system consisting of 500 hand-held radios for onsite communications. These radios are stored in reasonably protected buildings, including the FLEX Storage Building, to meet the requirements of EA-12-049. This information was provided In response to NTTF Recommendation 9.3, via Duke Energy Letter dated February 22, 2013, Carolina Power & Light Company's and Florida Power Corporation's Response to Follow-Up Letter on Technical Issues for Resolution Regarding Licensee Communication Submittals Associated With Near-Term Task Force Recommendation 9.3 (TAC No. ME7951) (i.e., Reference 8). This information was assessed by the NRC staff and a Staff Assessment was provided via NRC Letter April 4, 2013, Brunswick Steam Electric Plant, Units 1 and 2 – Staff Assessment in Response to Information Request Pursuant to 10 CFR 50.54(f) – 9.3, Communications Assessment (i.e., Reference 9).*** | |
| 6 | Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration. | ***Started.*** |
| 7 | Make available for NRC staff audit seismic and tornado missile final design criteria for the HCVS stack. | ***Complete.*** |
| | ***Evaluation of the pipe robustness was performed in EC 299559 Attachment Z01R0. This evaluation concluded that the pipe is robust with respect to all applicable hazards including wind-borne missiles. This evaluation was submitted as part of the response to order EA-12-049. The staff's review of this evaluation was documented in Reference 7, paragraph 3.4, stating that the analogous open item for EA-12-049 was closed. As part of the additional modifications being performed for EA-13-109, the piping modifications are being designed to two times the safe shutdown seismic acceleration (2XSSE).*** | |

Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2,
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| Table 6b - Interim Staff Evaluation Open Items (Phase 1) | | |
|---|---|---|
| **#** | **Open Item** | **Status** |
| ***Indicates a change since last 6-month update** | | |
| 8 | Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location. | ***Started.** |
| 9 | Make available for NRC staff audit documentation of HCVS incorporation into the FLEX diesel generator loading calculation. | ***Started.** |
| 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. | ***Started.** |
| 11 | Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods. | ***Started.** |
| 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. | ***Started.** |
| 13 | Make available for NRC staff audit a justification for not monitoring HCVS system pressure as described in NEI 13-02. | ***Started.** |
| 14 | 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. | ***Started.** |

Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2,
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| Table 6b - Interim Staff Evaluation Open Items (Phase 1) | | |
|---|---|---|
| **#** | **Open Item** | **Status** |
| ***Indicates a change since last 6-month update** | | |
| 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. | ***Started.** |
| 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. | ***Started.** |

Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2,
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## 7 Interim Staff Evaluation (ISE) Impacts (Phase 1 only)

Note: Page numbers refer to Reference 3 (ISE) "enclosure" pages.

This section provides suggested changes to Reference 3 (ISE), Section 3.0, Technical Evaluation, in response to changes and updates in this fourth six-month status report.

a. On page 4, delete plant-specific assumption BSEP-1 as no load stripping will be required.

   See "Change - Electrical Design" in Section 4 of this enclosure.

b. On page 4, change the second sentence of plant-specific assumption BSEP-3 to:

   "The FLEX air compressors are stored in the FLEX building to supplement the N2 backup system after 24 hours."

   See Reference 6 (OIP), Attachment 6, Item 1.

c. On page 4, delete plant-specific assumption BSEP-4 as the operators no longer have to go into the computer rooms.

   See "Change - Electrical Design" in Section 4 of this enclosure.

d. On page 10, change section 3.2.2.4 "electrical power" paragraph to:

   "All electrical power required for operation of HCVS components will be supplied by an installed 24 VDC station battery. Electrical equipment required to support operation and monitoring of the HCVS for 24 hours will be permanently installed on the 49' elevation of the Control Building. At 24 hours, FLEX generators will be available to repower the 24/48VDC battery charger and recharge the battery. Battery voltage status will be indicated on the same panel as the HCVS radiation monitor so that operators will be able to monitor the status of the 24 VDC battery."

   See "Change - Electrical Design" in Section 4 of this enclosure.

e. On page 11, change the last sentence of item #1 to:

   "The location of the FLEX diesel generators (DGs) and air compressors and their connections will be evaluated for use during a severe accident."

   See Reference 6 (OIP), Attachment 6, Item 1.

f. On page 11, change item 7 to:

Brunswick Steam Electric Plant (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)

"Following the initial 24-hour period, additional motive force will be supplied from the FLEX air compressor that will be located such that radiological impacts are not a concern."

See Reference 6 (OIP), Attachment 6, Item 1.

g. On page 12, first paragraph, delete "and replacement bottle storage location (licensee identified)".

See Reference 6 (OIP), Attachment 6, Item 1.

h. On page 20, first paragraph, change the first full sentence to:

"Indication of pneumatic supply pressure is available from the MCR, while battery voltage will be indicated on the same panel as the HCVS Radiation Monitor."

See "Change - Electrical Design" in Section 4 of this enclosure.

i. On page 20, first paragraph, delete "temperature" from the second full sentence as only containment pressure and wetwell level will be provided backup power by HCVS. Note that operators will still be able to read HCVS pipe temperature via a handheld meter.

See "Change - Electrical Design" in Section 4 of this enclosure.

j. On page 22, change section 3.2.3.1 "immediate operator actions" sentence to:

"Immediate operator actions can be completed by Operators from the MCR or ROS."

See "Change - Electrical Design" in Section 4 of this enclosure.

k. On page 24, first paragraph, replace the second full sentence with:

"FLEX air compressors will support sustained operations following the ELAP event."

See Reference 6 (OIP), Attachment 6, Item 1.

l. On page 27, first paragraph, replace the last two sentences with the following:

"Post-24 hours, the FLEX air compressor will supplement the nitrogen backup system for sustained operations."

See Reference 6 (OIP), Attachment 6, Item 1.

m. On page 28, second paragraph, replace the last two sentences with the following:

"Post-24 hours, the FLEX air compressor will supplement the nitrogen backup system for sustained operations."

See Reference 6 (OIP), Attachment 6, Item 1.

n. On page 33, replace Table 4-1 with the Reference 6 (OIP), Part 4, Table 4-1.

## 8 References

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

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 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)

7. NRC Letter, *Brunswick Steam Electric Plant, Units 1 and 2 – Report for the Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (TAC Nos. MF0975, MF0976, MF0973 and MF0974),* dated March 31, 2015, ADAMS Accession Number ML1508082A155.

8. Duke Energy Letter, *Carolina Power & Light Company's and Florida Power Corporation's Response to Follow-Up Letter on Technical Issues for Resolution Regarding Licensee Communication Submittals Associated with Near-Term Task Force Recommendation 9.3 (TAC No. ME7951),* dated February 22, 2013, ADAMS Accession Number ML13058A045.

9. NRC Letter, *Brunswick Steam Electric Plant, Units 1 and 2 – Staff Assessment in Response to Information Request Pursuant to 10 CFR 50.54(f) – 9.3, Communications Assessment,* dated April 4, 2013, ADAMS Accession Number ML13093A341.