DUKE ENERGY

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June 26, 2014

Serial: BSEP 14-0066

U. S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

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

References:

1. NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," dated September 1, 1989, ADAMS Accession Number ML031140220.
2. NRC Order Number EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents," dated March 12, 2012, ADAMS Accession Number ML12056A043.
3. 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, ADAMS Accession Number ML13130A067.
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," dated November 14, 2013, ADAMS Accession Number ML13304B836.
5. NRC Acknowledgement of NEI 13-02 Phase 1 OIP Template, dated May 14, 2014, ADAMS Accession Number ML14128A219.
6. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0, Dated November 2013.

On June 6, 2013, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (i.e., Reference 3) to Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. Reference 3 was immediately effective and directs BSEP to require their BWRs with a Mark I containment to take certain actions to ensure that these facilities have a hardened containment vent system (HCVS) to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in the loss of active containment heat removal capability while maintaining the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP). Specific requirements are outlined in Attachment 2 of Reference 3.

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Reference 3 requires submission of an Overall Integrated Plan (OIP) by June 30, 2014, for Phase 1 of the Order. The interim staff guidance (Reference 4) was issued November 14, 2013, which provides direction regarding the content of this OIP. The purpose of this letter is to provide the OIP for Phase 1 of the Order pursuant to Section IV, Condition D.1, of Reference 3. This letter confirms BSEP has received Reference 4 and has a Phase 1 OIP complying with the guidance for the purpose of ensuring the functionality of a HCVS 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 while maintaining the capability to operate under SA conditions resulting from an ELAP as described in Attachment 2 of Reference 3.

Reference 6, Section 7.0, contains the specific reporting requirements for the OIP. The information in the enclosure provides the BSEP 1 OIP pursuant to Section 7.0 of Reference 6 by use of the Phase 1 OIP Template per Reference 5.

For the purposes of compliance with Phase 1 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, BSEP plans to install a severe accident capable wetwell vent.

Compliance with the requirements of Reference 3 will supersede any and all actions or commitments associated with References 1 and 2. Any actions or commitments made relative to Reference 1 or 2 are rescinded and not binding by submittal of the Reference 3 Phase 1 OIP via this letter.

This letter contains no regulatory commitments.

If you have any questions regarding this report, 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 26, 2014.

Sincerely,

George T. Hamrick

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Enclosures:

1. Brunswick Steam Electric Plant Phase 1 Overall Integrated Plan (OIP) for the Hardened Containment Vent System (HCVS)

cc (with enclosures):

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Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324

Brunswick Steam Electric Plant Phase 1 Overall Integrated Plan (OIP) for the Hardened Containment Vent System (HCVS)

EC 89233, Rev. 1, Attachment Z11R1

Table of Contents:

Introduction

In 1989, the NRC issued Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," to all licensees of BWRs with Mark I containments to encourage licensees to voluntarily install a hardened wetwell vent. In response, licensees installed a hardened vent pipe from the wetwell to some point outside the secondary containment envelope (usually outside the reactor building). Some licensees also installed a hardened vent branch line from the drywell.

On March 19, 2013, the Nuclear Regulatory Commission (NRC) Commissioners directed the staff per Staff Requirements Memorandum (SRM) for SECY-12-0157 to require licensees with Mark I and Mark II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions." In response, the NRC issued Order EA-13-109, *Issuance of Order to Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accidents*, June 6, 2013. 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 vent 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 while maintaining 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 vents to assist in preventing core damage and, if necessary, to provide 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. The ISG endorses the compliance approach presented in NEI 13-02 Revision 0, *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 this ISG (NEI 13-02) 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. This document provides the 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. Six month progress reports will be provided consistent with the requirements of Order EA-13-109. The Plant venting actions for the EA-13-109 severe accident capable venting scenario can be summarized by the following:

- The HCVS will be initiated via manual action from the Main Control Room (MCR) or Remote Operating Station (ROS) at the appropriate time based on procedural guidance in response to plant conditions from observed or derived symptoms.
- The vent will utilize Containment Parameters of Pressure, Level and Suppression Pool Temperature from the MCR instrumentation to monitor effectiveness of the venting actions
- The vent operation will be monitored by HCVS valve position, temperature, and effluent radiation levels.
- The HCVS motive force will be monitored and have the capacity to operate for 24 hours with installed equipment. Replenishment of the motive force will be by use of portable equipment once the installed motive force is exhausted.
- Venting actions will be capable of being maintained for a sustained period of up to 7 days or a shorter time if justified.

Part 1: General Integrated Plan Elements and Assumptions

Extent to which the guidance, JLD-ISG-2013-02 and NEI 13-02, are being followed. Identify any deviations.

Include a description of any alternatives to the guidance. A technical justification and basis for the alternative needs to be provided. This will likely require a pre-meeting with the NRC to review the alternative.

Ref: JLD-ISG-2013-02

Compliance will be attained for Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2 with no known deviations to the guidelines in JLD-ISG-2013-02 and NEI 13-02 for each phase as follows:

- Unit 1, Phase 1 (wetwell): by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Currently scheduled for 1st Quarter of 2018.
- Unit 2, Phase 1 (wetwell): by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Currently scheduled for 1st Quarter of 2017.
- Unit 1, Phase 2 (drywell): later
- Unit 2, Phase 2 (drywell): later

If deviations are identified at a later date, then the deviations will be communicated in a future 6 month update following identification.

State Applicable Extreme External Hazard from NEI 12-06, Section 4.0-9.0

List resultant determination of screened in hazards from the EA-12-049 Compliance.

Ref: NEI 13-02 Section 5.2.3 and D.1.2

The following extreme external hazards screen in for BSEP, Unit Nos. 1 and 2

- Seismic, External Flooding, Extreme Cold – Ice only, High Wind, Extreme High Temperature

The following extreme external hazards screen out for BSEP, Unit Nos. 1 and 2

- Extreme Cold except for Ice

Key Site assumptions to implement NEI 13-02 HCVS Actions.

Provide key assumptions associated with implementation of HCVS Phase 1 Actions

Ref: NEI 13-02 Section 1

Mark I/II Generic HCVS Related Assumptions:

Applicable EA-12-049 assumptions:

049-1. Assumed initial plant conditions are as identified in NEI 12-06 section 3.2.1.2 items 1 and 2
049-2. Assumed initial conditions are as identified in NEI 12-06 section 3.2.1.3 items 1, 2, 4, 5, 6 and 8
049-3. Assumed reactor transient boundary conditions are as identified in NEI 12-06 section

Part 1: General Integrated Plan Elements and Assumptions

3.2.1.4 items 1, 2, 3 and 4

049-4. No additional events or failures are assumed to occur immediately prior to or during the event, including security events. (Ref. NEI 12-06, section 3.2.1.3 item 9)

049-5. At Time=0 the event is initiated and all rods insert and no other event beyond a common site ELAP is occurring at any or all of the units. (NEI 12-06, section 3.2.1.3 item 9 and 3.2.1.4 item 1-4)

049-6. Within 1 hour an ELAP is declared and actions begin as defined in EA-12-049 compliance

049-7. DC power and distribution can be credited for the duration determined per the EA-12-049 (FLEX) methodology for battery usage. (NEI 12-06, section 3.2.1.3 item 8)

049-8. Deployment resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours

049-9. All activities associated with plant specific EA-12-049 FLEX strategies that are not specific to implementation of the HCVS, including such items as debris removal, communication, notifications, SFP level and makeup, security response, opening doors for cooling, and initiating conditions for the event, can be credited as previously evaluated for FLEX.

Applicable EA-13-109 generic assumptions:

109-1. Site response activities associated with EA-13-109 actions are considered to have no access limitations associated with radiological impacts while RPV level is above 2/3 core height (core damage is not expected).

109-2. Portable equipment can supplement the installed equipment after 24 hours provided the portable equipment credited meets the criteria applicable to the HCVS. An example is the use of portable nitrogen bottles that is credited after 24 hours to supplement the installed backup nitrogen system.

109-3. SFP Level is maintained with either on-site or off-site resources such that the SFP does not contribute to the analyzed source term (Ref. HCVS-FAQ-07)

109-4. Existing containment components design and testing values are governed by existing plant containment criteria (e.g., Appendix J) and are not subject to the testing criteria from NEI 13-02 (Ref. HCVS-FAQ-05 and NEI 13-02 section 6.2.2).

109-5. Classical design basis evaluations and assumptions are not required when assessing the operation of the HCVS. The reason this is not required is that the order postulates an unsuccessful mitigation of an event such that an ELAP progresses to a severe accident with ex-vessel core debris which classical design basis evaluations are intended to prevent. (Ref. NEI 13-02 section 2.3.1).

109-6. HCVS manual actions that require minimal operator steps and can be performed in the postulated thermal and radiological environment at the location of the step(s) (e.g., load stripping, control switch manipulation, valving-in nitrogen bottles) are acceptable to obtain HCVS venting dedicated functionality. (Ref. HCVS-FAQ-01)

109-7. HCVS dedicated equipment is defined as vent process elements that are required for the HCVS to function in an ELAP event that progresses to core melt ex-vessel. (Ref. HCVS-FAQ-02 and White Paper HCVS-WP-01)

109-8. Use of MAAP Version 4 or higher provides adequate assurance of the plant conditions (e.g., RPV water level, temperatures, etc.) assumed for Order EA-13-109 BDBEE and SA HCVS operation. (Ref. FLEX MAAP Endorsement ML13190A201) Additional analysis using RELAP5/MOD 3, GOTHIC, PCFLUD, LOCADOSE and SHIELD are acceptable methods for evaluating environmental conditions in areas of the plant provided the specific version utilized is documented in the analysis.

109-9. Utilization of NRC Published Accident evaluations (e.g. SOARCA, SECY-12-0157, and

Part 1: General Integrated Plan Elements and Assumptions

NUREG 1465) as related to Order EA-13-109 conditions are acceptable as references. (Ref. NEI 13-02 section 8)

109-10. Permanent modifications installed per EA-12-049 are assumed implemented and may be credited for use in EA-13-109 Order response.

109-11. This Overall Integrated Plan is based on Emergency Operating Procedure changes consistent with EPG/SAGs Revision 3 as incorporated per the sites EOP/SAMG procedure change process.

109-12. Under the postulated scenarios of order EA-13-109 the Control room is adequately protected from excessive radiation dose per General Design Criterion (GDC) 19 in 10CFR50 Appendix A and no further evaluation of its use as the preferred HCVS control location is required. (Ref. HCVS-FAQ-01) In addition, adequate protective clothing and respiratory protection is available if required to address contamination issues.

Plant Specific HCVS Related Assumptions/Characteristics:

BSEP-1. 24/48VDC load stripping is accomplished prior to vessel breach (if any).

BSEP-2. FLEX generators will be aligned to repower the 24/48VDC battery charger and recharge the batteries to support sustained operation of the HCVS post 24 hours.

BSEP-3. A connection to supply supplemental N2 via the FLEX pneumatic makeup connection is established prior to vessel breach (if any). Portable N2 bottles are stored in the FLEX building to supplement the N2 backup system after 24 hours.

BSEP-4. The computer rooms located near the MCR are inside the MCR boundary and are protected from hazards similarly to the MCR and are acceptable for HCVS actions during a severe accident.

Part 2: Boundary Conditions for Wet Well Vent

Provide a sequence of events and identify any time or environmental constraint required for success including the basis for the constraint.

HCVS Actions that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, action to open vent valves).

HCVS Actions that have an environmental constraint (e.g. actions in areas of High Thermal stress or High Dose areas) should be evaluated per guidance.

Describe in detail in this section the technical basis for the constraints identified on the sequence of events timeline attachment.

See attached sequence of events timeline (Attachment 2)

Ref: EA-13-109 Section 1.1.1, 1.1.2, 1.1.3 / NEI 13-02 Section 4.2.1/6.1

The operation of the HCVS will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1. Immediate operator actions will be completed by plant personnel and will include the capability for remote-manual initiation from the HCVS control station. A list of the remote manual actions performed by plant personnel to open the HCVS vent path can be found in the following table (2-1). A HCVS Extended Loss of AC Power (ELAP) Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4.

Table 2-1 HCVS Remote Manual Actions

Primary Action	Primary Location / Component	Notes
1. Manually strip all loads on the 24/48VDC batteries not required for HCVS.	Open breakers in the 24/48VDC Distribution Panels located in the Unit 1 and 2 Battery Rooms on EL. 23' of the Control Building.	Action performed prior to vessel breach.
2. Close normally open breakers in Distribution Panels 1-21A/22B and 2-23A/24B supplying 48VDC to the HCVS inverters.	Close breakers in the 24/48VDC Distribution Panels located in the Unit 1 and 2 Battery Rooms on EL. 23' of the Control Building.	Action performed prior to vessel breach.
3. Transfer HCVS electrical loads to 24/48VDC Distribution Panels 1-21A/22B and 2-23A/24B	Key-locked transfer switch located in the Unit 1 and Unit 2 Computer Equipment Rooms on EL. 49' of the Control Building near the MCR.	

Part 2: Boundary Conditions for Wet Well Vent

4. Manually bypass Group 6 isolation and isolation override contacts for valves 1/2-CAC-V7 and 1/2-CAC-V216	Key-locked bypass switches on the HCVS Control Panel located in the Unit 1 and 2 Computer Equipment Rooms on EL. 49' of the Control Building near the MCR.	
5. Open Inboard Wetwell Purge Exhaust Valve 1/2-CAC-V7.	Control switch located in the MCR or via manual valve located at the ROS.	
6. Open Hardened Wetwell Vent Valve 1/2-CAC-V216.	Key-locked control switch located in the MCR or via manual valve located at the ROS.	
7. Run hose to FLEX pneumatic makeup connection to supply supplemental N2 for sustained operations (post-24 hours).	FLEX pneumatic makeup connections are located outside the RB in the vicinity of the HCVS vent pipe. The long term HCVS N2 supply connection will be located in the yard.	Action performed prior to vessel breach.
8. Replenish pneumatics with replaceable nitrogen bottles for sustained operations (post-24 hours), as necessary.	Nitrogen bottles will be located in an area that is accessible to operators during a severe accident. **[Open item #7]**	Action required to supplement the N2 backup system after 24 hours.
9. Re-power the 24/48VDC battery chargers for sustained operations (post-24 hours).	FLEX diesels will be staged in areas that meet the requirements of EA-12-049 and are accessible to operators during a severe accident. **[Open item #4]**	Action required to provide power to HCVS equipment after 24 hours.

A timeline was developed to identify required operator response times and potential environmental constraints. This timeline is based upon the following three cases:

1. Case 1 is a based upon the action response times developed for FLEX when utilizing anticipatory venting in a BDBEE without core damage.
2. Case 2 is based on a SECY-12-0157 Extended Loss of AC Power (or ELAP) with failure of RCIC after a black start where failure occurs because of subjectively assuming over injection.
3. Case 3 is based on NUREG-1935 (SOARCA) results for an Extended Loss of AC Power (or ELAP) with the loss of RCIC case without black start.

Discussion of time constraints identified in Attachment 2

- Approximately 2 Hours: Initiate use of Hardened Containment Vent System (HCVS) per site

Part 2: Boundary Conditions for Wet Well Vent

procedures to maintain containment parameters below design limits and within the limits that allow continued use of RCIC. The reliable operation of HCVS will be met because HCVS meets the seismic requirements identified in NEI 13-02 and will be powered by DC buses with motive force supplied to HCVS valves from installed backup nitrogen storage bottles via the N2 backup system. Critical HCVS controls and instruments associated with containment will be DC powered and operated from the MCR or a Remote Operating Station on each unit. The DC power for HCVS will be available as long as the HCVS is required. HCVS battery capacity will be available to extend past 24 hours. In addition, when available Phase 2 FLEX Diesel Generator (DG) can provide power before battery life is exhausted. Thus initiation of the HCVS from the MCR or the Remote Operating Station within 2 hours is acceptable because the actions can be performed any time after declaration of an ELAP until the venting is needed for BDBEE venting. This action can also be performed for SA HCVS operation which occurs at a time further removed from an ELAP declaration as shown in Attachment 2. **[Open item #6]**

- 24 Hours: portable nitrogen bottles will be aligned to supplement the N2 backup system. These nitrogen bottles will be stored in the on-site FLEX storage building and can be supplemented to ensure a continuous source of motive force to the HCVS. While 24 hours of capacity is provided without the use of these bottles, they can be connected at any time prior to 24 hours to ensure adequate capacity is maintained so this time constraint is not limiting.
- 24 Hours: FLEX generators will be connected to recharge the 24/48VDC batteries which power the HCVS critical components/instruments - Time critical after 24 hours as 24/48VDC batteries have sufficient capacity for 24 hour operation without recharging. FLEX DGs will be available to be placed in service prior to 24 hours as required to supply power to HCVS critical components/instruments, as per the BSEP EA 12-049 overall integrated plan.

<u>Discussion of radiological and temperature constraints identified in Attachment 2</u>

- Primary control of the HCVS is accomplished from the main control room. Under the postulated scenarios of order EA-13-109 the control room is adequately protected from excessive radiation dose per General Design Criterion (GDC) 19 in 10CFR50 Appendix A and no further evaluation of its use is required. (Ref. HCVS-FAQ-01)
- Alternate control of the HCVS is accomplished from the ROS. The ROS will be in an area evaluated to be accessible before and during a severe accident. **[Open item #2**]
- Other actions required to support HCVS operation performed in the Control Building, outside the MCR boundary (i.e., battery rooms), will be performed prior to vessel breach resulting from early RCIC failure. (Ref. Attachment 2)
- When an ELAP is declared, the HCVS power supply will be transferred from normal 120VAC distribution panels to the 24/48VDC dedicated HCVS batteries to ensure power to the inverters. Access to the transfer switch will be in the computer rooms just outside the main control room.
- For sustained operations (>24 hours), portable nitrogen bottles will be used to supplement the N2 backup system. Hoses stored in the FLEX building will be used to provide supplemental N2 to HCVS equipment via the pneumatic makeup connection prior to vessel breach resulting from early RCIC failure (Ref. Attachment 2). Portable nitrogen bottles will be protected from severe natural phenomena by storage in the FLEX building. The N2 connection will be in an area evaluated to be accessible before and during a severe accident. **[Open item #7]**

Part 2: Boundary Conditions for Wet Well Vent

- For sustained operations (>24 Hours), FLEX generators will be connected to installed switchgear to supply power to HCVS critical components/instruments. The connections, location of the DG and access for refueling will be located in an area that is accessible to operators during a severe accident. **[Open item #4]**

Provide Details on the Vent characteristics

Vent Size and Basis (EA-13-109 Section 1.2.1 / NEI 13-02 Section 4.1.1)

What is the plants licensed power? Discuss any plans for possible increases in licensed power (e.g. MUR, EPU).

What is the nominal diameter of the vent pipe in inches/ Is the basis determined by venting at containment design pressure, Primary Containment Pressure Limit (PCPL), or some other criteria (e.g. anticipatory venting)?

Vent Capacity (EA-13-109 Section 1.2.1 / NEI 13-02 Section 4.1.1)

Indicate any exceptions to the 1% decay heat removal criteria, including reasons for the exception. Provide the heat capacity of the suppression pool in terms of time versus pressurization capacity, assuming suppression pool is the injection source.

Vent Path and Discharge (EA-13-109 Section 1.1.4, 1.2.2 / NEI 13-02 Section 4.1.3, 4.1.5 and Appendix F/G)

Provides a description of Vent path, release path, and impact of vent path on other vent element items.

Power and Pneumatic Supply Sources (EA-13-109 Section 1.2.5 & 1.2.6 / NEI 13-02 Section 4.2.3, 2.5, 4.2.2, 4.2.6, 6.1)

Provide a discussion of electrical power requirements, including a description of dedicated 24 hour power supply from permanently installed sources. Include a similar discussion as above for the valve motive force requirements. Indicate the area in the plant from where the installed/dedicated power and pneumatic supply sources are coming

Indicate the areas where portable equipment will be staged after the 24 hour period, the dose fields in the area, and any shielding that would be necessary in that area. Any shielding that would be provided in those areas

Location of Control Panels (EA-13-109 Section 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.2.4, 1.2.5 / NEI 13-02 Section 4.1.3, 4.2.2, 4.2.3, 4.2.5, 4.2.6, 6.1.1. And Appendix F/G)

Indicate the location of the panels, and the dose fields in the area during severe accidents and any shielding that would be required in the area. This can be a qualitative assessment based on criteria in NEI 13-02.

Hydrogen (EA-13-109 Section 1.2.10, &1.2.11, and 1.2.12 / NEI 13-02 Section 2.3,2.4, 4.1.1, 4.1.6, 4.1.7, 5.1, & Appendix H)

State which approach or combination of approaches the plant will take to address the control of flammable gases, clearly demarcating the segments of vent system to which an approach applies

Part 2: Boundary Conditions for Wet Well Vent
Unintended Cross Flow of Vented Fluids (EA-13-109 Section 1.2.3, 1.2.12 / NEI 13-02 Section 4.1.2, 4.1.4, 4.1.6 and Appendix H) *Provide a description to eliminate/minimize unintended cross flow of vented fluids with emphasis on interfacing ventilation systems (e.g. SGTS). What design features are being included to limit leakage through interfacing valves or Appendix J type testing features?* ***Prevention of Inadvertent Actuation (EA-13-109 Section 1.2.7/NEI 13-02 Section 4.2.1)*** *The HCVS shall include means to prevent inadvertent actuation* ***Component Qualifications (EA-13-109 Section 2.1 / NEI 13-02 Section 5.1, 5.3)*** *State qualification criteria based on use of a combination of safety related and augmented quality dependent on the location, function and interconnected system requirements* ***Monitoring of HCVS (Order Elements 1.1.4, 1.2.8, 1.2.9/NEI 13-02 4.1.3, 4.2.2, 4.2.4, and Appendix F/G)*** *Provides a description of instruments used to monitor HCVS operation and effluent. Power for an instrument will require the intrinsically safe equipment installed as part of the power sourcing* ***Component reliable and rugged performance (EA-13-109 Section 2.2 / NEI 13-02 Section 5.2, 5.3)*** *HCVS components including instrumentation should be designed, as a minimum, to meet the seismic design requirements of the plant.* *Components including instrumentation that are not required to be seismically designed by the design basis of the plant should be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. (Ref. ISG-JLD-2012-01 and ISG-JLD-2012-03 for seismic details.)* *The components including instrumentation external to a seismic category 1 (or equivalent building or enclosure should be designed to meet the external hazards that screen in for the plant as defined in guidance NEI 12-06 as endorsed by JLD-ISG-12-01 for Order EA-12-049.* *Use of instruments and supporting components with known operating principles that are supplied by manufacturers with commercial quality assurance programs, such as ISO9001. The procurement specifications shall include the seismic requirements and/or instrument design requirements, and specify the need for commercial design standards and testing under seismic loadings consistent with design basis values at the instrument locations.* *Demonstration of the seismic reliability of the instrumentation through methods that predict performance by analysis, qualification testing under simulated seismic conditions, a combination of testing and analysis, or the use of experience data. Guidance for these is based on sections 7, 8, 9, and 10 of IEEE Standard 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," or a substantially similar industrial standard could be used.* *Demonstration that the instrumentation is substantially similar in design to instrumentation that has been previously tested to seismic loading levels in accordance with the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges). Such testing and analysis should be similar to that performed for the plant licensing basis.*

Part 2: Boundary Conditions for Wet Well Vent

Vent Size and Basis

The HCVS wetwell path is designed for venting steam/energy at a nominal capacity of 1% or greater of 2923 MWt thermal power (Current Licensed Thermal Power) at a pressure of 62 psig. This pressure is the lower of the containment design pressure (62 psig) and the PCPL value (70 psig). The size of the existing wetwell portion of the HCVS is ≥ 8 inches in diameter. The detailed design will confirm the vent has adequate capacity to meet or exceed the Order criteria at the containment design pressure (62 psig). **[Open item #9].**

Vent Capacity

The 1% value at BSEP assumes that the suppression pool pressure suppression capacity is sufficient to absorb the decay heat generated during the first 3 hours. The vent would then be able to prevent containment pressure from increasing above the containment design pressure. As part of the detailed design, the duration of suppression pool decay heat absorption capability will be confirmed. **[Open item #6]**

Vent Path and Discharge

The existing HCVS vent path at BSEP consists of a wetwell vent on each unit. The wetwell vent exits the Primary Containment through the wetwell purge exhaust piping and associated inboard wetwell purge exhaust valve. Between the inboard and outboard wetwell purge exhaust valves, the wetwell vent isolation valve is installed. Downstream of the wetwell vent isolation valve, the vent piping exits the Reactor Building through the west wall and into the space between the Reactor Building and Turbine Building. The vent traverses up the exterior of the building and re-enters the Reactor Building through the metal siding on the refuel floor, then rises along the west side where it exits the Reactor Building through the roof. All effluents are exhausted above each unit's Reactor Building.

The HCVS discharge path will be routed to a point above any adjacent structure. This discharge point is just above that unit's Reactor Building such that the release point will vent away from emergency ventilation system intake and exhaust openings, main control room location, location of HCVS portable equipment, access routes required following a ELAP and BDBEE, and emergency response facilities; however, these must be considered in conjunctions with other design criteria (e.g. flow capacity) and pipe routing limitations, to the degree practical.

The detailed design will address missile protection from external events as defined by NEI 12-06 for the outside portions of the vent pipe. (Ref. HCVS-FAQ-04) **[Open item #1]**

Power and Pneumatic Supply Sources

All electrical power required for operation of HCVS components will be routed through two 48VDC to 120VAC inverters, one for each electrical division. These inverters will be sized at 1.5 kW each and will convert DC power from the installed 24/48VDC batteries into AC power for the end users (instruments, solenoid valves, etc.). Battery power will be provided by the existing 24/48VDC batteries. Electrical equipment required to support operation and monitoring of the HCVS for 24 hours will be permanently installed on EL. 23'-0" and 49'-0" of the Control Building. At 24 hours, FLEX generators will be available to repower the 24/48VDC battery charger and recharge the batteries. Battery voltage status is indicated on the face of the inverters so that operators will be able to monitor the status of the 24/48VDC batteries.

Pneumatic power for the HCVS valve actuators is normally provided by the non-interruptible instrument air system (for the Reactor Building) and the pneumatic nitrogen system (for the Drywell)

Part 2: Boundary Conditions for Wet Well Vent

with backup nitrogen provided from the nitrogen backup system. Following an ELAP event, and the loss of non-interruptible instrument air and pneumatic nitrogen, the nitrogen backup system automatically provides operating pneumatics to the SRV accumulators and hardened wetwell vent valves. Therefore, for the first 24 hours post-ELAP initiation, pneumatic force will be supplied from the existing nitrogen backup system bottle racks located on the EL. 50'-0" of the Reactor Building. These installed bottles (capacity is being added as required) will supply the required motive force to those HCVS valves needed to maintain flow through the HCVS effluent piping.

1. The HCVS flow path valves are air-operated valves (AOV) with air-to-open and spring-to-close actuators. Opening the valves from the primary control station requires energizing an AC-powered solenoid-operated valve (SOV) and providing motive air/gas. The systems described above will provide a permanently installed power source and motive air/gas supply adequate for the first 24 hours. Beyond the first 24 hours, FLEX generators will be used to maintain battery power to the HCVS components. The initial stored motive air/gas will allow for a minimum of thirteen valve operating cycles for the HCVS valves for the first 24-hours. The location of the FLEX generators and supplemental nitrogen bottles and their connections will be evaluated for use during a severe accident. **[Open items #4 & #7]**
2. The Remote Operating Station will provide valves that supply pneumatics to the HCVS flow path valve actuators so that these valves may be opened without power to the valve actuator solenoids. This will provide a diverse method of valve operation improving system reliability.
3. 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. **[Open item #2]**
4. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during a ELAP (electric power, N2/air) will be located in areas reasonably protected from defined hazards listed in Part 1 of this report. **[Open items #4 & #7]**
5. All valves required to open the flow path will be designed for remote manual operation following a ELAP, such that the primary means of valve manipulation does not rely on use of a hand wheel, reach–rod or similar means that requires close proximity to the valve (Ref. HCVS-FAQ-03). Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards listed in Part 1 of this OIP.
6. Access to the locations described above will not require temporary ladders or scaffolding.
7. Following the initial 24 hour period, additional motive force will be supplied from nitrogen bottles that will be staged at a gas cylinder rack located such that radiological impacts are not a concern. **[Open item #7]**

Location of Control Panels

The BSEP wetwell HCVS will allow initiating and then operating and monitoring from a control panel located in the main control room (MCR) and will meet the requirements of Order element 1.2.4. The MCR functions as the normal control point for Plant Emergency Response actions and is a readily accessible location with no further evaluation required. Control Room dose associated with HCVS operation conforms to GDC 19/Alternative Source Term (AST). Additionally, to meet the intent for a secondary control location of section 1.2.5 of the Order, a readily accessible alternate location, called the Remote Operating Station (ROS), will also be incorporated into the HCVS design as described in

Part 2: Boundary Conditions for Wet Well Vent

NEI 13-02 section 4.2.2.1.2.1. Means to manually operate the wetwell vent will be provided at the ROS.

The proposed location for the ROS is in the southeast corner of the RB 50'-0" for Unit 1, and the northeast corner of the RB 50'-0" elevation for Unit 2. The ROS will be located within the RB, in an area shielded from the HCVS vent pipe, with a direct egress path to the MCR. Refer to the sketches provided in Attachment 3 for the BSEP site layout. The controls available at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, extended loss of AC power (ELAP), inadequate containment cooling, and loss of reactor building ventilation. As part of the detailed design, an evaluation will be performed to determine accessibility to the location, habitability, staffing sufficiency, and communication capability with vent-use decision makers. **[Open item #2]**

Hydrogen

As is required by EA-13-109, Section 1.2.11, the HCVS must be designed such that it is able to either provide assurance that oxygen cannot enter and mix with flammable gas in the HCVS (so as to form a combustible gas mixture), or it must be able to accommodate the dynamic loading resulting from a combustible gas detonation. Several configurations are available which will support the former (e.g., purge, mechanical isolation from outside air, etc.) or the latter (design of potentially affected portions of the system to withstand a detonation relative to pipe stress and support structures).

Options to address the control of flammable gases are still being evaluated. **[Open item #3]**

Unintended Cross Flow of Vented Fluids

The HCVS utilizes Containment Atmospheric Control (CAC) system valves CAC-V7 and CAC-V216 for containment isolation. CAC-V7 and CAC-V216 are AOVs and they are air-to-open and spring-to-shut. An SOV must be energized to allow the motive air to open the valve from the MCR location. CAC-V7 and CAC-V216 have a safety related function to maintain the containment pressure boundary during a design basis accident and are tested as required by 10CFR50, Appendix J. Although these valves are shared between the CAC and the HCVS, separate control circuits are provided to each valve. Specifically, the CAC control circuit will be used during all "design basis" operating modes including all design basis transients and accidents.

Cross flow potential exists between the HCVS and the Standby Gas Treatment System (SBGT). CAC system valves CAC-V8 and CAC-V172 function as boundary valves with the SBGT system. Valves CAC-V8 and V172 are containment isolation valves with a safety related function to maintain the containment pressure boundary during a design basis accident. These valves are tested, and will continue to be tested, for leakage under 10CFR50 Appendix J as part of the containment boundary IAW HCVS-FAQ-05. See Sketch 1 of Attachment 3 for a P&ID diagram of the system.

Prevention of Inadvertent Actuation

EOP/ERG operating procedures provide guidance that the HCVS is not to be used to defeat containment integrity during any design basis transients and accident. In addition, the HCVS will be designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error such that any credited containment accident pressure (CAP) that would provide net positive suction head to the emergency core cooling system (ECCS) pumps will be available (inclusive of a design basis loss-of-coolant accident (DBLOCA)). As part of BSEP's 120 percent power uprate, a 5 psig credit for containment overpressure was established for evaluating low pressure ECCS pump NPSH (Ref. 31, Section 6.3.2.2.5). However the ECCS pumps will not

Part 2: Boundary Conditions for Wet Well Vent

have power available because of the starting boundary conditions of an ELAP.

- The features that prevent inadvertent actuation are key lock switches at the primary control station and locked closed valves at the ROS. Procedures also provide clear guidance to not circumvent containment integrity by opening CAC purge exhaust and HCVS wetwell vent valves during any design basis transient or accident.

Component Qualifications

HCVS components downstream of the second containment isolation valve, not routed in seismically qualified structures, will be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. HCVS components that directly interface with the pressure boundary will be considered safety related, as the existing system is safety related. The containment system limits the leakage or release of radioactive materials to the environment to prevent offsite exposures from exceeding the guidelines of 10CFR100. During normal or design basis operations, this means serving as a pressure boundary to prevent release of radioactive material.

Likewise, any electrical or controls component which interfaces with Class 1E power sources will be considered safety related up to and including appropriate isolation devices such as fuses or breakers, as their failure could adversely impact containment isolation and/or a safety-related power source. The remaining components will be considered Augmented Quality. Newly installed piping and valves will be seismically qualified to handle the forces associated with the seismic margin earthquake (SME) back to their isolation boundaries. Electrical and controls components will be seismically qualified and will include the ability to handle harsh environmental conditions (although they will not be considered part of the site Environmental Qualification (EQ) program).

HCVS instrumentation performance (e.g., accuracy and precision) need not exceed that of similar plant installed equipment. Additionally, radiation monitoring instrumentation accuracy and range will be sufficient to confirm flow of radionuclides through the HCVS.

The HCVS instruments, including valve position indication, vent pipe temperature instrumentation, radiation monitoring, and support system monitoring, will be qualified by using one or more of the three methods described in the ISG, which includes:

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO9001) where the procurement specifications include the applicable seismic requirements, design requirements, and applicable testing.
2. Demonstration of seismic reliability via methods that predict performance described in IEEE 344.
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

Instrument	Qualification Method*
HCVS Process Temperature	ISO9001 / IEEE 344 / Demonstration
HCVS Process Radiation Monitor	ISO9001 / IEEE 344 / Demonstration
HCVS Process Valve Position	ISO9001 / IEEE 344 / Demonstration

Part 2: Boundary Conditions for Wet Well Vent

HCVS Pneumatic Supply Pressure	ISO9001 / IEEE 344 / Demonstration
HCVS Electrical Power Supply Availability	ISO9001 / IEEE 344 / Demonstration

* The specific qualification method used for each required HCVS instrument will be reported in future 6 month status reports.

Monitoring of HCVS

The BSEP wetwell HCVS will be capable of being manually operated during sustained operations from a control panel located in the main control room (MCR) and will meet the requirements of Order element 1.2.4. The MCR is a readily accessible location with no further evaluation required. Control Room dose associated with HCVS operation conforms to GDC 19/Alternative Source Term (AST). Additionally, to meet the intent for a secondary control location of section 1.2.5 of the Order, a readily accessible Remote Operating Station (ROS) will also be incorporated into the HCVS design as described in NEI 13-02 section 4.2.2.1.2.1. The controls and indications at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, extended loss of AC power (ELAP), and inadequate containment cooling. An evaluation will be performed to determine accessibility to the location, habitability, staffing sufficiency, and communication capability with Vent-use decision makers.

The HCVS will include indications for HCVS valve position, vent pipe temperature and effluent radiation levels in the MCR, as well as information on the status of supporting systems, such as battery voltage and pneumatic supply pressure. Indication of pneumatic supply pressure is available from the MCR, while battery voltage will be indicated on the inverter installed in the unit specific computer room. The wetwell HCVS will also include containment temperature, pressure, and wetwell level indication in the MCR to monitor vent operation. This monitoring instrumentation provides the indication from the MCR as per Requirement 1.2.4. The wetwell HCVS and required containment instrumentation will be supplied by existing 24/48VDC batteries.

Component reliable and rugged performance

The HCVS downstream of the second containment isolation valve, including piping and supports, electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) components, will be designed/analyzed to conform to the requirements consistent with the applicable design codes (e.g., Non-safety, Cat 1, SS and 300# ASME or B31.1, NEMA 4, etc.) for the plant and to ensure functionality following a design basis earthquake.

Additional modifications required to meet the Order will be reliably functional at the temperature, pressure, and radiation levels consistent with the vent pipe conditions for sustained operations. The instrumentation/power supplies/cables/connections (components) will be qualified for temperature, pressure, radiation level, total integrated dose radiation for the HCVS vent pipe and HCVS ROS location.

Conduit design will be installed to Seismic Class 1 criteria. Both existing and the requirement for new barriers will be evaluated to provide a level of protection from missiles when equipment is located outside of seismically qualified structures. Augmented quality requirements, will be applied to the components installed in response to this Order.

Part 2: Boundary Conditions for Wet Well Vent

If the instruments are purchased as commercial-grade equipment, they will be qualified to operate under severe accident environment as required by NRC Order EA-13-109 and the guidance of NEI 13-02. The equipment will be qualified seismically (IEEE 344), environmentally (IEEE 323), and EMI/RFI (per RG 1.180). These qualifications will be bounding conditions for BSEP.

For the instruments required after a potential seismic event, the following methods will be used to verify that the design and installation is reliable / rugged and thus capable of ensuring HCVS functionality following a seismic event. Applicable instruments are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated severe accident event conditions in the area of instrument component use using one or more of the following methods:

- demonstration of seismic motion will be consistent with that of existing design basis loads at the installed location;
- substantial history of operational reliability in environments with significant vibration with a design envelope inclusive of the effects of seismic motion imparted to the instruments proposed at the location;
- adequacy of seismic design and installation is demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Ref. 27) or a substantially similar industrial standard;
- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or
- seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

Part 2 Boundary Conditions for WW Vent: **BDBEE Venting**

Determine venting capability for BDBEE Venting, such as may be used in a ELAP scenario to mitigate core damage.

Ref: EA-13-109 Section 1.1.4 / NEI 13-02 Section 2.2

First 24 Hour Coping Detail

Provide a general description of the venting actions for first 24 hours using installed equipment including station modifications that are proposed.

Ref: EA-13-109 Section 1.2.6 / NEI 13-02 Section 2.5, 4.2.2

The operation of the HCVS will be designed to minimize the reliance on operator actions for response to a ELAP and BDBEE hazards identified in part 1 of this OIP. Immediate operator actions can be completed by Operators from the station battery rooms, the process computer rooms, and the MCR or ROS. The operator actions required to open a vent path are as described in table 2-1.

Remote-manual is defined in this report as a non-automatic power operation of a component and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting under the guiding procedural protocol.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR. In addition, the HCVS valves can be operated from an installed ROS as part of the response to EA-13-109. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report. [**Open item #2** for ROS evaluation.]

Permanently installed power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Power will be provided by the existing 24/48VDC batteries for a minimum of 24 hours before FLEX generators will be required to be functional for HCVS support. Pneumatics will be provided by the installed safety-related nitrogen backup system for a minimum of 24 hours before additional nitrogen makeup is required.

System control:

- Active: Primary Containment Isolation Valves (PCIVs) are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS will be designed for a minimum of 13 open/close cycles of the vent valve over the first 24 hours following an ELAP without the use of portable equipment. Anticipatory venting will be permitted in the revised EPGs and associated implementing EOPs. Operator actions required for HCVS vent operation during an ELAP are described in Table 2-1.
- Passive: Inadvertent actuation protection is provided by key lock switches located in the MCR and locked valves at the ROS. The HCVS isolation valve is key-locked and closed. Actuation of the HCVS vent path valves from the ROS will require manual operation of normally locked closed isolation valves.

Greater Than 24 Hour Coping Detail

Provide a general description of the venting actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed.

Ref: EA-13-109 Section 1.2.4, 1.2.8 / NEI 13-02 Section 4.2.2

Part 2 Boundary Conditions for WW Vent: **BDBEE Venting**
After a maximum of 24 hours, available personnel will be able to connect supplemental electrical power and nitrogen to the HCVS. Connections for supplementing electrical power and motive force required for HCVS will be located in accessible areas with reasonable protection per NEI 12-06 that minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections will be pre-engineered quick disconnects to minimize manpower resources. Sufficient portable nitrogen bottles will be staged to support sustained operations for up to 7-days following the ELAP event. After 24 hours, FLEX generators will repower the 24/48VDC battery chargers and recharge the 24/48VDC batteries supplying HCVS equipment and components. These actions provide long term support for HCVS operation for the period beyond 24 hours to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the unit(s) to provide needed action and supplies.
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
Primary Containment Control Flowchart (0EOP-02-PCCP) exists to direct operations in protection and control of containment integrity, including use of the existing Hardened Wetwell Vent System. Other site procedures for venting containment using the HCVS include: Primary Containment Venting (0EOP-01-SEP-01), SAMG Primary Containment Venting (0SAMG-12), and Containment Venting Under Conditions of Extreme Damage (0EDMG-003). These procedures will be updated for HCVS operation per EA-13-109, as applicable. **[Open item #5]**
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
<u>EA-12-049 Modifications</u> • EC 90398 (common) will develop a method to transfer fuel oil from the Emergency Diesel Generator (EDG) day tanks to the FLEX diesels in order to power the 24/48VDC battery chargers. • EC 92799 (Unit 1) and 90387 (Unit 2) will provide a connection to supply pneumatic makeup to the N2 backup system using FLEX equipment. • EC 90388, EC 90389, and EC 90390 will install the FLEX Diesel Generators and provide the necessary 480V tie-ins to unit substations in order to power the 24/48VDC battery chargers. <u>EA-13-109 Modifications</u> • Provide new HCVS power distribution panel, manual transfer switch, 48VDC to 120VAC inverters and 24VDC instrument power supplies needed to supply power to HCVS equipment for 24 hours post ELAP. Existing instrumentation and valve control power circuits required for HCVS will be de-terminated from existing power distribution panels and repowered from the new HCVS power distribution panels. • Install key-lock switches and additional control circuitry to allow bypass of the containment isolation signal contacts for the existing HCVS vent path AOVs to enable venting during an ELAP condition.

Part 2 Boundary Conditions for WW Vent: **BDBEE Venting**

- Install a Remote Operation Station, and associated tubing and valves to allow for manual operation of the HCVS vent path AOVs, for both units.
- Install new vent pipe temperature instrumentation and indication in the MCR.
- Modify the existing wetwell vent pipe radiation monitor, as necessary, to comply with the requirements of EA-13-109.
- Modify the existing hardened wetwell vent piping, as necessary, to comply with the requirements of EA-13-109.
- Add capacity, as necessary, to the nitrogen backup system to support pneumatic loads associated with HCVS operation for 24 hours post ELAP.

Key Venting Parameters:

List instrumentation credited for this venting actions. Clearly indicate which of those already exist in the plant and what others will be newly installed (to comply with the vent order)

Initiation, operation and monitoring of the HCVS venting will rely on the following key parameters and indicators.

New Instrumentation

Key Parameter	**Component Identifier**	**Indication Location**
HCVS effluent temperature	TBD	MCR
24/48VDC battery voltage	TBD	Control Building computer rooms

Initiation and operation of the HCVS system will rely on several existing Main Control Room key parameters and indicators which are qualified or evaluated to Reg. Guide 1.97 per the existing plant design.

Existing Instrumentation

Key Parameter	**Component Identifier**	**Indication Location**
Div. I N2 Backup supply pressure	1/2-RNA-PT-5270	MCR
Div. II N2 Backup supply pressure	1/2-RNA-PT-5268	MCR
Inboard wetwell purge exhaust valve position	1/2-CAC-V7	MCR
Hardened wetwell vent isolation valve position	1/2-CAC-V216	MCR
Drywell pressure	1/2-CAC-PT-1230	MCR
Wetwell pressure	1/2-CAC-PT-1257-2B	MCR
Wetwell temperature	1/2-CAC-TY/TR-4426-1A/1B	MCR
Wetwell level	1/2-CAC-LT-2601	MCR
Reactor water level	1/2-B21-LT-N026B	MCR
Wetwell vent rad monitor	1/2-CAC-RM-80	MCR

Existing indications for HCVS valve position, N2 backup supply pressure, and wetwell temperature, pressure and level are installed in the MCR. HCVS effluent temperature will be installed in the MCR to comply with EA-13-109. Battery supply voltage will be indicated on the inverters installed in unit

Part 2 Boundary Conditions for WW Vent: **BDBEE Venting**
specific computer rooms located just outside the Main Control Room.
Notes:

Part 2 Boundary Conditions for WW Vent: **Severe Accident Venting**
Determine venting capability for Severe Accident Venting, such as may be used in a ELAP scenario to mitigate core damage. **Ref: EA-13-109 Section 1.2.10 / NEI 13-02 Section 2.3**
First 24 Hour Coping Detail *Provide a general description of the venting actions for first 24 hours using installed equipment including station modifications that are proposed.* **Ref: EA-13-109 Section 1.2.6 / NEI 13-02 Section 2.5, 4.2.2**
The operation of the HCVS will be designed to minimize the reliance on operator actions for response to an ELAP and severe accident events. Severe accident event assumes that specific core cooling actions from the FLEX strategies identified in the response to Order EA-12-049 were not successfully initiated. Access to the reactor building will be restricted as determined by the RPV water level and core damage conditions. Immediate actions will be completed by Operators in the Main Control Room (MCR) or at the HCVS Remote Operating Station (ROS). The operator actions required to open a vent path were previously listed in the BDBEE Venting Part 2 section of this report (Table 2-1). Permanently installed power and motive air/gas capable will be available to support operation and monitoring of the HCVS for 24 hours. Specifics are the same as for BDBEE Venting Part 2. System control: i. Active: Same as for BDBEE Venting Part 2. ii. Passive: Same as for BDBEE Venting Part 2.
Greater Than 24 Hour Coping Detail *Provide a general description of the venting actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed.* **Ref: EA-13-109 Section 1.2.4, 1.2.8 / NEI 13-02 Section 4.2.2**
Specifics are the same as for BDBEE Venting Part 2 except the location and refueling actions for the FLEX DG and replacement nitrogen bottles will be evaluated for SA environmental conditions resulting from the proposed damaged Reactor Core and resultant HCVS pathway. **[Open Items #4 and #7]** These actions provide long term support for HCVS operation for the period beyond 24 hrs. to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the unit(s) to provide needed action and supplies.
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
The operation of the HCVS is governed the same for SA conditions as for BDBEE conditions. Existing guidance in the SAMGs directs the plant staff to consider changing radiological conditions in a severe accident.
Identify modifications*:*

Part 2 Boundary Conditions for WW Vent: **Severe Accident Venting**
List modifications and describe how they support the HCVS Actions.
The same as identified BDBEE Venting Part 2.
Key Venting Parameters: *List instrumentation credited for the HCVS Actions. Clearly indicate which of those already exist in the plant and what others will be newly installed (to comply with the vent order)*
The same as identified in BDBEE Venting Part 2.
Notes:

Part 2 Boundary Conditions for WW Vent: **HCVS Support Equipment Functions**
Determine venting capability support functions needed **Ref: EA-13-109 Section 1.2.8, 1.2.9 / NEI 13-02 Section 2.5, 4.2.4, 6.1.2**
BDBEE Venting *Provide a general description of the BDBEE Venting actions support functions. Identify methods and strategy(ies) utilized to achieve venting results.* **Ref: EA-13-109 Section 1.2.9 / NEI 13-02 Section 2.5, 4.2.2, 4.2.4, 6.1.2**
Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the MCR or ROS. Venting will require support from DC power as well as pneumatic systems as detailed in the response to Order EA-12-049. Existing 24/48VDC batteries will provide sufficient electrical power for HCVS operation for 24 hours. Before battery power is depleted, FLEX diesel generators, as detailed in the response to Order EA-12-049, will be credited to charge the 24/48VDC batteries and maintain DC bus voltage after 24 hours. The nitrogen backup system will provide sufficient motive force for all HCVS valve operation for the first 24 hours and will provide for multiple operations of the hardened wetwell vent valve. Post 24 hours, portable nitrogen bottles will be aligned to supplement the nitrogen backup system. Portable nitrogen bottles will be located in an area that is accessible to operators and protected from severe natural phenomena.
Severe Accident Venting *Provide a general description of the Severe Accident Venting actions support functions. Identify methods and strategy(ies) utilized to achieve venting results.* **Ref: EA-13-109 Section 1.2.8, 1.2.9 / NEI 13-02 Section 2.5, 4.2.2, 4.2.4, 6.1.2**
The same support functions that are used in the BDBEE scenario would be used for severe accident venting. Existing 24/48VDC batteries will provide sufficient electrical power for HCVS operation for 24 hours. At 24 hours, FLEX diesel generators, as detailed in the response to Order EA-12-049, will be credited to charge the 24/48VDC batteries and maintain DC bus voltage The nitrogen backup system will provide sufficient motive force for all HCVS valve operation for the first 24 hours. Post 24 hours, portable nitrogen bottles will be aligned to supplement the nitrogen backup system. Portable nitrogen bottles will be located in an area that is accessible to operators and protected from severe natural phenomena.
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
All of the equipment credited for HCVS operation during the first 24 hours will be permanently installed. Post 24 hours, the key portable items are the FLEX DGs and the portable nitrogen bottles needed to supplement the pneumatic supply to the AOVs. FLEX Support Guidelines (FSG) are being developed to address all HCVS operating strategies, including deployment of portable equipment. Direction to enter the FSGs for HCVS operation will be given in the EOPs, the site ELAP procedure, and the SAMGs. **[Open item #5]**

Part 2 Boundary Conditions for WW Vent: **HCVS Support Equipment Functions**
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
EA-12-049 Modifications • EC 90398 (common) will develop a method to transfer fuel oil from the Emergency Diesel Generator (EDG) day tanks to the FLEX diesels in order to power the 24/48VDC battery chargers. • EC 92799 (Unit 1) and 90387 (Unit 2) will provide a connection to supply pneumatic makeup to the N2 backup system using FLEX equipment. • EC 90388, EC 90389, and EC 90390 will install the FLEX Diesel Generators and provide the necessary 480V tie-ins to unit substations in order to power the 24/48VDC battery chargers. EA-13-109 Modifications • Provide new HCVS power distribution panel, manual transfer switch, 48VDC to 120VAC inverters and 24VDC instrument power supplies needed to supply power to HCVS equipment for 24 hours post ELAP. Existing instrumentation and valve control power circuits required for HCVS will be de-terminated from existing power distribution panels and repowered from the new HCVS power distribution panels. • Install key-lock switches and additional control circuitry to allow bypass of the containment isolation signal contacts for the existing HCVS vent path AOVs to enable venting during an ELAP condition. • Install a Remote Operation Station, and associated tubing and valves to allow for manual operation of the HCVS vent path AOVs, for both units. • Install new vent pipe temperature instrumentation and indication in the MCR. • Modify the existing wetwell vent pipe radiation monitor, as necessary, to comply with the requirements of EA-13-109. • Modify the existing hardened wetwell vent piping, as necessary, to comply with the requirements of EA-13-109. • Add capacity, as necessary, to the nitrogen backup system to support pneumatic loads associated with HCVS operation for 24 hours post ELAP.
Key Support Equipment Parameters: *List instrumentation credited for the support equipment utilized in the venting operation. Clearly indicate which of those already exist in the plant and what others will be newly installed (to comply with the vent order)*
Local control features of the FLEX DG electrical load and fuel supply will be newly supplied as part of FLEX modifications. Pressure gauge on supplemental Nitrogen bottles already exists.

Part 2 Boundary Conditions for WW Vent: **HCVS Support Equipment Functions**
Notes:

Part 2 Boundary Conditions for WW Vent: **HCVS Venting Portable Equipment Deployment**		
Provide a general description of the venting actions using portable equipment including modifications that are proposed to maintain and/or support safety functions. **Ref: EA-13-109 Section 3.1 / NEI 13-02 Section 6.1.2, D.1.3.1**		
Deployment pathways for compliance with Order EA-12-049 are acceptable without further evaluation needed except in areas around the Reactor Building or in the vicinity of the HCVS piping. Deployment in the areas around the Reactor Building or in the vicinity of the HCVS piping will allow access, operation and replenishment of consumables with the consideration that there is potential reactor core damage and HCVS operation.		
Details:		
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*		
Operation of the portable equipment is the same as for compliance with Order EA-12-049 thus they are acceptable without further evaluation		
HCVS Actions	**Modifications**	**Protection of connections**
Identify Actions including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA-12-049 (FLEX)
Portable nitrogen bottles stored in an area that is accessible to operators and protected from severe natural phenomena.	N/A	The FLEX pneumatic makeup connection is protected per compliance with Order EA-12-049. The HCVS long-term nitrogen supply connection will be seismically robust.
Notes:		

Part 3: Boundary Conditions for Dry Well Vent
Provide a sequence of events and identify any time constraint required for success including the basis for the time constraint. *HCVS Actions that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walkthrough of deployment).* *Describe in detail in this section the technical basis for the time constraint identified on the sequence of events timeline Attachment 2B* *See attached sequence of events timeline (Attachment 2B).* **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x**
To be provided with the Phase 2 OIP submittal.
Severe Accident Venting
Determine venting capability for Severe Accident Venting, such as may be used in an ELAP scenario to mitigate core damage. **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x**
First 24 Hour Coping Detail *Provide a general description of the venting actions for first 24 hours using installed equipment including station modifications that are proposed.* **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x**
To be provided with the Phase 2 OIP submittal.
Greater Than 24 Hour Coping Detail *Provide a general description of the venting actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed.* **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x**
To be provided with the Phase 2 OIP submittal.
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
To be provided with the Phase 2 OIP submittal.
Identify modifications*:* *List modifications and describe how they support the HCVS Actions.*

Part 3: Boundary Conditions for Dry Well Vent
To be provided with the Phase 2 OIP submittal.
Key Venting Parameters: *List instrumentation credited for the venting HCVS Actions.*
To be provided with the Phase 2 OIP submittal.
Notes:

Part 4: Programmatic Controls, Training, Drills and Maintenance

Identify how the programmatic controls will be met.

Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality addressing the impact of temperature and environment

Ref: EA-13-109 Section 3.1, 3.2 / NEI 13-02 Section 6.1.2, 6.1.3, 6.2

Program Controls:

The HCVS venting actions will include:

- Site procedures and programs are being developed in accordance with NEI 13-02 to address use and storage of portable equipment relative to the Severe Accident defined in NRC Order EA-13-109 and the hazards applicable to the site per Part 1 of this OIP. **[Open item #8]**
- Routes for transporting portable equipment from storage location(s) to deployment areas will be developed as the response details are identified and finalized. The identified paths and deployment areas will be accessible during all modes of operation and during Severe Accidents.

Procedures:

Procedures will be established for system operations when normal and backup power is available, and during ELAP conditions.

The HCVS procedures will be developed and implemented following the plant's process for initiating or revising procedures and contain the following details:

- appropriate conditions and criteria for use of the HCVS
- when and how to place the HCVS in operation,
- the location of system components,
- instrumentation available,
- normal and backup power supplies,
- directions for sustained operation, including the storage location of portable equipment,
- training on operating the portable equipment, and
- testing of portable equipment
- precautions that use of the vent may impact NPSH (CAP) available to the ECCS pumps.

Licensees will establish provisions for out-of-service requirements of the HCVS and compensatory measures. Programmatic controls will be implemented to document and control the following:

The provisions for out-of-service requirements for HCVS functionality are applicable in Modes 1, 2 and 3.

- If for up to 90 consecutive days, the primary or alternate means of HCVS operation are non-functional, no compensatory actions are necessary.
- If for up to 30 days, the primary and alternate means of HCVS operation are non-functional, no compensatory actions are necessary.
- If the out of service times exceed 30 or 90 days as described above, the following actions will be performed:
  - The condition will be entered into the corrective action system,

Part 4: Programmatic Controls, Training, Drills and Maintenance

- The HCVS functionality will be restored in a manner consistent with plant procedures,
- A cause assessment will be performed to prevent future loss of function for similar causes.
- Initiate action to implement appropriate compensatory actions

Describe training plan

List training plans for affected organizations or describe the plan for training development

Ref: EA-13-109 Section 3.2 / NEI 13-02 Section 6.1.3

Personnel expected to perform direct execution of the HVCS will receive necessary training in the use of plant procedures for system operations when normal and backup power is available and during ELAP conditions. The training will be refreshed on a periodic basis and as any changes occur to the HCVS. Training content and frequency will be established using the Systematic Approach to Training (SAT) process.

In addition, (Ref. NEI 12-06) all personnel on-site will be available to supplement trained personnel.

Identify how the drills and exercise parameters will be met.

Alignment with NEI 13-06 and 14-01as codified in NTTF Recommendation 8 and 9 rulemaking

The Licensee should demonstrate use of the HCVS system in drills, tabletops, or exercises as follows:

- Hardened containment vent operation on normal power sources (no ELAP).
- During FLEX demonstrations (as required by EA-12-049): Hardened containment vent operation on backup power and from primary or alternate location during conditions of ELAP/loss of UHS with no core damage. System use is for containment heat removal AND containment pressure control.
- HCVS operation on backup power and from primary or alternate location during conditions of ELAP/loss of UHS with core damage. System use is for containment heat removal AND containment pressure control with potential for combustible gases (Demonstration may be in conjunction with SAG change).

Ref: EA-13-109 Section 3.1 / NEI 13-02 Section 6.1.3

The site will utilize the guidance provided in NEI 13-06 and 14-01 for guidance related to drills, tabletops, or exercises for HCVS operation. In addition, the site will integrate these requirements with compliance to any rulemaking resulting from the NTTF Recommendations 8 and 9.

Describe maintenance plan:

- The HCVS maintenance program should ensure that the HCVS equipment reliability is being achieved in a manner similar to that required for FLEX equipment. Standard industry templates (e.g., EPRI) and associated bases may be developed to define specific maintenance and testing.
  - Periodic testing and frequency should be determined based on equipment type, expected use and manufacturer's recommendations.
  - Testing should be done to verify design requirements and/or basis. The basis should be

Part 4: Programmatic Controls, Training, Drills and Maintenance

documented and deviations from vendor recommendations and applicable standards should be justified.
  - Preventive maintenance should be determined based on equipment type and expected use. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.
  - Existing work control processes may be used to control maintenance and testing.
- HCVS permanently installed equipment should be maintained in a manner that is consistent with assuring that it performs its function when required.
  - HCVS permanently installed equipment should be subject to maintenance and testing guidance provided to verify proper function.
- HCVS non-installed equipment should be stored and maintained in a manner that is consistent with assuring that it does not degrade over long periods of storage and that it is accessible for periodic maintenance and testing.

Ref: EA-13-109 Section 1.2.13 / NEI 13-02 Section 5.4, 6.2

The site will utilize the standard EPRI industry PM process (similar to the Preventive Maintenance Basis Database) for establishing the maintenance calibration and testing actions for HCVS components. The control program will include maintenance guidance, testing procedures and frequencies established based on type of equipment and considerations made within the EPRI guidelines.

BSEP will implement the following operation, testing and inspection requirements for the HCVS to ensure reliable operation of the system.

Table 4-1: Testing and Inspection Requirements

Description	Frequency
Cycle the HCVS valves and the interfacing system valves not used to maintain containment integrity during operations.	Once per operating cycle
Perform visual inspections and a walk down of HCVS components	Once per operating cycle
Test and calibrate the HCVS radiation monitors.	Once per operating cycle
Leak test the HCVS.	(1) Prior to first declaring the system functional; (2) Once every three operating cycles thereafter; and (3) After restoration of any breach of system boundary within the buildings
Validate the HCVS operating procedures by conducting an open/close test of the HCVS control logic from its control panel (primary and alternate) and ensuring that all interfacing system valves move to their	Once per every other operating cycle

Part 4: Programmatic Controls, Training, Drills and Maintenance

proper (intended) positions.	

Part 5: Milestone Schedule

Provide a milestone schedule. This schedule should include:

- **Modifications timeline**
- **Procedure guidance development complete**
  - **HCVS Actions**
  - **Maintenance**
- **Storage plan (reasonable protection)**
- **Staffing analysis completion**
- **Long term use equipment acquisition timeline**
- **Training completion for the HCVS Actions**

The dates specifically required by the order are obligated or committed dates. Other dates are planned dates subject to change. Updates will be provided in the periodic (six month) status reports.

Ref: EA-13-109 Section D.1, D.3 / NEI 13-02 Section 7.2.1

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6 month status reports.

Milestone	Target Completion Date	Activity Status	Comments *{Include date changes in this column}*
Hold preliminary/conceptual design meeting	Jun, 2014	Complete	
Submit Overall Integrated Implementation Plan	Jun 2014	Started	
Submit 6 Month Status Report	Dec. 2014		
Submit 6 Month Status Report	Jun. 2015		
Storage Plan	TBD		
Staffing analysis completion	TBD		
Long term use equipment acquisition timeline	TBD		
Submit 6 Month Status Report	Dec. 2015		Simultaneous with Phase 2 OIP
U2 Design Engineering On-site/Complete	Mar, 2016		
Submit 6 Month Status Report	Jun. 2016		
Operations Procedure Changes Developed	Dec, 2016		
Site Specific Maintenance Procedure Developed	Dec, 2016		
Submit 6 Month Status Report	Dec. 2016		
Training Complete	Mar. 2017		

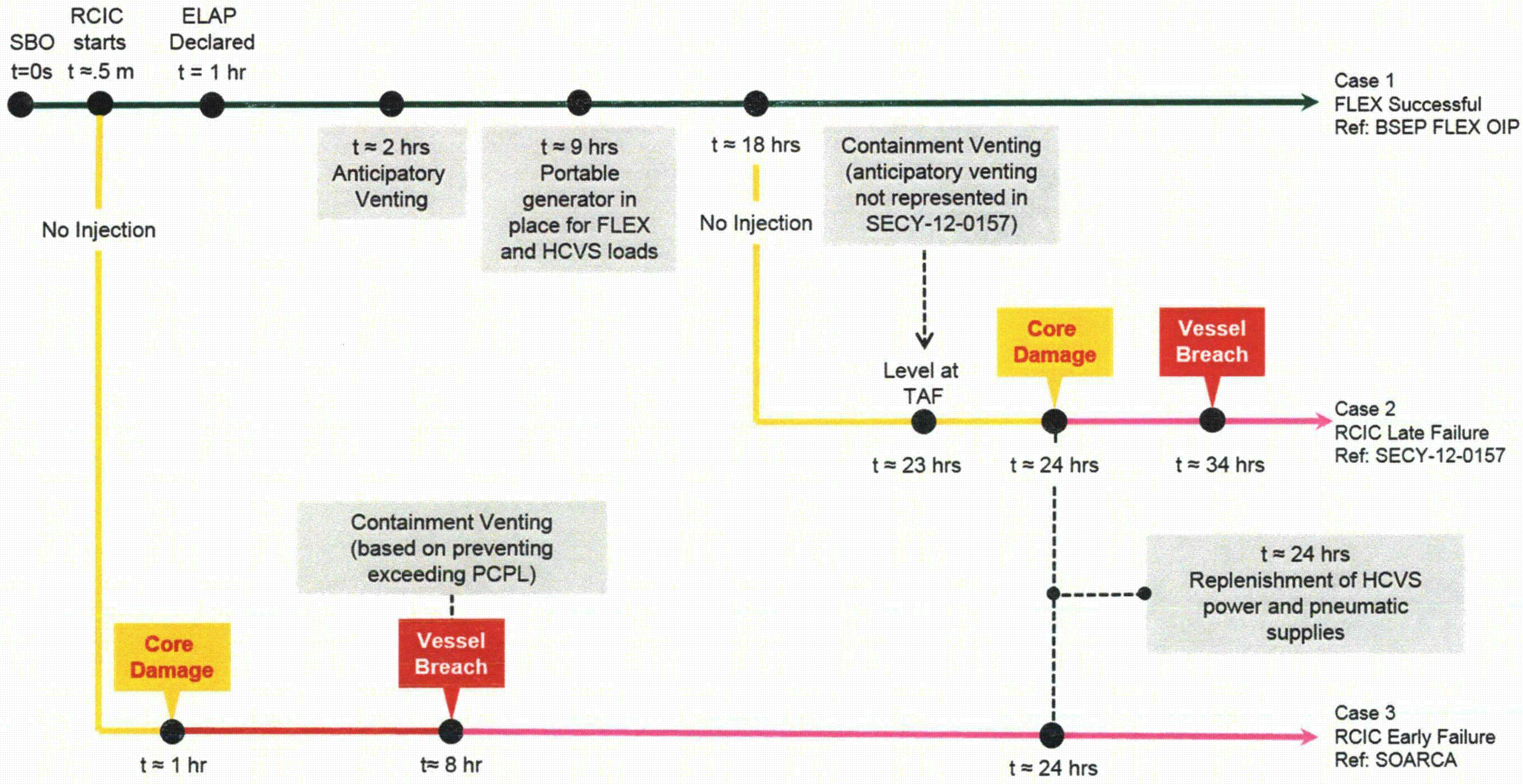
Part 4: Programmatic Controls, Training, Drills and Maintenance

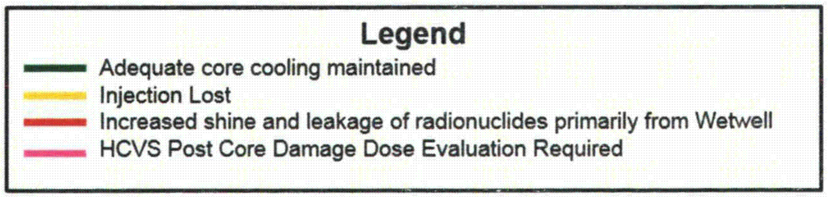
U2 Implementation Outage	Mar, 2017		
Procedure Changes Active	Mar, 2017		
U2 Walk Through Demonstration/Functional Test	Mar, 2017		
U1 Design Engineering On-site/Complete	Mar, 2017		
Submit 6 Month Status Report	Jun. 2017		
Submit 6 Month Status Report	Dec. 2017		
U1 Implementation Outage	Mar, 2018		
U1 Walk Through Demonstration/Functional Test	Mar, 2018		
Submit Completion Report	May, 2018		

Attachment 1: HCVS Portable Equipment

List portable equipment	*BDBEE Venting*	*Severe Accident Venting*	*Performance Criteria*	*Maintenance / PM requirements*
Portable Nitrogen Bottles	X	X	340 ft^3 at 3600 psig	Check periodically for pressure, replace or replenish as needed
FLEX DG	X	X	500 kW	Per Response to EA-12-049

Attachment 2: Sequence of Events Timeline





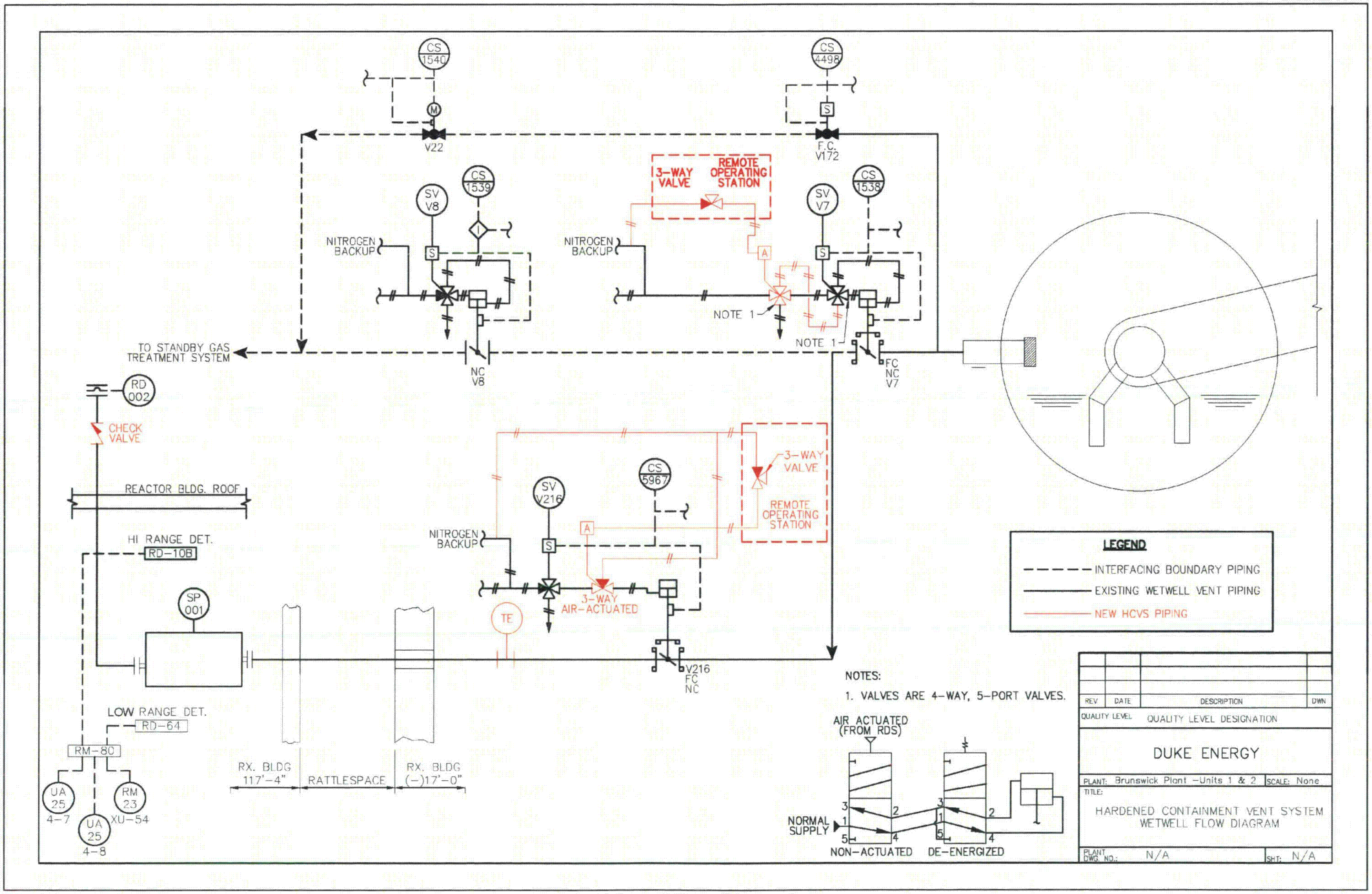
References:
Case 1: BSEP, UNITS 1 & 2 FLEX Overall Integrated Plan
Case 2: SECY-12-0157 – ML12344A030
Case 3: SOARCA – ML13150A053

Not to scale

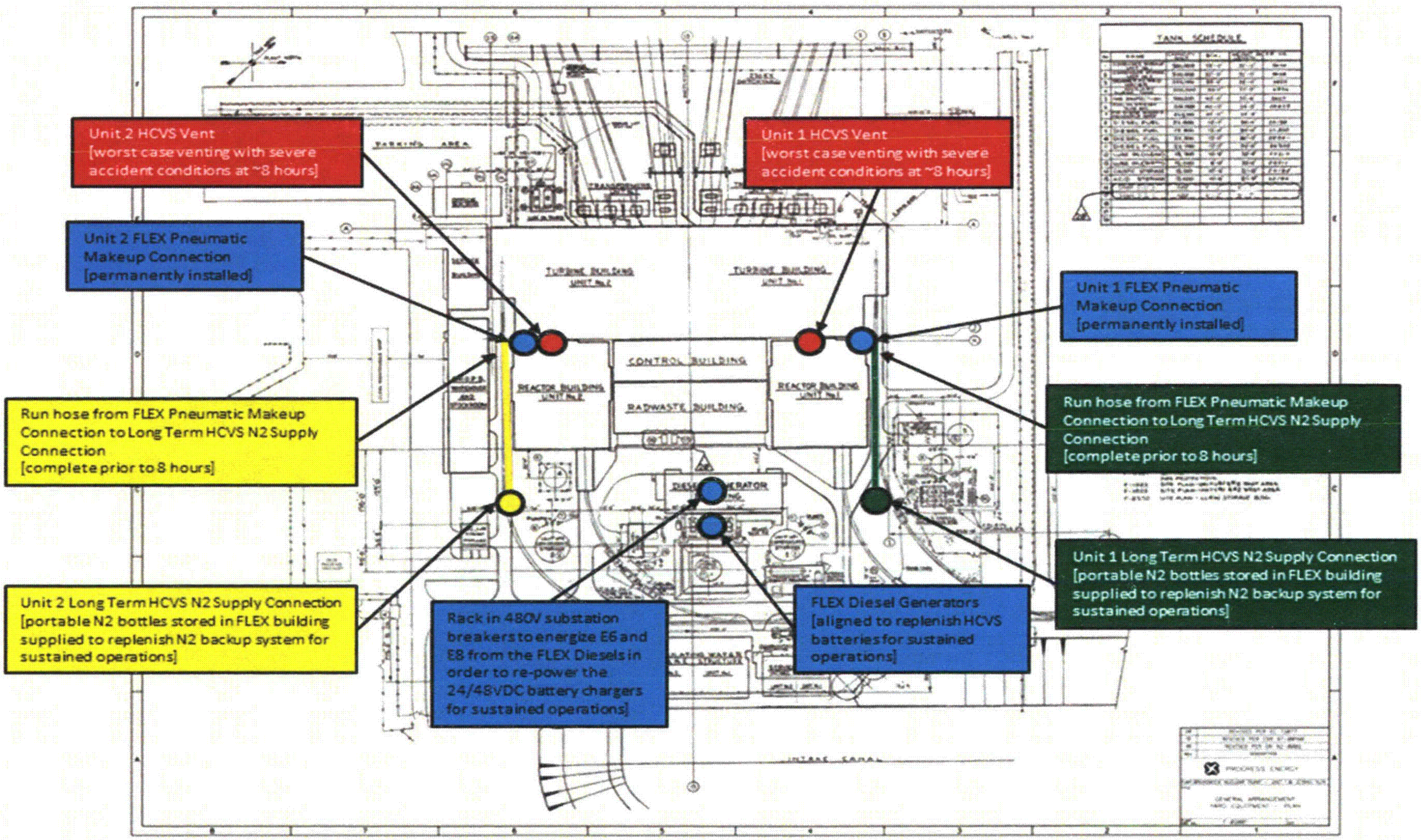
Attachment 3: Conceptual Sketches

Sketch No.	Description
1	HCVS Wetwell P&ID
2	HCVS Layout – Yard Actions
3 *	HCVS Vent – Section View Looking North
4 *	HCVS Vent – Section View Looking East
5	HCVS Power Distribution
6	HCVS Site Layout

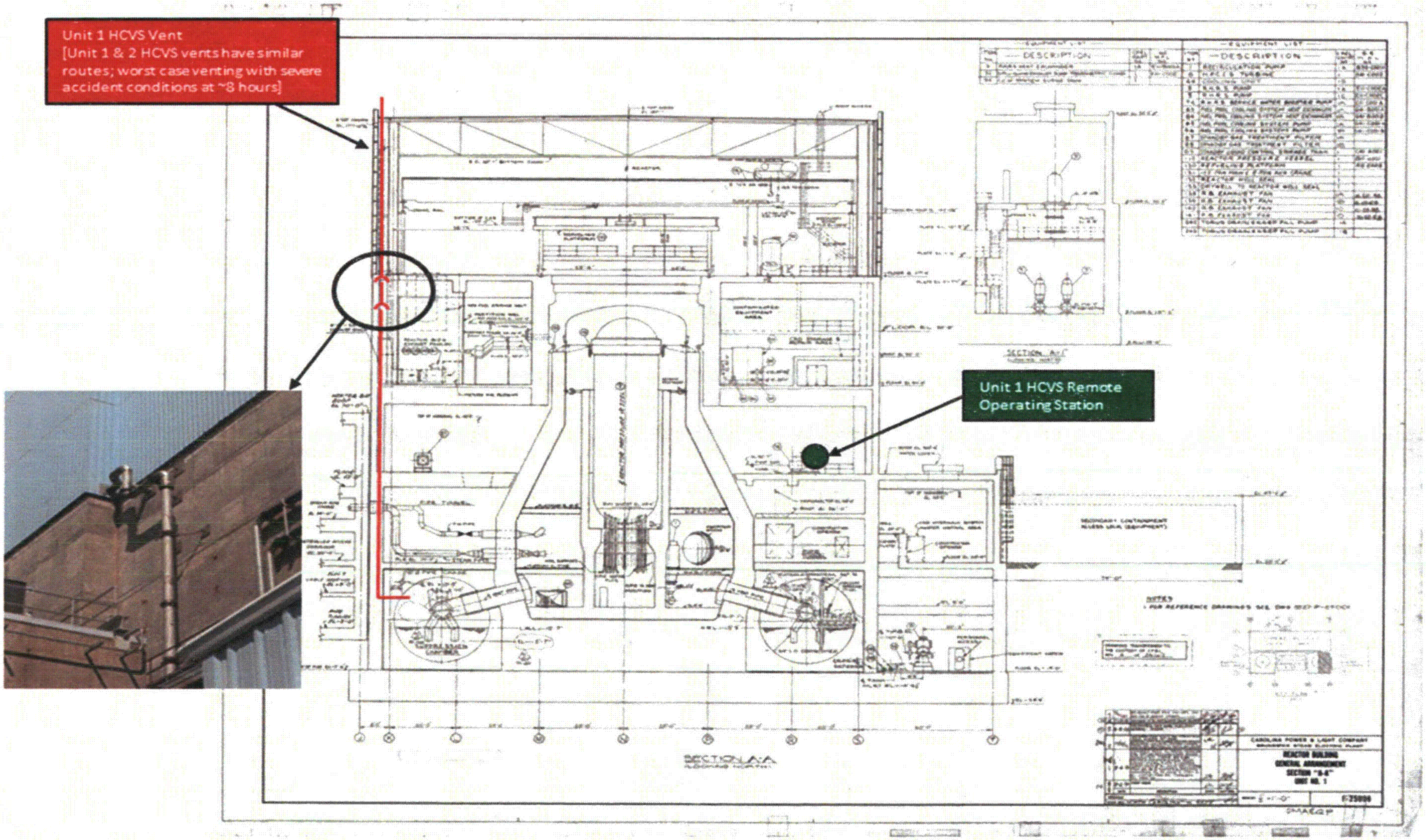
* The vent layout for Unit 2 is similar to that shown for Unit 1. Unit 1 is shown because the HCVS vent pipe is in closer proximity to the proposed location of the ROS.



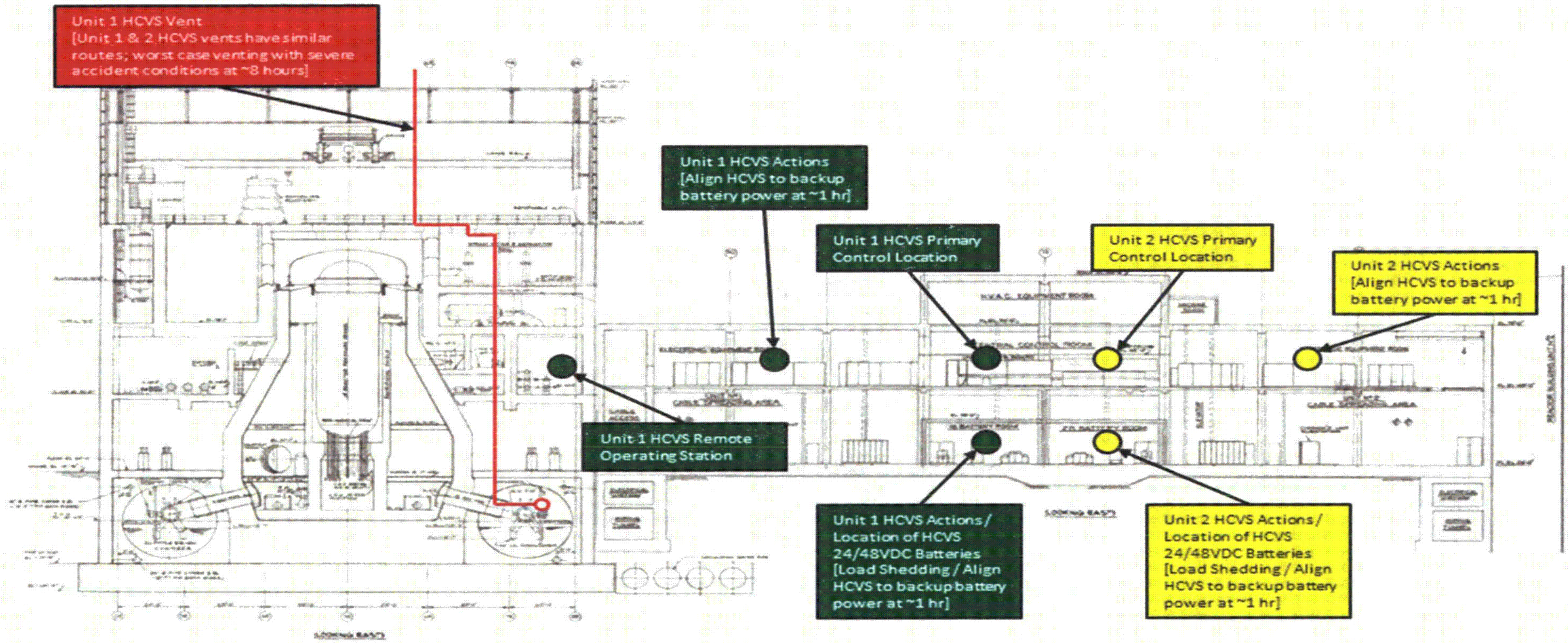
Sketch 1: HCVS Wetwell P&ID



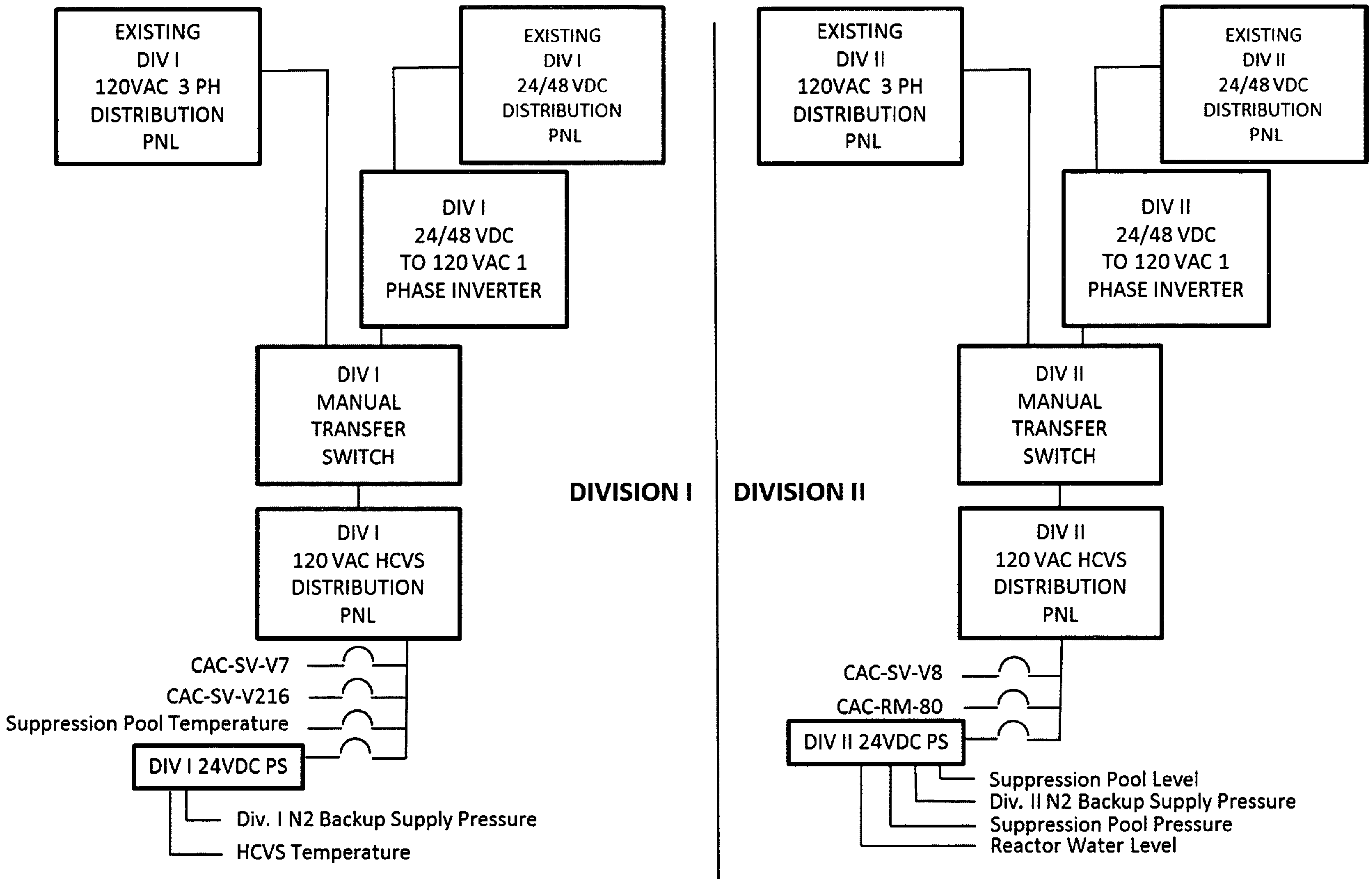
Sketch 2: HCVS Layout – Yard Actions



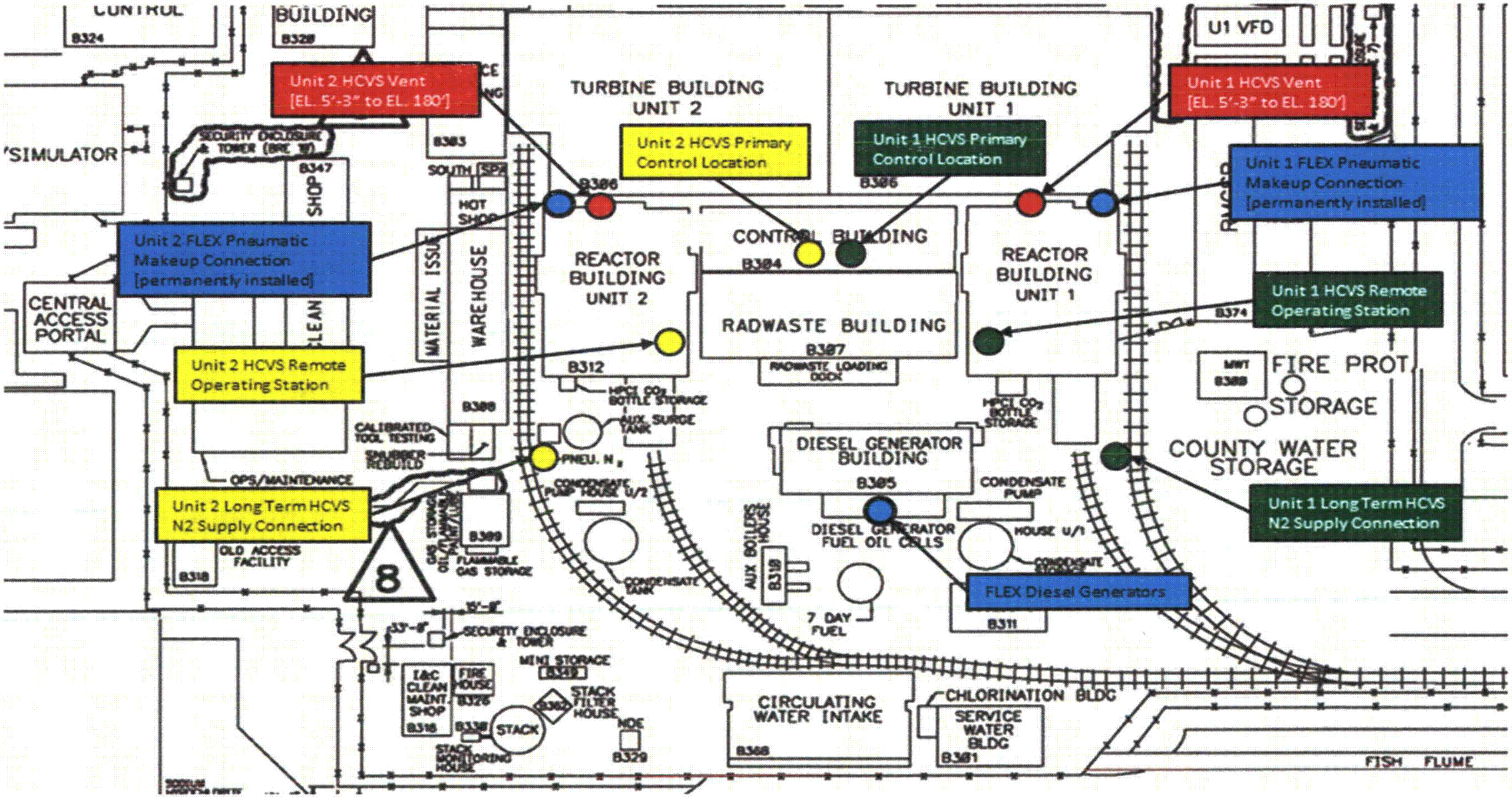
Sketch 3: HCVS Vent – Section View Looking North



Sketch 4: HCVS Vent – Section View Looking East



Sketch 5: HCVS Power Distribution



Sketch 6: HCVS Site Layout

Attachment 4: Failure Evaluation Table

Functional Failure Mode	Failure Cause	Alternate Action	Failure with Alternate Action Impact on Containment Venting?
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of normal AC power	Swap power to 24/48VDC batteries and inverters	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of alternate AC power (long term)	Operate valves from the ROS.	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to complete loss of batteries (long term)	Recharge station service batteries with FLEX provided generators, considering severe accident conditions or operate valves from ROS.	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of normal pneumatic air supply	Valves will be supplied from safety-related nitrogen backup system.	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of alternate pneumatic air supply (long term)	If nitrogen backup system is depleted, connect portable bottles to nitrogen makeup station.	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to SOV failure	Open valves from ROS.	No

Attachment 5: References

1. Generic Letter 89-16, Installation of a Hardened Wetwell Vent, dated September 1, 1989
2. Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated March 12, 2012
3. Order EA-12-050, Reliable Hardened Containment Vents, dated March 12, 2012
4. Order EA-12-051, Reliable SFP Level Instrumentation, dated March 12, 2012
5. Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated June 6, 2013
6. JLD-ISG-2012-01, Compliance with Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated August 29, 2012
7. JLD-ISG-2012-02, Compliance with Order EA-12-050, Reliable Hardened Containment Vents, dated August 29, 2012
8. JLD-ISG-2013-02, Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated November 14, 2013
9. NRC Responses to Public Comments, Japan Lessons-Learned Project Directorate Interim Staff Guidance JLD-ISG-2012-02: Compliance with Order EA-12-050, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents, ADAMS Accession No. ML12229A477, dated August 29, 2012
10. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 1, dated August 2012
11. NEI 13-02, Industry Guidance for Compliance with Order EA–13–109, Revision 0, Dated November 2013
12. NEI 13-06, Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents and Events, Revision 0, dated March 2014
13. NEI 14-01, Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents, Revision 0, dated March 2014
14. NEI HCVS-FAQ-01, HCVS Primary Controls and Alternate Controls and Monitoring Locations
15. NEI HCVS-FAQ-02, HCVS Dedicated Equipment
16. NEI HCVS-FAQ-03, HCVS Alternate Control Operating Mechanisms
17. NEI HCVS-FAQ-04, HCVS Release Point
18. NEI HCVS-FAQ-05, HCVS Control and 'Boundary Valves'
19. NEI HCVS-FAQ-06, FLEX Assumptions/HCVS Generic Assumptions
20. NEI HCVS-FAQ-07, Consideration of Release from Spent Fuel Pool Anomalies
21. NEI HCVS-FAQ-08, HCVS Instrument Qualifications
22. NEI HCVS-FAQ-09, Use of Toolbox Actions for Personnel
23. NEI White Paper HCVS-WP-01, HCVS Dedicated Power and Motive Force
24. NEI White Paper HCVS-WP-02, HCVS Cyclic Operations Approach
25. NEI White Paper HCVS-WP-03, Hydrogen/CO Control Measures
26. NEI White Paper HCVS-WP-04, FLEX/HCVS Interactions
27. IEEE Standard 344, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
28. BSEP EA-12-049 (FLEX) Overall Integrated Implementation Plan, Rev 0, February 2013
29. BSEP EA-12-050 (HCVS) Overall Integrated Implementation Plan, Rev 0, February 2013

30. BSEP EA-12-051 (SFP LI) Overall Integrated Implementation Plan, Rev 0, February 2013
31. Updated FSAR (UFSAR) Brunswick Steam Electric Plant, Units 1 and 2, Rev. 23A

Attachment 6: Changes/Updates to this Overall Integrated Implementation Plan

Any significant changes to this plan will be communicated to the NRC staff in the 6 Month Status Reports

Attachment 7: List of Overall Integrated Plan Open Items

Open Item	Action	Comment
1	Evaluate, design, and implement missile protection as required for the HCVS piping external to the reactor building.	
2	Finalize location of the Remote Operating Station.	
3	Finalize and design means to address flammable gases in the HCVS.	
4	Evaluate location of FLEX DG for accessibility under Severe Accident conditions.	
5	Develop procedures for BDBEE and Severe Accident vent operation (load shedding, power supply transfer, and vent valve operation from the MCR 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	
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.	
7	Finalize location of supplemental N2 bottle connection.	
8	Establish programs and processes for control of HCVS equipment functionality, out-of-service time, and testing.	
9	Confirm wetwell vent capacity is sufficient at the containment design pressure (62 psig). Existing calculation 0D12-0009 calculates a wetwell vent capacity at PCPL (70 psig).	