

**Table of Contents:**

**Part 1:** [General Integrated Plan Elements and Assumptions](#)

**Part 2:** [Boundary Conditions for WW Vent](#)

**Part 3:** [Boundary Conditions for DW Vent](#)

**Part 4:** [Programmatic Controls, Training, Drills and Maintenance](#)

**Part 5:** [Implementation Schedule Milestones](#)

**Attachment 1:** [HCVS Portable Equipment](#)

**Attachment 2:** [Sequence of Events](#)

**Attachment 3:** [Conceptual Sketches](#)

**Attachment 4:** [Failure Evaluation Table](#)

**Attachment 5:** [References](#)

**Attachment 6:** [Changes/Updates to this Overall Integrated Implementation Plan](#)

**Attachment 7:** [List of Overall Integrated Plan Open Items](#)

## 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 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 or Remote Operating Station at the appropriate time based on procedural guidance in response to the Plant observed or derived symptoms.
- The vent will utilize Containment Parameters of Pressure, Level and Temperature from the MCR instrumentation to monitor effectiveness of the venting actions
- The vent operation will be monitored by HCVS valve position, temperature, pressure and effluent radiation levels.
- The motive force will be monitored and have the capacity to operate 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.

## 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 E.I. Hatch Units 1&2 (Plant Hatch) with no known deviations to the guidelines in JLD-ISG-2013-02 and NEI 13-02 for each phase as follows:

- 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 1<sup>st</sup> Quarter 2017 (Unit 2), 1<sup>st</sup> Quarter 2018 (Unit 1)
- Phase 2: 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 Plant Hatch

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

The following extreme external hazards screen out for Plant Hatch

- External Flooding, Extreme Cold except for Ice

**Key Site assumptions to implement NEI 13-02 strategies.**

*Provide key assumptions associated with implementation of HCVS Phase 1 Strategies*

**Ref: NEI 13-02 Section 1**

Mark I/II Generic HCVS Related Assumptions:

Applicable EA-12-049 assumptions:

- 049-1. 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.
- 049-2. At 48 minutes (time critical at a time greater than 1 hour) an ELAP is declared and actions begin as defined in EA-12-049 compliance
- 049-3. Deployment resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours
- 049-4. DC power and distribution can be credited for the duration determined per the EA-12-049 (FLEX) methodology for battery usage, (greater than 12 hours with a calculation limiting value of 14.5 hrs.)

## Part 1: General Integrated Plan Elements and Assumptions

- 049-5. All activities associated with EA-12-049 (FLEX) that are not specific to implementation of the HCVS (i.e., HCVS valves, instruments and motive force) can be credited as having been accomplished.

### Applicable EA-13-109 generic assumptions:

- 109-1. Site response activities associated with EA-13-109 actions are considered to have no limitations up to the time that the RPV level is below 2/3 core height (core damage is imminent) when access becomes restricted. For actions that take place after the core is uncovered, evaluations will only be required for elevations above the water level in the RPV.
- 109-2. Qualified and appropriately located portable equipment can supplement the installed equipment after 24 hours. An example is recharging HCVS components after 24 hours with "Severe Accident (SA) Capable" actions, where "SA Capable" is defined as requiring an evaluation for SA conditions.
- 109-3. Recharging from "FLEX only" actions cannot be credited for SA HCVS functions, where "FLEX only" is defined as having no additional evaluations beyond compliance with order EA-12-049.
- 109-4. SFP Level is maintained above EA-12-051 Level 2 with either on-site or off-site resources such that the SFP does not contribute to the analyzed source term
- 109-5. 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 (reference FAQ HCVS-05).
- 109-6. Operation of the HCVS is not bounded by the Technical Specifications because of the nature of the order criteria of assuming an ELAP and progression to a severe accident with ex-vessel core debris. Therefore, the design and implementation of the HCVS does not create an un-reviewed safety question (change).
- 109-7. Typical ELAP operator actions, a limited number of quickly and easily performed actions (e.g., load stripping, control switch manipulation, valving-in nitrogen bottles) are acceptable to obtain HCVS venting dedicated functionality. 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. (reference FAQ HCVS-02)
- 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. Additional analysis using RELAP5/MOD 3, GOthic, PCFLUD, LOCADOSE and SHIELD-etc. are acceptable methods for evaluating environmental conditions in other portions of the plant.
- 109-9. Utilization of NRC Published Accident evaluations (e.g. SOARCA, SECY-12-0157, NUREG 1465) as related to Order EA-13-109 conditions are acceptable as references.
- 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.

## **Part 1: General Integrated Plan Elements and Assumptions**

- 109-12. Control room is adequately protected from excessive radiation dose as per General Design Criterion (GDC) 19 in 10CFR50 Appendix A.

### Plant Specific HCVS Related Assumptions/Characteristics:

- HNP-1. The main stack at Plant Hatch can handle the HCVS flow from both units simultaneously. Once outside the reactor building, effluent lines slope downward toward main stack.
- HNP-2. All load stripping is accomplished within one hour and fifteen minutes of event initiation and will occur below the core area at locations not impacted by a radiological event.
- HNP-3. The rupture disk will be manually breached within 7.3 hours of event initiation

## Part 2: Boundary Conditions for WW 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 trained 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	Location / Component	Notes
1. Isolate Standby Gas Treatment System (SGTS) by closing inlet valve 1/2T48-F081 and outlet isolation valves 1T46-F005 & 2T46-F002A & F002B	Hand switches located in the MCR or at the Remote Operating Station (ROS), depending on where operator of HCVS is stationed	
2. Disable PCIV interlocks by installing electrical jumpers for PCIVs (ref. Procedures 31EO-EOP-101-1 and 31EO-EOP-101-2)	Panels in MCR containing PCIV interlocks	
3. Open HCVS condensate drain valve 2T48-F085 to remove condensate from the HCVS piping.	Hand switch located in the MCR and at Remote Operating Station (ROS) panel for condensate drain valve	Unit 2 only. Unit 1 N/A

## Part 2: Boundary Conditions for WW Vent

4. Close HCVS condensate drain valve 2T48-F085	Hand switch located in the MCR and ROS panel for condensate drain valve	Unit 2 only. Unit 1 N/A
5. Breach the rupture disk by opening the argon cylinder valve & valve 1/2T48-F407	Manual hand wheels for valves at the argon bottle and at the piping at the argon bottle station	Not required during SA event Only required if performing early venting for FLEX
6. Close argon cylinder valve & valve 1/2T48-F407	Manual hand wheels for valves at the argon bottle and at the piping at the argon bottle station	Not required during SA event Only required if performing early venting for FLEX
7. Open Wetwell PCIVs 1/2T48-F318 & 1/2T48-F326	Hand switches located in the MCR and ROS panel	
8. Open HCVS vent control valve 1/2T48-F082	Hand switch for valve in the MCR and ROS panel	
9. Align power supplies for all valves and instruments via Inverters 1/2R44-S006 & 1/2R44-S007.	Instruments and controls located in the MCR and ROS panel	Prior to depletion of station batteries, actions will be required to swap to dedicated HCVS power supply.
10. Replenish pneumatics with replaceable nitrogen bottles	Nitrogen bottles will be located in an area that is accessible to operators, preferably near the ROS.	Prior to depletion of the pneumatic sources actions will be required to connect back-up sources at a time greater than 24 hours.

## Part 2: Boundary Conditions for WW Vent

11. Re-align power supplies for all valves and instruments via Inverters 1/2R44-S006 & 1/2R44-S007.

Instruments and controls located in the MCR and ROS panel

Prior to depletion of the installed power sources actions will be required to connect back-up sources at a time greater than 24 hours.

Operator action constraints timeline for time or environmental constraints is determined based on the following sequences:

1. Sequence 1 is a FLEX run with Venting in a BDBEE without core damage.
2. Sequence 2 is based on SOARCA results for a prolonged SBO (ELAP) with the loss of RCIC case without black start.
3. Sequence 3 is based on SECY-12-0157 a SBO (ELAP) with failure of RCIC after a black start where failure is occurs because of subjectively assuming over injection.

### Discussion of time constraints identified in Attachment 2

- 7.3 Hours, Initiate use of Hardened Containment Vent System (HCVS) per site 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 accumulators and portable nitrogen storage bottles. 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. Station batteries will provide power for greater than 12 hours, 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 7.3 hours is acceptable because the actions can be performed any time after declaration of an ELAP until the venting is needed at 12 hours for BDBEE venting. This action can also be performed for SA HCVS operation which occur at a time further removed from an ELAP declaration as shown in Attachment 2.
- At 12 hours, based on battery depletion, power supply will be swapped from station batteries to dedicated HCVS batteries to ensure power to the inverters. Access to the transfer switch will be in the control building.
- 24 Hours {greater than 24 hours}, installed nitrogen bottles will be valved-in to supplement the Nitrogen tank supply. The Nitrogen bottles can be replenished one at a time leaving the other 2 supplying the HCVS. This can be performed at any time prior to 24 hours to ensure adequate

## Part 2: Boundary Conditions for WW Vent

capacity is maintained so this time constraint is not limiting.

- 24 Hours {greater than 24 hours}, temporary generators will be installed and connected to the pigtail to power up battery chargers using a portable DG to supply power to HCVS critical components/instruments - Time critical after 25 hours. Current battery durations are calculated to last greater than 24 hours (Reference X). DG will be staged beginning at approximately 8-10 hour time frame (Reference *FLEX OIP*). Within Two (2) hours later the DG will be in service. Thus the DGs will be available to be placed in service at any point after 24 hours as required to supply power to HCVS critical components/instruments. A DG will be maintained in on-site FLEX storage buildings (Reference 4). DG will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards (Reference Z). Modifications will be implemented to facilitate the connections and operational actions required to supply power within 10 hours which is acceptable because the actions can be performed any time after declaration of an ELAP until the repowering is needed at greater than 24 hours.
- At >24 hours, power supply will be swapped back to the station batteries, which have been repowered, from the dedicated HCVS batteries to ensure power to the inverters. Access to the transfer switch will be in the control building.

### Discussion of radiological, temperature, other environmental constraints identified in Attachment 2

- At 7.3 hours, the rupture disc will be manually breached using the argon tank station in the reactor building.
- At 12 hours, based on battery depletion, power supply will be swapped from station batteries to dedicated HCVS batteries to ensure power to the inverters. Access to the transfer switch will be in the control building.
- At >24 hours, installed nitrogen bottles will be valved-in to supplement the air accumulator supply as stated for time constraint sequence 1. Nitrogen bottles will be located in an area that is accessible to operators, preferable near the ROS.
- At >24 Hours, temporary generators will be installed and connected to the pigtail to power up battery chargers using a portable DG to supply power to HCVS critical components/instruments - Time critical after 26 hours. Current battery durations are calculated to last greater than GG hours (Reference X). DG will be staged beginning at approximately 8-10 hour time frame (Reference 4). Within Two (2) hours of deployment the DG will be in service. Thus the DGs will be available to be placed in service at any point after 24 hours as required 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 in the Control Building or in the yard area because the HCVS vent pipe is underground once it leaves the Reactor Building.
- At >24 hours, power supply will be swapped back to the station batteries from the dedicated HCVS batteries to ensure power to the inverters. Access to the connections and location switch will be in the control building.

## Part 2: Boundary Conditions for WW Vent

### **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, 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

#### **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?

#### **Component Qualifications (EA-13-109 Section 2.1 / NEI 13-02 Section 5.1)**

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/ISG 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.

## Part 2: Boundary Conditions for WW Vent

*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. (reference 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.*

### Vent Size and Basis

The HCVS wetwell path is designed for venting steam/energy at a nominal capacity of 1% of 2804 MWt thermal power at pressure of 56 psig. This pressure is the lower of the containment design pressure (56 psig) and the PCPL value (62 psig). The size of the wetwell portion of the HCVS is  $\geq 18$  inches in diameter which provides adequate capacity to meet or exceed the Order criteria.

### Vent Capacity

The greater than 1% capacity at Plant Hatch 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-1: Confirm suppression pool heat capacity]**

### Vent Path and Discharge

Existing HCVS vent path at Hatch consists of a wetwell and drywell vent on each unit. The drywell vent exits the Primary Containment into the Reactor Building and proceeds down to the torus bay. Wetwell and drywell vent piping merges into a common header in the torus bay. Vent path for both wetwell and drywell exits the reactor building through an underground pipe. This pipe travels approximately 500 feet from both units and combines in a mixing chamber at the base of the main stack. All effluents exit out the main stack.

The HCVS discharge path uses the main stack.

## Part 2: Boundary Conditions for WW Vent

### Power and Pneumatic Supply Sources

All electrical power required for operation of HCVS components will be routed through two Inverters, one for each electrical division. These inverters will be sized at 7.5 kW each and will convert DC power from installed batteries into AC power for the end users (instruments, solenoid valves, etc.). Battery power will be provided by the existing station service batteries for the first 12 hours following the ELAP event. At about 12 hours, power will be transferred to dedicated batteries that will supply power for an additional 12 hours. At 24 hours, power will transfer back to the station batteries, at which time it is expected that FLEX generators will be in service to recharge station batteries.

Pneumatic power is normally provided by the non-interruptible air system with backup nitrogen provided from installed nitrogen supply tanks. Following an ELAP event, station air system is lost, and normal backup from installed nitrogen supply tanks is isolated. Therefore, for the first 24 hours, pneumatic force will be supplied from newly installed air accumulator tanks. These tanks 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-shut. Opening the valves requires energizing an AC powered solenoid operated valve (SOV) and providing motive air/gas. The detailed design 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 valve for the first 24-hours.
2. An assessment of temperature and radiological conditions will be performed to ensure operating personnel can safely access and operate controls at the ROS based on time constraints listed in Attachment 2.
3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (electric power, N<sub>2</sub>/air) will be located in areas reasonably protected from the hazards listed in Part 1 of this report.
4. All valves required to open the flow path will be designed for remote manual operation following an ELAP, such that the primary means of valve manipulation does not rely on use of a hand wheel, reach-rod, or similar means requiring close proximity to the valve (reference FAQ HCVS-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.
5. 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 (near the ROS in the control building or outside) such that radiological impacts are not an issue. Additional bottles can be brought in as needed.
6. Access to the locations described above will not require temporary ladders or scaffolding.

## Part 2: Boundary Conditions for WW Vent

### Location of Control Panels

The HCVS design allows for initiation, operation, and monitoring of the HCVS from the Main Control Room (MCR) or the Remote Operating Station (ROS). The MCR location is protected from adverse natural phenomena and is the normal control point for HCVS operation and Plant Emergency Response actions.

The final location of the ROS is still under evaluation and is identified as an Open Item at this time.

### 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).

**[OPEN ITEM- 2: State which approach or combination of approaches the plant decides to take to address the control of flammable gases, clearly demarcating the segments of vent system to which an approach applies.]**

### Unintended Cross Flow of Vented Fluids

The HCVS uses the Primary Containment Isolation System (PCIS) containment isolation valves for containment isolation. These containment isolation valves 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. Although these valves are shared between the PCIS and the HCVS, separate control circuits are provided to each valve for each function. Specifically:

1. The PCIS control circuit will be used during all “design basis” operating modes including all design basis transients and accidents.
2. The potential for cross flow exists between the HCVS and the Standby Gas Treatment System (SGTS). Resolution involves evaluation of SGTS isolation valve leakage for both inlet and outlet valves, as both interface with the HCVS. If necessary, these valves will be replaced with leak-tight valves. Testing and maintenance will be performed to ensure that the valves remain leak-tight.
3. An additional cross-flow avenue exists between the HCVS of the two units and other connected systems at the mixing chamber in the shared Main Stack. With the Main Stack being open to the atmosphere, there is no motive force to push effluent from the mixing chamber back to the plant, thus it is assumed this avenue of cross flow is not a reasonable assumption.

EOP/ERG operating procedures provide clear 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

## Part 2: Boundary Conditions for WW Vent

available (inclusive of a design basis loss-of-coolant accident (DBLOCA)). However the ECCS pumps will not have normal power available because of the starting boundary conditions of an ELAP.

- The features that prevent inadvertent actuation at all times are two PCIV's in series powered from different division, a rupture disk and key lock switches. Procedures also provide clear guidance to not circumvent containment integrity by simultaneously opening torus and drywell vent valves during any design basis transient or 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.

### Component Qualifications

The HCVS components downstream of the second containment isolation valve and components that interface with the HCVS are routed in seismically qualified structures. For those components, the structure will be analyzed for seismic ruggedness to ensure that any potential failure would not adversely impact the function of the HCVS or other safety related structures or components. HCVS components that directly interface with the pressure boundary will be considered safety related, as the existing system is safety related. Likewise, any electrical or controls component which interfaces with Class 1E power sources will be considered safety related, as their failure could adversely impact containment isolation and/or a safety-related power source. The remaining components will be considered Augmented Quality. 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, 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).

### Monitoring of HCVS

The Plant Hatch 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/Alternate 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.

## Part 2: Boundary Conditions for WW Vent

The wetwell HCVS will include means to monitor the status of the vent system in both the MCR and the ROS. Included in the current design of the reliable hardened vent (RHV) are control switches in the MCR with valve position indication. The existing RHV controls currently meet the environmental and seismic requirements of the Order for the plant severe accident and will be upgraded to address ELAP. Control and indication of the wetwell HCVS valves will be duplicated at the ROS. The ability to open/close these valves multiple times during the event's first 24 hours will be provided by two air accumulator tanks and station service batteries, supplemented by installed backup battery power sources. Beyond the first 24 hours, the ability to maintain these valves open or closed will be provided with replaceable nitrogen bottles and FLEX generators.

The wetwell HCVS will include indications for vent pipe pressure, temperature, and effluent radiation levels at both the MCR and ROS. Other important information on the status of supporting systems, such as power source status and pneumatic supply pressure, will also be included in the design and located to support HCVS operation. The wetwell HCVS includes existing containment 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 and will be designed for sustained operation during an ELAP event.

The HCVS instruments, including valve position indication, process instrumentation, radiation monitoring, and support system monitoring, will be qualified by using one 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 344-2004
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

<u>Instrument</u>	<u>Qualification Method*</u>
HCVS Process Temperature	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Pressure	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Radiation Monitor	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Valve Position	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Pneumatic Supply Pressure	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Electrical Power Supply Availability	ISO9001 / IEEE 344-2004 / Demonstration

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

## Part 2: Boundary Conditions for WW Vent

### *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 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.

A torus hardened vent (THV) system was originally installed to satisfy the requirements of Generic Letter 89-16. The modifications associated with the THV vent were performed under the provisions of 10CFR50.59 and thus the Plant Hatch THV was designed, analyzed, and implemented consistent with the design basis of the plant. The current design will be evaluated to confirm that the existing system, coupled with current and planned modifications to upgrade the THV to a hardened containment vent system (HCVS), will meet the requirements of Order EA-13-109 and remain functional following a severe accident.

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 Effluent Vent Pipe and HCVS ROS Location.

Conduit design will be installed to Seismic Class 1 criteria. Both existing and new barriers will be used 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.

In addition to these design requirements, providing sufficient channel separation (by distance and/or protective barriers) will minimize the likelihood of a common cause event which adversely affects both divisions of the containment isolation valves when the control for these valves are provided on the ROS. Separation will be in accordance with Plant Hatch electrical design criteria, RG 1.75 and IEEE 384.

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 EMC (per RG 1.180). These qualifications will be bounding conditions for Plant Hatch. The qualification for the equipment by the supplier will be validated by SNC for the specific location at Plant Hatch to ensure that the bounding conditions envelope the specific plant conditions.

For the instruments required after a potential seismic event, the following measures 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

## Part 2: Boundary Conditions for WW Vent

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 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference xxx) 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 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**

The operation of the HCVS will be designed to minimize reliance on operator actions for response to an ELAP and severe accident events. Immediate operator actions will be completed by Reactor Operators from either the Main Control Room (MCR) or the HCVS Remote Operating Station (ROS) and will include remote-manual actions from a local gas cylinder station. 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 primary procedural protocol.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR and will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report.

Permanently installed electrical 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 installed batteries for up to 24 hours before FLEX generators will be required to be functional.

**System control:**

- i. Active: PCIVs are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS is designed for a minimum of 13 open/close cycles of the vent valve under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EPGs. As noted in Table 2-1 jumpers will be used to override the containment isolation circuit on the PCIVs needed to vent containment.
- ii. Passive: Inadvertent actuation protection is provided by the current containment isolation circuitry associated with the PCIVs used to operate the HCVS. In addition, the HCVS isolation valve is normally key-locked closed and has a rupture disc located downstream. This rupture disc has a burst set pressure above the maximum inlet header pressure expected during a design basis event. Breach of the rupture disk will occur outside of the MCR and will require manual operation of two valves, one of which is normally locked closed.

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

**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**

After approximately 24 hours, available personnel will be able to connect supplemental 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 Part 1 of this report. Connections will be pre-engineered quick disconnects to minimize manpower resources. Sufficient nitrogen bottles will be staged to support operations for up to 72 hours following the ELAP event. After 24 hours, power will be switched back to the station batteries which are expected to be powered by FLEX generators at that time.

**Details:**

**Provide a brief description of Procedures / Guidelines:**

*Confirm that procedure/guidance exists or will be developed to support implementation.*

Primary Containment Control Flowchart exists to direct operations in protection and control of containment integrity, including use of the existing Hardened Vent System. Other site procedures for venting containment using the HCVS include: 31EO-TSG-001-0, Technical Support Guidelines; 31EO-EOP-101-1/2, Emergency Containment Venting; 31EO-EOP-104-1/2, Primary Containment Venting for Hydrogen and Oxygen Control.

**Identify modifications:**

*List modifications and describe how they support the HCVS Actions.*

EA-12-049 Modifications

- DCPs SNC467474 and SNC476661 will provide the Inverters that will convert station battery DC power into AC power for use by the end-users needed for HCVS operation.
- DCPs SNC440278 and SNC539300 will provide both the air accumulators and the nitrogen bottles needed for pneumatic support of the HCVS air actuators for the first 72 hours following an ELAP event. It will install the means to manually burst the rupture disk in the HCVS header to allow for flow.
- DCP SNC469007 will provide forced ventilation to MCR for operator habitability and HCVS equipment controls and instrumentation functionality.

EA-13-109 Modifications

- A modification will be required to install the dedicated batteries and the disconnect switches needed to supply power to HCVS for the second 12 hours following the ELAP event once station batteries have been depleted.

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

- A modification will be required to install a Remote Operation Station for both units.
- A modification will be required to install a HCVS Rad Monitor and power supply on each unit.
- A modification will be required for installation of required HCVS instrumentation and controls in the MCR and ROS for both units. Some of this will be completed under FLEX DCPs SNC440278 and SNC539300.
- Additional modifications may be required to system isolation valves, rupture disk/assembly, and existing HCVS piping.

**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:

<b><u>Key Parameter</u></b>	<b><u>Component Identifier</u></b>	<b><u>Indication Location</u></b>
HCVS Effluent temperature	TBD	MCR/ROS
HCVS Pneumatic supply pressure	TBD	MCR/ROS
HCVS valve position indication	TBD	MCR/ROS
HCVS system pressure indication	TBD	MCR/ROS
Rupture Disc Pressure	1T48-N030/2T48-N030)	Reactor Building

Initiation, operation and monitoring of the HCVS system will rely on several existing Main Control Room key parameters and indicators:

<b><u>Key Parameter</u></b>	<b><u>Component Identifier</u></b>	<b><u>Indication Location</u></b>
Drywell pressure	1/2T48-N023A/B	MCR
Torus pressure		MCR
Torus water temperature		MCR
Torus level	1/2T48-N021A/B	MCR
Reactor pressure		MCR
Drywell radiation		MCR

HCVS indications for HCVS valve position indication, HCVS pneumatic supply pressure, HCVS effluent temperature, and HCVS system pressure will be installed in the MCR to comply with EA-13-109.

**Notes:**

**[Note: On-going discussions on source of analysis, adequacy of analysis to provide reasonable assurance, and method of documentation to reach a milestone]**

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 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**

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 the FLEX strategies identified in the response to Order EA-12-049 have not worked. Venting will occur without the need for manually breaching the rupture disk, since conditions in the drywell would be sufficient to burst the rupture disk without assistance from operators. Access to the reactor building will be severely restricted. Immediate operator actions will be completed by Reactor Operators from Main Control Room (MCR) or the HCVS Remote Operating Station (ROS) and will include remote-manual actions from a local gas cylinder station. The operator actions required to open a vent path were previously listed in the Part 2 section of this report under BDBEE Venting.

The HCVS has been designed to allow initiation, control, and monitoring of venting from the MCR and will be capable of operation from an ROS to be installed as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and is protected from hazards assumed in Part 1 of this document. Travel pathways will be reviewed for dose and temperature, and alternate routes may need to be considered to minimize operator exposure to harsh environmental conditions.

Permanently installed power and motive air/gas capable will be available to support operation and monitoring of the HCVS for 24 hours

System control:

- i. Active: PCIVs are operated in accordance with EOPs to control containment pressure. The HCVS is designed for a minimum of 13 open/close cycles of the isolation valve under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EPGs. Jumpers will be used to override the containment isolation circuit on the PCIVs needed to vent containment.
- ii. Passive: Inadvertent actuation protection is provided by the current containment isolation circuitry associated with the PCIVs used to operate the HCVS. In addition, the HCVS isolation valve is normally key-locked closed and has a rupture disc located downstream. This rupture disc has a burst set pressure above the maximum inlet header pressure expected during a design basis event. Breach of the rupture disc will occur outside of the MCR and will require manual operation of two valves, one of which is normally locked closed.

Part 2 Boundary Conditions for WW Vent: <b>Severe Accident Venting</b>	
<b>Greater Than 24 Hour Coping Detail</b>	
<i>Provide a general description of the venting actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
<p>After approximately 24 hours, available personnel will be able to connect supplemental 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 Part 1 of this report. Connections will be pre-engineered quick disconnects or similar arrangement to minimize manpower resources. Sufficient nitrogen bottles will be staged to support operations for up to 72 hours following the ELAP event. After 24 hours, power will be switched back to the station batteries which are expected to be powered by FLEX generators at that time.</p> <p>[OPEN ITEM]: Perform SA Evaluation for FLEX DG use for post 24 hour actions</p>	
<b>Details:</b>	
<p><b>Provide a brief description of Procedures / Guidelines:</b></p> <p><i>Confirm that procedure/guidance exists or will be developed to support implementation.</i></p>	
<p>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.</p>	
<p><b>Identify modifications:</b></p> <p><i>List modifications and describe how they support the HCVS Actions.</i></p>	
<p>The same as for BDBEE Venting Part 2</p>	
<p><b>Key Venting Parameters:</b></p> <p><i>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)</i></p>	
<p>The same as for BDBEE Venting Part 2</p>	
<p><b>Notes:</b></p>	
<p><b>[Note: On-going discussions on source of analysis, adequacy of analysis to provide reasonable assurance, and method of documentation to reach a milestone]</b></p>	

Part 2 Boundary Conditions for WW Vent: <b>Support Equipment Functions</b>	
<b>Determine venting capability support functions needed</b>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
<b>BDBEE Venting</b>	
<i>Provide a general description of the BDBEE Venting actions support functions. Identify methods and strategy(ies) utilized to achieve venting results.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
<p>Venting will require support from DC power as well as instrument air systems.</p> <p>Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the MCR or ROS except for breaching of the rupture disc for anticipatory venting.</p> <p>Venting will require support from DC power as well as instrument air systems as detailed in the response to Order EA-12-049. Existing safety related station batteries will provide sufficient electrical power for HCVS operation for greater than 12 hours. Before station batteries are depleted, portable FLEX diesel generators, as detailed in the response to Order EA-12-049, will be credited to charge the station batteries and maintain DC bus voltage after 12 hours. Newly installed accumulator tanks with back-up portable N2 bottles will provide sufficient motive force for all HCVS valve operation and will provide for multiple operations of the 1/2T48-F082 vent valve.</p>	
<b>Severe Accident Venting</b>	
<i>Provide a general description of the Severe Accident Venting actions support functions. Identify methods and strategy(ies) utilized to achieve venting results.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
<p>The same support functions that are used in the BDBEE scenario would be used for severe accident venting. To ensure power from 12 to 24 hours, a set of dedicated HCVS batteries will be available to feed HCVS loads via a manual transfer switch. At 24 hours, power will be switched back to the station batteries backed up by FLEX generators evaluated for SA capability.</p> <p>Nitrogen bottles that will be located outside of the reactor building and in the immediate area of the ROS will be available to tie-in supplemental pneumatic sources.</p>	
<b>Details:</b>	
<b>Provide a brief description of Procedures / Guidelines:</b>	
<i>Confirm that procedure/guidance exists or will be developed to support implementation.</i>	
<p>Most of the equipment used in the HCVS is permanently installed. The key portable items are the SA Capable/FLEX DGs, argon bottles needed to burst the rupture disk and the nitrogen bottles needed to supplement the air supply to the AOVs after 24 hours. These will be staged in position for the duration of the event.</p>	
<b>Identify modifications:</b>	
<i>List modifications and describe how they support the HCVS Actions.</i>	

Part 2 Boundary Conditions for WW Vent: <b>Support Equipment Functions</b>
<p>FLEX modifications applicable to HCVS operation: main control room vestibule to provide air flow pathway to main control rooms for operator habitability; add connection points and cabling at the control building wall and turbine building (SW Corner) to connect FLEX 600VAC diesel generators to the 600 VAC Bus C and Bus D to provide power to the battery chargers and critical AC components after 24 hours.</p> <p>HCVS modification: add piping and connection points at a suitable location in the control building or outside to connect portable N2 bottles for motive force to HCVS components after 24 hours. HCVS connections required for portable equipment will be protected from all applicable screened-in hazards and located such that operator exposure to radiation and occupational hazards will be minimized. Structures to provide protection of the HCVS connections will be constructed to meet the requirements identified in NEI-12-06 section 11 for screened in hazards.</p>
<p><b>Key Support Equipment Parameters:</b>  <i>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)</i></p>
<p>Local control features of the FLEX DG electrical load and fuel supply.            Pressure gauge on supplemental Nitrogen bottles.</p>
<p><b>Notes:</b></p>

<b>Part 2 Boundary Conditions for WW Vent: Venting Portable Equipment Deployment</b>		
<i>Provide a general description of the venting actions using portable equipment including modifications that are proposed to maintain and/or support safety functions.</i>		
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>		
<b>Details:</b>		
<b>Provide a brief description of Procedures / Guidelines:</b>		
<i>Confirm that procedure/guidance exists or will be developed to support implementation.</i>		
<p>All deployment actions are not impacted by the vent piping since the piping is underground for the routing outside the buildings and Plant Hatch is utilizing the main stack for discharge. Thus the procedures/guidelines for HCVS actions are the same as for support equipment section.</p> <p>Strategy Implementation Guidelines (SIGs) are being developed to address all HCVS operating strategies, including deployment of portable equipment. Direction to enter the SIGs for HCVS operation will be given in the EOPs, the site ELAP procedure, and the SAMGs. (refer to Part 4 for general information on Procedures)</p>		
<b>Strategy</b>	<b>Modifications</b>	<b>Protection of connections</b>
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA-12-049 (FLEX)
<b>Notes:</b> Additional bottles can be brought in after 72 hours.		

### Part 3: Boundary Conditions for DW 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**

The normal response for a BDBEE/Severe Accident is to vent via the wetwell. At the point when the wetwell becomes unusable then venting via the drywell will be available from the original Generic Letter 89-16 design for Plant Hatch.

The rest of Part 3 will be completed with the Phase 2 OIP submittal by December 31, 2015

#### **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 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**

#### **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**

**Details:**

### Part 3: Boundary Conditions for DW Vent

**Provide a brief description of Procedures / Guidelines:**

*Confirm that procedure/guidance exists or will be developed to support implementation.*

**Identify modifications:**

*List modifications and describe how they support the HCVS Actions.*

**Key Venting Parameters:**

*List instrumentation credited for the venting HCVS Actions.*

**Notes:**

**[Note: On-going discussions on source of analysis, adequacy of analysis to provide reasonable assurance, and method of documentation to reach a milestone]**

## **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 X.X.X / NEI 13-02 Section X.X.x**

#### 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.
- 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.

Plant Hatch will utilize the industry developed guidance from the Owners Groups, EPRI, and NEI Task team to develop/enhance site specific procedures or guidelines to address the criteria in NEI 13-02. These procedures and/or guidelines will support existing symptom based command and control strategies in the current EOPs and will 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 (reference NEI 13-02), including the storage and location of portable equipment,
- location of the remote control HCVS operating station (panel)
- training on operating the portable equipment, and
- testing of portable equipment

Provisions will be established for out-of-service requirements of the HCVS and compensatory measures that comply with the criteria from NEI 13-02.

Licensees will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in the *{Site Specific control document}*:

The provisions for out-of-service requirements for HCVS 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

## Part 4: Programmatic Controls, Training, Drills and Maintenance

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,
  - The HCVS availability will be restored in a manner consistent with plant procedures
  - A cause assessment will be performed to prevent future unavailability 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 X.X.X / NEI 13-02 Section X.X.x**

Personnel expected to perform direct execution of the HCVS 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, (reference 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 14-01 as codified in NTF Recommendation 8 and 9 rulemaking*

The Licensee should demonstrate use in drills, tabletops, or exercises for HCVS operation 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 X.X.X / NEI 13-02 Section X.X.x**

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 NTF 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.

## Part 4: Programmatic Controls, Training, Drills and Maintenance

- Periodic testing and frequency should be determined based on equipment type and expected use (further details are provided in Section 6 of this document).
- Testing should be done to verify design requirements and/or basis. The basis should be 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 permanent 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 X.X.X / NEI 13-02 Section X.X.x**

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.

Plant Hatch 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 five years 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 and ensuring that all interfacing system valves move to their proper (intended) positions.	Once per every other operating cycle

**Part 4: Programmatic Controls, Training, Drills and Maintenance**

Notes:

DRAFT

## 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 X.X.X / NEI 13-02 Section X.X.x**

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 <i>{Include date changes in this column}</i>
Hold preliminary/conceptual design meeting	Jun, 2014	Complete	
Submit Overall Integrated Implementation Plan	Jun 2014	Complete	
Submit 6 Month Status Report	Dec. 2014		
Submit 6 Month Status Report	Jun. 2015		
Submit 6 Month Status Report	Dec. 2015		Simultaneous with Phase 2 OIP
<i>U2 Design Engineering On-site/Complete</i>	<i>Mar, 2016</i>		
Submit 6 Month Status Report	Jun. 2016		
<i>Operations Procedure Changes Developed</i>	<i>Dec, 2016</i>		
<i>Site Specific Maintenance Procedure Developed</i>	<i>Dec, 2016</i>		
Submit 6 Month Status Report	Dec. 2016		
<i>Training Complete</i>	<i>Dec, 2016</i>		
<i>U2 Implementation Outage</i>	<i>Feb, 2017</i>		
<i>Procedure Changes Active</i>	<i>Mar, 2017</i>		
<i>U2 Walk Through Demonstration/Functional Test</i>	<i>Mar, 2017</i>		
<i>U1 Design Engineering On-site/Complete</i>	<i>Mar, 2017</i>		
Submit 6 Month Status Report	Jun. 2017		
Submit 6 Month Status Report	Dec. 2017		
<i>U1 Implementation Outage</i>	<i>Feb, 2018</i>		
<i>U1 Walk Through Demonstration/Functional Test</i>	<i>Mar, 2018</i>		
Submit Completion Report	<i>May, 2018</i>		

**Attachment 1: [HCVS Portable Equipment](#)**

<i>List portable equipment</i>	<i>BDBEE Venting</i>	<i>Severe Accident Venting</i>	<i>Performance Criteria</i>	<i>Maintenance / PM requirements</i>
<b>Argon Cylinders</b>	<b>X</b>			<b>Check periodically for pressure, replace or replenish as needed</b>
<b>Nitrogen Cylinders</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>Check periodically for pressure, replace or replenish as needed</b>
<b>FLEX DG</b>	<b>X</b>	<b>X</b>	<b>TBD</b>	<b>Per Response to EA-12-049</b>

## Attachment 2: Sequence of Events Timeline

*{insert site specific time line to support submittal}*

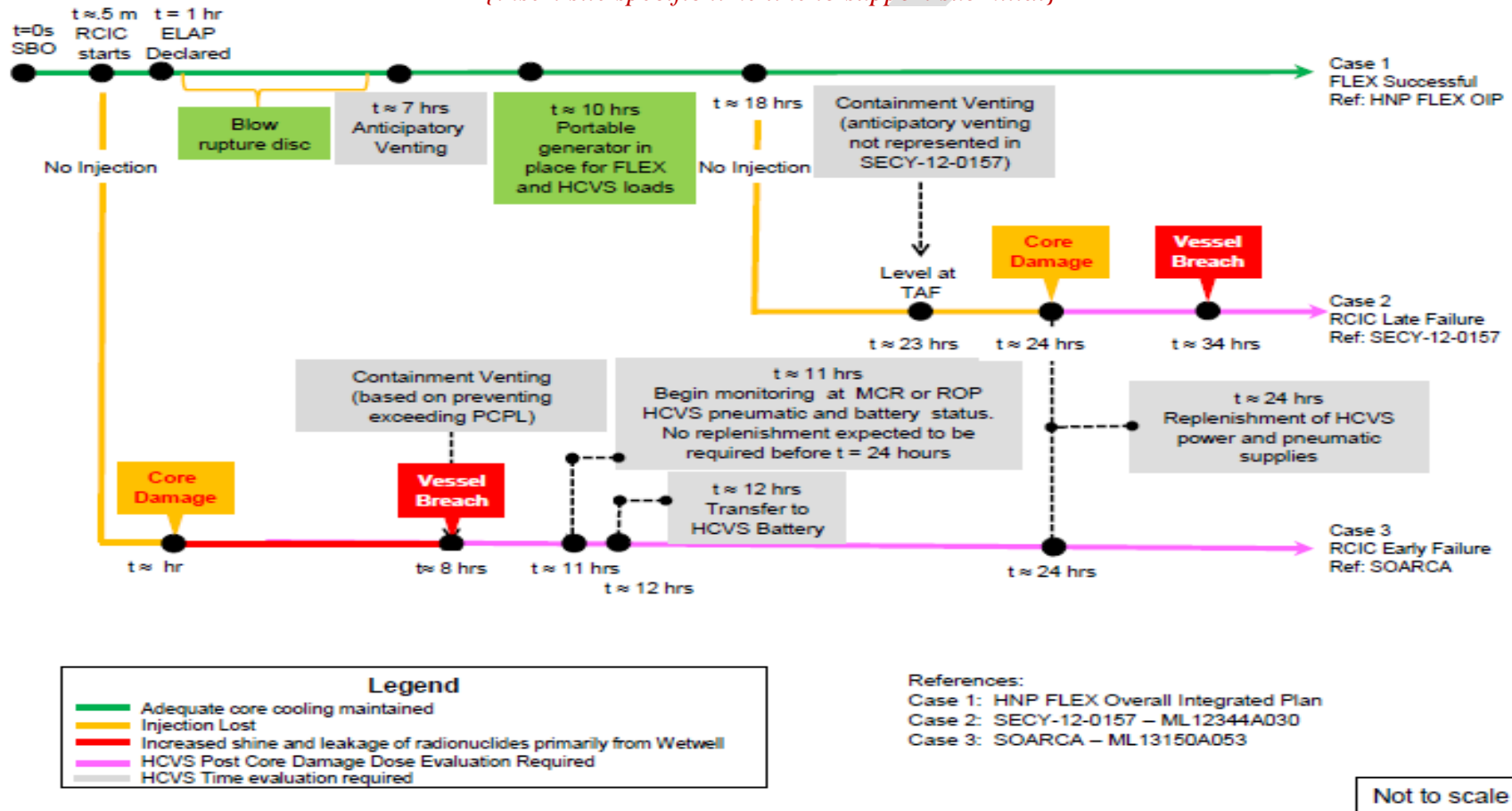


Table 2A: Wet Well HCVS Timeline

### **Attachment 3: Conceptual Sketches**

#### **Sketch 1: Electrical Layout of System**

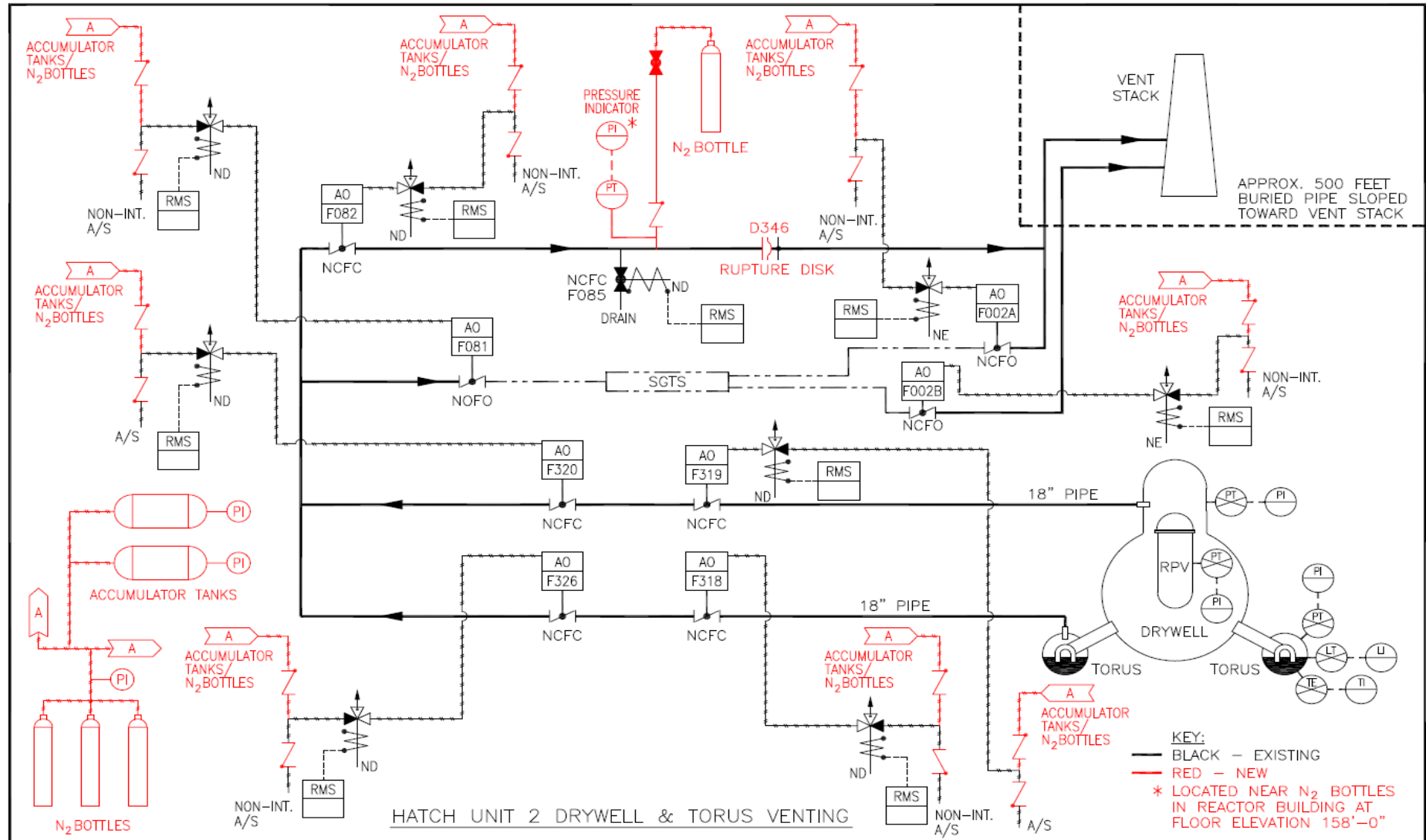
#### **Sketch 2: Layout of current HCVS**

(Conceptual sketches, as necessary to indicate equipment which is installed or equipment hookups necessary for the strategies. )

- Plant layout with egress and ingress pathways
- Piping routing for vent path
- Instrumentation Process Flow
- Electrical Connections
- Include a piping and instrumentation diagram of the vent system. Demarcate the valves (in the vent piping) between the currently existing and new ones.



# Hatch June 2014 HCVS Phase 1 Overall Integrated Plan



**Sketch 2: Layout of current HCVS, Unit 2 (Unit 1 similar)**

**Attachment 4: Failure Evaluation Table**

Table 4A: Wet Well HCVS Failure Evaluation Table

<b>Functional Failure Mode</b>	<b>Failure Cause</b>	<b>Alternate Action</b>	<b>Failure with Alternate Action Impact on Containment Venting?</b>
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of normal AC power	No action needed, power is already tied into station service battery via inverter for minimum 12 hours	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of alternate AC power (long term)	Connect dedicated batteries to inverter via transfer switch for minimum 12 hours	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	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of normal pneumatic air supply	No action needed, air can be supplied by accumulator tanks, which is sufficient for up to 3 cyclings of F082 valve over first 24 hours.	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to loss of alternate pneumatic air supply (long term)	Tie-in nitrogen cylinders to air system supporting HCVS valves, replace bottles as needed.	No
Fail to Vent (Open on Demand)	Valves fail to open/close due to SOV failure	Heroic action needed	Yes

## **Attachment 5: References**

Generic Letter 89-16, Installation of a Hardened Wetwell Vent, dated September 1, 1989

Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated March 12, 2012

Order EA-12-050, Reliable Hardened Containment Vents, dated March 12, 2012

Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated June 6, 2013

JLD-ISG-2012-02, Compliance with Order EA-12-050, Reliable Hardened Containment Vents, dated August 29, 2012

JLD-ISG-2013-02, Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated November 14, 2013

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

NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 1, dated August 2012

NEI 13-02, Industry Guidance for Compliance with Order EA-13-109, Revision 0, Dated November 2013

NEI 13-06, Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents and Events, Revision 0, dated March 2014

NEI 14-01, Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents, Revision 0, dated March 2014

IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations,

31EO-EOP-101-1, Version 3.7, Emergency Containment Venting (Unit 1)

31EO-EOP-101-2, Version 4.5, Emergency Containment Venting (Unit 2)

Edwin I. Hatch EA-12-049 (FLEX) Overall Integrated Implementation Plan, Rev 0, February 27, 2013

Edwin I. Hatch HCVS Overall Integrated Implementation Plan, Rev 0, February 27, 2013 (submittal for EA-12-050)

**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*

DRAFT

**Attachment 7: List of Overall Integrated Plan Open Items**

Open Item	Action	Comment
1	Confirm suppression pool heat capacity	
2	State which approach or combination of approaches the plant decides to take to address the control of flammable gases, clearly demarcating the segments of vent system to which an approach applies.]	

DRAFT