Xcel Energy®

Monticello Nuclear Generating Plant
2807 W County Road 75
Monticello, MN 55362

June 30, 2014

L-MT-14-052
10 CFR 2.202

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

Monticello Nuclear Generating Plant
Docket No. 50-263
Renewed Facility Operating License No. DPR-22

MNGP's 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 Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013 (ADAMS Accession Number ML13143A334).

2. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 14, 2013 (ADAMS Accession Number ML13304B836).

3. Nuclear Energy Institute (NEI) 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0, dated November 2013 (ADAMS Accession Number ML13316A853).

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued an Order (Reference 1) to Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy. Reference 1 was immediately effective and directs NSPM to require the MNGP, a Boiling Water Reactor (BWR) with a Mark I containment, to implement a reliable, severe accident capable hardened containment venting system (HCVS). This requirement will be implemented in two phases. Specific requirements for both phases of the Order are outlined in Attachment 2 of Reference 1.

Reference 1 requires submission of an overall integrated plan for Phase 1, including a description of how compliance with the Phase 1 requirements described in Attachment

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2 of Reference 1 will be achieved, by June 30, 2014. The purpose of this letter is to provide the overall integrated plan for Phase 1 pursuant to Section IV, Condition D.1, of Reference 1.

The NRC's interim staff guidance (Reference 2) for Phase 1 of the Order was issued November 14, 2013, which endorsed, with exceptions and clarifications, the methodologies described in the industry guidance document NEI 13-02 (Reference 3). Section 7.0 of Reference 3 contains the specific reporting requirements for the Phase 1 overall integrated plan. The information in the Enclosure to this letter aligns with the guidance provided in this section of Reference 3.

The enclosed overall integrated plan is based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the Enclosure, will be provided in the six-month status reports required by Reference 1.

If there are any questions or if additional information is needed, please contact Ms. Jennie Wike, Licensing Engineer, at 612-330-5788.

Summary of Commitments

This letter makes no new commitments and no revisions to existing commitments.

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

Executed on June 30, 2014.

Karen D. Fili
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Director of Nuclear Reactor Regulation (NRR), USNRC
NRR Project Manager, Monticello Nuclear Generating Plant, USNRC
Senior Resident Inspector, Monticello Nuclear Generating Plant, USNRC

ENCLOSURE

Monticello Nuclear Generating Plant

Hardened Containment Venting System (HCVS)

Phase 1 Overall Integrated Plan

(42 Pages to Follow)

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 (Reference 1). 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" (Reference 31). 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," on June 6, 2013 (Reference 5). 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 EA-13-109 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.") (Reference 5).
- "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.") (Reference 5).

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 (Reference 8). 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," (Reference 11) with clarifications. Except in those cases in which a licensee proposes an acceptable alternative method for complying with Order EA-13-109, the NRC staff will use the methods described in the NRC JLD-ISG-2013-02 and NEI 13-02 to evaluate licensee compliance as presented in submittals required in Order EA-13-109.

The Order EA-13-109 also requires submittal of an overall integrated plan which will provide a description of how the requirements of the Order will be achieved. This enclosure 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 status reports will be provided consistent with the requirements of Order EA-13-109.

The Monticello Nuclear Generating Plant (MNGP) venting actions for the Order EA-13-109 severe accident capable venting scenario can be summarized by the following:

- The Hardened Containment Vent System (HCVS) will be initiated via manual action from the main control room, or a remote but readily accessible location, at the appropriate time based on procedural guidance in response to plant conditions from observed or derived symptoms.
- The vent operation will utilize Containment Parameters of Pressure and Wetwell Level 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 with no known deviations to the schedule in Order EA-13-109 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. This refueling outage is currently scheduled for completion in April 2017.
- Phase 2: Later

NSPM has identified one alternative from the guidance in JLD-ISG-2013-02 and NEI 13-02, which is described in the following paragraphs.

HCVS Release Location

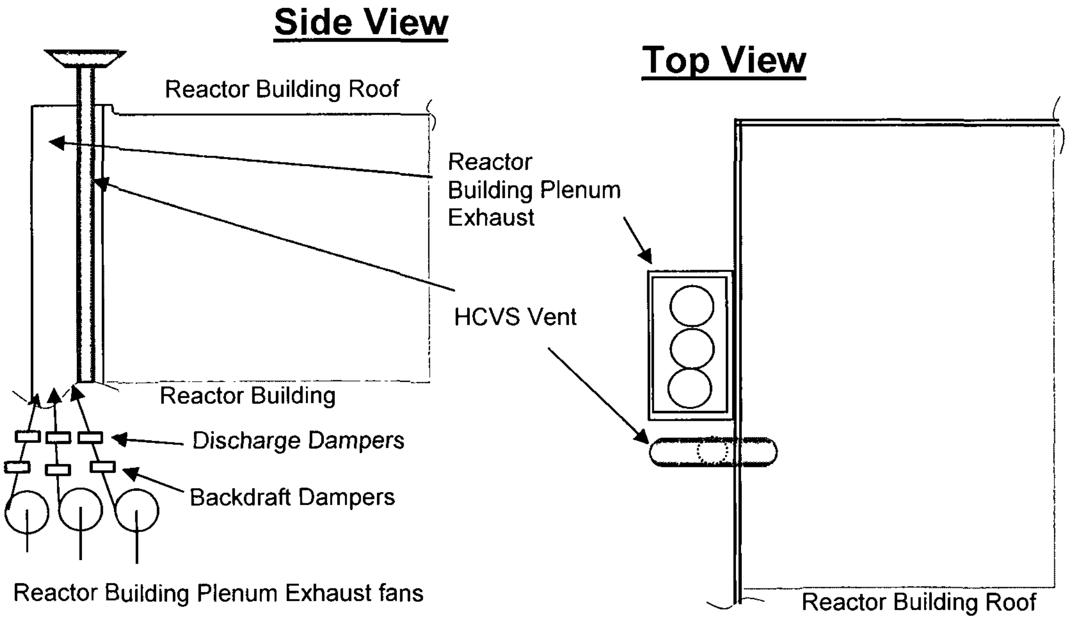
NEI 13-02, Section 4.1.5.2.2 (Reference 11), states:

> *The release point should be situated away from ventilation system intake and exhaust openings or other openings that may be used as natural circulation ventilation intake flow paths during a BDBEE (e.g., to prevent recirculation of the releases back into the buildings.)*

The HCVS discharge path is currently routed next to the Reactor Building plenum exhaust with the vent exhaust 3 ft. above the top of the Reactor Building plenum exhaust stack (see Figure 1). The vent exhaust is above the main plant structures. The vent is located greater than 100 ft. above ground level, providing an elevated release point that will not affect personnel staging any portable equipment needed for the Beyond Design Basis External Event (BDBEE).

Part 1: General Integrated Plan Elements and Assumptions

Figure 1: HCVS Exhaust Vent



The HCVS exhaust vent is not near the Reactor Building intake, control room intake, or the emergency response facilities, but is next to the Reactor Building plenum exhaust path. The Reactor Building plenum exhaust fans will be without a power source in a station blackout.

There are two dampers after each Reactor Building plenum exhaust fan – a backdraft damper and discharge damper. The discharge damper will close on loss of power associated with the station blackout and the backdraft damper will close on loss of Reactor Building exhaust flow. Both dampers are designed to prevent reverse flow, and therefore, prevent HCVS gases from entering the Reactor Building via the plenum room. Safety related dampers also isolate the plenum room from the rest of the Reactor Building. The "T" at the top of the vent will also be removed and replaced with a straight exit with a weather cap. This change will direct the vented gases upward and away from the plant.

Therefore, the existing HCVS vent configuration is an acceptable alternative to JLD-ISG-13-02 and NEI 13-02.

If additional deviations are identified, then the deviations will be communicated in a future six-month status report following identification.

Part 1: General Integrated Plan Elements and Assumptions

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 MNGP:

- Seismic,
- Flooding,
- Extreme Cold, Snow and Ice,
- High Wind,
- High Temperature

The following extreme external hazards screen out for MNGP:

- None.

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 Order 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 (Reference 10).
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 (Reference 10).
049-3. Assumed reactor transient boundary conditions are as identified in NEI 12-06 Section 3.2.1.4 items 1, 2, 3 and 4 (Reference 10).
049-4. No additional events or failures are assumed to occur immediately prior to or during the event, including security events (Reference 10, 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. (Reference 10, Section 3.2.1.3 item 9 and Section 3.2.1.4 items 1-4).
049-6. At 1 hour an ELAP is declared and actions begin as defined in EA-12-049 compliance (Reference 28).
049-7. DC power and distribution can be credited for the duration determined per the Order EA-12-049 (FLEX) methodology for battery usage (Reference 10, 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 Order 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 Order EA-13-109 generic assumptions:

109-1. Site response activities associated with Order 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).

Part 1: General Integrated Plan Elements and Assumptions

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 use of FLEX portable air supply equipment that is credited to recharge air lines for HCVS components after 24 hours. The FLEX portable air supply used must be demonstrated to meet the "SA Capable" criteria that are defined in NEI 13-02 Section 4.2.4.2 and Appendix D Section D.1.3 (Reference 11).

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 (Reference 20).

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 (Reference 18 and Reference 11, 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. (Reference 11, 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 (Reference 14).

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 (Reference 15 and Reference 23).

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 (Reference 32). 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 NUREG 1465) as related to Order EA-13-109 conditions are acceptable as references (Reference 11, 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 (EOP) changes consistent with the Emergency Procedure Guidelines/Severe Accident Guidelines (EPG/SAG) Revision 3 as incorporated per the sites EOP/Severe Accident Management Guideline (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 10 CFR 50 Appendix A, and no further evaluation of its use for the HCVS scenario is required (Reference 14). In addition, adequate protective clothing and respiratory protection is available if required to address contamination issues.

Part 1: General Integrated Plan Elements and Assumptions

Plant Specific HCVS Related Assumptions/Characteristics:

1. Alternate Shutdown System Panel
   Rather than the main control room, NSPM will use the Alternate Shutdown System panel located in the Emergency Filtration (EFT) Building as the primary control station for operation and monitoring of the HCVS, as permitted by Order EA-13-109, Section 1.2.4.
2. Backup HCVS Operating Station
   If operation is not possible from the Alternate Shutdown System panel, the HCVS will be operated from the Turbine Building in the vicinity of Train B of the Alternate Nitrogen System. This location will be called the Backup HCVS Operating Station.
3. Initiation of Venting
   The vent will not be opened at a specific time. The HCVS will be initiated per plant procedural guidance.

Part 2: Boundary Conditions for Wetwell 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 4.2.5, 4.2.6, 6.1.1

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. A list of the manual actions that will be performed by plant personnel to open the HCVS vent path can be found in 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. Open manual valve to connect HCVS to Train B, Alternate Nitrogen System (AI-651, N2 SUPPLY TO HARD PIPE VENT)	Backup HCVS Operating Station	
2. Open key-locked solenoid valves that supply nitrogen to open the rupture disc	Alternate Shutdown System panel	Alternately, at Backup HCVS Operating Station
3. Shut solenoid valves that supply nitrogen to open the rupture disc after 5 minutes	Alternate Shutdown System panel	Alternately, at Backup HCVS Operating Station
4. Open key-locked air operated HCVS containment isolation valves	Alternate Shutdown System panel	Alternately, at Backup HCVS Operating Station

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 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 long term station blackout (LTSBO) or ELAP with failure of RCIC after a black start where failure occurs because of subjectively assuming over injection (Reference 31).
3. Case 3 is based on NUREG-1935 (SOARCA) results for a prolonged SBO or ELAP with the loss of RCIC case without black start (Reference 33).

Part 2: Boundary Conditions for Wetwell Vent

Discussion of time constraints identified in Attachment 2 for the three timeline cases identified above

- 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 bus(es) with motive force supplied to HCVS valves from the Alternate Nitrogen System. Critical HCVS controls and instruments associated with containment will be DC powered and operated from the Alternate Shutdown System panel. 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 will provide power before battery life is exhausted. Thus, initiation of the HCVS from the Alternate Shutdown System panel according to plant procedures 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 occur at a time further removed from an ELAP declaration as shown in Attachment 2.
- Installed Train B, Alternate Nitrogen System, bottles will be able to supply the HCVS for 24 hours. Replacement bottles can be installed at any time prior to 24 hours to ensure adequate capacity after 24 hours is maintained, so this time constraint is not limiting.
- Portable FLEX diesel generators will be staged and connected to power the battery chargers in order to supply power to HCVS critical components/instruments after 24 hours. A battery will supply power to the HCVS critical components/instruments during the first 24 hours. The FLEX diesel generators 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 FLEX diesel generator will be located in on-site FLEX storage buildings. FLEX diesel generator will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards. Modifications will be implemented to facilitate the connections and operational actions to supply the required power within 24 hours, which is acceptable because actions can be performed any time after declaration of an ELAP until the repowering is needed at greater than 24 hours.

Discussion of radiological and temperature constraints identified in Attachment 2

- Prior to venting, the nitrogen supply to the HCVS will need to be unisolated. NSPM will evaluate the Alternate Shutdown System panel and Backup HCVS Operation Station locations for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers (Open Item 4).
- At greater than 24 hours, replacement nitrogen bottles, as needed, will continue to supply the required Alternate Nitrogen System pressure. NSPM will evaluate the effects of radiological and temperature constraints on the deployment of nitrogen bottles after 24 hours (Open Item 7).
- At greater than 24 Hours, temporary generators will be installed and connected to power the battery chargers using a portable FLEX diesel generator to supply power to HCVS critical components/instruments. HCVS battery durations will be greater than 24 hours. The FLEX diesel generator will be staged and ready for service prior to 24 hours. Thus, the FLEX diesel generators will be available to be placed in service at any point after 24 hours as required to

Part 2: Boundary Conditions for Wetwell Vent

supply power to HCVS critical components/instruments. The connections, location of the FLEX diesel generator and access for refueling will be located in an area that is accessible to operators. NSPM will determine radiological conditions for the FLEX portable equipment staging areas (Open Item 3).

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, 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 Wetwell 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. (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

Part 2: Boundary Conditions for Wetwell Vent

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 existing HCVS wetwell path is designed for venting steam/energy at a nominal capacity of 1% or greater of 2004 MWt thermal power at a pressure of 56 psig. This pressure is the lower of the containment design pressure and the PCPL value. The size of the wetwell portion of the HCVS (provided below in the "Vent Path and Discharge" response) provides adequate capacity to meet or exceed the Order criteria.

Vent Capacity
The 1% value at MNGP 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. The duration of suppression pool decay heat absorption capability has been confirmed.

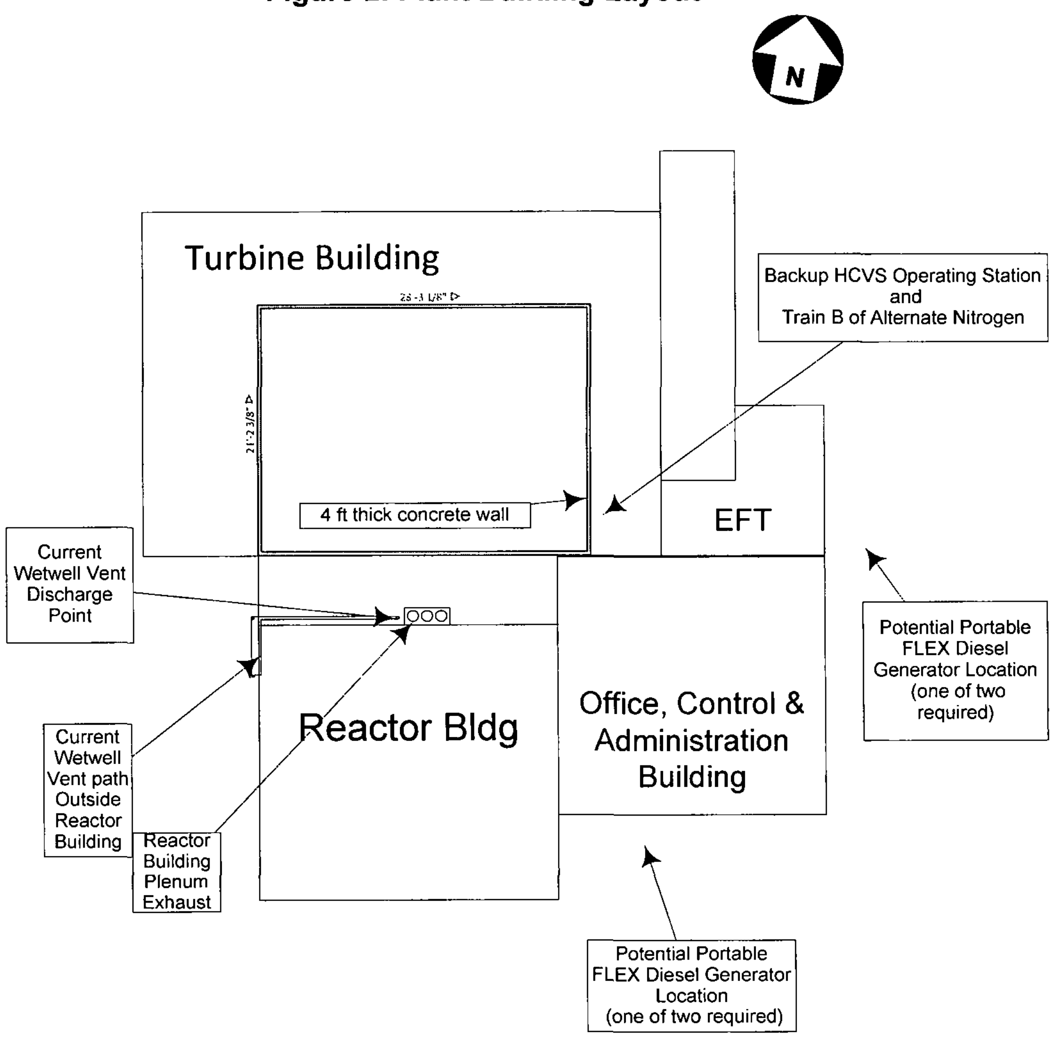
Vent Path and Discharge
The existing HCVS vent connects to the wetwell through an eight inch dedicated penetration. Two air-operated valves (AOV) in series provide containment isolation. These valves are located in the torus room. The eight inch line then enters the HPCI room connecting to a rupture disc. The rupture disc will rupture at 44 to 50 psig. It can be ruptured by compressed nitrogen supplied via two solenoid operated valves, which pressurize the area between the outboard containment isolation valve and the rupture disc. Immediately upstream of the rupture disc, the vent line changes to a 10 inch pipe that exits the Reactor Building through the HPCI roof. The vent then travels up the side of the Reactor Building where the piping continues horizontally by approximately 60 ft. The vent piping then runs vertically beside the Reactor Building vent stack to an elevation 3 ft. above the highest structure on the Reactor Building roof. A layout of the MNGP buildings is provided in Figure 2.

The HCVS discharge path is routed to a point above any adjacent structure. This discharge point is above the 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 an ELAP and BDBEE, and emergency response facilities; however, these must be considered in conjunction with other design criteria (e.g., flow capacity) and pipe routing limitations, to the degree practical. As discussed in Part 1, the HCVS discharge is in the vicinity of the Reactor Building plenum exhaust.

The missile protection for the HCVS will follow the generic industry guidance on missile protection for HCVS (Open Item 1).

Part 2: Boundary Conditions for Wetwell Vent

Figure 2: Plant Building Layout



Part 2: Boundary Conditions for Wetwell Vent

Power and Pneumatic Supply Sources

The electrical power supply required for operation of HCVS components will be supplied by a battery with sufficient capacity for the first 24 hours, after which the battery will be charged by a portable FLEX diesel generator. The following HCVS components will be electrically powered:

- One Solenoid for each of the two containment isolation valves
- Two Solenoids for opening the rupture disc
- Valve position indication for containment isolation valves
- HCVS radiation monitor
- HCVS temperature monitor

NSPM has not completed the design of the HCVS power supply sources. NSPM will identify the 24 hour power supply for the HCVS (Open Item 2).

NSPM has not completed the dose evaluation for the FLEX portable equipment staging area. NSPM will determine the radiological conditions for the FLEX portable equipment staging areas (Open Item 3).

Pneumatic supply is currently provided by the B Train of the Alternate Nitrogen System. The following HCVS components will be pneumatically powered:

- Two containment isolation valves (AOVs)
- Opening the rupture disc

The B Train of the Alternate Nitrogen System is located in the Turbine Building. Train B of the Alternate Nitrogen System currently provides a safety related backup pneumatic supply to the following components:

- T-ring seals for three Primary Containment & Atmospheric Control System purge and vent valves,
- Three of the eight Safety Relief Valves.
- Inboard Main Steam Isolation Valves.
- HCVS isolation valves and rupture disc.

The purpose of the Alternate Nitrogen System is to provide the pneumatic supply to the above components during accident scenarios when the non-safety related pneumatic supplies, Instrument Air and Instrument Nitrogen, may be unavailable. Nitrogen bottles will ensure the HCVS will be able to perform the following:

- Open the rupture disc,
- Open the first containment isolation valve once, and
- Open the second containment isolation valve 8 times in the first 24 hours.

1. The HCVS flow path valves are AOVs with air-to-open and spring-to-shut. Opening the valves requires energizing a 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. The FLEX diesel generator will provide power for HCVS after 24 hours. NSPM will identify the 24 hour power supply for the HCVS (Open Item 2).
2. An assessment of temperature and radiological conditions will be performed to ensure that

Part 2: Boundary Conditions for Wetwell Vent

operating personnel can safely access and operate controls based on time constraints listed in Attachment 2. NSPM will evaluate the Alternate Shutdown System panel and Backup HCVS Operation Station locations for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers (Open Item 4).

3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (i.e., electric power, nitrogen) will be located in areas reasonably protected from defined 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 that requires close proximity to the valve (Reference 16). 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. Access to the locations described above will not require temporary ladders or scaffolding.
6. Following the initial 24 hour period, additional motive force will be supplied from the replenishment of the alternate nitrogen system bottles. The alternate nitrogen system bottles are located in the Turbine Building and shielded from the HCVS vent by a 4 ft. concrete wall. Additional bottles will be brought in as needed.

Location of Control Panels

The HCVS design allows initiating, operating and monitoring HCVS from the Alternate Shutdown System panel. If the primary Alternate Shutdown System panel is inaccessible during an ELAP, then the Backup HCVS Operating Station will be used to initiate and operate the HCVS. NSPM will evaluate the Alternate Shutdown System panel and Backup HCVS Operation Station locations for accessibility, habitability, staffing sufficiency, associated pathways from the control room, and communication capability with vent-use decision makers (Open Item 4).

Hydrogen

As is required by Order 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). The hydrogen control method has not been determined. NSPM will determine the approach or combination of approaches to control hydrogen (Open Item 5).

Unintended Cross Flow of Vented Fluids

The HCVS piping does not interface with any other system piping or ductwork, except for Alternate Nitrogen System instrument lines. Therefore, cross flow is not a concern for MNGP.

Prevention of Inadvertent Actuation

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)). However,

Part 2: Boundary Conditions for Wetwell Vent

the ECCS pumps will not have normal power available, because of the starting boundary conditions of an ELAP.

EOPs provide supplementary instructions to point out that reducing primary containment pressure will affect Net Positive Suction Head (NPSH) margin. This administrative control, along with key lock switches on the Alternate Shutdown System (ASDS) panel will prevent inadvertent vent opening.

The features that currently prevent inadvertent actuation are key lock switches on the Alternate Shutdown System (ASDS) panel. Controls that open the vent at the Backup HCVS Operating Station, which will only be used if vent operation cannot be performed from the Alternate Shutdown System panel, will be locked to prevent inadvertent actuation.

Component Qualifications
The HCVS components downstream of the second containment isolation valve up to the HPCI room roof are routed in seismically qualified structures. The piping outside safety related structures is designed to Class II and supported to meet Class I seismic requirements. HCVS components that directly interface with the pressure boundary are 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 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 safe shutdown earthquake (SSE) 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, the radiation monitoring instrumentation accuracy and range will be sufficient to confirm flow of radionuclides through the HCVS.

The HCVS instruments, including valve position indication, process 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 344-2004 (Reference 27).
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

Part 2: Boundary Conditions for Wetwell Vent

Table 2-2: Instrumentation Qualification Methods

Instrument	Qualification Method*
HCVS Process Temperature	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

*Note: NSPM will determine the Qualification Method for HCVS Instrumentation (Open Item 6). The specific qualification method used for each required HCVS instrument will be reported in future six-month status reports.

Monitoring of HCVS

The MNGP wetwell HCVS will be capable of being manually operated during sustained operations from the Alternate Shutdown System panel and will meet the requirements of Order EA-13-109 element 1.2.4. To meet the intent for a secondary control location of Section 1.2.5 of the Order, a readily accessible Backup HCVS Operating Station in the Turbine Building will also be incorporated into the HCVS design as described in NEI 13-02 Section 4.2.2.1.2.1. The controls at the Backup HCVS Operating Station and Alternate Shutdown System panel locations 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, ELAP, and inadequate containment cooling. NSPM will evaluate the Alternate Shutdown System panel and Backup HCVS Operation Station locations for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers (Open Item 4).

The wetwell HCVS will include means to monitor the HCVS at the Alternate Shutdown System panel. The wetwell HCVS will also include indications for temperature and effluent radiation levels (see Table 2-3 for details). Other important information on the status of supporting systems, such as power source status and pneumatic supply pressure will be available locally by the battery charger (power source status) and in the Turbine Building (pneumatic supply pressure). NSPM will evaluate the HCVS battery charger location for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers (Open Item 8). Monitoring of the power source and the pneumatic supply pressure will be performed periodically, based on plant procedures. The wetwell HCVS includes existing containment pressure and wetwell level indication at the Alternate Shutdown System panel to monitor vent operation. Table 2-3 summarizes the existing and planned instrumentation.

Part 2: Boundary Conditions for Wetwell Vent

Table 2-3: *Instrumentation*

Parameter	Requirements			Plant Equipment				Modification Required
	NRC EA-13-109	NEI 13-02	Power Supply	Instrument	ASDS Panel	Backup HCVS Operating Station	Other Plant Location	
Valve Position	1.2.8	4.2.4.1.1	24 hour	AO-4539 HPV ISOLATION INBOARD	HS-4539	None	None	Yes, 24 hour power supply
				AO-4540 HPV ISOLATION OUTBOARD	HS-4540	None	None	Yes, 24 hour power supply
Effluent Discharge Radioactivity	1.2.9	4.2.4.1.2	24 hour	HARD PIPE VENT RADIATION MONITOR RECORDER	RR-4544	None	None	Yes, 24 hour power supply
Effluent Temperature	NA	4.2.2.1.8	24 hour	HARD PIPE EXTERNAL SURFACE TEMPERATURE	New Instrument	None	None	Yes, add thermocouple and 24 hours power supply
Containment Pressure and Wetwell Level	NA	4.2.2.1.9 4.2.4.1.4	24 hour with FLEX DG	PRIMARY CONTAINMENT WIDE RANGE PRESSURE	PI-7251B	None	None	No, FLEX DG will power
				SUPPRESSION POOL LEVEL	LI-7338B	None	None	No, FLEX DG will power
Electrical Power and Pneumatic Supply Pressure	NA	4.2.4.1.3	24 hour	BATTERY CHARGER VOLTMETER (OR HAND HELD FLUKE)	None	None	Local Indicator	No, the monitored battery will provide indication at the charger
				ALT N2 TRAIN B PRESSURE	None	PI-4237 in turbine building	None	No power needed

Component reliable and rugged performance

The HCVS downstream of the second containment isolation valve, including piping and supports has been designed/analyzed to conform to the requirements consistent with the applicable design codes for the plant and to ensure functionality following a design basis earthquake. The HCVS 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 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, and total integrated dose radiation for the effluent vent pipe.

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

Part 2: Boundary Conditions for Wetwell Vent

response to this Order.

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.

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 will be 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 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, 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 Wetwell Vent-BDBEE Venting

Determine venting capability for BDBEE Venting, such as may be used in an 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 an ELAP and BDBEE hazards identified in Part 1 of this OIP. Immediate operator actions will be completed by Operators from the HCVS control stations and include remote-manual initiation. The operator actions that will be required to open a vent path are 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 will be required to initiate venting under the guiding procedural protocol.

The HCVS has been designed to allow initiation, control, and monitoring of venting from the Alternate Shutdown System panel. NSPM will evaluate the Alternate Shutdown System panel location for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers (Open Item 4). Alternate Shutdown System panel is located in a Class I structure, and therefore, is protected from the hazards assumed in Part 1 of this report.

Permanently installed power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Permanently installed equipment will supply nitrogen and power to HCVS for 24 hours.

System control:

i. Active: HCVS valves are operated in accordance with EOPs/AOPs to control containment pressure. The HCVS will be designed for at least 8 open/close cycles under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EPGs and associated implementing EOPs.

ii. Passive: Inadvertent actuation protection is provided by key lock switches on the Alternate Shutdown System (ASDS) panel..
   - A rupture disc is currently provided in the HCVS vent line downstream of the containment isolation valves. The rupture disc will be designed such that it can be intentionally breached from the Alternate Shutdown System panel or the Backup HCVS Operating Station, as directed by applicable procedures. The containment isolation valves must be opened to permit vent flow.
   - HCVS key lock switches located in the Alternate Shutdown System panel.
   - Controls at the Backup Operating Station in the Turbine Building will be locked.

Part 2: Boundary Conditions for Wetwell 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 1.2.4, 1.2.8 / NEI 13-02 Section 4.2.2

After 24 hours, available personnel will be able to connect supplemental motive air/gas to the HCVS. Connections for supplementing electrical power and motive air/gas required for HCVS will be located in accessible areas with reasonable protection per NEI 12-06 and minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections will be pre-engineered quick disconnects to minimize manpower resources. A FLEX diesel generator will be used to ensure HCVS control power after 24 hours. The response to NRC EA-12-049 will demonstrate the capability for FLEX efforts to maintain the power source.

These actions will 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 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 exists to direct operations in protection and control of containment integrity, including use of the existing Hardened Vent System.

Identify modifications:

List modifications and describe how they support the HCVS Actions.

EA-12-049 Modifications

- The battery chargers will be modified to allow a portable 480 Volt FLEX diesel generator to recharge the station batteries. This modification will ensure the availability of containment pressure and suppression pool level instrumentation for monitoring containment conditions during the first 24 hours and beyond.

EA-13-109 Modifications

- Additional bottles will be installed to increase the capability of the Train B, Alternate Nitrogen System as necessary.
- The solenoids for the containment isolation valves will be relocated outside the Reactor Building to allow an alternate method of opening the containment isolations valves. This new control panel will be the Backup HCVS Operating System.
- A modification will be required to install a HCVS power supply.
- A modification will be required for installation of required HCVS instrumentation. See Table 2-3 for the list of new instruments.

Part 2: **Boundary Conditions for Wetwell Vent-BDBEE Venting**
• Missile shielding will be provided as necessary to ensure the availability of the HCVS system. • The existing "T" at the top of the current vent pipe will be replaced with a straight section of pipe and a weather cap.
Key Venting Parameters: *List instrumentation credited for the 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)*
See Table 2-3 for key parameters and indicators for the initiation, operation, and monitoring of the HCVS venting.
Notes:

Part 2: Boundary Conditions for Wetwell Vent-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 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 Reactor Pressure Vessel (RPV) water level and core damage conditions. Immediate actions will be completed by Operators at the Alternate Shutdown System panel or in the Turbine Building via the Backup HCVS Operating Station, and will include remote-manual actions at the Train B Alternate Nitrogen System. The operator actions that will be required to open a vent path were previously listed in the BDBEE Venting Part 2 section of this report in Table 2-1.

Permanently installed power and motive air/gas capability 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.

These actions will 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 provide needed action and supplies.

Part 2: Boundary Conditions for Wetwell Vent-Severe Accident Venting
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: *List modifications and describe how they support the HCVS Actions.*
The same as for 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 for BDBEE Venting Part 2.
Notes:

Part 2: Boundary Conditions for Wetwell 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 Alternate Shutdown System panel or the Backup HCVS Operating Station in the Turbine Building.

Venting will require support from DC power as well as the Alternate Nitrogen System. Before station batteries are depleted, a portable FLEX diesel generator, as detailed in the response to Order EA-12-049, will be credited to charge the station batteries and maintain DC bus voltage.

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.

Details:

Provide a brief description of Procedures / Guidelines:

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

The key portable items are the FLEX diesel generators and the nitrogen bottles needed to supplement the nitrogen supply to the HCVS valves after 24 hours. Use of portable equipment will be proceduralized.

Identify modifications:

List modifications and describe how they support the HCVS Actions.

Modifications are identified in BDBEE Venting Part 2.

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)

See Table 2-3 for list of instrumentation.

Notes:

Part 2: Boundary Conditions for Wetwell 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)

Notes:

Part 3: Boundary Conditions for Drywell 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 walk-through 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**
Part 3 will be submitted according to the schedule specified in Order EA-13-109 for Phase 2.
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**
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:
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.*

Part 3: <u>Boundary Conditions for Drywell Vent</u>
Key Venting Parameters: *List instrumentation credited for the venting HCVS Actions.*
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 will be 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.

The HCVS procedures will be developed and implemented following the plants 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

EOPs provide supplementary instructions to point out that reducing primary containment pressure will affect Net Positive Suction Head (NPSH) margin.

NSPM will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in the Technical Requirements Manual:
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,
    - The HCVS functionality will be restored in a manner consistent with plant procedures,

Part 4: Programmatic Controls, Training, Drills and Maintenance

- A cause assessment will be performed to prevent future loss of function for similar causes, per procedure.
- 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, all personnel on-site will be available to supplement trained personnel (Reference 10).

Identify how the drills and exercise parameters will be met.

Alignment with NEI 13-06 and 14-01 as 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 (Reference 12) and NEI 14-01 (Reference 13) 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 Near-Term Task Force (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 (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*

Part 4: Programmatic Controls, Training, Drills and Maintenance

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 1.2.13 / NEI 13-02 Section 5.4, 6.2

The site will utilize the standard EPRI industry Preventative Maintenance (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.

NSPM 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 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:

Part 5: Milestone Schedule

Provide a milestone schedule. This schedule should include:

- *Modifications timeline*
- *Procedure guidance development complete*
  - *HCVS Actions*
  - *Maintenance*
- *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 six-month status reports.

Milestone	Target Completion Date	Activity Status	Comments
Hold initial design meeting	Jun. 2014	Complete	
Submit Overall Integrated Implementation Plan	Jun. 2014	Complete	Completed by this submittal.
Submit six-month Status Report	Dec. 2014		
Submit six-month Status Report	Jun. 2015		
Submit six-month Status Report	Dec. 2015		Simultaneous with Phase 2 OIP
Design Engineering On-site/Complete	Mar. 2016		
Submit six-month Status Report	Jun. 2016		
Operations Procedure Changes Developed	Sep. 2016		
Site Specific Maintenance Procedure Developed	Sep. 2016		
Submit six-month Status Report	Dec. 2016		
Training Complete	Apr. 2017		
Implementation Outage	Apr. 2017		
Procedure Changes Active	Apr. 2017		
Walk Through Demonstration/Functional Test	Apr. 2017		
Submit Completion Report	Jun. 2017		

Attachment 1: HCVS Portable Equipment				
List portable equipment	*BDBEE Venting*	*Severe Accident Venting*	*Performance Criteria*	*Maintenance / PM requirements*
Nitrogen Cylinders	**X**	**X**	**TBD**	**Check periodically for pressure, replace or replenish as needed**
FLEX diesel generator	**X**	**X**	**TBD**	**Per Response to Order EA-12-049**

Attachment 2: Sequence of Events Timeline

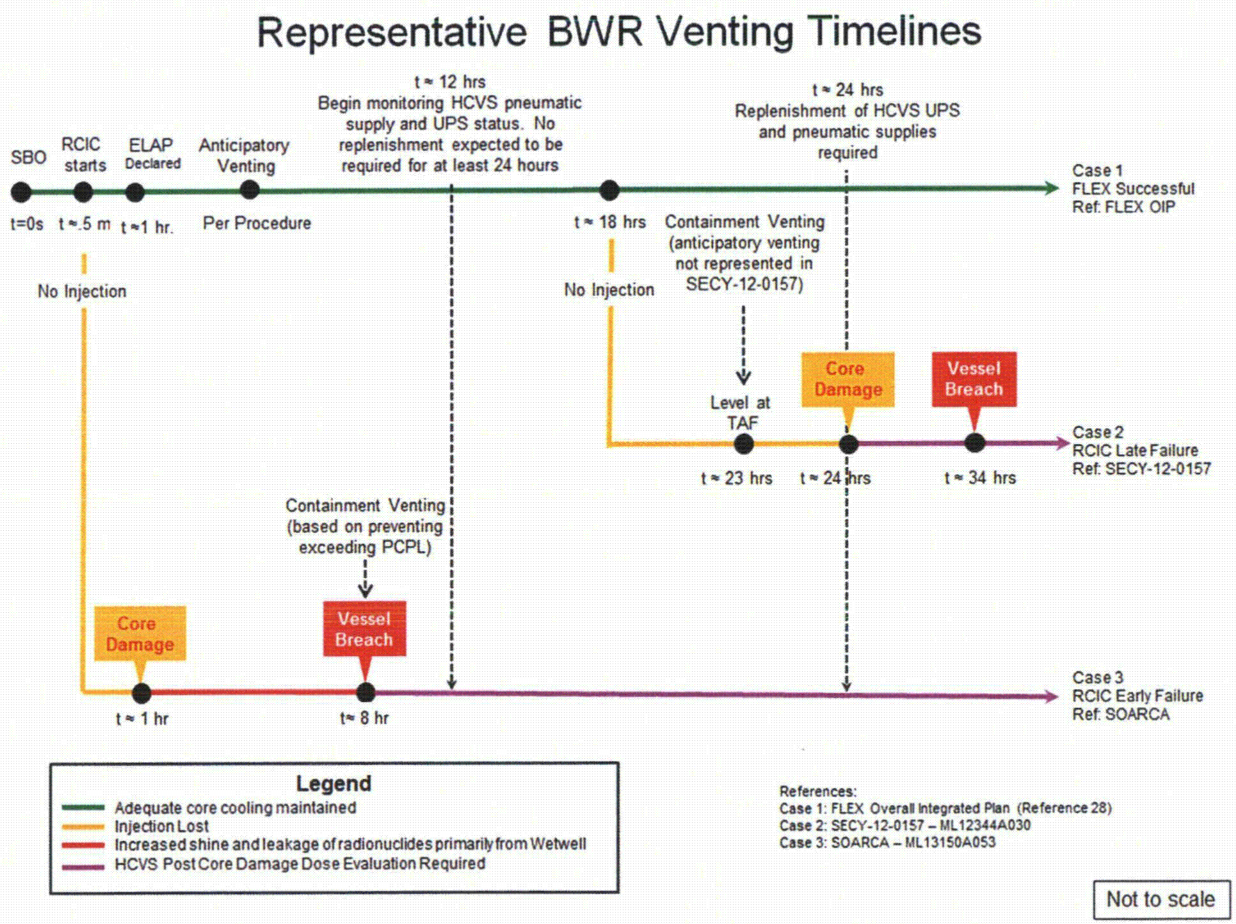


Figure A2: Wetwell HCVS Timeline

Attachment 3: Conceptual Sketches

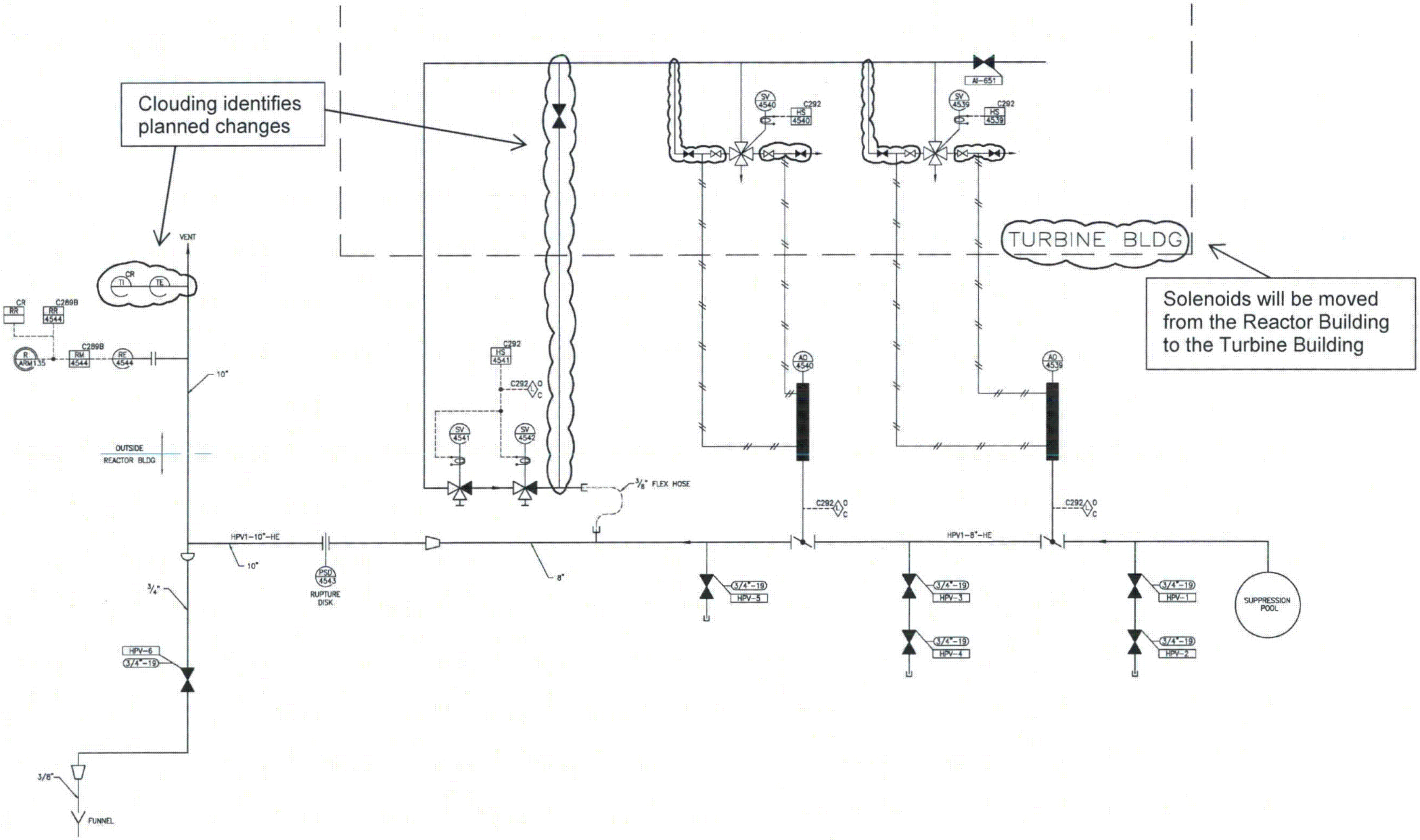


Figure A3: Conceptual Sketch of HCVS

Attachment 4: Failure Evaluation Table

Table 4: Wetwell HCVS Failure Evaluation Table

Functional Failure Mode	Failure Cause	Alternate Action	Failure with Alternate Action Impact on Containment Venting?
Failure of Vent to Open on Demand	Valves fail to open/close due to loss of normal power	No action needed, a 24 hour battery will be provided	No
Failure of Vent to Open on Demand	Valves fail to open/close due to loss of alternate power (long term)	No action needed, a 24 hour battery will be provided	No
Failure of Vent to Open on Demand	Valves fail to open/close due to complete loss of batteries (long term)	Manual valves need to be used to open valves – bypassing the solenoids at the Backup HCVS Operating Station	No
Failure of Vent to Open on Demand	Valves fail to open/close due to loss of normal pneumatic air supply	Replace nitrogen bottles	No
Failure of Vent to Open on Demand	Valves fail to open/close due to SOV failure	Manual valves need to be used to open valves – bypassing the solenoids at the Backup Operating Station	No

Attachment 5: References

1. NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," dated September 1, 1989 (ADAMS Accession No. ML060760371).
2. NRC Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ADAMS Accession No. ML12054A735).
3. NRC Order Number EA-12-050, "Issuance of Order to Modify Licenses with Regard to Requirements for Reliable Hardened Containment Vents," dated March 12, 2012 (ADAMs Accession No. ML12054A682).
4. NRC Order Number EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ADAMS Accession No. ML12054A679).
5. NRC Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013 (ADAMs Accession Number ML13143A334).
6. NRC Interim Staff Guidance JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12229A174).
7. NRC Interim Staff Guidance JLD-ISG-2012-02, "Compliance with Order EA 12 050, Order Modifying Licenses with Regard to Requirements for Reliable Hardened Containment Vents," Revision 0, dated August 29, 2012 (ADAMs Accession Number ML12229A475).
8. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 14, 2013 (ADAMs Accession No. ML13304B836).
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," dated August 29, 2012 (ADAMS Accession No. ML12229A477).
10. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012 (ADAMS Accession No. ML12242A378).
11. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0, dated November 2013 (ADAMS Accession Number ML13316A853).
12. NEI 13-06, "Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents and Events," Draft Revision 0, dated March 2014 (ADAMS Accession No. ML14049A002).
13. NEI 14-01, "Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents," Draft Revision 0, dated March 2014 (ADAMS Accession No. ML14049A005).
14. NEI FAQ HCVS-01, "HCVS Primary and Alternate Controls and Monitoring Locations," Revision 2, dated April 14, 2014 (ADAMS Accession No. ML14120A289).
15. NEI FAQ HCVS-02, "HCVS Dedicated Equipment," Revision 0, dated March 11, 2014 (ADAMS Accession No. ML14120A289).

16. NEI FAQ HCVS-03, "HCVS Alternate Control Operating Mechanisms," Revision 1, dated April 2, 2014 (ADAMS Accession No. ML14120A289).
17. NEI FAQ HCVS-04, "HCVS Release Point," Revision 1, April 14, 2014 (ADAMS Accession No. ML14120A289).
18. NEI FAQ HCVS-05, "HCVS Control and 'Boundary Valves,'" Revision 2, April 14, 2014 (ADAMS Accession No. ML14120A289).
19. NEI FAQ HCVS-06, "HCVS FLEX and Generic Assumptions," Revision 2, April 14, 2014 (ADAMS Accession No. ML14120A289).
20. NEI FAQ HCVS-07, "HCVS Source Term from SFP," Revision 0, March 11, 2014 (ADAMS Accession No. ML14120A289).
21. NEI FAQ HCVS-08, "HCVS Instrument Qualification," Revision 1, April 14, 2014 (ADAMS Accession No. ML14120A289).
22. NEI FAQ HCVS-09, "HCVS Toolbox Approach for Collateral Actions," Revision 1, dated April 14, 2014 (ADAMS Accession No. ML14120A289).
23. NEI White Paper HCVS-WP-01, "HCVS Dedicated and Permanently Installed Motive Force," dated April 15, 2014 (ADAMS Accession No. ML14120A298 and ML14120A295).
24. NEI White Paper HCVS-WP-02, "Hardened Containment Vent System (HCVS) Cyclic Operations Approach," Draft Revision A, dated April 2, 2014.
25. NEI White Paper HCVS-WP-03, "Hydrogen/Carbon Monoxide Control Measures," Draft Revision, dated April 4, 2014.
26. NEI White Paper HCVS-WP-04, "Hardened Containment Vent System (HCVS) Severe Accident Capabilities and Impact on FLEX Mitigation Strategies," Draft Revision B, dated March 3, 2014.
27. IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, dated June 8, 2005.
28. NSPM Letter to NRC, "Monticello Nuclear Generating Plant's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013 (ADAMS Accession No. ML13066A066).
29. NSPM Letter to NRC, "MNGP's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Hardened Containment Vents (Order Number EA-12-050)," dated February 28, 2013 (ADAMS Accession No. ML13060A411).
30. NSPM Letter to NRC, "Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated February 28, 2013 (ADAMS Accession No. ML13060A447).
31. NRC Staff Requirements Memorandum (SRM) for SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," dated March 19, 2013 (ADAMS Accession No. ML13078A017).
32. NRC Letter to NEI, endorsing FLEX MAAP4 Computer Code, dated October 3, 2013 (ADAMS Accession No. ML13275A318).
33. NUREG-1935, State-of-the-Art Reactor Consequence Analyses (SOARCA) Report, dated November 2012 (ADAMS Accession No. ML12332A057).

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 six-month status reports.

Attachment 7: List of Overall Integrated Plan Open Items

Open Item	Action	Comment
1	Follow industry guidance on missile protection for HCVS.	
2	Identify the 24 hour power supply for the HCVS.	
3	Determine radiological conditions for the FLEX portable equipment staging areas.	
4	Evaluate the Alternate Shutdown System panel and Backup HCVS Operation Station locations for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers.	
5	Determine approach or combination of approaches to control hydrogen.	
6	Determine the Qualification Method for HCVS Instrumentation.	
7	Evaluate the effects of radiological and temperature constraints on the deployment of nitrogen bottles after 24 hours.	
8	Evaluate HCVS battery charger location for accessibility, habitability, staffing sufficiency, associated pathways from the control room and communication capability with vent-use decision makers.	