Xcel Energy®

Monticello Nuclear Generating Plant
2807 W County Road 75
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December 17, 2015

L-MT-15-090
10 CFR 2.202
EA-13-109

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

Monticello Nuclear Generating Plant's Phase 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109) including Phase 1 Status Report

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-2015-01, "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated April 2015. (ADAMS Accession Number ML15104A118)

3) Nuclear Energy Institute (NEI) 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 1, dated April 2015. (ADAMS Accession Number ML15113B318)

4) Letter from K. Fili (NSPM) to Document Control Desk (NRC), "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)," L-MT-14-052, dated June 30, 2014. (ADAMS Accession No. ML14183A412)

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5) Letter from K. Fili (NSPM) to Document Control Desk (NRC), "Monticello Nuclear Generating Plant: First Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," L-MT-14-092, dated December 16, 2014. (ADAMS Accession No. ML14353A215)

6) Letter from P. Gardner (NSPM) to Document Control Desk (NRC), "Monticello Nuclear Generating Plant: Second Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), Phase 1," L-MT-15-031, dated June 22, 2015. (ADAMS Accession No. ML15173A176)

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 (OIP) for Phase 2, including a description of how compliance with the Phase 2 requirements, described in Attachment 2 of Reference 1, will be achieved by startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. This letter provides the OIP for Phase 2 pursuant to Section IV, Condition D.2, of Reference 1.

The NRC's interim staff guidance (Reference 2) for Phase 2 of the Order was issued April 2015, which endorsed, with exceptions and clarifications, the methodologies described in the industry guidance document NEI 13-02, Revision 1(Reference 3). Section 7 of NEI 13-02, Revision 1 (Reference 3) contains the specific reporting requirements for the Phase 2 OIP.

The purpose of this letter is to provide the OIP for Phase 2 of the Order. The OIP 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. The information in the Enclosure to this letter aligns with the guidance provided in NEI 13-02, Revision 1, Section 7.

In addition, a status report of Phase 1 activities is included within the Phase 2 OIP. The Phase 1 OIP was provided to the NRC in Reference 4. Status reports for Phase 1 were previously provided to the NRC in References 5 and 6. The current status report for

Phase 1 is incorporated throughout the Phase 2 OIP as the Enclosure incorporates both Phase 1 and Phase 2 OIP information. Changes to the Phase 1 OIP are indicated in Attachment 6 of the Enclosure to assist the NRC in determining the scope of changes that have been made. Any significant changes to this plan will be communicated to the NRC staff in future Six-Month Status Reports.

Please contact John Fields, Fukushima Response Licensing, at 763-271-6707, if additional information or clarification is required.

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 December 17, 2015.

Kent Scott for Pete Gardner

Peter A. Gardner
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Monticello Nuclear Generating Plant, USNRC
Resident Inspector, Monticello Nuclear Generating Plant, USNRC

ENCLOSURE

MONTICELLO NUCLEAR GENERATING PLANT

HARDENED CONTAINMENT VENTING SYSTEM (HCVS)

PHASE 2 OVERALL INTEGRATED PLAN

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Introduction

In 1989, the NRC issued Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," to all licensees of Boiling Water Reactors (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 suppression pool 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 (DW).

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*, dated 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 also maintaining the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP).

The Order requirements are applied in a phased approach where:

- "Phase 1 involves upgrading the venting capabilities from the containment wetwell to provide reliable, severe accident capable hardened vents to assist in preventing core damage and, if necessary, to provide venting capability during severe accident conditions." (Completed "no later than startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first.")
- "Phase 2 involves providing additional protections for severe accident conditions through installation of a reliable, severe accident capable DW 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 DW 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 (ISG) (JLD-ISG-2013-02 issued in November 2013 and JLD-ISG-2015-01 issued in April 2015). The ISG endorses the compliance approach presented in NEI 13-02, Revisions 0 and 1, *Industry Guidance for Compliance with Order EA-13-109, BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Sever Accident Conditions*, 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 ISGs to evaluate licensee compliance as presented in submittals required in Order EA-13-109.

The Order also requires submittal of an overall integrated plan (OIP), which will provide a description of how the requirements of the Order will be achieved. This document provides the OIP for complying with Order EA-13-109 using the methods described in NEI 13-02 and endorsed by NRC JLD-ISG-2013-02 and JLD-ISG-2015-01. Six-month progress reports will be provided consistent with the requirements of Order EA13-109. The submittals required are:

- OIP for Phase 1 of EA-13-109 was required to be submitted by licensees to the NRC by June 30, 2014. The NRC requires periodic (six-month) updates for the Hardened Containment Vent System (HCVS) actions being taken. The first update for Phase 1 was due December 2014, with the second due June 2015.
- OIP for Phase 2 of EA-13-109 is required to be submitted by licensees to the NRC by December 31, 2015. It is expected the December 2015 six month update for Phase 1 will be combined with the Phase 2 OIP submittal by means of a combined Phase 1 and 2 OIP.
- Thereafter, the six-month updates will be for both the Phase 1 and Phase 2 actions until complete, consistent with the requirements of Order EA-13-109.

Note: At the Licensee's option, the December 2015 six-month update for Phase 1 may be independent of the Phase 2 OIP submittal, but will require separate six-month updates for Phase 1 and 2 until each phase is in compliance.

The plant venting actions for the EA-13-109, Phase 1, severe accident capable venting scenario can be summarized by the following:

- The HCVS will be initiated via manual action from either the Main Control Room (MCR) (some plants have a designated Primary Operating Station (POS) that will be treated as the main operating location for this order) or from a Remote Operating Station (ROS) at the appropriate time based on procedural guidance in response to plant conditions from observed or derived symptoms.
- The vent will utilize containment parameters of pressure and level from the MCR instrumentation to monitor effectiveness of the venting actions.
- The vent operation will be monitored by HCVS valve position, temperature, and effluent radiation levels.
- The HCVS motive force will be monitored and have the capacity to operate for 24 hours with installed equipment. Replenishment of the motive force will be by use of portable equipment once the installed motive force is exhausted.
- Venting actions will be capable of being maintained for a sustained period of up to 7 days or a shorter time if justified.

The NRC issued an Interim Staff Evaluation (ISE) for Phase 1 of the Monticello Nuclear Generating Plant (MNGP) HCVS Order response on April 2, 2015.

The Phase 2 actions can be summarized as follows:

- Utilization of Severe Accident Water Addition (SAWA) to initially inject water into the Reactor Pressure Vessel (RPV) or DW.
- Utilization of Severe Accident Water Management (SAWM) to control injection and Suppression Pool level to ensure the HCVS (Phase 1) wetwell vent (SAWV) will remain functional for the removal of decay heat from containment.
- Ensure that the decay heat can be removed from the containment for seven (7) days using the HCVS or describe the alternate method(s) to remove decay heat from the containment from the time the HCVS is no longer functional until alternate means of decay heat removal are established that make it unlikely the DW vent will be required for DW pressure control.
- The SAWA and SAWM actions will be manually activated and controlled from areas that are accessible during severe accident conditions.
- Parameters measured should be DW pressure, Suppression Pool level, SAWA flowrate and the HCVS parameters listed above.
- Alternatively, SAWA and a Severe Accident Capable Drywell Vent (SADV) strategy may be implemented to meet Phase 2 of Order EA-13-109.

Part 1: General Integrated Plan Elements and Assumptions

Extent to which the guidance, JLD-ISG-2013-02, JLD-ISG-2015-01 and NEI 13-02 (Revision 1), 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, JLD-ISG-2015-01

Compliance will be attained for MNGP with no known deviations to the guidelines in JLD-ISG-2013-02, JLD-ISG-2015-01 and NEI 13-02 for each phase as follows:

- The HCVS will be comprised of installed and portable equipment and operating guidance:
  - Severe Accident Wetwell Vent (SAWV) – Permanently installed vent from the Suppression Pool to the top of the reactor building.
  - Severe Accident Water Addition (SAWA) – A combination of permanently installed and portable equipment to provide a means to add water to the reactor pressure vessel (RPV) following a severe accident and monitor system and plant conditions.
  - Severe Accident Water Management (SAWM) strategies and guidance for controlling the water addition to the RPV for the sustained operating period. (reference attachment 2.1.D)
- 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 May 2017.
- Phase 2 (alternate strategy): by the startup from the first refueling outage that begins after June 30, 2017 or June 30, 2019, whichever comes first. Currently scheduled for May 2019.

Northern States Power Minnesota, a Minnesota corporation, doing business as Xcel Energy (NSPM – the licensee for MNGP) has identified two alternatives from the guidance in JLD-ISG-2013-02 and NEI 13-02, which is described in the following paragraphs.

1) <u>HCVS Design Temperature</u>

NEI 13-02, Section 2.4.3.3 (Reference 11) states:
The design temperature for the wetwell vent portions of the HCVS are recommended to be based on the 350°F upper bound of the EPG/SAG [Emergency Procedure Guidelines/Severe Accident Guidelines] *bases document which is above the saturation temperature corresponding to typical PCPL* [Primary Containment Pressure Limit] *values.*

The design pressure and temperature for the existing MNGP Hardened Containment Vent System (called Hard Pipe Vent System) are 62 psig and 309°F, respectively. The design temperature of 309°F is lower than the NEI 13-02 recommended value of 350°F, but is acceptable for the MNGP

Part 1: General Integrated Plan Elements and Assumptions

HCVS design for the following reasons:

NEI 13-02, Section 2.4.3.1 states:
The suppression pool/wetwell of a BWR Mark I/II containment can be considered to be at saturation conditions. MNGP is designed with a Mark I containment with a design pressure of 62 psig. At saturation conditions, this corresponds to a saturation temperature of 309°F. Thus, the HCVS design temperature of 309°F meets the requirements of NEI-13-02, Section 2.4.3.1. To reach 350°F in the HCVS, the MNGP wetwell would need to be at 120 psig, which exceeds the design of the MNGP primary containment design pressure of 62 psig.

Procedural guidance will direct venting containment through the HCVS prior to primary containment pressure exceeding 62 psig.

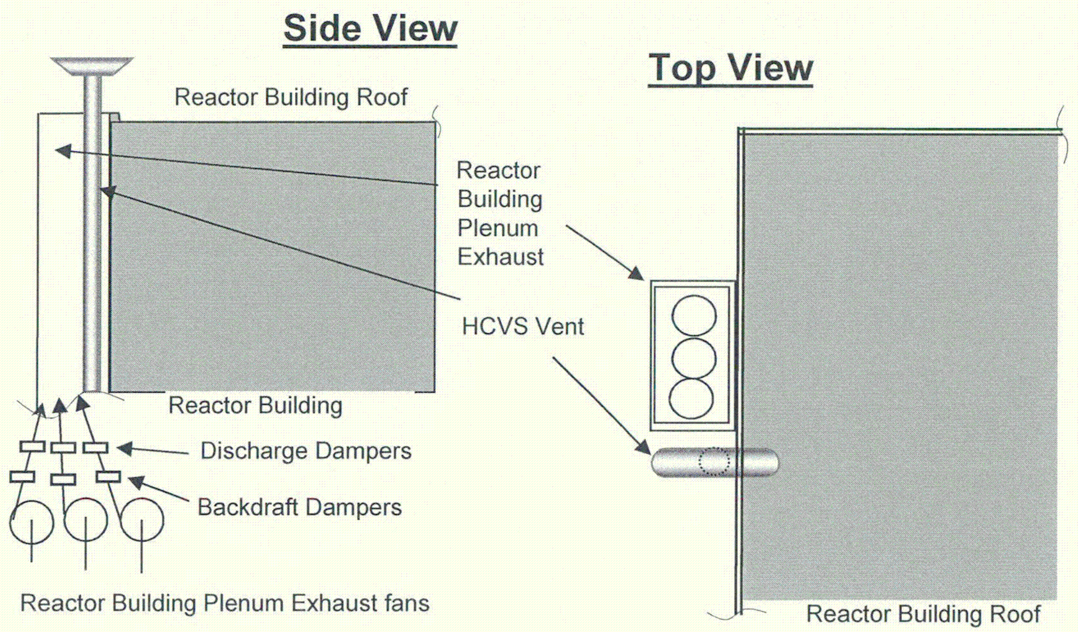
2) HCVS Release Location

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 existing Hardened Vent System discharge path is currently routed next to the Reactor Building plenum exhaust with the vent exhaust 3 feet (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). (OIP Open Item 3)

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 configuration is an acceptable alternative to JLD-ISG-13-02 and NEI 13-02.

If additional deviations are identified, the deviations will be communicated in a future six-month

Part 1: General Integrated Plan Elements and Assumptions

status report 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 MNGP:

- Seismic, External Flooding, Extreme Cold, High Wind, Extreme High Temperature

The following extreme external hazards screen out for MNGP:

- None

Key Site assumptions to implement NEI 13-02 HCVS, Phase 1 and 2 Actions.

Provide key assumptions associated with implementation of HCVS Phase 1 and Phase 2 Actions

Ref: NEI 13-02, Revision 1, Section 2, NEI 12-06 Revision 0

Mark I/II Generic EA-13-109 Phase 1 and Phase 2 Related Assumptions:

Applicable EA-12-049 assumptions:

049-1. Assumed initial plant conditions are as identified in NEI 12-06, Section 3.2.1.2, Items 1 and 2.

049-2. Assumed initial conditions are as identified in NEI 12-06, Section 3.2.1.3, Items 1, 2, 4, 5, 6 and 8.

049-3. Assumed reactor transient boundary conditions are as identified in NEI 12-06, Section 3.2.1.4, Items 1, 2, 3 and 4.

049-4. No additional events or failures are assumed to occur immediately prior to or during the event, including security events, except for failure of Reactor Core Isolation Cooling (RCIC) or High Pressure Coolant Injection (HPCI) systems. (Reference NEI 12-06, Section 3.2.1.3, Item 9)

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

Part 1: General Integrated Plan Elements and Assumptions

and Section 3.2.1.4, Item 1-4)

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

049-7. DC power and distribution can be credited for the duration determined per the EA-12-049 (FLEX) methodology for battery usage, i.e. 12 hours. This assumption applies to the water addition capability under SAWA/SAWM. The power supply scheme for the HCVS shall be in accordance with EA-13-109 and the applicable guidance. (Reference NEI 12-06, Section 3.2.1.3, Item 8.)

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

049-9. All activities associated with plant specific FLEX strategies that are not specific to implementation of the HCVS, including such items as debris removal, communication, notification, Spent Fuel Pool (SFP) level and makeup, security response, opening doors for cooling, and initiating conditions for the event, can be credited as previously evaluated for FLEX. (Refer to assumption 109-02 below for clarity on SAWA and HCVS-FAQ-11)

Applicable EA-13-109 generic assumptions:

109-01. Site response activities associated with EA-13-109 actions are considered to have no access limitations associated with radiological impacts while RPV level is above 2/3 core height (core damage is not expected). This is further addressed in HCVS-FAQ-12.

109-02. 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. This assumption does not apply to Phase 2 SAWA/SAWM because SAWA equipment needs to be connected and placed in service within 8 hours from the time of the loss of RPV injection. (Reference HCVS-FAQ-12)

109-03. 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 HCVS-FAQ-07)

109-04. Existing containment components design and testing values are governed by existing plant primary containment criteria (e.g., Appendix J) and are not subject to the testing criteria from NEI 13-02. (Reference HCVS-FAQ-05 and NEI 13-02 section 6.2.2)

109-05. 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 NEI 13-02, Section 2.3.1)

Part 1: General Integrated Plan Elements and Assumptions

109-06. 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, aligning nitrogen bottles) are acceptable to obtain HCVS venting dedicated functionality. (Reference HCVS-FAQ-01) This assumption does not apply to Phase 2 SAWA/SAWM because SAWA equipment needs to be connected and placed in service within 8 hours from the time of the loss of RPV injection and will require more than minimal operator action.

109-07. 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 HCVS-FAQ-02 and HCVS-WP-01). This assumption does not apply to Phase 2 SAWA/SAWM because SAWA equipment is not dedicated to HCVS but shared to support FLEX functions. This is further addressed in HCVS-FAQ-11.

109-08. 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 FLEX MAAP Endorsement ML13190A201) Additional analysis using RELAP5/MOD 3, GOTHIC, PCFLUD, LOCADOSE and SHIELD are acceptable methods for evaluating environmental conditions in areas of the plant provided the specific version utilized is documented in the analysis. MAAP Version 5 was used to develop EPRI Technical Report 3002003301 to support DW temperature response to SAWA under severe accident conditions.

109-09. 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 NEI 13-02 section 8).

109-10. Permanent modifications installed or planned per Order 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 EPG/SAGs, Revision 3, as incorporated per the sites EOP/ Severe Accident Management Guidelines (SAMG) procedure change process. This assumption does not apply to Phase 2 SAWM because SAWM is not part of Revision 3. (Reference Attachment 2.1.D for SAWM SAMG Changes approved by the BWROG Emergency Procedures Committee)

109-12. Under the postulated scenarios of Order EA-13-109, the Control Room is adequately protected from excessive radiation dose due to its distance and shielding from the reactor (per General Design Criterion (GDC) 19 in 10CFR50, Appendix A) and no further evaluation of its use as the preferred HCVS control location is required provided that the HCVS routing is a sufficient distance away from the MCR or is shielded to minimize impact to the MCR dose. In addition, adequate protective clothing and respiratory protection are available if required to address contamination issues. (Reference HCVS-FAQ-01 and HCVS-FAQ-09)

Part 1: General Integrated Plan Elements and Assumptions

109-13. The suppression pool/wetwell of a BWR Mark I/II containment is considered to be bounded by assuming a saturated environment for the duration of the event response because of the water/steam interactions.

109-14. RPV depressurization is directed by the EPGs in all cases prior to entry into the SAGs. (Reference NEI 13-02 Rev 1, Section I.1.3)

109-15. The Severe Accident impacts are assumed on one unit only due to the site compliance with NRC Order EA-12-049. However, each BWR Mark I and II under the assumptions of NRC Order EA-13-109 ensures the capability to protect the containment exists for each unit. (HCVS-FAQ-10) This is further addressed in HCVS-FAQ-10.

Plant Specific HCVS Related Assumptions/Characteristics:

PLT-1. ASDS Panel

Rather than the MCR, NSPM will use the Alternate Shutdown System (ASDS) panel located in the Emergency Filtration Train (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.

PLT-2. Backup HCVS Operating Station

If operation of the HCVS is not possible from the ASDS panel, the HCVS will be operated manually from the Turbine Building, in a location to be determined. This location will be called the Backup HCVS Operating Station.

PLT-3. Initiation of Venting

The HCVS will not be opened at a specific time. Use of the HCVS will be determined by plant *conditions and 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 2A)

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. Initial operator actions will be completed by plant personnel and will include the capability for remote-manual initiation from the HCVS control station. A list of the remote manual actions performed by plant personnel to open the HCVS vent path can be found in the following table (2-1). A 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 isolation valve to connect HCVS to dedicated HCVS N2 (nitrogen) supply	Backup HCVS Operating Station / Component number will be determined as part of modification to install dedicated HCVS N2 supply.	Current pneumatic supply is from Alternate Nitrogen System. An independent, dedicated N2 supply will be installed to meet Phase 1 of EA-13-109
2. OPEN manual isolation valve to connect rupture disk to dedicated rupture disk N2 supply	Backup HCVS Operating Station / Component number will be determined as part of modification to install dedicated rupture disk N2 supply	Current supply is from the Alternate Nitrogen System. An independent, dedicated N2 supply will be installed to meet Phase 1 of EA-13-109.
3. Breach the rupture disk by opening solenoid valve	ASDS Panel / Key-locked switch HS-4541	If required - Rupture disk will burst between 44 – 50 psig. Alternate method by using manual valve at Backup HCVS Operating Station.

Part 2: Boundary Conditions for Wetwell Vent

4. Open air operated suppression pool Primary Containment Isolation Valves (PCIVs) AO-4539 and AO-4540	ASDS panel / Key-locked switches HS-4539 and HS-4540	Alternate method by using manual valves at Backup HCVS Operating Station.
5. Transfer HCVS power to uninterruptable power supply (UPS) Y80, powered from EA-12-049 FLEX portable diesel generator (PDG)	Y80 distribution panel is located near the ASDS panel.	Transfer occurs prior to depletion of dedicated HCVS battery. Actions will be required to transfer power at a time greater than 24 hours.
6. Replenish pneumatics with replaceable N2 bottles	Nitrogen bottles will be located in an area that is accessible to operators, preferably near the Backup HCVS Operating Station.	Prior to depletion of the pneumatic sources, actions will be required to connect back-up sources at a time greater than 24 hours.

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

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

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

The following is a discussion of time constraints identified in Attachment 2A for the 3 timeline cases identified above

- Initiate use of 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 Direct Current (DC) buses with motive force supplied to HCVS valves from a dedicated installed HCVS N2 supply. Critical HCVS controls and instruments associated with containment will be DC powered and operated from the ASDS panel or a Remote Operating Station. The DC power for HCVS will be available as long as the HCVS is required. The HCVS battery will supply HCVS critical components / instruments during the first 24 hours. In addition, when available, Phase 2 FLEX PDG can provide power before battery life is

Part 2: Boundary Conditions for Wetwell Vent

exhausted. HCVS operation will occur from the ASDS panel.

- Installed, dedicated nitrogen bottles will be able to burst the rupture disk if needed. In addition, installed, dedicated nitrogen bottles will be able to supply the HCVS for 24 hours. The HCVS Nitrogen bottles will be able to be replenished one at a time.
- At greater than 24 hours, power to HCVS critical components/instruments will be transferred from the dedicated HCVS battery to the Division 2, UPS Y80, powered by the FLEX PDG.

Discussion of radiological and temperature constraints identified in Attachment 2A

- Prior to venting, the rupture disk nitrogen manual isolation valve and the HCVS nitrogen manual isolation valve will need to be opened. Venting will be accomplished from the ASDS panel (in EFT building) or from the ROS (located in the turbine building). Radiological and temperature conditions are not expected to be significant in these areas and will be confirmed by calculation.
- At >12 hours a FLEX PDG will be installed and connected to power station battery chargers used to supply power to primary containment pressure and wetwell level instrumentation. The cable connections, location of the FLEX PDG 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. (OIP Open Item 3)
- At >24 hours, replacement nitrogen bottles will continue to supply HCVS pneumatics, as needed. NSPM will evaluate the effects of radiological and temperature constraints on the deployment of nitrogen bottles after 24 hours. (OIP Open Item 7)

Provide Details on the Vent characteristics

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,

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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

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-201201 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

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commercial quality assurance programs, such as ISO 9001. 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 suppression pool path is designed for venting steam/energy at a nominal capacity of 1% decay heat removal criteria from the extended power uprate, 2004 Megawatts thermal (MWt) - current licensed thermal power, at a containment 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" section of this OIP) provides adequate capacity to meet or exceed the Order criteria.

Vent Capacity

The vent is able to prevent containment pressure from increasing above the containment design pressure. The 1% capacity will be reconfirmed for the final HCVS configuration.

Vent Path and Discharge

The existing HCVS vent path at MNGP connects to the wetwell vapor space through an eight inch penetration. Containment isolation is provided by two air operated valves in series, located in the torus room. The eight inch line then enters the HPCI room and connects to a rupture disk. The rupture disk will burst at 44 to 50 psig. It can be manually actuated using a dedicated rupture disk nitrogen supply by opening two solenoid operated valves that pressurize the area between the outboard containment isolation valve and the rupture disk. After the rupture disk, the pipe transitions to a 10 inch pipe that exits the Reactor Building through the HPCI roof. The vent pipe extends up the side of the reactor building to the Plenum Room roof. It then continues horizontally for approximately 60 feet before travelling vertically, adjacent to the Reactor Building vent, to an elevation 3 feet above the highest structure on the Reactor Building roof. As discussed in Part 1, the HCVS discharge is in the vicinity of the Reactor Building plenum exhaust. 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

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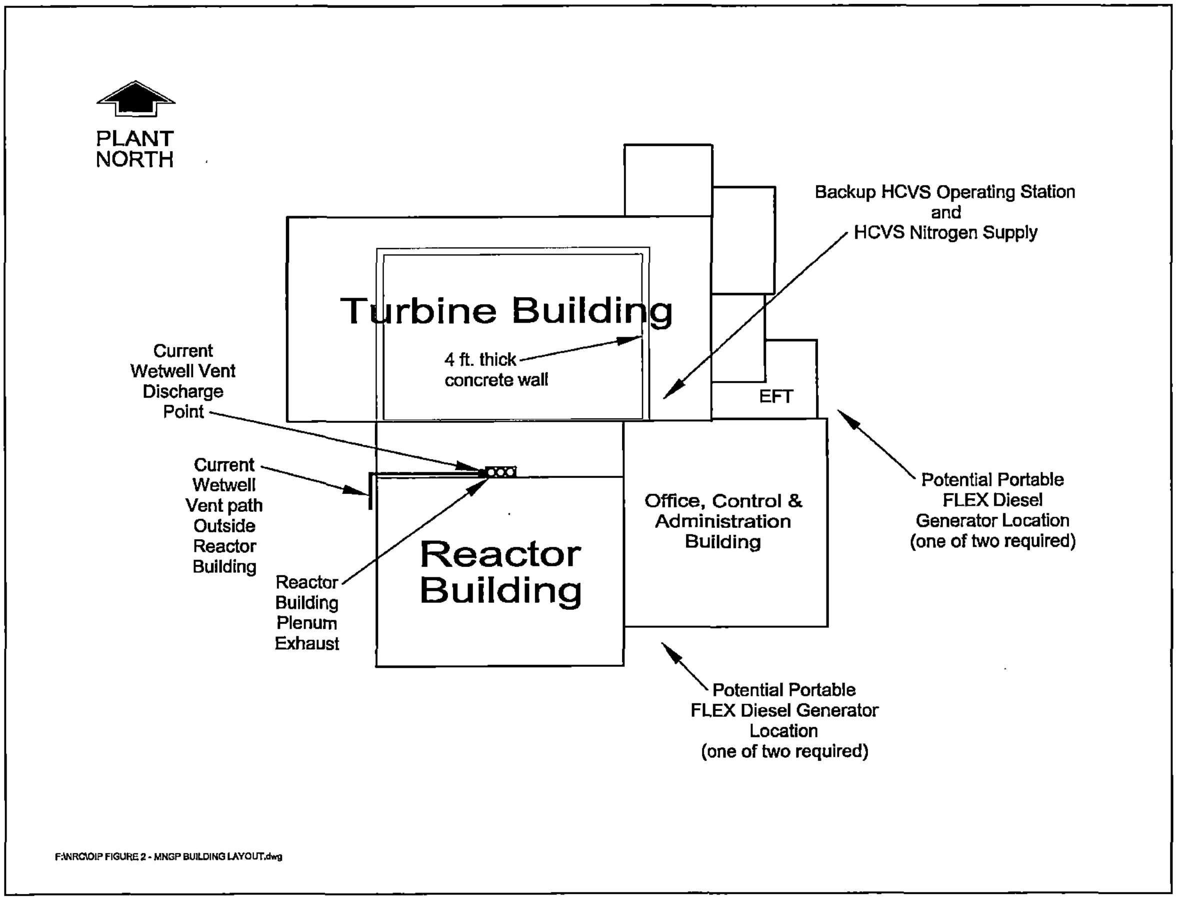
system intake and exhaust openings, main control room location, location of HCVS portable equipment, access routes required following an ELAP and BDBEE, and emergency response facilities; however, these must be considered in conjunction with other design criteria (e.g., flow capacity) and pipe routing limitations, to the degree practical.

The detailed design will address missile protection as directed in HCVS-WP-04 related to limited evaluation above 30 feet. (Reference HCVS-FAQ-04; HCVS-WP-04).

Figure 2: MNGP Plant Building Layout



Power and Pneumatic Supply Sources

All electrical power required for operation of HCVS components will be supplied by a dedicated HCVS battery that will be designed with sufficient capacity to power HCVS instrumentation and controls for the first 24 hours. After 24 hours, power for the HCVS loads will be transferred to the Division 2 UPS, Y80, which will be powered by an EA-12-049 FLEX PDG. The following

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components will be supplied by the dedicated HCVS battery:

- HCVS Temperature Monitor,
- HCVS Radiation Monitor,
- Two solenoids for opening the rupture disk,
- One solenoid for the inboard, air operated, primary containment isolation valve,
- One solenoid for the outboard, air operated, primary containment isolation valve,
- Valve position indication for each of the two primary containment isolation valves.

NSPM has not completed the design of the dedicated HCVS battery. NSPM will identify the 24 hour power supply for the MNGP HCVS. (OIP 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 in accordance with HCVS-WP-02. (OIP Open Item 3)

1. Pneumatic power for the HCVS air-operated (AOVs) is currently provided by the B train of the Alternate Nitrogen System. The plant will be modified to install a dedicated rupture disk nitrogen supply and dedicated HCVS nitrogen supply. The dedicated HCVS nitrogen supply will be designed to supply HCVS pneumatics for the two air operated containment isolation valves for the first 24 hours. Opening the valves requires energizing an AC powered solenoid operated valve (SOV) and providing nitrogen. The detailed design will provide a permanently installed power source and nitrogen supply adequate for the first 24 hours. The FLEX PDG will provide power to the HCVS after 24 hours. NSPM will identify the 24 hour power supply for the HCVS. (OIP Open Item 2)
2. In accordance with HCVS-WP-02, as part of the design of the dedicated HCVS nitrogen supply will be designed for 8 vent cycles within the first 24 hours.
3. An assessment of temperature and radiological conditions will be performed to ensure that operating personnel can safely access and operate controls based on time constraints listed in Attachment 2A. NSPM will evaluate the ASDS panel and Backup HCVS Operating Station locations for accessibility, habitability, staffing sufficiency, associated pathway from the main control room, and communication capability with vent-use decision makers. (OIP Open Item 4)
4. 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.
5. HCVS 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 will not rely on use of a hand wheel, reach–rod or similar means that requires 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.

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6. Access to the locations described above will not require temporary ladders or scaffolding.
7. Following the initial 24 hour period, additional motive force will be supplied from the replenishment of the dedicated HCVS nitrogen bottles using nitrogen bottles that are staged at a gas cylinder rack located in the Turbine Building, shielded from the HCVS by a 4 foot concrete wall. Additional bottles can be brought in as needed.

Location of Control Panels

The HCVS design allows initiating and then operating and monitoring the HCVS from the ASDS panel. If the ASDS panel is not accessible during an ELAP, the Backup HCVS Operating Station, located in the Turbine Building, will be used. NSPM will evaluate the ASDS panel and the Backup HCVS Operating Station locations for accessibility, staffing sufficiency, associated pathways from the main control room, and communication capability with vent-use decision makers (OIP Open Item 4).

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 that 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 HCVS will be designed with mechanical isolation from outside air such that the HCVS is able to provide assurance that oxygen cannot enter and mix with flammable gas in the HCVS (OIP Open Item 5).

Unintended Cross Flow of Vented Fluids

The HCVS piping does not interface with any other system piping or ductwork, except for the dedicated HCVS rupture disk nitrogen supply. A check valve will be installed to prevent cross flow of vented fluids into the HCVS rupture disk nitrogen supply.

Prevention of Inadvertent Actuation

EOP/SAMG 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 (NPSH) to the emergency core cooling system (ECCS) pumps will be available (inclusive of a design basis loss-of-coolant accident (DBLOCA)). However the ECCS pumps will not be in service during an ELAP condition because ECCS pumps will not have any power available based on the starting boundary conditions of an ELAP.

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EOP/SAMG operating procedures provide supplementary instructions to point out that reducing primary containment pressure will affect NPSH margin. This administrative control, along with key lock switches on the ASDS panel will prevent inadvertent vent opening.

The features that prevent inadvertent actuation are key lock switches on the ASDS panel. Valves that open the HCVS at the Backup HCVS Operating Station, which will only be used if the HCVS cannot be operated from the ASDS panel, will be secured 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. Piping outside safety related structures is designed to Class II and is supported to meet Class I seismic requirements. HCVS components that directly interface with the primary containment pressure boundary will be considered safety related, as the existing system is safety related. The primary 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. 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.

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. Electrical and controls components will be seismically qualified and will include the ability to handle harsh environmental conditions (although they will not be considered part of the site Environmental Qualification (EQ) program).

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

The HCVS instruments, including valve position indication, 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., ISO 9001) 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

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previously qualified.

Instrument	Qualification Method*
HCVS Process Temperature	ISO 9001 / IEEE 344-2004 / Demonstration
HCVS Process Radiation Monitor	ISO 9001 / IEEE 344-2004 / Demonstration
HCVS Process Valve Position	ISO 9001 / IEEE 344-2004 / Demonstration
HCVS Pneumatic Supply Pressure	ISO 9001 / IEEE 344-2004 / Demonstration
HCVS Electrical Power Supply Availability	ISO 9001 / IEEE 344-2004 / Demonstration

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

Monitoring of HCVS

The MNGP wetwell HCVS will be capable of being manually operated during sustained operations from the ASDS panel and will meet the requirements of Order Section 1.2.4. Additionally, to meet the intent for a secondary control location of Section 1.2.5 of the Order, a readily accessible Backup HCVS Operating Station (i.e. the ROS), located 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 and indications at the Backup HCVS Operating Station and the ASDS 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, extended loss of AC power (ELAP), and inadequate containment cooling. NSPM will evaluate the ASDS panel and the Backup HCVS Operating Station locations for accessibility to the location, habitability, staffing sufficiency, and communication capability with vent-use decision makers (OIP Open Item 4).

The wetwell HCVS will include means to monitor the status of the vent system at the ASDS panel.

The wetwell HCVS will include indications for vent temperature, and effluent radiation levels adjacent to the ASDS panel. Other important information on the status of supporting systems, such as power source status and pneumatic supply pressure will be available locally by the dedicated HCVS battery (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 main control room, and communication capability with vent-use decision makers (OIP Open Item 8). Monitoring of the power source and the pneumatic pressure will be performed periodically, based on plant procedures. The wetwell HCVS includes existing DW pressure and Suppression Pool level indication at the ASDS panel location to monitor vent operation. This monitoring instrumentation provides the indication from the ASDS panel as per Requirement 1.2.4 and will be designed for sustained operation during an ELAP event. Table 2-2 summarizes the existing and planned instrumentation.

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Table 2-2: 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 HCVS battery
				AO-4540 HPV ISOLATION OUTBOARD	HS-4540	None	None	Yes, 24 hour HCVS battery
Effluent Discharge Radioactivity	1.2.9	4.2.4.1.2	24 hour	HARD PIPE VENT RADIATION MONITOR RECORDER	RR-4544	None	None	Yes, New instrument and 24 hour HCVS battery
Effluent Temperature	NA	4.2.2.1.8	24 hour	HARD PIPE EXTERNAL SURFACE TEMPERATURE	New Instrument	None	None	Yes, Add a new thermocouple and 24 hour HCVS battery
Containment Pressure and Wetwell Level	NA	4.2.2.1.9 and 4.2.4.1.4	24 hour with FLEX PDG	PRIMARY CONTAINMENT WIDE RANGE PRESSURE	PI-7251B	None	None	No, powered from FLEX PDG
				SUPPRESSION POOL LEVEL	LI-7338B	None	None	No, powered from FLEX PDG
Electrical Power and Pneumatic Supply Pressure	NA	4.2.4.1.3	24 hour	BATTERY POWER MONITOR	None	None	Local Indicator	Yes, part of 24 hour HCVS battery design
				HCVS DEDICATED N2 SUPPLY PRESSURE	None	Local Pressure Gauge	None	Yes, part of dedicated HCVS N2 supply design

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,

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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, 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 (OIP Open Item 1) when required. (Reference HCVS-WP-04) Augmented quality requirements, will be applied to the components installed in 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. (OIP Open Item 6) Applicable instruments are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated severe accident event conditions in the area of instrument component use using one or more of the following methods:

- demonstration of seismic motion will be consistent with that of existing design basis loads at the installed location;
- substantial history of operational reliability in environments with significant vibration with a design envelope inclusive of the effects of seismic motion imparted to the instruments proposed at the location;
- adequacy of seismic design and installation is demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 27) or a substantially similar industrial standard;
- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or
- seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

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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. Initial operator actions can be completed by Operators from the HCVS control station and include remote-manual initiation. The operator actions required to open a vent path are as described in Table 2-1.

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

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

Permanently installed power and nitrogen 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, SAMGs, and/or AOPs to control DW pressure. In accordance with HCVS-WP-02, the HCVS will be designed eight (8) open/close cycles under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EPG/SAG and associated implementing EOPs and SAMGs.

ii. Passive: Inadvertent actuation protection is provided by:
   - HCVS key lock switches located on the ASDS panel.
   - A rupture disk is currently provided in the HCVS vent line, downstream of the

Part 2: Boundary Conditions for Wetwell Vent

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

containment isolation valves. The rupture disk is designed such that it can be intentionally breached from the ASDS panel as directed by applicable procedures. The rupture disk pneumatics will be designed such that the rupture disk can be intentionally breached from the Backup HCVS Operating Station as directed by applicable procedures. The containment isolation valves must be opened to permit HCVS flow. The rupture disk is designed to burst between 44 – 50 psig, which is less than the suppression chamber internal design pressure (56 Psig at 281 °F), the maximum suppression chamber internal pressure (62 Psig at 281 °F), or the existing HCVS design pressure (62 Psig at 309°F).

- Controls at the Backup Operating Station required to open the HCVS will be secured.

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 nitrogen to the HCVS. Connections for supplementing electrical power and nitrogen required for HCVS will be located in accessible areas with reasonable protection per NEI 12-06 that minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections will be pre-engineered quick disconnects to minimize manpower resources. A FLEX PDG will be used to ensure HCVS control power after 24 hours. The response to NRC EA-12-049 demonstrates the capability for FLEX efforts to maintain the power source.

These actions provide long term support for HCVS operation for the period beyond 24 hrs to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the unit(s) to provide needed action and supplies.

Details:

Provide a brief description of Procedures / Guidelines:

Confirm that procedure/guidance exists or will be developed to support implementation.
NEI 13-02 §6.1.2

Part 2: Boundary Conditions for Wetwell Vent

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

The operation of the HCVS is governed the Primary Containment Control Flowchart. Other site procedures for venting containment using the HCVS include:

- EOP Support Procedure C.5-3505 (Venting Primary Containment),
- EDMG A.8-05.08 (Manually Open Containment Vent Lines),
- Emergency Management Guideline 5790-110-01,
- Severe Accident Management Guideline A.7-SAMG-01 (Primary Containment Flooding),
- Severe Accident Management Guideline A.7-SAMG-02 (RPV, Containment, and Radioactivity Release Control),
- Severe Accident Management Guideline A.7-SAMG-03 (Combustible Gas Control), and
- Abnormal Procedure B.04.01-05.H.2 (Alternate N2 Supply for Operating AO-4539 and AO-4540)

C.5-3505 will be revised to incorporate plant modifications made to meet EA 13-109. A new procedure will be developed to control transfer of HCVS loads from HCVS battery to Y80.

Identify modifications:

List modifications and describe how they support the HCVS Actions.

EA-12-049 Modifications

- Two of three Division 2, 250 Vdc battery chargers have been modified to connect to the 480 volt FLEX PDG to repower the battery chargers. This permits powering the containment pressure and suppression pool level instruments located on the ASDS panel from the FLEX PDG. This also permits powering HCVS instrumentation and controls from the FLEX PDG after 24 hours.
- Missile shielding will be provided as necessary to ensure the availability of the HCVS (L-MT-14-083).

EA-13-109 Modifications

- A dedicated HCVS nitrogen supply will be installed as a pneumatic supply for the containment isolation valves.
- A dedicated HCVS rupture disk nitrogen supply will be installed.
- Manual valves will be installed on the dedicated HCVS nitrogen supply and the dedicated HCVS rupture disk nitrogen supply to allow manual actuation of the HCVS from the Backup HCVS Operating Station, located in the Turbine Building.

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

- A dedicated HCVS power supply will be installed
- The existing HCVS radiation monitor will be replaced with a radiation monitor that meets the requirements of EA-13-109. (See Table 2-2)
- A new HCVS temperature element will be installed. (See Table 2-2)
- A mechanical isolation device will be installed on the existing HCVS pipe such that the HCVS is able to provide assurance that oxygen from outside air cannot enter the HCVS and mix with flammable gas in the HCVS (OIP Open Item 5).
- The existing “T” at the top of the existing Hardened Vent System pipe will be replaced with a straight section of pipe and a weather cap.

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 (refer also to Table 2-2):

Key Parameter	Component Identifier	Indication Location
HCVS Effluent temperature	TBD	ASDS panel
HCVS Pneumatic supply pressure	TBD	Local at dedicated HCVS nitrogen supply.
HCVS valve position indication	HS-4539 and HS-4540	ASDS panel

Initiation, operation and monitoring of the HCVS system will rely on several existing ASDS panel key parameters and indicators which are qualified or evaluated to Regulatory Guide (RG) 1.97 per the existing plant design:

Key Parameter	Component Identifier	Indication Location
Drywell pressure	PI-7251B	ASDS panel
Suppression Pool level	LI-7338B	ASDS panel
Reactor pressure	PI-4012	ASDS panel

Part 2: Boundary Conditions for Wetwell Vent

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 EA12-049 were not successfully initiated. Access to the reactor building will be restricted as determined by the RPV water level and core damage conditions. Initial actions will be completed by Operators at the ASDS panel or in the Turbine Building at the Backup HCVS Operating Station and will include remote-manual actions at the dedicated HCVS nitrogen supply and the dedicated rupture disk nitrogen supply. The operator actions required to open a vent path were previously listed in the BDBEE Venting Part 2 section of this report (Table 2-1).

Permanently installed power and nitrogen capable will be available to support operation and monitoring of the HCVS for 24 hours. Specifics are the same as for BDBEE Venting Part 2.

System control:

i. Active: Same as for BDBEE Venting Part 2

ii. Passive: Same as for BDBEE Venting Part 2.

Details:

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

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

Part 2: Boundary Conditions for Wetwell Vent

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

Specifics are the same as for BDBEE Venting Part 2.

These actions provide long term support for HCVS operation for the period beyond 24 hours to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to provide needed action and supplies.

First 24 Hour Coping Detail

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)

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

Key Parameter	Component Identifier	Indication Location
HCVS effluent temperature	TBD	ASDS panel
HCVS pneumatic supply pressure	TBD	Local at HCVS nitrogen supply

Part 2: Boundary Conditions for Wetwell Vent

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

HCVS valve position indication	HS-4539 and HS-4540	ASDS panel
HCVS power status	TBD	Local at HCVS battery
HCVS effluent radiation monitor	RM-4544	ASDS panel

Initiation, operation and monitoring of the HCVS system will rely on several existing ASDS panel key parameters and indicators that are the same as for BDBEE Venting Part 2.

HCVS indications for HCVS pneumatic supply pressure and HCVS power status will be installed locally to comply with EA-13-109. HCVS effluent temperature and HCVS effluent radiation will be installed at the ASDS panel to comply with EA-13-109.

Part 2: Boundary Conditions for Wetwell Vent

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 ASDS panel or the Backup HCVS Operating Station, located in the Turbine Building.

Venting will require support from DC power as well as the dedicated HCVS nitrogen supply and the dedicated rupture disk nitrogen supply. A dedicated HCVS power supply will provide sufficient electrical power for HCVS operation for greater than 24 hours. Before the dedicated HCVS battery is depleted, a portable FLEX PDG, as detailed in the response to Order EA-12-049, will be credited to supply electrical power to the HCVS after 24 hours.

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.

Most of the equipment used in the HCVS is permanently installed. The key portable items are the portable FLEX PDG and nitrogen bottles needed to supplement the pneumatic supply to the HCVS

Part 2: Boundary Conditions for Wetwell Vent
Part 2 Boundary Conditions for Wetwell Vent: **HCVS Support Equipment Functions**
valves after 24 hours. Use of portable equipment will be per existing procedure.
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
FLEX modifications applicable to HCVS operation 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)*
Local control features of the FLEX PDG electrical load and fuel supply. Pressure gauge on dedicated HCVS nitrogen supply bottles.

Part 2: Boundary Conditions for Wetwell Vent

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
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA12-049 (FLEX)

Part 3: Boundary Conditions for EA-13-109, Option B.2

General:

Licensees that use Option B.1 of EA-13-109 (SA Capable DW Vent without SAWA) must develop their own OIP. This template does not provide guidance for that option.

Licensees using Option B.2 of EA-13-109 (SAWA and SAWM or 545°F SADW Vent (SADV) with SAWA) may use this template for their OIP submittal. Both SAWM and SADV require the use of SAWA and may not be done independently. The HCVS actions under Part 2 apply to all of the following:

This Part is divided into the following sections:

3.1: Severe Accident Water Addition (SAWA)

3.1.A: Severe Accident Water Management (SAWM)

3.1.B: Severe Accident DW Vent (545 deg F)

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

SAWA and SAWM or SADV Actions supporting SA conditions 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). Actions already identified under the HCVS part of this template need not be repeated here.

The time to establish the water addition capability into the RPV or DW should be less than 8 hours from the onset of the loss of all injection sources.

- *Electrical generators satisfying the requirements of EA-12-049 may be credited for powering components and instrumentation needed to establish a flow path.*
- *Time Sensitive Actions (TSAs) for the purpose of SAWA are those actions needed to transport, connect and start portable equipment needed to provide SAWA flow or provide power to SAWA components in the flow path between the connection point and the RPV or drywell. Actions needed to establish power to SAWA instrumentation should also be included as TSAs.*

Ref: NEI 13-02 Section 6.1.1.7.4.1, I.1.4, I.1.5

The operation of the HCVS using SAWA and SAWM/SADV will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1. Initial operator actions will be completed by plant personnel and will include the capability for remote-manual initiation from the ASDS panel or the Backup HCVS Operating Station, located in the Turbine Building.

Timelines (see attachments 2.1.A for SAWA/SAWM) were developed to identify required operator response times and actions. The timelines are an expansion of Attachment 2A and begin either as core damage occurs (SAWA) or after initial SAWA injection is established and as flowrate is adjusted for option B.2 (SAWM). The timelines do not assume the core is ex-vessel and the actions taken are appropriate for both in-vessel and ex-vessel core damage conditions.

Part 3.1: Boundary Conditions for SAWA

Table 3.1 – SAWA Manual Actions

Primary Action	Primary Location / Component	Notes
1. Establish HCVS capability in accordance with Part 2 of this guidance.	• ASDS Panel / Backup HCVS Operating Station	• Applicable to SAWA/SAWM strategy
2. Establish SAWA/SAWM flow path	• FLEX PDG Staging Area • Turbine Building • Main Control Room	• Stage FLEX PDG • Layout cables and connect FLEX PDG to electrical distribution • Repower the Low Pressure Coolant Injection (LPCI) swing bus (OIP Open Item 9) • Open LPCI isolation valve from control room using hand switch
3. Connect FLEX Portable Diesel Pump (PDP) to water source	• Discharge Canal	• Alternate Location at Intake
4. Connect FLEX PDP discharge to injection piping	• 5 inch portable fire hoses	• Route hoses from discharge canal to RHR/RHRSW cross-tie located in Turbine Building.
5. Inject to RPV using FLEX PDP (diesel)	• From RHR/RHRSW cross-tie located in Turbine Building.	• Valves (RHRSW-68 and RHRSW-14) are operated manually. • Initial SAWA injection rate is 305 gpm
6. Monitor SAWA indications	• Pump flow • Turbine Building / Flow meter installed on 5 inch fire hose • HCVS Valve Position • HS-4539 and HS-4540 / Located on ASDS panel	• Flow meter procedurally controlled to be installed during layout of 5 inch hose from the portable diesel pump to the RHR/RHRSW cross-tie.

Part 3.1: Boundary Conditions for SAWA

7. Use SAWM to maintain availability of the Wetwell vent (Part 3.1.A)	• ASDS panel and RHR/RHRSW cross-tie, located in Turbine Building • Drywell Pressure • Suppression Pool Level	• Monitor DW pressure and Suppression Pool level at ASDS panel. • Control SAWM at RHR/RHRSW cross-tie. Excess pump flow is returned to the discharge canal as needed by throttling manual valve RHRSW-12. • SAWM flowrate is 61 gpm.
8. Power primary containment pressure and wetwell level instruments from EA-12-049 FLEX PDG	• FLEX PDG staging area • Turbine Building • EFT Building	• Layout cables and connect FLEX PDG and Division 2, 250 Vdc battery chargers. • Repower Division 2, 250 Vdc battery chargers.

Discussion of timeline SAWA identified items

HCVS operations are discussed under Phase 1 of EA-13-109 (Part 2 of this OIP).

8 Hours – Establish electrical power and other EA-12-049 actions needed to support the strategies for EA-13-109, Phase 1 and Phase 2. Action being taken within the reactor building under EA-12-049 conditions after RPV level lowers to 2/3 core height must be evaluated for radiological conditions assuming permanent containment shielding remains intact. (HCVS-FAQ-12) Other actions required are assumed to be in-line with the FLEX timeline submitted in accordance with the EA-12-049 requirements.

Less than 8 Hours – Initiate SAWA flow to the RPV. Having the HCVS in service will assist in minimizing the peak DW pressure during the initial cooling conditions provided by SAWA.

Severe Accident Operation

Determine operating requirements for SAWA, such as may be used in an ELAP scenario to mitigate core damage.

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Section I.1.6, I.1.4.4

Part 3.1: Boundary Conditions for SAWA

It is anticipated that SAWA will be used in Severe Accident Events based on presumed failure of injection systems or presumed failure to implement an injection system in a timely manner leading to core damage. This does not preclude the use of the SAWA system to supplement or replace the EA-12-049 injection systems if desired. SAWA will consist of both portable and installed equipment.

The motive force equipment needed to support the SAWA strategy shall be available prior to t=8 hours from the loss of injection (assumed at T=0).

The SAWA flow path includes methods to minimize exposure of personnel to radioactive liquids / gases and potentially flammable conditions by inclusion of backflow prevention. AO-10-46A is an installed check valve in the RHR system, downstream of the RHR injection isolation valves. AO-10-46A will prevent leakage when the FLEX PDP is secured (See Attachment 3, Sketch 3a).

Description of SAWA actions for first 24 hours:

T<1 hr:

- No evaluation required for actions inside the reactor building for SAWA. Expected actions are:
    - None

T=1 – 8 hr:

- Evaluation of core gap and early in vessel release impact to reactor building access for SAWA actions is required. It is assumed that reactor building access is limited due to the source term at this time unless otherwise noted. (Refer to HCVS-FAQ-12 for actions in T=1-7 hr) Expected actions are:
    - None
- Establish flow to the RPV using SAWA systems. Begin injection at a maximum rate, not to exceed 305 gpm.
    - Steps 2, 3, 4, and 5 of Table 3.1 above
- Establish electrical power for indications using EA-12-049 FLEX PDG
    - Steps 2 and 8 of Table 3.1 above

T≤8 –12 hr:

- Continue injection for 4 hours after SAWA injection begins at initial SAWA rate.
    - Steps 6 of Table 3.1 above

T≤12 hrs:

- Proceed to SAWM actions (Part 3.1.A)
    - Step 7 of Table 3.1 above

Part 3.1: Boundary Conditions for SAWA

Greater Than 24 Hour Coping Detail

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

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3/ NEI 13-02 Section 4.2.2.4.1.3.1, I.1.4,

SAWA Operation is the same for the full period of sustained operation. If SAWM is employed flow rates will be directed to preserve the availability of the HCVS wetwell vent (see 3.1.A).

Details:

Details of Design Characteristics/Performance Specifications

SAWA shall be capable of providing an RPV injection rate of 300 *gpm within 8 hours of a loss of all RPV injection following an ELAP/Severe Accident. SAWA shall meet the design characteristics of the HCVS with the exception of the dedicated 24 hour power source. Hydrogen mitigation is provided by backflow prevention for SAWA.*

Ref: EA-13-109 Attachment 2, Section B.2.1, B.2.2, B.2.3/ NEI 13-02 Section I.1.4

Equipment Locations/Controls/Instrumentation

The locations of the SAWA equipment and controls, as well as ingress and egress paths will be evaluated for the expected severe accident conditions (temperature, humidity, radiation) for the Sustained Operating period. Equipment has been evaluated to remain operational throughout the Sustained Operating period. Personnel exposure and temperature / humidity conditions for operation of SAWA equipment will not exceed the limits for Emergency Response Organization (ERO) dose and plant safety guidelines for temperature and humidity (OIP Open Item 3).

The FLEX Portable Diesel Pump (PDP) will be staged at the discharge canal. Two 5 inch fire hoses will be run between the portable diesel pump and the Turbine Building. Near the Turbine Building entrance, the two 5 inch fire hoses will be combined into a single 5 inch hose that is run to the RHR/RHRSW cross-tie. A flow meter will be included in the flow path after the fire hoses are combined, but before the hose is connected to the injection isolation valve at the RHR/RHRSW cross-tie (RHRSW-68). Once connected, RHRSW-68 is opened to admit water into the RHR/RHRSW cross-tie, at which point the Emergency RHR Injection Isolation Valve (RHRSW-14) can be opened to inject water into the RHR system. With the LPCI injection isolation valve open (MO-2014), the RHR system will inject into the RPV. RPV injection flow is controlled by throttling RHRSW-14 as needed to maintain the desired flow. Excess pump flow is routed back to the discharge canal through installed piping by opening the isolation valve between RHR and RHRSW (RHRSW-12). See Attachment 3, Sketch 3.

Part 3.1: Boundary Conditions for SAWA

Evaluations for projected SA conditions (radiation / temperature) will indicate that personnel can complete the initial and support activities without exceeding the ERO-allowable dose for equipment operation or site safety standards. (reference HCVS-WP-02, Plant-Specific Dose Analysis for the Venting of Containment during the SA Conditions) (OIP Open Item 3).

Electrical equipment and instrumentation will be powered from the existing station batteries and from AC distribution systems that are powered form the EA-12-049 portable DG. The battery chargers are also powered from the FLEX PDG to maintain the battery capacities during the Sustained Operating period. The indications include:

Parameter	Instrument	Location	Power Source / Notes
DW Pressure	PI-7251B	ASDS panel	Station batteries plus EA-12-049 generator
Suppression Pool Level	LI-7338B	ASDS panel	Station batteries plus EA-12-049 generator
SAWA Flow	Flow meter staged on hose	Installed during hose staging	No power source required

The instrumentation and equipment being used for SAWA and supporting equipment will be evaluated to perform for the Sustained Operating period under the expected radiological and temperature conditions (OIP Open Item 3).

Equipment Protection

Any SAWA component and connections external to protected buildings have been protected against the screened-in hazards of EA-12-049 for the station. Portable equipment used for SAWA implementation meets the protection requirements for storage in accordance with the criteria in NEI 12-06, Revision 0.

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Section 5.1.1, 5.4.6, I.1.6

Provide a brief description of Procedures / Guidelines:

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

Ref: EA-13-109 Attachment 2, Section A.3.1, B.2.3 / NEI 13-02 Section 1.3, 6.1.2

Guidance has been or will be developed to:

- Stage FLEX PDP at the discharge canal*

Part 3.1: Boundary Conditions for SAWA

- Layout and connect hoses from the FLEX PDP to the RHR/RHRSW cross-tie*
- Start and run the FLEX PDP*
- Stage the FLEX PDG*
- Repower station battery chargers from FLEX PDG*
- Repower the LPCI swing bus from FLEX PDG
- Verify OPEN at least one LPCI injection flow path
- Establish and control RPV injection using RHRSW-68, RHRSW-14, and RHRSW-12 as needed*
- Transfer HCVS power from dedicated HCVS power to Division 2 UPS, Y80

* Existing FLEX Support Guideline

Identify modifications:

List modifications and describe how they support the SAWA Actions.

Ref: EA-13-109 Attachment 2, Section B.2.2, / NEI 13-02 Section 4.2.4.4, 7.2.1.8, Appendix I

Two modifications are required to support SAWA Actions:

1. To establish SAWA flowrate within 8 hours and repower the station battery chargers from the FLEX PDG within 8 hours, a modification to the east side of the site security perimeter is required. This will provide a second access portal into the plant that can be used independent of off-site personnel.
2. To establish SAWA flowrate within 8 hours, one of the LPCI injection isolation valves must be opened. A modification to the power distribution system is required. This will allow the LPCI swing bus to be powered from the FLEX PDG independent of off-site personnel, allowing the LPCI injection isolation valve to be opened from the main control room.

Component Qualifications:

State the qualification used for equipment supporting SAWA

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Section I.1.6

Permanently installed plant equipment shall meet the same qualifications as described in Part 2 of this OIP. Temporary/Portable equipment shall be qualified and stored to the same requirements as FLEX equipment as specified in NEI 12-06 Rev 0. SAWA components are not required to meet NEI

Part 3.1: Boundary Conditions for SAWA
13-02, Table 2-1 design conditions.

Part 3.1.A: Boundary Conditions for SAWA/SAWM

Time periods for the maintaining SAWM actions such that the Wetwell vent

SAWM Actions supporting SA conditions 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). Actions already identified under the HCVS part of this template need not be repeated here.

There are three time periods for the maintaining SAWM actions such that the WW vent remains available to remove decay heat from the containment:

- *SAWM can be maintained for >7 days without the need for a drywell vent to maintain pressure below PCPL or containment design pressure, whichever is lower.*
  - *Under this approach, no detail concerning plant modifications or procedures is necessary with respect to how alternate containment heat removal will be provided.*
- *SAWM can be maintained for at least 72 hours, but less than 7 days before DW pressure reaches PCPL or design pressure, whichever is lower.*
  - *Under this approach, a functional description is required of how alternate containment heat removal might be established before DW pressure reaches PCPL or design pressure whichever is lower. Under this approach, physical plant modifications and detailed procedures are not necessary, but written descriptions of possible approaches for achieving alternate containment heat removal and pressure control will be provided.*
- *SAWM can be maintained for <72 hours* SAWM strategy can be implemented but for less than 72 hours before DW pressure reaches PCPL or design pressure whichever is lower.
  - *Under this approach, a functional description is required of how alternate containment heat removal might be established before DW pressure reaches PCPL or design pressure whichever is lower. Under this approach, physical plant modifications and detailed procedures are required to be implemented to insure achieving alternate containment heat removal and pressure control will be provided for the sustained operating period.*

Ref: NEI 13-02 Appendix C.7

SAWM can be maintained for > 7 days without the need for a DW vent to maintain pressure below PCPL or containment design pressure, whichever is lower.

Basis for SAWM time frame

Option 1 - SAWM can be maintained greater than or equal to 7 days:

MNGP is bounded by the evaluations performed in BWROG TP-2015-008 and representative of the reference plant in NEI 13-02 figures C-2 through C-6. (C.7.1.4.1) and will be confirmed.

Instrumentation relied upon for SAWM operations is DW Pressure, Suppression Pool level and SAWA flow. DW Pressure and Suppression Pool Level are initially powered by station batteries, and then by the EA-12-049 FLEX PDG, which is placed in-service prior to core breach. The SAWA

Part 3.1.A: Boundary Conditions for SAWA/SAWM

flow meter is installed during hose layout, and does not require AC power to operate. The DG will provide power throughout the Sustained Operation period (7 days). DW Temperature monitoring is not a requirement for compliance with Phase 2 of the order, but some knowledge of temperature characteristics provides information for the operation staff to evaluate plant conditions under a severe accident and provide confirmation to adjust SAWA flow rates. (C.7.1.4.2, C.8.3.1)

Suppression Pool level indication is maintained throughout the Sustained Operation period, so the HCVS remains in-service.

Table 3.1.B – SAWM Manual Actions

Primary Action	Primary Location / Component	Notes
1. Lower SAWA injection rate to control Suppression Pool Level and decay heat removal	Turbine Building	• Control to maintain containment and Wetwell parameters to ensure Wetwell vent remains functional. • 61 gpm minimum capability is maintained for greater than 7 days.
2. Control to SAWM flowrate for containment control / decay heat removal	Turbine Building	• SAWM flow rates will be monitored using the following instrumentation o FLEX PDP (EA-12-049) Flow o Suppression Pool Level o DW pressure • SAWM flow rates will be controlled using RHRSW-14 and RHRSW-12 as needed
3. Establish alternate source of decay heat removal		• >7 days.
4. Secure SAWA / SAWM	Turbine Building and Discharge Canal	• When reliable alternate containment decay heat removal is established.

SAWM Time Sensitive Actions

Time Sensitive SAWM Actions:

12 Hours – Initiate actions to maintain the Wetwell vent capability by lowering injection rate, while maintaining the cooling of the core debris (SAWM). Monitor SAWM critical parameters while ensuring the Wetwell vent remains available.

24 Hours – Transfer HCVS loads (instrumentation and controls) from dedicated HCVS battery to

Part 3.1.A: Boundary Conditions for SAWA/SAWM

FLEX PDG.

SAWM Severe Accident Operation

Determine operating requirements for SAWM, such as may be used in an ELAP scenario to mitigate core damage.

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Appendix C

It is anticipated that SAWM will only be used in Severe Accident Events based on presumed failure of plant injection systems per direction by the plant SAMGs. Refer to attachment 2.1.D for SAWM SAMG language additions.

First 24 Hour Coping Detail

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

Given the initial conditions for EA-13-109:

- *BDBEE occurs with ELAP*
- *Failure of all injection systems, including steam-powered injection systems*

Ref: EA-13-109 Section 1.2.6, Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 2.5, 4.2.2, Appendix C, Section C.7

SAWA will be established as described as stated above. SAWM will use the installed instrumentation to monitor and adjust the flow from SAWA to control the pump discharge to deliver flowrates applicable to the SAWM strategy.

Once the SAWA initial low rate has been established for 4 hours, the flow will be reduced while monitoring DW pressure and Suppression Pool level. SAWM flowrate can be lowered to maintain containment parameters and preserve the Wetwell vent path. SAWM will be capable of injection for the period of Sustained Operation.

Greater Than 24 Hour Coping Detail

Provide a general description of the SAWM 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, Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Section 4.2.2, Appendix C, Section C.7

Part 3.1.A: Boundary Conditions for SAWA/SAWM

SAWM can be maintained >7 days:

The SAWM flow strategy will be the same as the first 24 hours until "alternate reliable containment heat removal and pressure control" is reestablished. SAWM flow strategy uses the SAWA flow path. A MNGP specific SAWA/SAWM analysis will be required.

No additional modifications are being proposed for SAWM.

Details:

Details of Design Characteristics/Performance Specifications

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Section Appendix C

SAWM shall be capable of monitoring the containment parameters (DW pressure and Suppression Pool Level) to provide guidance on when injection rates shall be reduced, until alternate containment decay heat/pressure control is established. SAWA will be capable of injection for the period of Sustained Operation.

Equipment Locations/Controls/Instrumentation

Describe location for SAWM monitoring and control.

Ref: EA-13-109 Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Appendix C, Section C.8, Appendix I

The SAWM control location is the same as the SAWA control location. Local indication of SAWM flow rate is provided by a portable flowmeter installed on the hose from the FLEX PDP. The flow meter will be near the SAWA injection point.

Injection flowrate is controlled by manually throttling RHRSW-14 and RHRSW-12, located in the Turbine Building.

Suppression Pool level and DW pressure are read at the ASDS panel using indicators powered by the FLEX PDG installed under EA-12-049. These indications are used to control SAWM flowrate to the RPV.

Key Parameters:

List instrumentation credited for the SAWM Actions.

Part 3.1.A: Boundary Conditions for SAWA/SAWM

Parameters used for SAWM are:

- DW Pressure
- Suppression Pool Level
- SAWM Flowrate

The DW pressure and Suppression Pool level instruments are qualified to RG 1.97 and are the same as listed in part 2 of this OIP. The SAWM flow instrumentation will be qualified for the expected environmental conditions expected when needed (OIP Open Item 6).

Part 3.1.B: Boundary Conditions for SAWA/SADV
Applicability of Wetwell Design Considerations
Not applicable for MNGP.
Table 3.1.C – SADV Manual Actions
Timeline for SADV
Severe Accident Venting
First 24 Hour Coping Detail
Greater Than 24 Hour Coping Detail
Details:

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 1.2.10, 3.1, 3.2 / NEI 13-02 Sections 5, 6.1.2, 6.1.3, 6.2

Program Controls:

The HCVS venting actions will include:

- Site procedures and programs are being developed in accordance with NEI 13-02 to address use and storage of portable equipment relative to the Severe Accident defined in NRC Order EA-13-109 and the hazards applicable to the site per Part 1 of this OIP.
- 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 analyzed for radiation and temperature to ensure they are accessible 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.

EOP/SAMGs provide supplementary instructions to point out that reducing primary containment pressure will affect Net Positive Suction head margin.

NSPM will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in a controlled document:

The provisions for out-of-service requirements for HCVS/SAWA functionality are applicable in

Part 4: Programmatic Controls, Training, Drills and Maintenance

Modes 1, 2 and 3.

- If for up to 90 consecutive days, the primary or alternate means of HCVS/SAWA operation are non-functional, no compensatory actions are necessary.
- If for up to 30 days, the primary and alternate means of HCVS/SAWA operation are nonfunctional, 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 through the sites corrective action program:
  - Document the cause(s) of the non-functionality,
  - The actions to be taken and the schedule for restoring the system to functional status and prevent recurrence,
  - Initiate action to implement appropriate compensatory actions, and
  - Restore full HCVS functionality at the earliest opportunity not to exceed one full operating cycle.

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 HCVS/SAWA/SAWM actions 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/SAWA/SAWM actions, systems or strategies. Training content and frequency will be established using the Systematic Approach to Training (SAT) process.

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/SAWA/SAWM 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).*

Part 4: Programmatic Controls, Training, Drills and Maintenance

- *Operation for sustained period with SAWA and SAWM to provide decay heat removal and containment pressure control.*

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

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

Describe maintenance plan:

Describe the elements of the maintenance plan

- *The maintenance program should ensure that the HCVS/SAWA/SAWM 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 Part 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/SAWA permanent installed equipment should be maintained in a manner that is consistent with assuring that it performs its function when required.*
  - *HCVS/SAWA permanently installed equipment should be subject to maintenance and testing guidance provided to verify proper function.*
- *HCVS/SAWA 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

NSPM will utilize the standard EPRI industry Preventive Maintenance (PM) process as guidance (similar to the Preventive Maintenance Basis Database) for establishing the maintenance calibration and testing actions for HCVS/SAWA/SAWM 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, or in accordance with site program.

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

Part 4: Programmatic Controls, Training, Drills and Maintenance

Table 4-1: Testing and Inspection Requirements

Description	Frequency
Cycle the HCVS and installed SAWA valves[1] and the interfacing system boundary valves not used to maintain containment integrity during Mode 1, 2 and 3. For HCVS valves, this test may be performed concurrently with the control logic test described below.	Once per every[2] operating cycle
Cycle the HCVS and installed SAWA check valves not used to maintain containment integrity during unit operations[3]	Once per every other[4] operating cycle
Perform visual inspections and a walk down of HCVS and installed SAWA components	Once per every other[4] operating cycle
Functionally test 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 function from its control location and ensuring that all HCVS vent path and interfacing system boundary valves[5] move to their proper (intended) positions.	Once per every other operating cycle

[1] Not required for HCVS and SAWA check valves.
[2] After two consecutive successful performances, the test frequency may be reduced to a maximum of once per every other operating cycle.
[3] Not required if integrity of check function (open and closed) is demonstrated by other plant testing requirements.
[4] After two consecutive successful performances, the test frequency may be reduced by one operating cycle to a maximum of once per every fourth operating cycle.
[5] Interfacing system boundary valves that are normally closed and fail closed under ELAP conditions (loss of power and/or air) do not require control function testing under this part. Performing existing plant design basis function testing or system operation that reposition the valve(s) to the HCVS required position will meet this requirement without the need for additional testing.

Part 5: Milestone Schedule

Provide a milestone schedule

This schedule should include:

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

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

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

The following milestone schedules are 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.

Phase 1 Milestone Schedule:

Phase 1 Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Hold preliminary/conceptual design meeting	June 2014	Complete	
Submit Overall Integrated Implementation Plan	June 2014	Complete	
Submit 6 Month Status Report	Dec. 2014	Complete	
Submit 6 Month Status Report	June 2015	Complete	
Submit 6 Month Status Report	Dec. 2015	Complete with this submittal	Simultaneous with Phase 2 OIP.
Design Engineering On-site/Complete	June 2016	Started	Revised from March 2016 based on current project schedule.

Part 5: Milestone Schedule

Submit 6 Month Status Report	June 2016	Not Started	
Operations Procedure Changes Developed	Dec. 2016	Not Started	Revised from September 2016 based on current project schedule.
Site Specific Maintenance Procedure Developed	Dec. 2016	Not Started	Revised from September 2016 based on current project schedule.
Submit 6 Month Status Report	Dec. 2016	Not Started	
Training Complete	May 2017	Not Started	
Implementation Outage	May 2017	Not Started	
Procedure Changes Active	May 2017	Not Started	
Walk Through Demonstration/Functional Test	May 2017	Not Started	
Submit Completion Report	July 2017	Not Started	

Phase 2 Milestone Schedule:

Phase 2 Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Hold preliminary/conceptual design meeting	Oct 2015	Complete	
Submit Overall Integrated Implementation Plan	Dec 2015	Complete with this submittal	
Submit 6 Month Status Report	June 2016	Not Started	

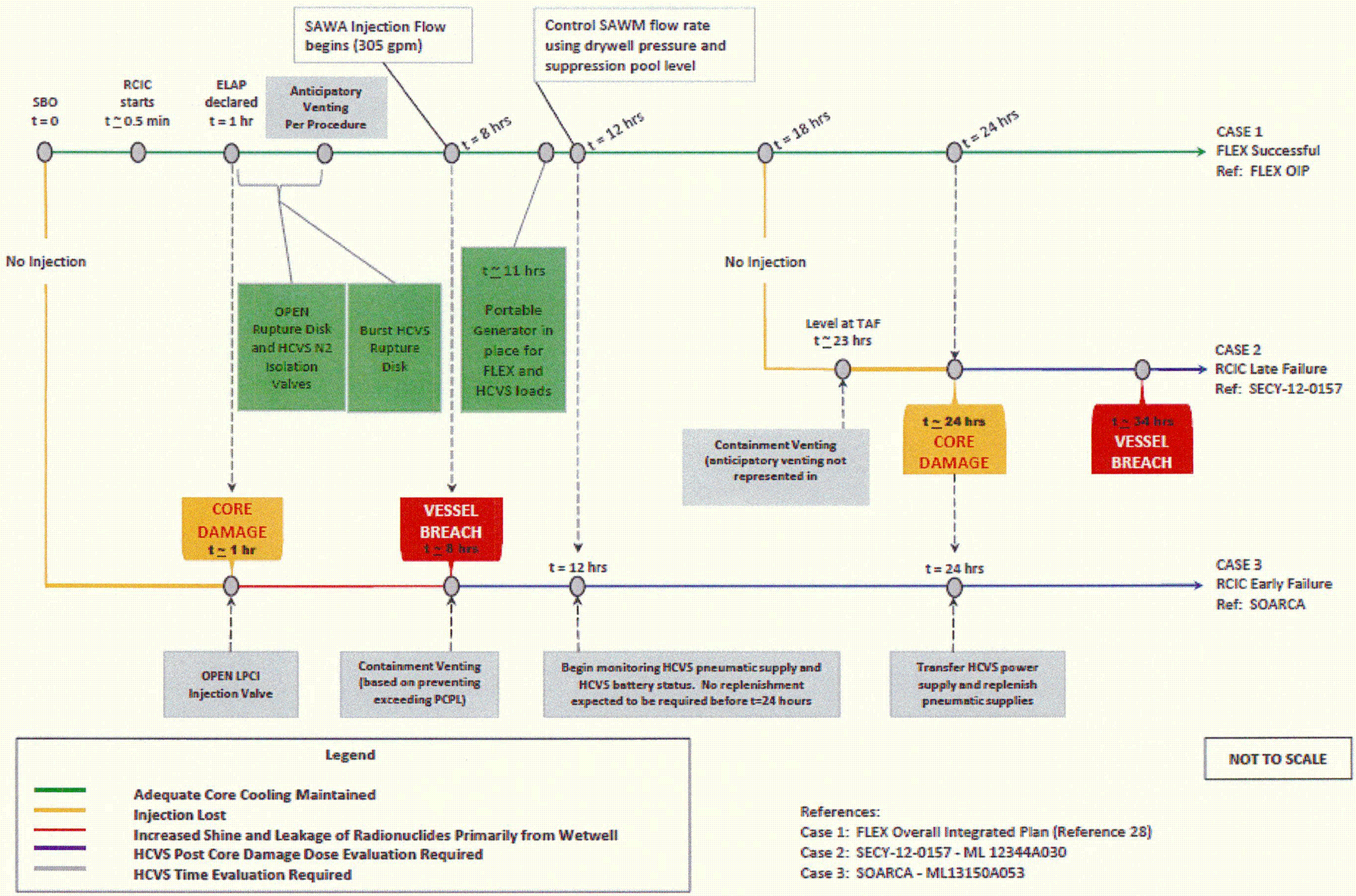
Part 5: Milestone Schedule

Submit 6 Month Status Report	Dec 2016	Not Started	
Submit 6 Month Status Report	June 2017	Not Started	
Submit 6 Month Status Report	Dec. 2017	Not Started	
Design Engineering On-site/Complete	June 2018	Not Started	
Submit 6 Month Status Report	June 2018	Not Started	
Submit 6 Month Status Report	Dec. 2018	Not Started	
Operations Procedure Changes Developed	Dec. 2018	Not Started	
Site Specific Maintenance Procedure Developed	Dec. 2018	Not Started	
Training Complete	May 2019	Not Started	
Implementation Outage	May 2019	Not Started	
Procedure Changes Active	May 2019	Not Started	
Walk Through Demonstration/Functional Test	May 2019	Not Started	
Submit Completion Report	July 2019	Not Started	

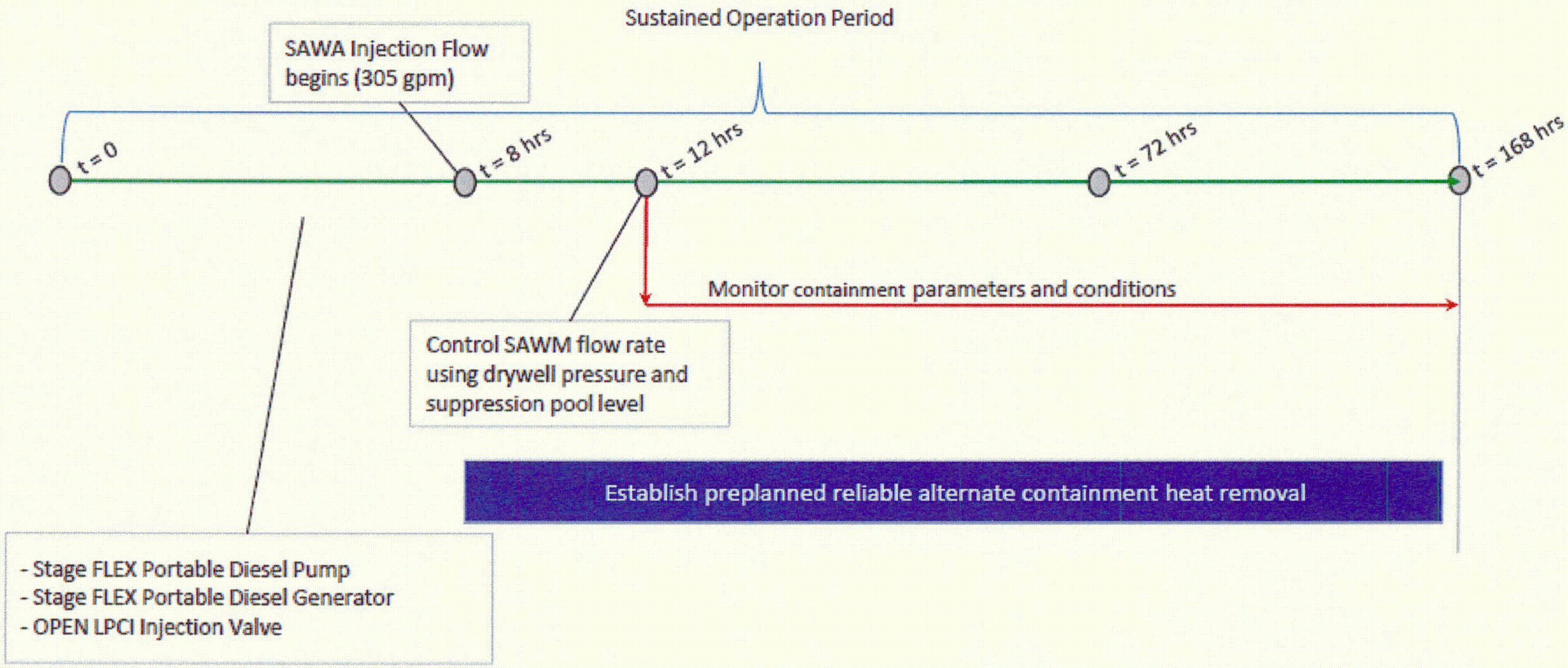
Attachment 1: HCVS/SAWA Portable Equipment

List portable equipment	BDBEE Venting	Severe Accident Venting	Performance Criteria	Maintenance / PM requirements
Nitrogen Cylinders	X	X	Required number of bottles will be determined during design of dedicated HCVS nitrogen supply. (ISE Open Item 2)	Check periodically for pressure, replace or replenish as needed
FLEX PDG (and associated equipment)	X	X	EA-12-049	Per Response to EA-12-049
FLEX PDP (and associated equipment)	X	X	305 gpm first 4 hours 61 gpm thereafter	Per Response to EA-13-109

Attachment 2A: Sequence of Events Timeline – HCVS



Attachment 2.1.A: Sequence of Events Timeline – SAWA / SAWM



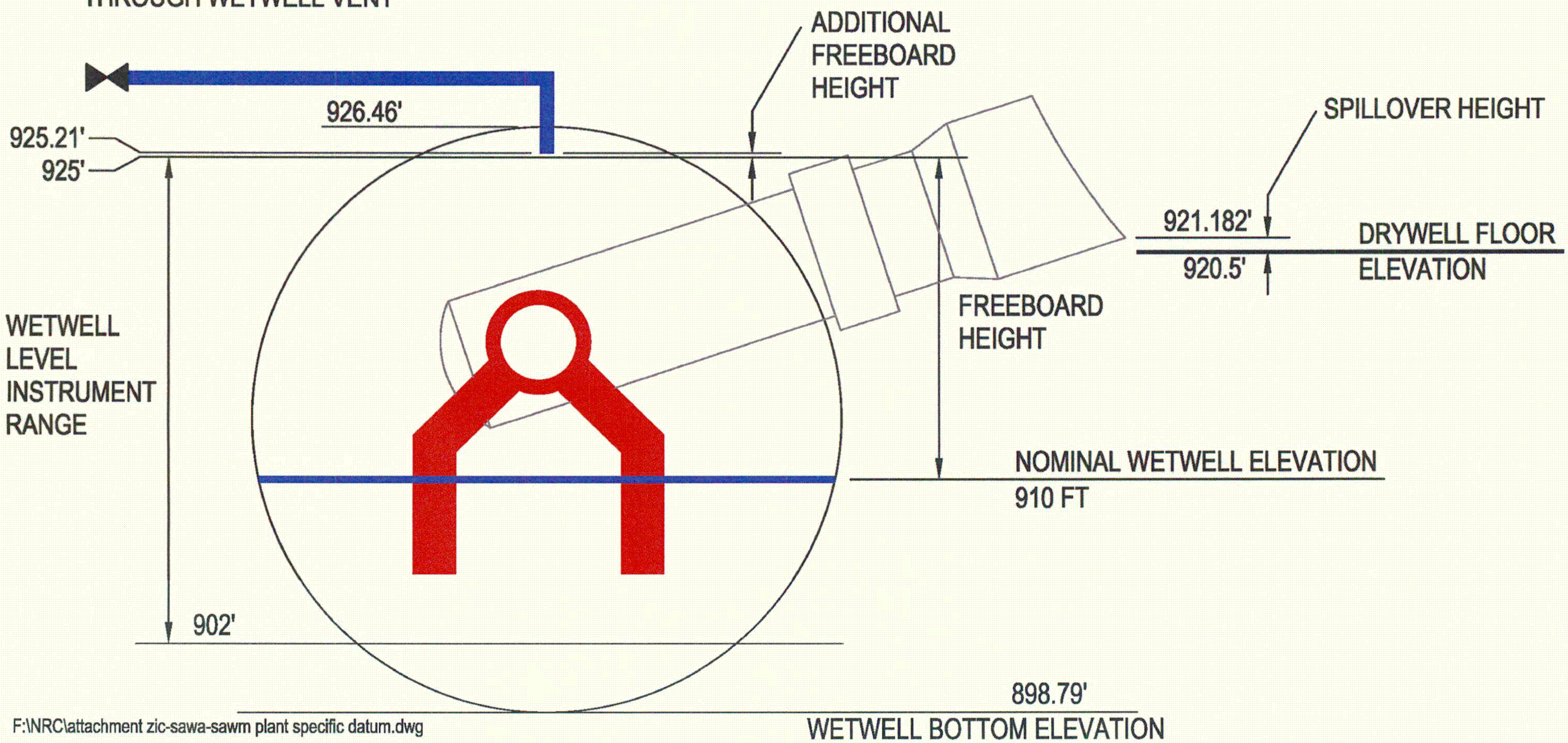
Attachment 2.1.B: Sequence of Events Timeline – SADV

Not applicable to MNGP.

Attachment 2.1.C: SAWA / SAWM Plant-Specific Datum

AT 305 GPM SAWA FLOW, RATE OF RISE IS 0.29 FT/HR*
AT 61 GPM SAWM FLOW, RATE OF RISE IS 0.058 FT/HR*

* DOES NOT CONSIDER MASS LOSS RATE OF STEAM LEAVING CONTAINMENT THROUGH WETWELL VENT



Attachment 2.1.D: SAWM SAMG Approved Language

The following general cautions, priorities and methods will be evaluated for plant specific applicability and incorporated as appropriate into the plant specific SAMGs using administrative procedures for EPG/SAG change control process and implementation. SAMGs are symptom based guidelines and therefore address a wide variety of possible plant conditions and capabilities while these changes are intended to accommodate those specific conditions assumed in Order EA-13-109. The changes will be made in a way that maintains the use of SAMGs in a symptom based mode while at the same time addressing those conditions that may exist under extended loss of AC power (ELAP) conditions with significant core damage including ex-vessel core debris.

Actual Approved Language that will be incorporated into site SAMG*

Cautions:

- Addressing the possible plant response associated with adding water to hot core debris and the resulting pressurization of the primary containment by rapid steam generation.
- Addressing the plant impact that raising suppression pool water level above the elevation of the suppression chamber vent opening elevation will flood the suppression chamber vent path.

Priorities:

With significant core damage and RPV breach, SAMGs prioritize the preservation of primary containment integrity while limiting radioactivity releases as follows:

- Core debris in the primary containment is stabilized by water addition (SAWA)
- Primary containment pressure is controlled below the Primary Containment Pressure Limit (Wetwell venting)
- Water addition is managed to preserve the Mark I/II suppression chamber vent paths, thereby retaining the benefits of suppression pool scrubbing and minimizing the likelihood of radioactivity and hydrogen release into the secondary containment (SAWM)

Methods:

Identify systems and capabilities to add water to the RPV or DW, with the following generic guidance:

- Use controlled injection if possible.
- Inject into the RPV if possible.
- Maintain injection from external sources of water as low as possible to preserve suppression chamber vent capability.

* Actual language may vary by acceptable site procedure standards, but intent and structure should follow this guidance.

Attachment 3: Conceptual Sketches

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

Sketch 1: Electrical Layout of System *(preliminary)*

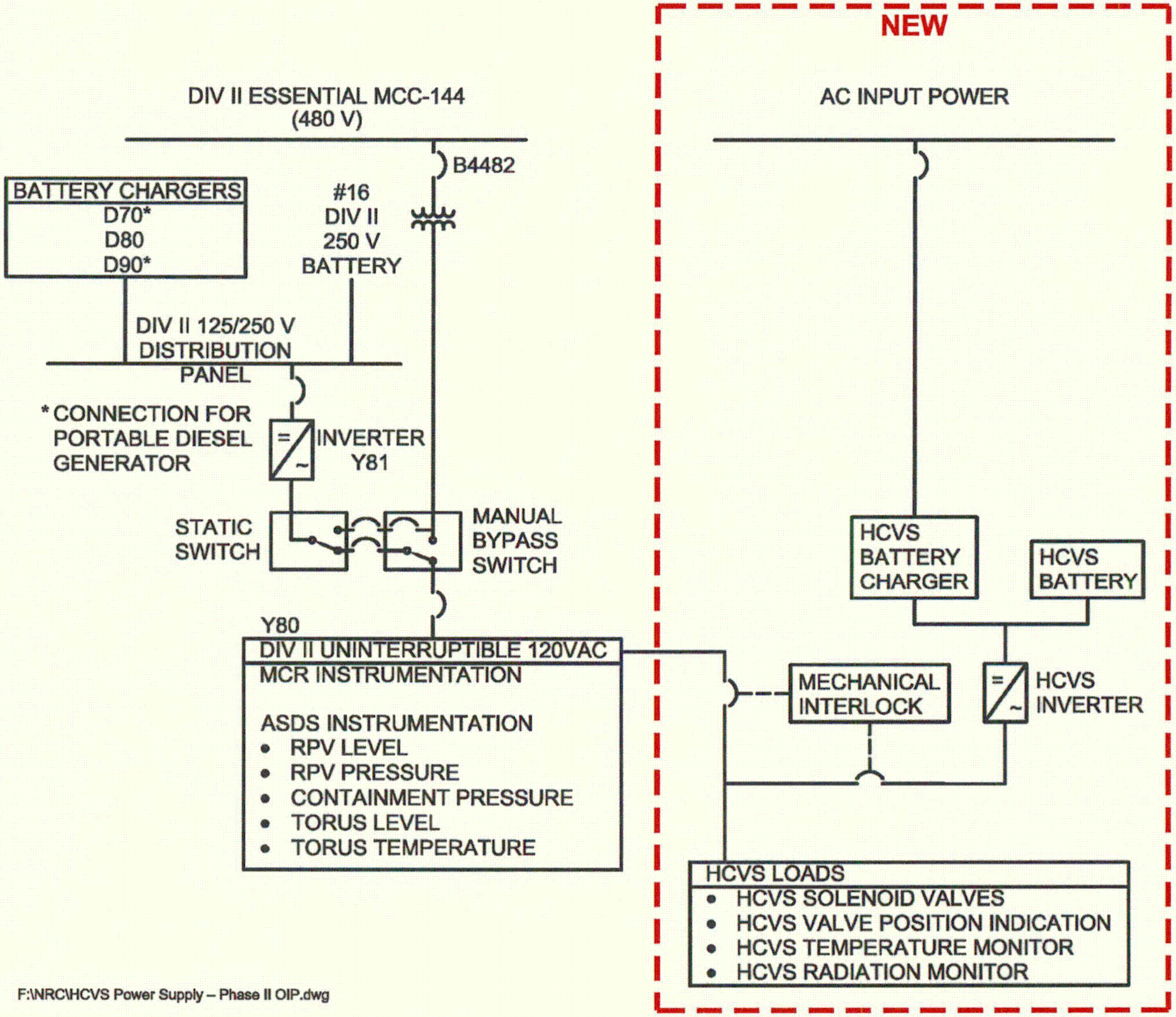
- Instrumentation Process Flow
- Electrical Connections

Sketch 2: P&ID Layout of Wetwell Vent *(preliminary)*

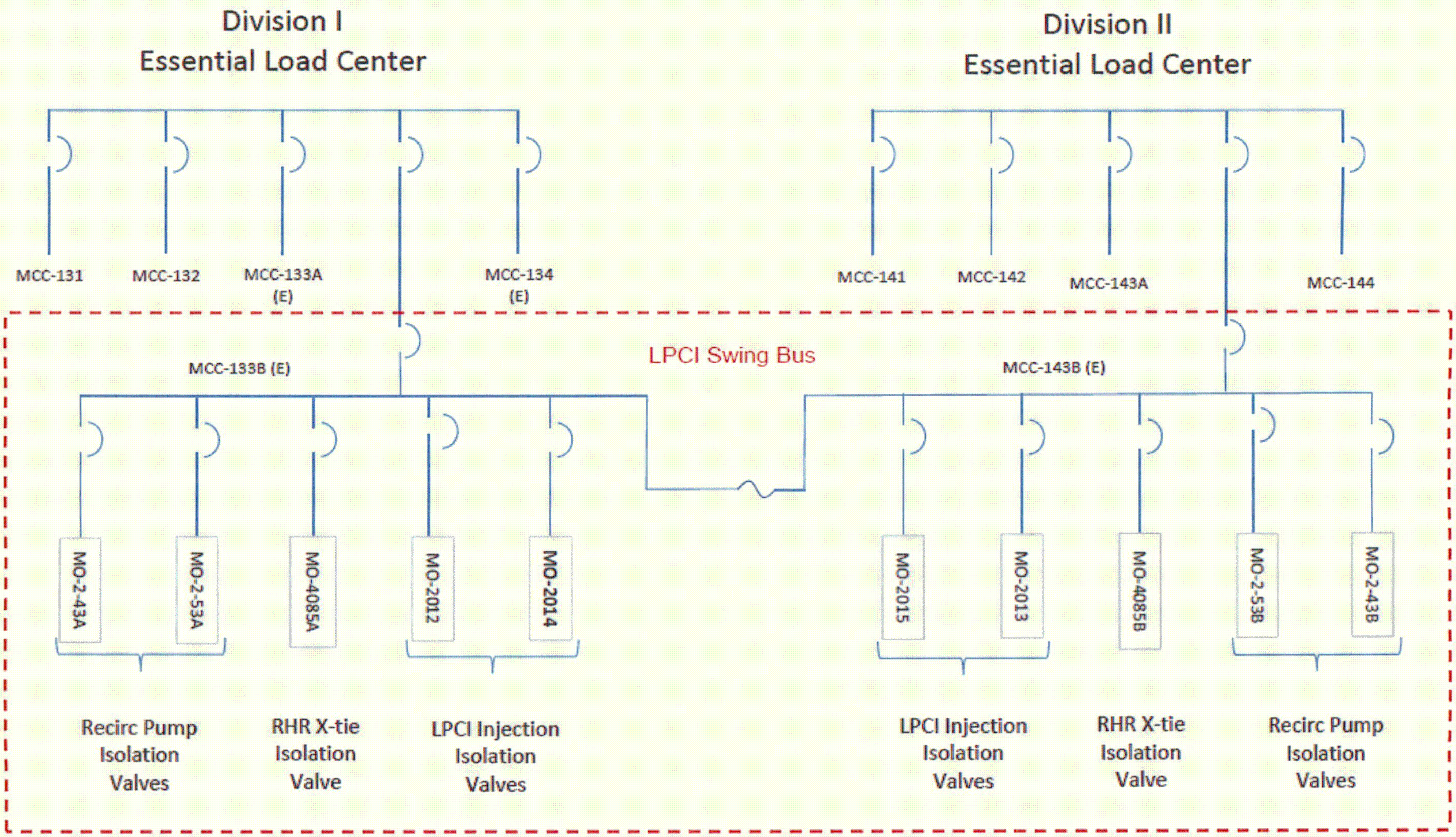
- Piping routing for vent path – Wetwell Vent
  - Demarcate the valves (in the vent piping) between the currently existing and new ones
  - Wetwell Vent Instrumentation Process Flow Diagram
  - Egress and Ingress Pathways to ROS, Battery Transfer Switch, DG Connections and Deployment location
  - Site layout sketch to show location/routing of Wetwell vent piping and associated components. This should include relative locations both horizontally and vertically

Sketch 3: P&ID Layout of SAWA *(preliminary)*

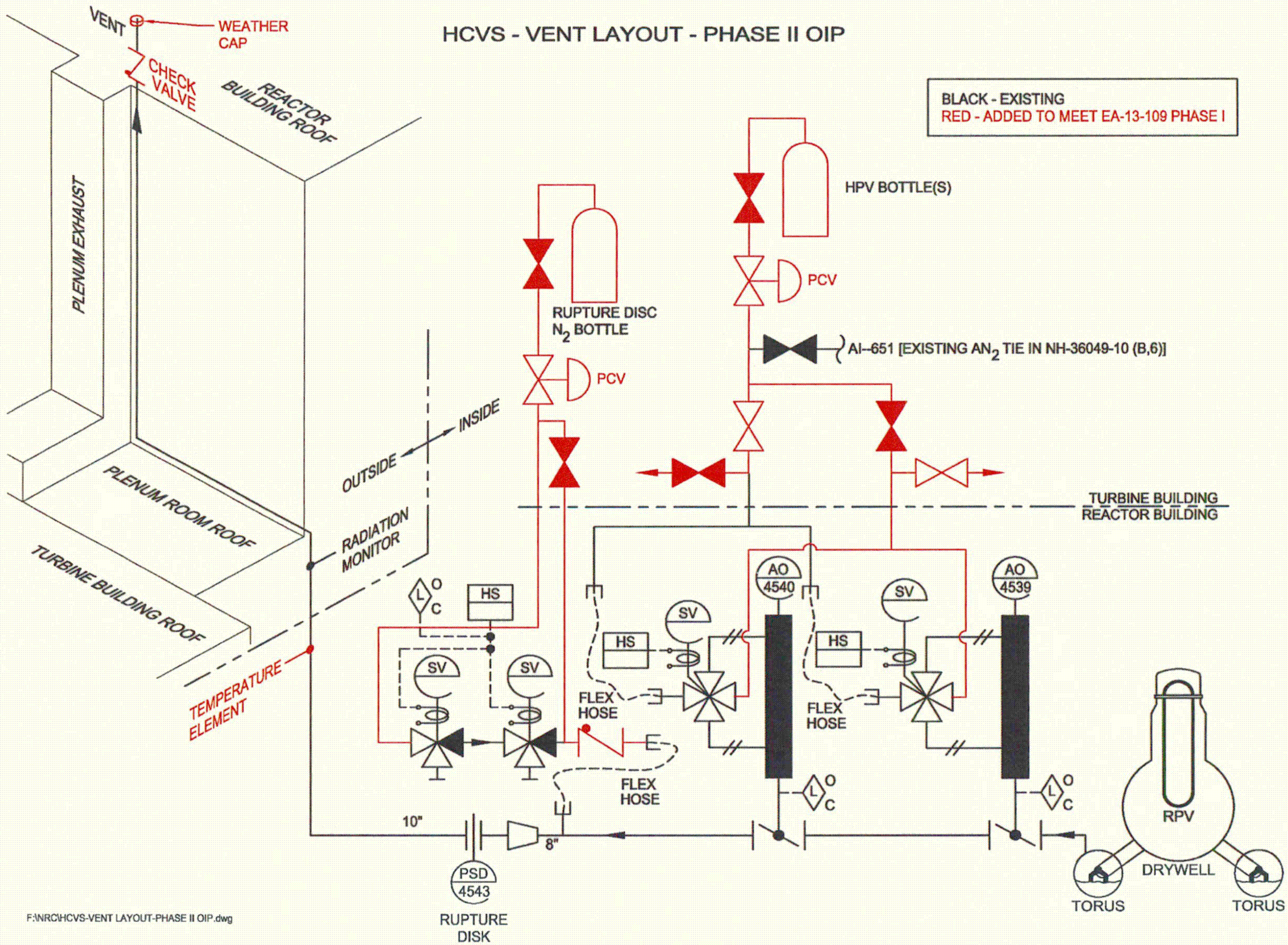
- Piping routing for SAWA path
  - SAWA instrumentation process paths
  - SAWA connections
  - Include a piping and instrumentation diagram of the vent system. Demarcate the valves (in the vent piping) between the currently existing and new ones.
  - Ingress and egress paths to and from control locations and manual action locations
  - Site layout sketch to show locations of piping and associated components. This should include relative locations both horizontally and vertically



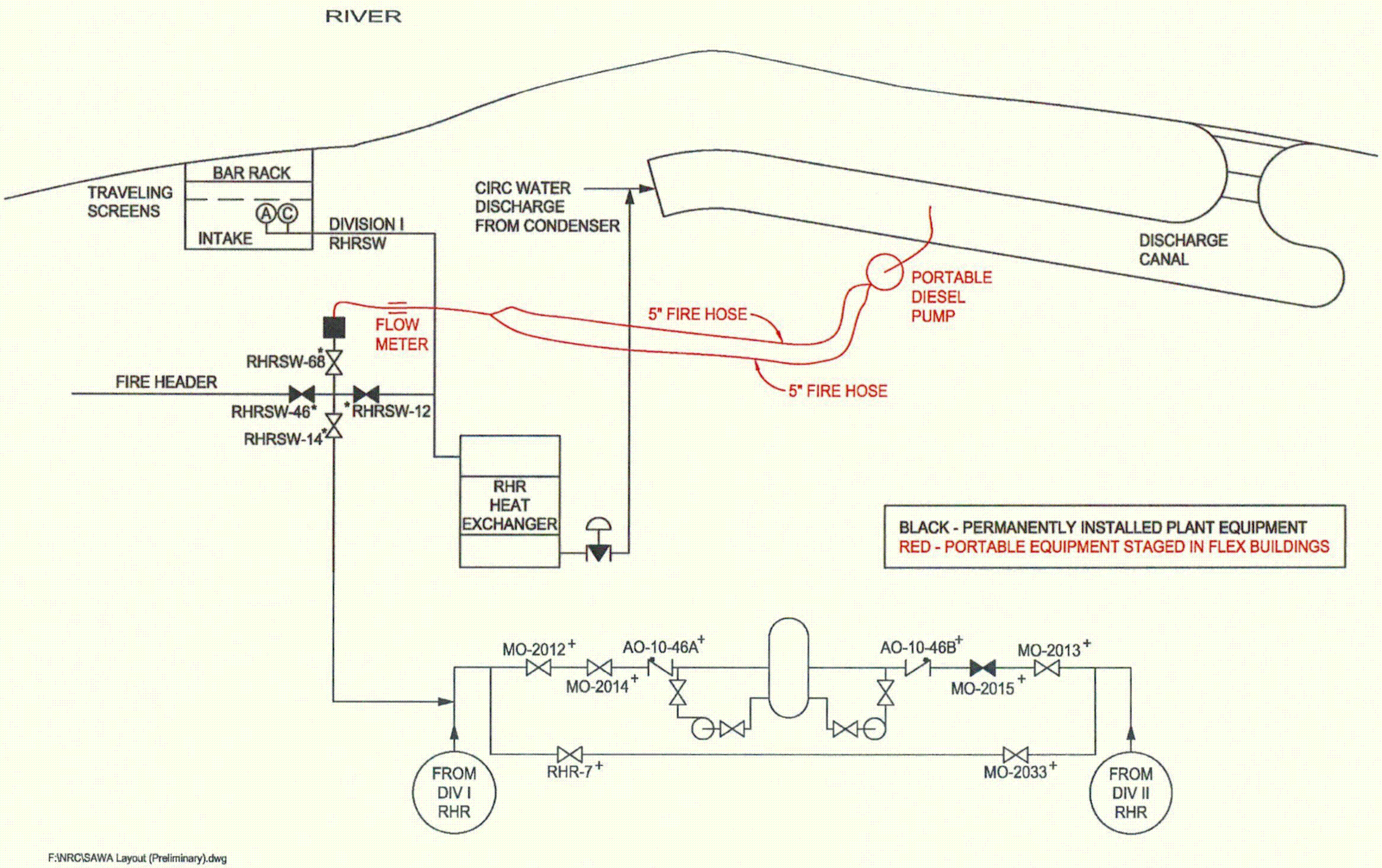
Sketch 1a: Electrical Layout of System *(preliminary)*



Sketch 1b: Electrical Layout of System

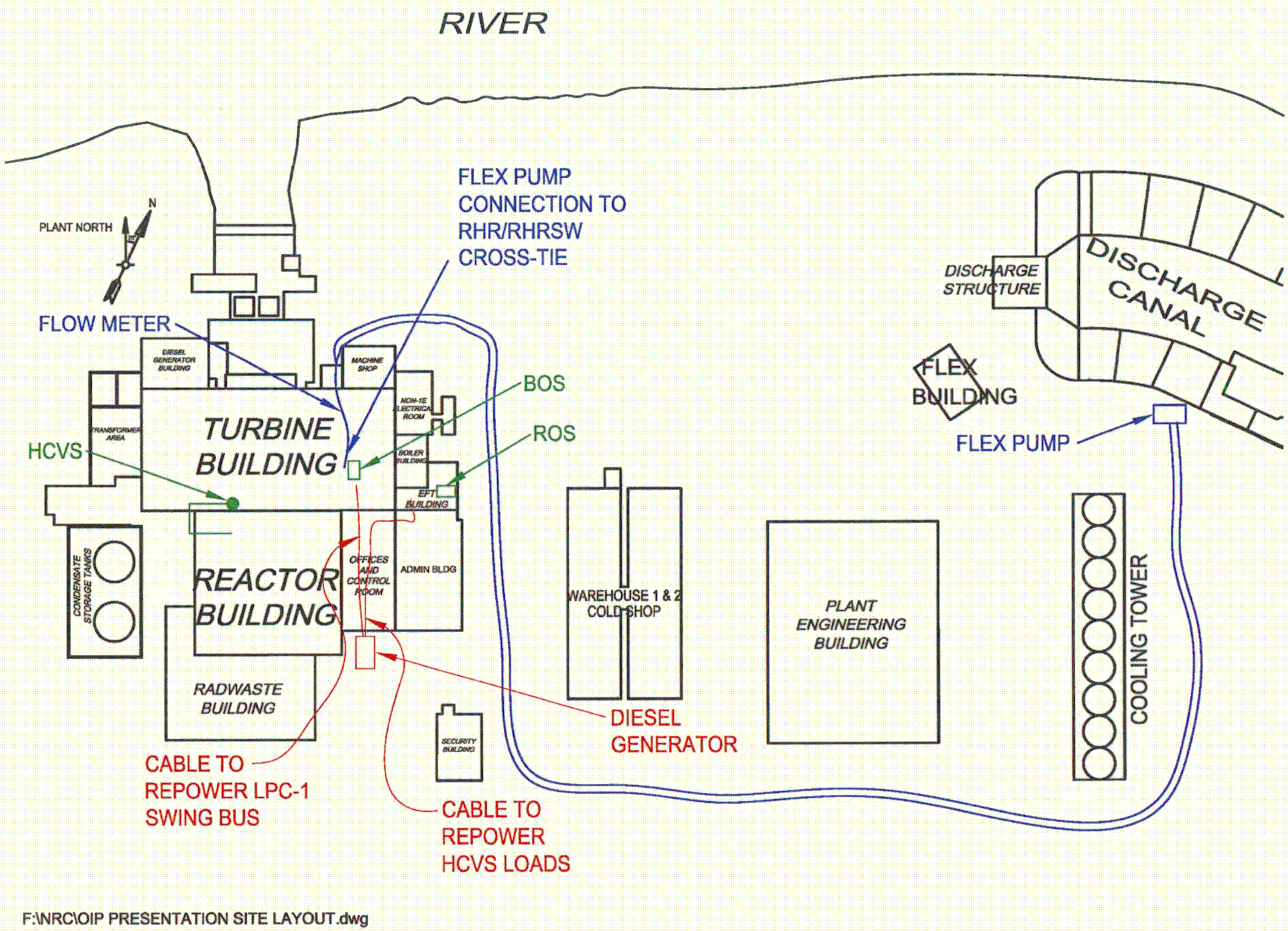


Sketch 2: Layout of Current HCVS with Planned Phase 1 Modifications



* VALVES LOCATED IN TURBINE BUILDING
\+ VALVES LOCATED IN REACTOR BUILDING

Sketch 3a: P&ID Layout of SAWA (*preliminary*)



Sketch 3b: P&ID Layout of SAWA (*preliminary*)

Attachment 4: 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 located at the Backup HCVS Operating Station will be used to open the HCVS	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 located at the Backup HCVS Operating Station will be used to open the HCVS	No
SAWA / SAWM Specific	TBD	TBD	TBD

Table 4A: Wetwell HCVS Failure Evaluation Table

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. ML 12054A682).
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 ML 12229A475).
8. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-09, 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. ML 13304B836).
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 April14, 2014 (ADAMS Accession No. ML 14120A289).
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, April14, 2014 (ADAMS Accession No. ML 14120A289).
22. NEI FAQ HCVS-09, "HCVS Toolbox Approach for Collateral Actions," Revision 1, dated April14, 2014 (ADAMS Accession No. ML14120A289).
23. NEI White Paper HCVS-WP-01, "HCVS Dedicated and Permanently Installed Motive Force," dated April15, 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 April4, 2014.
26. NEI White Paper HCVS-WP-04, "Missile Evaluation for HCVS Components 30 Feet Above Grade," Revision 0, dated August 17, 2015.
27. IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1 E 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)," L-MT-13-017, 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)," L-MT-13-015, 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)," L-MT-13-016, dated February 28, 2013 (ADAMS Accession No. ML 13060A447).
31. JLD-ISG-2015-01, Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions, dated April 2015. (ADAMS Accession No. ML15104A118)
32. Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments, SECY-12-0157, (ADAMS Accession No. ML12344A030)
33. NUREG/CR-7110, V1, R1, State-of-the-Art Reactor Consequence Analyses (SOARCA) Project: Peach Bottom Integrated Analysis, (ADAMS Accession No. ML13150A053).
34. NEI HCVS-FAQ-10, Severe Accident Multiple Unit Response
35. NEI HCVS-FAQ-11, Plant Response During a Severe Accident
36. NEI HCVS-FAQ-12, Radiological Evaluations on Plant Actions Prior to HCVS Initial Use
37. NEI HCVS-FAQ-13, Severe Accident Venting Actions Validation

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

This Overall Integrated Plan has been updated in format and content to encompass both Phase 1 and Phase 2 of Order EA-13-109. Any significant changes to this plan will be communicated to the NRC staff in the 6 Month Status Reports.

Phase	Change Description
Phase 1	An additional alternative to JLD-ISG-2013-02 and NEI 13-02 has been added. The HCVS design temperature will be 309°F, not 350°F.
Phase 1	A dedicated HCVS rupture disk nitrogen supply will be installed to burst the rupture disk if needed. Previously communicated that the rupture disk nitrogen was to be supplied from Train B, Alternate Nitrogen System.
Phase 1	A dedicated HCVS nitrogen supply will be installed to provide pneumatics to HCVS air operated suppression pool PCIVs. Previously communicated that the HCVS pneumatics were to be supplied from Train B, Alternate Nitrogen System.
Phase 1	Manual valves will be installed on both the dedicated HCVS rupture disk nitrogen supply and the dedicated HCVS nitrogen supply to bypass the solenoid valves to allow the HCVS to be actuated manually from the Backup HCVS Operating Station. Previously communicated that the solenoid valves were to be moved from the reactor building to the Backup HCVS Operating Station.
Phase 1	A dedicated HCVS battery will be installed to power HCVS instrumentation and controls for the first 24 hours of the event.
Phase 1	The HCVS will be designed with mechanical isolation from outside air such that the HCVS is able to provide assurance that oxygen cannot enter and mix with flammable gas in the HCVS.
Phase 1	A check valve will be installed on the dedicated HCVS rupture disk nitrogen supply line to prevent cross flow of vented fluids. Previously communicated the HCVS piping does not interface with any other system piping, or ductwork except the Alternate Nitrogen System.
Phase 1	Valves that open the HCVS at the Backup HCVS Operating Station will be secured to prevent inadvertent actuation. Previously communicated the valves would be locked.

Phase	Change Description
Phase 1	A battery power monitor will be installed on the dedicated HCVS battery to monitor electrical power. Previously communicated power monitoring would be done using the battery charger voltmeter or a hand held FLUKE meter.
Phase 1	Have identified missile shielding of HCVS as being required to meet EA-12-049 rather than EA-13-109 requirements.
Phase 1	The existing Hardened Vent System radiation monitor will be replaced with a radiation monitor that meets the requirements of EA-13-109.

Attachment 7: List of Overall Integrated Plan Open Items

Table 7.1 - OIP Open Items

Open Item	Action	Comment
1	Follow industry guidance on missile protection for HCVS.	Phase 1
2	Identify the 24 hour power supply for the HCVS.	Phase 1
3	Determine radiological conditions for the FLEX portable equipment staging areas.	Phase 1
4	Evaluate the ASDS 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.	Phase 1
5	Determine approach or combination of approaches to control hydrogen.	Phase 1
6	Determine the Qualification Method for HCVS Instrumentation.	Phase 1
7	Evaluate the effects of radiological and temperature constraints on the deployment of nitrogen bottles after 24 hours.	Phase 1
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.	Phase 1
9	Determine approach to repower LPCI swing bus from FLEX PDG	Phase 2

Table 7.2 - ISE Open Items

ISE Open Item	Action	ISE Section Reference
1	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX PDG loading calculation.	Section 3.2.1 Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6
2	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	Section 3.2.1 Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6
3	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Section 3.2.1 Section 3.2.2.3 Section 3.2.2.4 Section 3.2.2.5 Section 3.2.2.10 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.2 Section 3.2.6
4	Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.	Section 3.2.2.1 Section 3.2.2.2

ISE Open Item	Action	ISE Section Reference
5	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Section 3.2.2.3
6	Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Section 3.2.2.5 Section 3.2.2.9 Section 3.2.2.10
7	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	Section 3.2.2.5
8	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Section 3.2.2.6
9	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	Section 3.2.2.6
10	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Section 3.2.2.9
11	Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.	Section 3.2.2.9