

December 2015 Hardened Containment Venting System (HCVS) Phase 1 and 2 Overall  
Integrated Plan Template

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### Introduction

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

On March 19, 2013, the Nuclear Regulatory Commission (NRC) Commissioners directed the staff per Staff Requirements Memorandum (SRM) for SECY-12-0157 to require licensees with Mark I and Mark II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050 with a containment venting system designed and installed to remain functional during severe accident conditions." In response, the NRC issued Order EA-13-109, *Issuance of Order to Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accidents*, June 6, 2013. The Order (EA-13-109) requires that licensees of BWR facilities with Mark I and Mark II containment designs ensure that these facilities have a reliable hardened vent to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in the loss of active containment heat removal capability while maintaining the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP).

The Order requirements are applied in a phased approach where:

- "Phase 1 involves upgrading the venting capabilities from the containment wetwell to provide reliable, severe accident capable hardened vents to assist in preventing core damage and, if necessary, to provide venting capability during severe accident conditions." (Completed "no later than startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first.")
- "Phase 2 involves providing additional protections for severe accident conditions through installation of a reliable, severe accident capable drywell vent system or the development of a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions." (Completed "no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first.")

The NRC provided an acceptable approach for complying with Order EA-13-109 through Interim Staff Guidance (JLD-ISG-2013-02) issued in November 2013, and JLD-ISG-2015-01 issued in April 2015). The ISG endorses the compliance approach presented in NEI 13-02 Revision 0 and 1, *Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents*, with clarifications. Except in those cases in which a licensee proposes an acceptable alternative method for complying with Order EA-13-109, the NRC staff will use the methods described in this ISG (NEI 13-02) 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 which will provide a description of how the requirements of the Order will be achieved. This document provides the Overall Integrated Plan (OIP) for complying with Order EA-13-109 using the methods described in NEI 13-02 and endorsed by NRC JLD-ISG-2013-02 and JLD-ISG-2015-01. Six month progress reports will be provided consistent with the requirements of Order EA13-109.

The submittals required are:

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- 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 (6 month) updates for the 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 6 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 combined with 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 by means of a combined Phase 1 and 2 OIP. This template is structured to support the combined approach.

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

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 Drywell.
- Utilization of Severe Accident Water Management (SAWM) to control injection and wetwell level to ensure the HCVS (Phase 1) wetwell vent (SAWV) will remain functional for the removal of the decay heat from the core 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 drywell vent will be required for containment pressure control.
- The SAWA and SAWM actions will be manually activated and controlled from areas that are accessible during severe accident conditions.

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- Parameters measured should be Drywell pressure, Wetwell level, SAWA flowrate and the HCVS parameters listed above.
- ~~As an alternative to the SAWA/SAWM alternative venting strategy, SAWA and a Severe Accident Capable Drywell Vent (SADV) designed to 545°F 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 E.I. Hatch Units 1&2 (Plant Hatch) 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:

- ~~Phase 1 (wetwell):~~ by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Currently scheduled for 1st Quarter 2017 (Unit 2), 1st Quarter 2018 (Unit 1)
- ~~Phase 2: Later~~
- Phase 2 (drywell or 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 1st Quarter 2019 (Unit 2), 1st Quarter 2018 (Unit 1)

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

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

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

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

The following extreme external hazards screen-in for Plant Hatch

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

The following extreme external hazards screen out for Plant Hatch

- External Flooding, Extreme Cold except for Ice

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

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

**Ref: NEI 13-02, Revision 01, NEI 12-06 Revision 0**

Mark I/II Generic **HCVSEA-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 RCIC or HPCI. (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. (NEI 12-06, section 3.2.1.3 item 9 and 3.2.1.4 item 1-4)
- 049-6. At 48 minutes (time sensitive at a time greater than 1 hour) an ELAP is declared and actions begin as defined in EA-12-049 compliance
- 049-7. DC power and distribution can be credited for the duration determined per the EA-12-049 (FLEX) methodology for battery usage, (greater than 12 hours with a calculation limiting value of 13.35 hrs.) (NEI 12-06, section 3.2.1.3 item 8)
- 049-8. Deployment resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours
- 049-9. All activities associated with plant specific EA-12-049 FLEX strategies that are not specific to implementation of the HCVS, including such items as debris removal, communication, notification, 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)(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).
- 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. (New HCVS-FAQ-XX)**
- 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

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

intended to prevent. (Reference NEI 13-02 section 2.3.1).

- 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, valving-in 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 White Paper 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.~~
- 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. ~~Upper drywell temperatures will be determined as part of Phase 2 evaluation and guidance development.~~ MAAP Version 5 was used to develop EPRI Technical Report 3002003301 to support drywell temperature response to SAWA under severe accident conditions.
- 109-09. Utilization of NRC Published Accident evaluations (e.g. SOARCA, SECY-12-0157, and NUREG 1465) as related to Order EA-13-109 conditions ~~are~~ acceptable as references. (Reference NEI 13-02 section 8).
- 109-10. Permanent modifications installed or planned per EA-12-049 are assumed implemented and may be credited for use in EA-13-109 Order response.
- 109-11. This Overall Integrated Plan is based on Emergency Operating Procedure changes consistent with EPG/SAGs Revision 3 as incorporated per the sites EOP/SAMG procedure change process. ~~This assumption does not apply to Phase 2 SAWM because SAWM requires changes to the EPG/SAGs per approved issue from 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. ~~(reference HCVS-FAQ-01)~~ In addition, adequate protective clothing and respiratory protection is available if required to address contamination issues. (reference HCVS-FAQ-01)
- 109-13. The suppression pool/wetwell of a BWR Mark I/II containment ~~can be considered to not have significant superheat~~ 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 is assumed on one unit only due to the site compliance with NRC Order EA-12-049, However, each BWR MK I and II under the assumptions of NRC Order EA-13-109 ensure the capability to protect containment exists for each unit. (HCVS-FAQ-10)

### Plant Specific HCVS Related Assumptions/Characteristics:

HNP-1. The main stack at Plant Hatch can handle the HCVS flow from both units simultaneously. Once outside the

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reactor building, effluent lines slope downward toward main stack such that effluent is unlikely to accumulate and create a hot spot.

HNP-2. All load stripping is accomplished within one hour and fifteen minutes of event initiation and will occur below the core area at locations not impacted by a radiological event.

HNP-3. The rupture disc will be manually breached within 7.3 hours of event initiation if required for anticipatory venting during an ELAP.

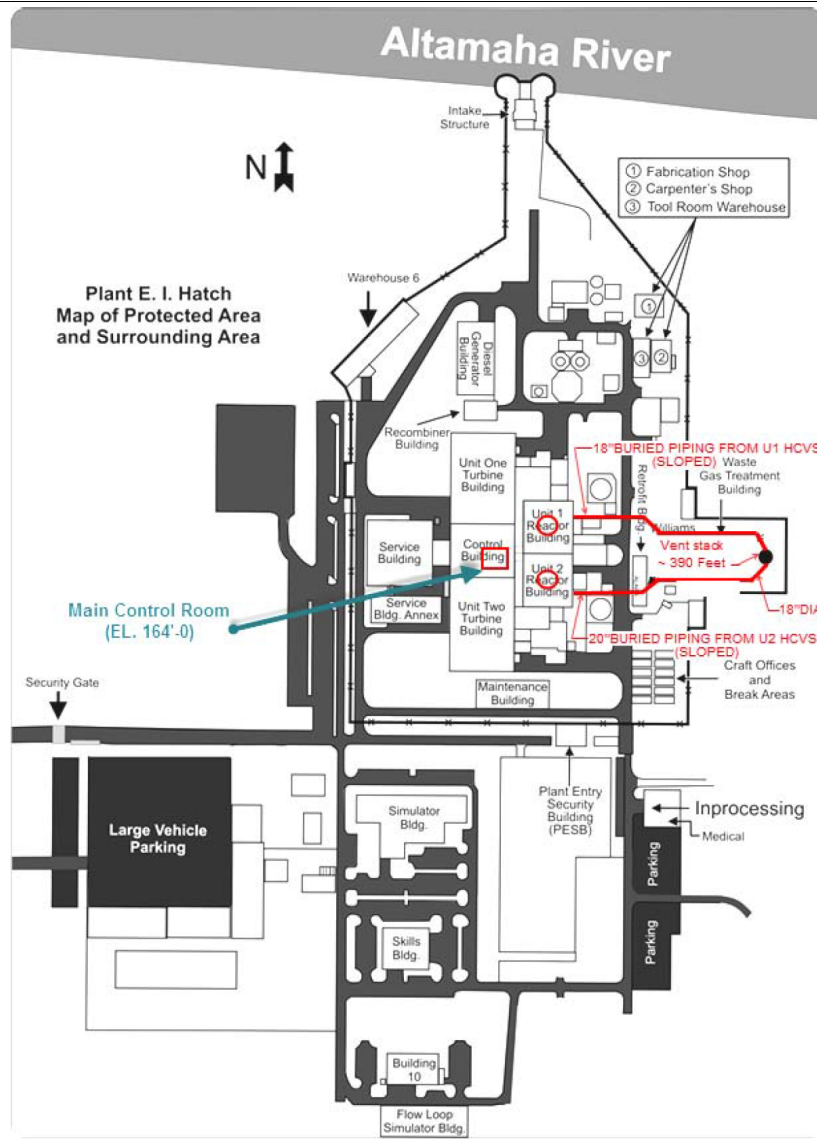
HNP-4. All load stripping activities performed are located in the control building either at lower elevations (EL 130) or in the MCR.

HNP-5. The Plant layout of buildings and structures are depicted in the following figures 1-1, 1-2 and 1-3. Note the Main Control Room is located on the turbine deck elevation. The Control Building has substantial structural walls and features independent of the Reactor Building. The vent routing is indicated on figure 1-1.

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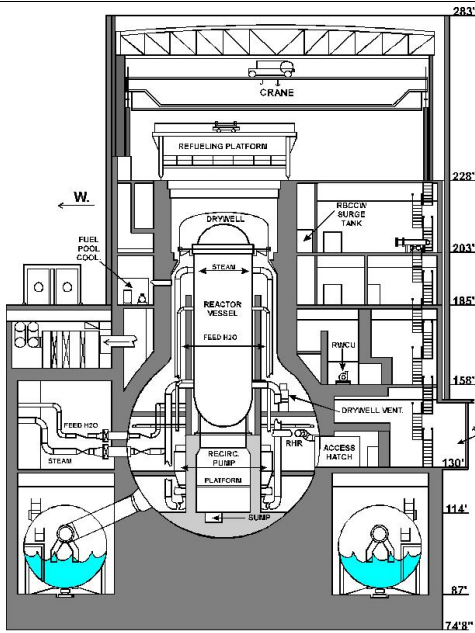
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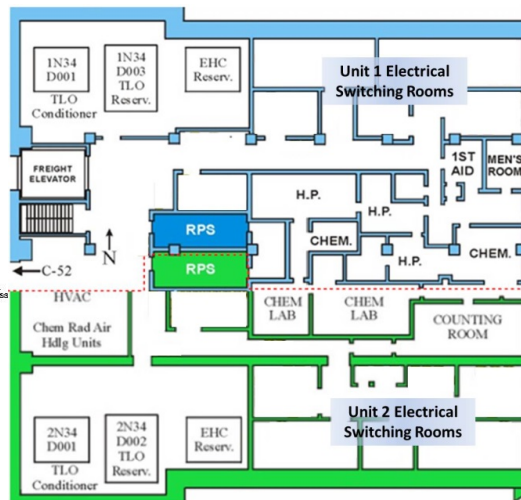
**Figure 1-1**  
**Plant Hatch Site Layout**

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**Figure 1-2**  
Hatch Reactor Building Elevation View



**Figure 1-3**  
Hatch Control Building Ground Floor (EL 130)

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## Part 2: Boundary Conditions for Wet Well Vent

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

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

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

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

*See attached sequence of events timeline (Attachment 2)*

**Ref: EA-13-109 Section 1.1.1, 1.1.2, 1.1.3 / NEI 13-02 Section 4.2.5, 4.2.6. 6.1.1**

The operation of the HCVS will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1. ~~Immediate-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). The reliable operation of HCVS will be met because HCVS meets the seismic requirements identified in NEI 13-02 and will be powered by DC buses with motive force supplied to HCVS valves from installed accumulators and portable nitrogen storage bottles. A HCVS Extended Loss of AC Power (ELAP) Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4.

**Table 2-1 HCVS Remote Manual Actions**

Primary Action	Primary Location / Component	Notes
1. Isolate Standby Gas Treatment System (SGTS) by closing inlet valve 1/2T48-F081 and outlet isolation valves 1T46-F005 & 2T46-F002A & F002B	Hand switches located in the MCR	or at the Remote Operating Station (ROS), depending on where operator of HCVS is stationed
2. Disable PCIV interlocks by Installing electrical jumpers for PCIVs (ref. Procedures 31EO-EOP-101-1 and 31EO-EOP-101-2)	Panels in MCR containing PCIV interlocks	
3. Confirm closed HCVS condensate drain valve 2T48-F085	Hand switch located in the MCR for condensate drain valve	Unit 2 only. Unit 1 N/A And at ROS panel
4. Breach the rupture disc by opening the argon cylinder valve & valve 1/2T48-F407	Manual hand wheels for valves at the argon bottle and at the piping at the argon bottle station	Not required during SA event Only required if performing early

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

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

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

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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.

Discussion of time constraints identified in Attachment 2A for the 3 timeline cases identified above

- At 7.3 Hours, Initiate use of Hardened Containment Vent System (HCVS) per site procedures to maintain containment parameters below design limits and within the limits that allow continued use of RCIC for mitigation in a BDBEE -- The reliable operation of HCVS will be met because HCVS meets the seismic requirements identified in NEI 13-02 and will be powered by DC buses with motive force supplied to HCVS valves from installed accumulators and portable nitrogen storage bottles. Critical HCVS controls and instruments associated with containment will be DC powered and operated from the MCR or a Remote Operating Station on each unit. The DC power for HCVS will be available as long as the HCVS is required. Station batteries will provide power for greater than 12 hours, HCVS battery capacity will be available to extend past 24 hours. In addition, when available Phase 2 FLEX Diesel Generator (DG) can provide power before battery life is exhausted. Thus initiation of the HCVS from the MCR or the Remote Operating Station within 7.3 hours is acceptable because the actions can be performed any time after declaration of an ELAP (1 hour) until the venting is needed at 7.3 hours for BDBEE venting. This action can also be performed for SA HCVS operation which occur at a time further removed from an ELAP declaration as shown in Attachment 2A.
- At 12 hours, based on battery depletion, the power supply will be swapped from station batteries to dedicated HCVS batteries to ensure power to the inverters. The DC power for HCVS will be available as long as the HCVS is required. Station batteries will provide power for greater than 12 hours, HCVS battery capacity will be available to extend past 24 hours. In addition, when available, Phase 2 FLEX Diesel Generator (DG) can provide power before battery life is exhausted. A power monitor will be available at the MCR or ROS to dictate when transfer from the Station Batteries to the dedicated HCVS battery capacity is needed. Margin will be established such that the HCVS dedicated battery capacity exceeds 14 hours.
- At 24 Hours, temporary generators will be installed and connected to the pigtail to power up battery chargers using a portable DG to supply power to HCVS critical components/instruments; time critical at a time greater than 25 hours (>12 hour Station Battery life plus >14 hour dedicated HCVS battery capacity). Current battery (station service plus dedicated HCVS) durations are calculated to last greater than 24 hours. DG will be staged beginning at approximately 8-10 hour time frame (Reference FLEX OIP). Within Two (2) hours later the DG will be in service. Thus the DGs will be available to be placed in service at any point after 24 hours as required to supply power to HCVS critical components/instruments. DGs will be maintained in on-site FLEX storage buildings. DGs will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards applicable to Plant Hatch. Modifications will be implemented to facilitate the connections and operational actions required to supply power within 10 hours which is acceptable because the actions can be performed any time after declaration of an ELAP until the repowering of the station service batteries is needed at greater than 24 hours for HCVS operation. For Phase 2 applicability the 8-10 hours will change to 6-7 hours, since it provides power to the SAWA Valves, and will be validated by the Phase 2 Verification and Validation activity, thus providing power by 7 hours,
- At >24 hours installed nitrogen bottles will be valved-in to supplement the air accumulator tanks. The nitrogen bottles (three provided) can be replenished one at a time leaving the other 2 supplying the HCVS. This can be performed at any time prior to depletion of the accumulators which is expected to last greater than 24 hours assuming a minimum of 12 HCVS cycles. Thus 24 hours ensures adequate capacity is maintained so this time constraint is not limiting.
  - At >24 hours, the dedicated HCVS power supplies will be swapped from the dedicated HCVS batteries to the normal configuration powered by portable DGs. Margin will be established such that the total HCVS battery capacity exceeds 25 hours.

Discussion of radiological and temperature constraints identified in Attachment 2A

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**Part 2: Boundary Conditions for Wet Well Vent**

- At <7.3 hours, the rupture disc will be manually breached using the argon tank station in the reactor building. This is not an environmental constraint because the breaching of the rupture disc is not required for events where anticipatory venting at a value less than PSP (Pressure Suppression Pressure)/PCPL (Primary Containment Pressure Limit) is initiated since the rupture set point will be changed in response to NRC Order EA-12-049 to a value less than or equal to PSP.
- At 12 hours, based on battery depletion, power supply will be swapped from station batteries to dedicated HCVS batteries to ensure power to the inverters. Access to the transfer switch will be in the control building which is separated from the Reactor Building by substantial walls and air space (refer to figure 1-1).  
**[OPEN ITEM 1: Determine location of dedicated HCVS battery transfer switch – Switch is located on ground elevation of Control Building]**
- At >24 hours, installed nitrogen bottles will be valved-in to supplement the air accumulator supply as stated for the related time constraint item. Nitrogen bottles and manual tie-in valve will be located in an area that is accessible to operators the Control Building or yard area.  
**[OPEN ITEM 2: Determine location of back-up nitrogen bottles – Nitrogen Bottles will be located in the Control Building]**
- At >24 Hours, temporary generators will be installed and connected to the pigtail to power up battery chargers using a portable DG to supply power to HCVS critical components/instruments - Time critical at a time greater than 25 hours for HCVS operation and at 8 hours for SAWA operation (refer to section 3.1 of this OIP). Current battery durations are calculated to last greater than 26 hours. DG will be staged beginning at approximately 8-10 hour time frame. Within Two (2) hours of deployment the DG will be in service. Thus the DGs will be available to be placed in service at any point after 24 hours as required to supply power to HCVS critical components/instruments. The connections, location of the DG and access for refueling will be located in an area that is accessible to operators in the Control Building or in the yard area because the HCVS vent pipe is underground once it leaves the Reactor Building.  
**[OPEN ITEM 3: Evaluate location of portable DG for accessibility under Severe Accident HCVS use – Portable DG will be staged and operated adjacent to the Reactor Building substantially away from the HCVS piping or the main stack release point]**
- At >24 hours, power supply will be swapped back to the normal configuration from the dedicated HCVS batteries. Access to the connections and location switch will be in the control building.

**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)**

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

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

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

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

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

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

### **Hydrogen (EA-13-109 Section 1.2.10, 1.2.11, 1.2.12 / NEI 13-02 Section 2.3.2.4, 4.1.1, 4.1.6, 4.1.7, 5.1, & Appendix H)**

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

### **Unintended Cross Flow of Vented Fluids (EA-13-109 Section 1.2.3, 1.2.12 / NEI 13-02 Section 4.1.2, 4.1.4, 4.1.6 and Appendix H)**

*Provide a description to eliminate/minimize unintended cross flow of vented fluids with emphasis on interfacing ventilation systems (e.g. SGTS). What design features are being included to limit leakage through interfacing valves or Appendix J type testing features?*

### **Prevention of Inadvertent Actuation (EA-13-109 Section 1.2.7/NEI 13-02 Section 4.2.1)**

*The HCVS shall include means to prevent inadvertent actuation*

### **Component Qualifications (EA-13-109 Section 2.1 / NEI 13-02 Section 5.1, 5.3)**

*State qualification criteria based on use of a combination of safety related and augmented quality dependent on the location, function and interconnected system requirements*

### **Monitoring of HCVS (Order Elements 1.1.4, 1.2.8, 1.2.9/NEI 13-02 4.1.3, 4.2.2, 4.2.4, and Appendix F/G)**

*Provides a description of instruments used to monitor HCVS operation and effluent. Power for an instrument will require the intrinsically safe equipment installed as part of the power sourcing*

### **Component reliable and rugged performance (EA-13-109 Section 2.2 / NEI 13-02 Section 5.2, 5.3)**

*HCVS components including instrumentation should be designed, as a minimum, to meet the seismic design requirements of the plant.*

*Components including instrumentation that are not required to be seismically designed by the design basis of the plant should be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. (reference ISG-JLD-2012-01 and ISG-JLD-2012-03 for seismic details.)*

*The components including instrumentation external to a seismic category 1 (or equivalent building or enclosure should be designed to meet the external hazards that screen-in for the plant as defined in guidance NEI 12-06 as endorsed by JLD-ISG-12-01 for Order EA-12-049.*

*Use of instruments and supporting components with known operating principles that are supplied by manufacturers with commercial quality assurance programs, such as ISO9001. The procurement specifications shall include the seismic*

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*requirements and/or instrument design requirements, and specify the need for commercial design standards and testing under seismic loadings consistent with design basis values at the instrument locations.*

*Demonstration of the seismic reliability of the instrumentation through methods that predict performance by analysis, qualification testing under simulated seismic conditions, a combination of testing and analysis, or the use of experience data. Guidance for these is based on sections 7, 8, 9, and 10 of IEEE Standard 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," or a substantially similar industrial standard could be used.*

*Demonstration that the instrumentation is substantially similar in design to instrumentation that has been previously tested to seismic loading levels in accordance with the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges). Such testing and analysis should be similar to that performed for the plant licensing basis.*

### **Vent Size and Basis**

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

### **Vent Capacity**

The greater than 1% decay heat removal capacity at Plant Hatch assumes that the suppression pool pressure suppression capacity is sufficient to absorb the decay heat generated during the first 3 hours. The vent would then be able to prevent containment pressure from increasing above the containment design pressure. As part of the detailed design, the duration of suppression pool decay heat absorption capability will be confirmed.

**[OPEN ITEM-4: Confirm suppression pool heat capacity]**

### **Vent Path and Discharge**

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

The HCVS discharge path uses the main stack.

### **Power and Pneumatic Supply Sources**

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

Pneumatic power for the HCVS air-operated valves (AOVs) is normally provided by the non-interruptible air system. Following an ELAP event, the non-interruptible air system is lost, and normal backup from installed nitrogen supply tanks is isolated. Therefore, for the first 24 hours, pneumatic force will be supplied from newly installed air accumulator

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tanks. These tanks will supply the required motive force to those HCVS valves needed to maintain flow through the HCVS effluent piping. After the first 24 hours, backup nitrogen provided by nitrogen supply bottles will be manually valved-in and replenished as needed.

1. The HCVS flow path valves are air-operated valves (AOV) with air-to-open and spring-to-shut (i.e., the wetwell containment isolation valves and the HCVS inlet isolation valve). Opening the valves requires energizing an AC powered solenoid operated valve (SOV) and providing motive air/gas. The detailed design will provide a permanently installed power source and motive air/gas supply adequate for the first 24 hours. Beyond the first 24 hours, FLEX generators will be used to maintain battery power to the HCVS components. The initial stored motive air/gas will allow for a minimum of twelve valve operating cycles for the HCVS valve for the first 24 hours.
2. Following the initial 24 hour period, additional motive force will be supplied from nitrogen bottles that will be staged at a gas cylinder rack located (near the ROS in the control building or outside) such that radiological impacts are not an issue. Additional bottles can be brought in as needed.
3. An assessment of temperature and radiological conditions will be performed to ensure that operating personnel can safely access and operate controls at the ROS based on time constraints listed in Attachment 2A.

**[OPEN ITEM 5: Determine location of HCVS Remote Operating Station (ROS) for both units. Utilize HCVS-FAQ-01 in the response. – ROS will be located at the 147' elevation of the Control Building, one floor below the elevation of the MCR]**

4. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (i.e., electric power, N2/air) will be located in areas reasonably protected from defined hazards listed in Part 1 of this report.
5. All valves required to open the flow path or valves that require manual operation to be closed to prevent diversion or cross-flow into other systems/units will be designed for remote manual operation following an ELAP, such that the primary means of valve manipulation does not rely on use of a hand wheel, reach-rod or similar means that requires close proximity to the valve (reference HCVS-FAQ-03). Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards listed in Part 1 of this OIP.
6. Access to the locations described above will not require temporary ladders or scaffolding.

### **Location of Control Panels**

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

The final location of the ROS is- the 147' elevation of the Control Building, one floor below the elevation of the MCR still under evaluation at this time.

**[OPEN ITEM 5: Determine location of HCVS Remote Operating Station (ROS) for both units. Utilize HCVS-FAQ-01 in the response – ROS will be located at the 147' elevation of the Control Building, one floor below the elevation of the MCR.]**

### **Hydrogen**

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

[**OPEN ITEM 6:** State which approach or combination of approaches Plant Hatch decides to take to address the control of flammable gases – **Plant Hatch plans to use option 1 of the endorsed white paper and power up the mixing chamber fan in the base of the metrological stack.**]

### **Unintended Cross Flow of Vented Fluids**

The HCVS uses the Primary Containment Isolation System (PCIS) containment isolation valves for containment isolation. These containment isolation valves are AOVs that are air-to-open and spring-to-shut. An SOV must be energized to allow the motive air to open the valve. Specifically:

1. The PCIS control circuit will be used during all “design basis” operating modes including all design basis transients and accidents.
2. Cross flow potential exists between the HCVS and the Standby Gas Treatment System (SGTS). Resolution involves evaluation of SGTS isolation valve leakage for both inlet and outlet valves (referred to as boundary valves), as both interface with the HCVS. This evaluation will follow the testing criteria presented in NEI HCVS-FAQ-05. If necessary, these valves will be replaced with leak-tight valves. Testing and maintenance will be performed to ensure that the valves remain leak-tight.

[**OPEN ITEM 7:** Evaluate SGTS valve leakage utilizing criteria from NEI HCVS-FAQ-05.]

3. An additional cross-flow avenue exists between the HCVS of the two units and other connected systems at the mixing chamber in the shared Main Stack. With the Main Stack being open to the atmosphere, there is no motive force to push effluent from the mixing chamber back to the plant, thus it is assumed this avenue of cross flow is not a reasonable assumption, since *the buoyancy of the vent process fluid will not have sufficient motive force to create backflow* in the mixing chamber

### **Prevention of Inadvertent Actuation**

EOP/ERG operating procedures provide clear guidance that the HCVS is not to be used to defeat containment integrity during any design basis transients and accident. In addition, the HCVS will be designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error such that any credited containment accident pressure (CAP) that would provide net positive suction head to the emergency core cooling system (ECCS) pumps will be available (inclusive of a design basis loss-of-coolant accident (DBLOCA)). However the ECCS pumps will not have normal power available because of the starting boundary conditions of an ELAP.

- The features that prevent inadvertent actuation are two PCIV’s in series powered from different divisions, a rupture disk, or key lock switches. Procedures also provide clear guidance to not circumvent containment integrity by simultaneously opening torus and drywell vent valves during any design basis transient or accident. In addition, the HCVS will be designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error.

### **Component Qualifications**

The HCVS components downstream of the second containment isolation valve and components that interface with the HCVS are routed in seismically qualified structures. For these components, the structures that are credited in Order EA-13-109 were analyzed for seismic ruggedness to ensure that any potential failure would not adversely impact the function

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of the HCVS or other safety related structures or components. HCVS components that directly interface with the pressure boundary will be considered safety related, as the existing system is safety related. 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.

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

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

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

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO9001) where the procurement specifications include the applicable seismic requirements, design requirements, and applicable testing.
2. Demonstration of seismic reliability via methods that predict performance described in IEEE 344-2004
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

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

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

**[OPEN ITEM 8: Identify qualification method used for HCVS instruments.]**

### **Monitoring of HCVS**

The Plant Hatch wetwell HCVS will be capable of being manually operated during sustained operations from a control panel located in the MCR and will meet the requirements of Order element 1.2.4. The MCR is a readily accessible location with no further evaluation required. Control Room dose associated with HCVS operation conforms to GDC 19/Alternate Source Term (AST). Additionally, to meet the intent for a secondary control location of section 1.2.5 of the

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Order, a readily accessible Remote Operating Station (ROS) will also be incorporated into the HCVS design as described in NEI 13-02 section 4.2.2.1.2.1. The controls and indications at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, extended loss of AC power (ELAP), and inadequate containment cooling. An evaluation will be performed to determine accessibility to the location, habitability, staffing sufficiency, and communication capability with Vent-use decision makers (EOP/SOP/SAMG).—

**[OPEN ITEM 9: Evaluate HCVS monitoring location for accessibility, habitability, staffing sufficiency, and communication capability with vent-use decision makers]**

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

The wetwell HCVS will include indications for vent temperature and effluent radiation levels at both the MCR and ROS. Other important information on the status of supporting systems, such as power source status and pneumatic supply pressure, will also be included in the design and located to support HCVS operation. The wetwell HCVS includes existing containment pressure and wetwell level indication in the MCR to monitor vent operation. This monitoring instrumentation provides the indication from the MCR as per Requirement 1.2.4 and will be designed for sustained operation during an ELAP event.

### **Component reliable and rugged performance**

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

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

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

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

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of protection from missiles when equipment is located outside of seismically qualified structures. Augmented quality requirements, will be applied to the components installed in response to this Order.

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

If the instruments are purchased as commercial-grade equipment, they will be procured suitable to operate under severe accident environment as required by NRC Order EA-13-109 and the guidance of NEI 13-02. The equipment procurement will utilize the following guidance for seismic per IEEE 344, environment per IEEE 323, and Electromagnetic Compatibility (EMC) per RG 1.180. These qualifications will be bounding conditions for Plant Hatch. The qualification for the equipment by the supplier will be validated by SNC for the specific location at Plant Hatch to ensure that the bounding conditions envelope the specific plant conditions.

For the instruments required after a potential seismic event, the following methods will be used to verify that the design and installation is reliable / rugged and thus capable of ensuring HCVS functionality following a seismic event.

Applicable instruments are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated severe accident event conditions in the area of instrument component use using one or more of the following methods:

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

**Part 2 Boundary Conditions for WW 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 a ELAP and BDBEE hazards identified in part 1 of this OIP. ~~Immediate~~

~~Initial~~ operator actions can be completed by Operators from the HCVS control station(s) 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 will be designed to allow initiation, control, and monitoring of venting from the MCR the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report.

Permanently installed power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Permanently installed equipment will supply air and power to HCVS for 24 hours before FLEX diesel generators will be required to be functional.

System control:

- i. Active: PCIVs are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS is designed for a minimum of 12 open/close cycles under ELAP conditions over the first 24 hours following an ELAP, based on normal operating pressures. Controlled venting will be permitted in the revised EPGs and associated implementing EOPs, e.g., jumpers will be used to override the containment isolation circuit on the PCIVs needed to vent containment.
- ii. Passive: Inadvertent actuation protection is provided by the current containment isolation circuitry associated with the PCIVs used to operate the HCVS. In addition, the HCVS isolation valve is normally key-locked closed and has a rupture disc located downstream. This rupture disc has a burst set pressure above the header pressure expected during a design basis event. Breach of the rupture disc will occur outside of the MCR and will require manual operation.

**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**

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**Part 2: Boundary Conditions for Wet Well Vent**

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

After approximately 24 hours, available personnel will be able to connect supplemental nitrogen to the HCVS, but based on the staged quantity of bottles this action is not expected to occur until after 72 hours. Connections for supplementing electrical power and motive force required for HCVS will be located in accessible areas with reasonable protection from the hazards described in Part 1 of this report per NEI 12-06 that minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections will be pre-engineered quick disconnects or similar in order to minimize manpower resources. Sufficient nitrogen bottles will be staged to support operations for up to 72 hours following the ELAP event (less than 3 planned actuations for FLEX), additional bottles can be connected to support sustained operation. After 24 hours, power can be switched back to the normal configuration which is expected to be powered by FLEX generators.

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**

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

**Identify modifications:**

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

**EA-12-049 Modifications**

- Provide the Inverters that will convert station battery DC power into AC power for use by the end-users needed for HCVS operation.
- Provide both the air accumulators and the nitrogen bottles for pneumatic support of the HCVS air actuators for the first 72 hours following an ELAP event.
- Provide a means to manually breach the rupture disc in the HCVS header to allow for flow.

**EA-13-109 Modifications**

- Install dedicated batteries and disconnect switches to supply power to HCVS for the second 12 hours following the ELAP event once station batteries have been depleted.
- Install a Remote Operation Station for both units.
- Install a HCVS Radiation Monitor and power supply on each unit.
- Install required HCVS instrumentation and controls in the MCR and ROS for both units required by the Order. Some of this will be completed under EA-12-049 (FLEX) modifications listed above (rupture disc instrumentation).
- Additional modifications may be required to system isolation valves, rupture disk/assembly, and existing HCVS

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

pipng to facilitate testing requirements or comply with the effluent temperature requirements.

**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:

<u>Key Parameter</u>	<u>Component Identifier</u>	<u>Indication Location</u>
HCVS Effluent temperature	TBD	MCR/ROS
HCVS Pneumatic supply pressure	TBD	MCR/ROS
HCVS valve position indication	TBD	MCR/ROS
Rupture Disc Pressure	1/2T48-R030	Reactor Building

Initiation and operation of the HCVS system will rely on several existing Main Control Room key parameters and indicators which are qualified or evaluated to the existing plant design (reference NEI 13-02 Section 4.2.2.1.9):

<u>Key Parameter</u>	<u>Component Identifier</u>	<u>Indication Location</u>
Drywell pressure	1/2T48-R608/R609	MCR
Torus pressure	1/2T48-R608/R609	MCR
Torus water temperature	1/2T47-R611/R612	MCR
Torus level	1/2T48-R607A/B	MCR
Reactor pressure	1/2C32-R605A/B	MCR
Drywell radiation	1/2T48-R601A/B	MCR

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

**Notes:**

None

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**Part 2: Boundary Conditions for Wet Well Vent**

**Part 2 Boundary Conditions for WW Vent: Severe Accident Venting**

**Determine venting capability for Severe Accident Venting, such as may be used in an ELAP scenario to mitigate core damage.**

**Ref: EA-13-109 Section 1.2.10 / NEI 13-02 Section 2.3**

**First 24 Hour Coping Detail**

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

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

The operation of the HCVS will be designed to minimize the reliance on operator actions for response to an ELAP and severe accident events. Severe accident event assumes that specific core cooling actions from the FLEX strategies identified in the response to Order EA-12-049 were unsuccessful and that core damage has occurred, up to and including a breach of the reactor vessel by molten core debris. Venting will occur without the need for manually breaching the rupture disc, since conditions in containment would be sufficient to burst the rupture disc without assistance from operators. Access to the reactor building will be restricted as determined by the RPV water level and core damage conditions. ~~Immediate-Initial~~ actions will be completed by Operators in the Main Control Room (MCR) or at the HCVS Remote Operating Station (ROS) and will include remote-manual actions from a local gas cylinder station. The operator actions required to open a vent path were previously listed in the BDBEE Venting Part 2 section of this report.

As stated in the section on BDBEE Venting, the HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR and will be capable of operation from an ROS to be installed as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part (Table 2-1 of this document. Travel pathways will be reviewed for dose and temperature, and alternate routes may need to be considered to minimize operator exposure to harsh environmental conditions).

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

System control:

- i. Active: PCIVs are operated in accordance with EOPs to control containment pressure. The HCVS is designed for a minimum of 12 open/close cycles of the isolation valve under ELAP conditions over the first 24 hours following an ELAP. ~~Controlled-HCVS~~ venting will be ~~permitted-indirected per the revised EPGsSAMGs~~. Jumpers will be used to override the containment isolation circuit on the PCIVs needed to vent containment.
- ii. Passive: Inadvertent actuation protection is provided by the current containment isolation circuitry associated with the PCIVs used to operate the HCVS. In addition, the HCVS isolation valve is normally key-locked closed and has a rupture disc located downstream. This rupture disc has a burst set pressure above the header pressure expected during a design basis event.

**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**

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## Part 2: Boundary Conditions for Wet Well Vent

### Part 2 Boundary Conditions for WW Vent: Severe Accident Venting

Connections for supplementing electrical power and motive force required for HCVS will be located in accessible areas with reasonable protection per Part 1 of this report. Connections will be pre-engineered quick disconnects or similar arrangement to minimize manpower resources.

After 24 hours, power will be switched back to the normal configuration which is expected to be powered by SA Capable FLEX generators at that time (refer to Open Item 3).

After approximately 24 hours, available personnel will be able to connect supplemental nitrogen to the HCVS if greater than 12 HCVS cycles have occurred or the pneumatic pressure is low. Sufficient nitrogen bottles will be staged to support operations for up to 72 hours following the ELAP event.

Specifics are the same as for BDBEE Venting Part 2 except {the location and refueling actions for the FLEX DG and replacement Nitrogen Bottles} will be evaluated for SA environmental conditions resulting from the proposed damaged Reactor Core and resultant HCVS vent pathway.

**[OPEN ITEM 10: Perform SA Evaluation for FLEX DG use for post 24 hour actions]**

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

#### Details:

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

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

The operation of the HCVS is governed the same for SA conditions as for BDBEE conditions, except for the need to manually breach the rupture disk. 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 Part 2 BDBEE Venting

**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)*

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**Part 2: Boundary Conditions for Wet Well Vent**

**Part 2 Boundary Conditions for WW Vent: Severe Accident Venting**

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

<u>Key Parameter</u>	<u>Component Identifier</u>	<u>Indication Location</u>
HCVS effluent temperature	TBD	MCR/ROS
HCVS pneumatic supply pressure	TBD	MCR/ROS
HCVS valve position indication	TBD	MCR/ROS
HCVS power status	TBD	MCR/ROS
HCVS effluent radiation monitor	TBD	MCR/ROS

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

HCVS indications for HCVS pneumatic supply pressure, HCVS power status, HCVS effluent temperature and HCVS effluent radiation will be installed in the MCR to comply with EA-13-109.

**Notes:**

None

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**Part 2: Boundary Conditions for Wet Well Vent**

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

**Determine venting capability support functions needed**

**Ref: EA-13-109 Section 1.2.8, 1.2.9 / NEI 13-02 Section 2.5, 4.2.4, 6.1.2**

**BDBEE Venting**

*Provide a general description of the BDBEE Venting actions support functions. Identify methods and strategy(ies) utilized to achieve venting results.*

**Ref: EA-13-109 Section 1.2.9 / NEI 13-02 Section 2.5, 4.2.2, 4.2.4, 6.1.2**

Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the MCR or ROS except for breaching of the rupture disc for anticipatory venting, which is not required for BDBEE venting.

Venting will require support from DC power as well as instrument air systems as detailed in the response to Order EA-12-049. Existing safety related station service batteries will provide sufficient electrical power for HCVS operation for greater than 12 hours. Before station service batteries are depleted, portable FLEX diesel generators, as detailed in the response to Order EA-12-049, will be credited to charge the station service batteries and maintain DC bus voltage after 12 hours. Newly installed accumulator tanks with back-up portable N2 bottles will provide sufficient motive force for all HCVS valve operation and will provide for multiple operations of the 1/2T48-F082 vent valve.

**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. To ensure power for the 12 to 24 hours, a set of dedicated HCVS batteries will be available to feed HCVS loads via a manual transfer switch. At 24 hours, power will be switched back to the normal configuration powered by FLEX generators evaluated for SA capability.

Nitrogen bottles located outside of the reactor building and in the immediate area of the ROS will be available to tie-in supplemental pneumatic sources before the air accumulator tanks are depleted.

**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 SA Capable/FLEX DGs and the nitrogen bottles needed to supplement the air supply to the AOVs after 24 hours. The nitrogen bottles will

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**Part 2: Boundary Conditions for Wet Well Vent**

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

be permanently staged in the plant for use post event. The DGs and additional nitrogen bottles once deployed post event will remain in position for the duration of the event. The staging and deployment of this equipment will be incorporated into new or existing procedures as part of the BDBEE/severe accident response.

**Identify modifications:**

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

EA-12-049 Modifications applicable to HCVS operation

- Provide connection points and cabling at the control building wall and turbine building (SW Corner) to connect FLEX 600VAC diesel generators to the 600 VAC Bus C and Bus D to provide power to the battery chargers and critical AC components after 24 hours.

EA-13-109 Modification:

- Provide piping and connection points at a suitable location in the control building or outside to connect portable nitrogen bottles for motive force to HCVS components after 24 hours. HCVS connections required for portable equipment will be protected from all applicable screened-in hazards and located such that operator exposure to radiation and occupational hazards will be minimized. Structures to provide reasonable protection of the HCVS connections will be constructed to meet the requirements identified in NEI-12-06 section 11 for screened in hazards.

**Key Support Equipment Parameters:**

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

Local control features of the FLEX DG electrical load and fuel supply. (part of EA-12-049 compliance)  
Pressure gauge on supplemental nitrogen bottles, to be staged with Nitrogen bottles.

**Notes:**

None

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**Part 2: Boundary Conditions for Wet Well Vent**

**Part 2 Boundary Conditions for WW Vent: HCVS 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.

<b>Strategy</b>	<b>Modifications</b>	<b>Protection of connections</b>
<i>Identify Actions including how the equipment will be deployed to the point of use.</i>	<i>Identify modifications</i>	<i>Identify how the connection is protected</i>
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA-12-049 (FLEX)

**Notes:** Additional nitrogen bottles can be brought in after 72 hours for the valve motive force.

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**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 Section 2 apply to all of the following:*

*This section is divided into the following strategies:*

*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)*

*Chart on Attachment 2.1.C lists the plant-specific information to support SAWA and SAWM actions.*

**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 section 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 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 MCR using control switches, at MCC/Busses in the Control Building and locally at the intake structure. In addition, HCVS operation may occur at the ROS on the 147' elevation in the Control Building.

Timelines (see attachments 2 and 2.1.A for SAWA, and 2.1.A for SAWM) were developed to identify required operator response times and actions. The timelines are an expansion of Attachment 2 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 are appropriate for both in-vessel and ex-vessel core damage conditions.

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**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.	■ MCR or ROS	■
2. Connect SAWA pump / motive component to water source	■ River	
3. Connect SAWA pump discharge to injection piping	■ Use installed piping	■ RHRSW at Intake
4. Power up SAWA (RHR/RHRSW) valves with EA-12-049 (FLEX) generator	■ RHR/RHRSW valves may be operated from the control room	■ Should be done as soon as possible
5. Inject to RPV using SAWA pump (diesel)		■ Initial SAWA injection rate is 500 gpm
6. Monitor SAWA indications		■ Using Skid mounted <ul style="list-style-type: none"> <li>○ Pump Flow</li> <li>○ Valve Position</li> </ul>
7. Use SAWM to maintain availability of the SAWV (Section 3.1.A)	■ MCR and Intake	■ Monitor DW Pressure and Suppression Pool Level in MCR ■ Control SAWA at pump skid at intake

Discussion of timeline SAWA identified items

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

- 7.5 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) All 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 Section X.X.X / NEI 13-02 Section I.1.6, I.1.4.4**

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### **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. 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 event initiation.

The SAWA flow path includes methods to minimize exposure of personnel to radioactive liquids / gases and potentially flammable conditions by inclusion of backflow prevention. The check valve is integral with the pump skid and will close and prevent leakage when the SAWA pump is secured. RHR LPCI injection mode has installed ECCS backflow prevention devices (1/2E11-F050) qualified for accident scenarios.

#### **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 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. Expected actions are:
  - None
- Establish electrical power for SAWA systems and indications using EA-12-049.
  - *step 4 of table 3.1 above*
- Establish flow to the RPV using SAWA systems. Begin injection at a maximum rate, not to exceed 500 gpm.
  - *steps 2, 3, 5 and 6 of table 3.1 above*

$T < 8 - 12$  hr:

- Continue injection for 4 hours after SAWA injection begins at initial SAWA rate.

$T < 12$  hrs:

- Proceed to SAWM actions (Section 3.1.A)
  - *step 7 of table 3.1 above*

#### **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 Section X.X.X / 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. SAWM flow rates will be directed to preserve the availability of the HCVS wetwell vent (see 3.1.A).

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## Part 3.1: Boundary Conditions for SAWA

### Details:

#### Details of Design Characteristics/Performance Specifications

SAWA shall be capable of providing a RPV or DW injection rate of 500 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 not applicable to SAWA.

Ref: EA-13-109 Section X.X.X / NEI 13-02 Section 5.1.1, 5.4.6, I.1.6, I.1.4

#### Equipment Locations/Controls/Instrumentation

The locations of the SAWA equipment and controls, as well as ingress and egress paths have been 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 ERO dosage and plant safety guidelines for temperature and humidity.

{Describe location and flow path for SAWA injection and how flow rate will be monitored/ controlled.} [The electrical and mechanical equipment being used to support SAWA actions may be the same equipment used for EA-12-049.]

Evaluations for projected SA conditions (radiation / temperature) 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)

Electrical equipment and instrumentation will be powered from the existing station batteries, and from AC distribution systems that are powered from the EA-12-049 generator(s). The battery chargers are also powered from the EA-12-049 generator(s) to maintain the battery capacities during the Sustained Operating period.

Parameter	Instrument	Location	Power Source / Notes
DW Pressure	1/2T48-R608/R609	MCR	Station batteries via EA-12-049 generator
Torus Level	1/2T48-R607A/B	MCR	Station batteries via EA-12-049 generator
SAWA Flow	FLEX Pump Flow indicator	FLEX Pump Skid	SAWA pump (skid mounted device)
SAWA pump power	On-Board Generator	1/2T48-R607A/B	EA-12-049 generator
RHR and RHRSW Valve controls	MCR Panels	MCR and Control Building	1R24-S012/S018B (2R24-S011/S018A) EA-12-049 generator

The instrumentation and equipment being used for SAWA and supporting equipment has been evaluated to perform for the Sustained Operating period under the expected radiological and temperature conditions.

#### Equipment Protection

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<b><u>Part 3.1: Boundary Conditions for SAWA</u></b>	
Any SAWA component and connections external to protected buildings have been protected against the screened-in hazards of EA-12-049 for the station. Via a below grade valve pit connecting to piping in the intake structure and the Reactor Building. Portable equipment used for SAWA implementation will meet the protection requirements for storage in accordance with the criteria in NEI 12-06.	
<b>Provide a brief description of Procedures / Guidelines:</b> <i>Confirm that procedure/guidance exists or will be developed to support implementation.</i>  <b>Ref: EA-13-109 Attachment 2, Section A.3.1, B.2.3 / NEI 13-02 Section 1.3, 6.1.2</b>	
<b>{Provide a brief description of Procedures / Guidelines: to be used for SAWA, likely an FSG}</b> <ul style="list-style-type: none"> <li>• Hook up FLEX pump to intake manifold per FSG</li> <li>• Hook-up and start FLEX DG to repower 1R26-S012(2R26-S011) and 1R26-S018B(2R26-S018A)</li> <li>• Open 1E11-F073B(2E11-F073A) and 1E11-F075B(2E11-F075B) using MCR Switches to cross tie RHR with RHRSW</li> <li>• Verify using MCR switches that 1/2E11-F003A, F016A, F028A, F048A and 1/2E11-F068A/B to isolate RHR SDC modes</li> <li>• Open 1E11-F015(2E11-F015) and 1E11-F017(2E11-F017) using MCR Switches for RHR LPCI injection pathway</li> <li>• Start FLEX pump via on-board generator</li> <li>• Adjust flow rate using skid mounted flow indicator and isolation valve</li> </ul>	
<b>Identify modifications:</b> <i>List modifications and describe how they support the SAWA Actions.</i>  <b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X</b>	
None	
<b>Component Qualifications:</b> <i>State the qualification used for equipment supporting SAWA</i>  <b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X</b>	
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. SAWA components are not required to meet NEI 13-02, Table 2-1 design conditions.	
<b>Notes:</b>	

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**Part 3.1.A: Boundary Conditions for SAWA/SAWM**

**Time periods for the maintaining SAWM actions such that the WW 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 section 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 containment 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 containment 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 containment 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 containment 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 drywell vent to maintain pressure below PCPL.

**Basis for SAWM time frame**

SAWM can be maintained >7 days:

Plant Hatch is bounded by the evaluations performed in BWROG TP-2015-XXX and are representative of the reference plant in NEI 13-02 figures C-2 through C-6.

Instrumentation relied upon for SAWM operations is DW pressure and Torus level. All of which are powered by the FLEX (EA-12-049) generator which is placed in-service prior to core breach. The DG will provide power throughout the Sustained Operation period (7 days). (C.7.1.4.2)

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.8.3.1)

Torus level indication is maintained throughout the Sustained Operation period, so the HCVS remains in-service. The time to reach the level at which the WW vent must be secured is >7days using SAWM flowrates (C.6.3, C.7.1.4.3)

Procedures will be developed that control the torus level in the indicating range, while ensuring the DW pressure indicate the core is being cooled, whether in-vessel or ex-vessel. Procedures will dictate conditions during which

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**Part 3.1.A: Boundary Conditions for SAWA/SAWM**

SAWM flow rate should be adjusted (up or down) using torus level and DW pressure as controlling parameters to remove the decay heat from the containment. (this is similar to the guidance currently provided in the BWROG SAMGs) (C.7.1.4.3)

Attachment 2C shows the timeline of events for SAWM. (C.7.1.4.4)



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	Intake Structure	<ul style="list-style-type: none"> <li>■ Control to maintain containment and Suppression Pool parameters to ensure SAWV remains operational.</li> <li>■ 100 gpm minimum capability is maintained for greater than 7 days</li> </ul>
2. Control to SAWM flow rate for containment control / decay heat removal	Intake Structure and MCR	<ul style="list-style-type: none"> <li>■ SAWM Flow rates will be monitored using the following instrumentation                             <ul style="list-style-type: none"> <li>○ FLEX Pump Flow</li> <li>○ Suppression Pool level</li> <li>○ DW press</li> </ul> </li> <li>■ SAWM flow rates will be controlled using the manual flow control valve at the FLEX pump</li> </ul>
3. Establish alternate source of decay heat removal	Yard	<ul style="list-style-type: none"> <li>■ &gt;7days</li> </ul>
4. Secure SAWA / SAWM	Intake Structure	<ul style="list-style-type: none"> <li>■ When reliable alternate containment decay heat removal is established.</li> </ul>

**SAWM Time Sensitive Actions**

**Time Sensitive SAWM Actions:**

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

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

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<b><u>Part 3.1.A: Boundary Conditions for SAWA/SAWM</u></b>	
It is anticipated that SAWM will only be used in Severe Accident Events based on presumed failure of injection systems.	
<b>First 24 Hour Coping Detail</b>	
<p><i>Provide a general description of the SAWM actions for first 24 hours using installed equipment including station modifications that are proposed.</i></p> <p><i>Given the initial conditions for EA-13-109:</i></p> <ul style="list-style-type: none"> <li>■ BDBEE occurs with ELAP</li> <li>■ Failure of all injection systems, including steam-powered injection systems</li> </ul> <p><b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b></p>	
<p>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.</p> <p>Once the SAWA initial low rate has been established for 4 hours, the flow will be reduced monitoring DW pressure and torus level. SAWM flow rate can be lowered to maintain containment parameters and preserve the WW vent path. SAWM will be capable of injection for the period of Sustained Operation.</p>	
<b>Greater Than 24 Hour Coping Detail</b>	
<p><i>Provide a general description of the SAWM actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed.</i></p> <p><b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b></p>	
<p><u>SAWM can be maintained &gt;7 days:</u></p> <p>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. No additional modifications are being made for SAWM.</p>	
<b>Details:</b>	
<b>Details of Design Characteristics/Performance Specifications</b>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X</b>	
<p>SAWM shall be capable 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.</p>	
<b>Equipment Locations/Controls/Instrumentation</b>	
<i>Describe location for SAWM monitoring and control.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X</b>	

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**Part 3.1.A: Boundary Conditions for SAWA/SAWM**

The SAWM control location is the same as the SAWA control location. Local indication of SAWM flow rate is provided at the pump skid by installed flow instrument qualified to operate under the expected environmental conditions.

Injection flowrate is controlled by FLEX manual valve located on the FLEX pump at the intake

Torus level and DW pressure are read in the control room using indicators powered by the FLEX DG 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.*

Parameters used for SAWM are:

- Containment Pressure\*
- Suppression Pool Level\*
- SAWM Flow

The Containment Pressure and Suppression Pool Level instruments are qualified to RG 1.97 and are the same as listed in section 2 of this OIP. The SAWM flow instrumentation are qualified for the expected environmental conditions expected when needed which is extreme temperatures

Notes:

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<b><u>Part 3.1.B: Boundary Conditions for SAWA/SADV</u></b>	
<b>Applicability of WW Design Considerations</b>	
All of Section 2 of this OIP applies to the SADV, with the exception that the temperature qualification for SADV components, and interfacing WW Vent components, shall be rated for 545 Deg F.	
<b>Table 3.1.C – SADV Manual Actions</b>	
N/A	
<b>Timeline for SADV</b>	
<i>Describe timeline for SADV actions from the time the WW vent is no longer operational</i>	
N/A	
<b>Severe Accident Venting</b>	
<i>Determine venting capability for Severe Accident Venting, such as may be used in an ELAP scenario to mitigate core damage.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
N/A	
<b>First 24 Hour Coping Detail</b>	
<i>Provide a general description of the SADV actions for first 24 hours using installed equipment including station modifications that are proposed.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
N/A	
<b>Greater Than 24 Hour Coping Detail</b>	
<i>Provide a general description of the SADV actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed.</i>	
<b>Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x</b>	
N/A	

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	<b><u>Part 3.1.B: Boundary Conditions for SAWA/SADV</u></b>
	<b>Details:</b>
	<b>Provide a brief description of Procedures / Guidelines:</b> <i>Confirm that procedure/guidance exists or will be developed to support implementation.</i> <b>Ref:</b> EA-13-109 Section X.X.X / NEI 13-02 Section 6.1.2
	N/A
	<b>Identify modifications:</b> <i>List modifications and describe how they support the SADV Actions.</i>
	N/A
	<b>Key Venting Parameters:</b> <i>List instrumentation credited for the SADV Actions.</i>
	N/A

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## **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

Licensees 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/SAWM/SADV** functionality are applicable in Modes 1, 2 and 3.

- If for up to 90 consecutive days, the primary or alternate means of HCVS operation are non-functional, no compensatory actions are necessary.
- If for up to 30 days, the primary and alternate means of HCVS operation are 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:
  - The condition will entered into the corrective action system,
  - The HCVS functionality will be restored in a manner consistent with plant procedures,
  - A cause assessment will be performed to prevent future loss of function for similar causes.

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

- Initiate action to implement appropriate compensatory actions

[OPEN ITEM 11: Determine the control document for HCVS out of service time criteria]

### **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).*
- *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 Section 6 of this document).*
  - *Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.*
  - *Preventive maintenance should be determined based on equipment type and expected use. The basis should*

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

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

The site will utilize the standard EPRI industry PM process (Similar to the Preventive Maintenance Basis Database) for establishing the maintenance calibration and testing actions for HVCS/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.

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

Table 4-1: Testing and Inspection Requirements

Description	Frequency
Cycle the HCVS and installed SAWA valves <sup>1</sup> 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 <sup>2</sup> operating cycle
Cycle the HCVS and installed SAWA check valves not used to maintain containment integrity during unit operations <sup>3</sup>	Once per every other <sup>4</sup> operating cycle
Perform visual inspections and a walk down of HCVS and installed SAWA components	Once per every other <sup>4</sup> operating cycle
Functionally test the HCVS radiation monitors.	Once per operating cycle
Leak test the HCVS.	<ol style="list-style-type: none"> <li>1. Prior to first declaring the system functional;</li> <li>2. Once every three operating cycles thereafter; and</li> <li>3. After restoration of any breach of system boundary within the buildings</li> </ol>

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

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<sup>5</sup> move to their proper (intended) positions.

Once per every other operating cycle

<sup>1</sup> Not required for HCVS and SAWA check valves.

<sup>2</sup> After two consecutive successful performances, the test frequency may be reduced to a maximum of once per every other operating cycle.

<sup>3</sup> Not required if integrity of check function (open and closed) is demonstrated by other plant testing requirements.

<sup>4</sup> 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.

<sup>5</sup> 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 section. 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.

**Notes:**

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

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**Part 5: Milestone Schedule**

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

**Phase 2 Milestone Schedule:**

**Phase 2 Milestone Schedule**

Milestone	Target Completion Date	Activity Status	Comments (Include date changes in this column)
Submit Overall Integrated Implementation Plan	Dec 2015		
Hold preliminary/conceptual design meeting	Apr 2016		Expect to be engineering justification not modifications
Submit 6 Month Status Report	June 2016		
Submit 6 Month Status Report	Dec 2016		
U1 Design Engineering On-site/Complete	Feb 2017		Expect to be engineering justification not modifications
Submit 6 Month Status Report	June 2017		
Operations Procedure Changes Developed	Sep 2017		SAMG Revision
Site Specific Maintenance Procedure Developed	Dec 2017		Expect to be N/A
Training Complete	Dec 2017		
Submit 6 Month Status Report	Dec 2017		
U2 Design Engineering On-site/Complete	Feb 2018		Expect to be engineering justification not modifications
U1 Implementation Outage	Mar 2018		
Procedure Changes Active	Mar 2018		
U1 Walk Through Demonstration/Functional Test	Mar 2018		
Submit 6 Month Status Report	June 2018		
Submit 6 Month Status Report	Dec 2018		
U2 Implementation Outage	Mar 2019		

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**Part 5: Milestone Schedule**

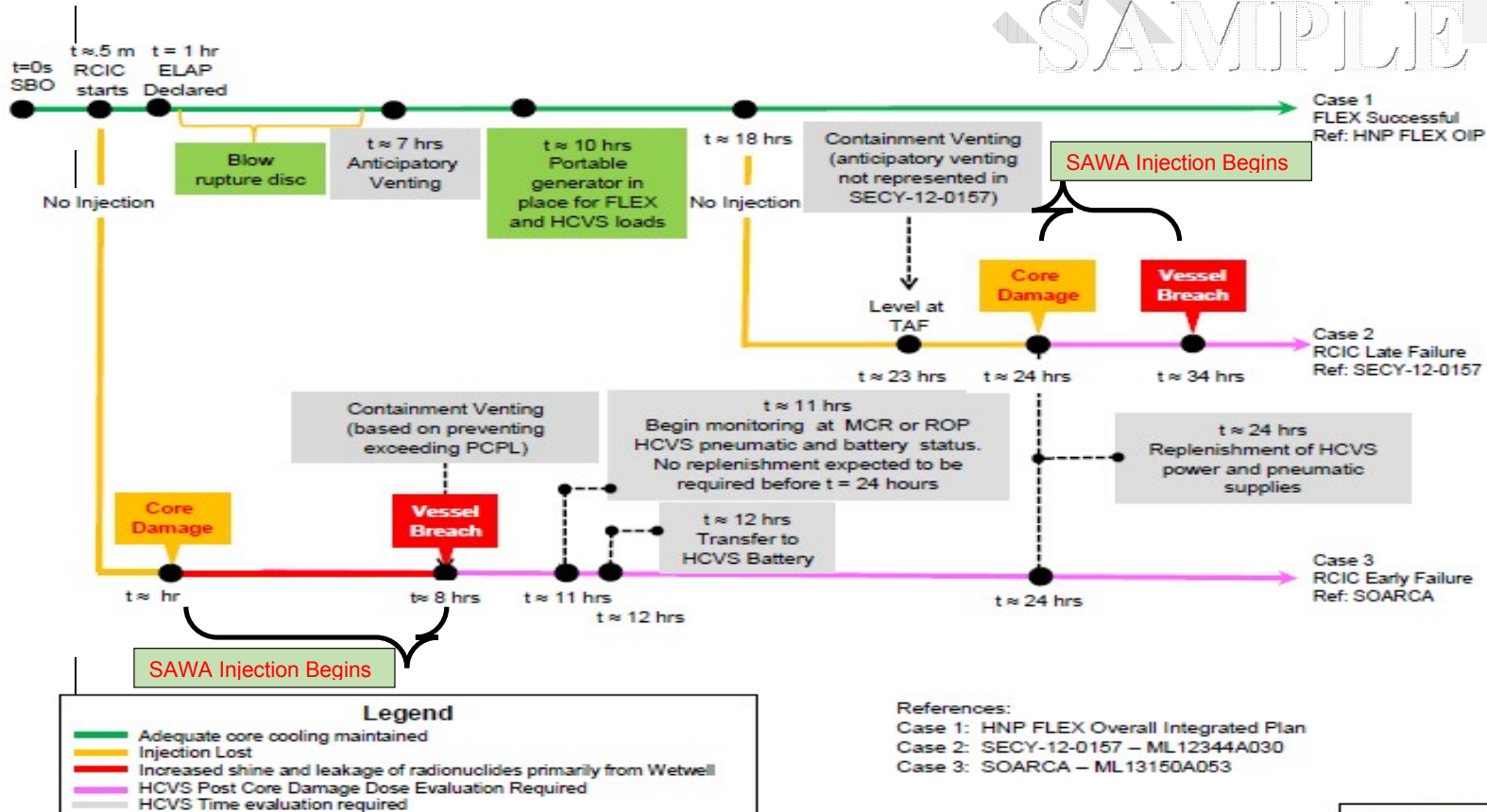
U2 Walk Through Demonstration/Functional Test	Mar 2019		
Submit Completion Report	May 2019		

**Notes:**

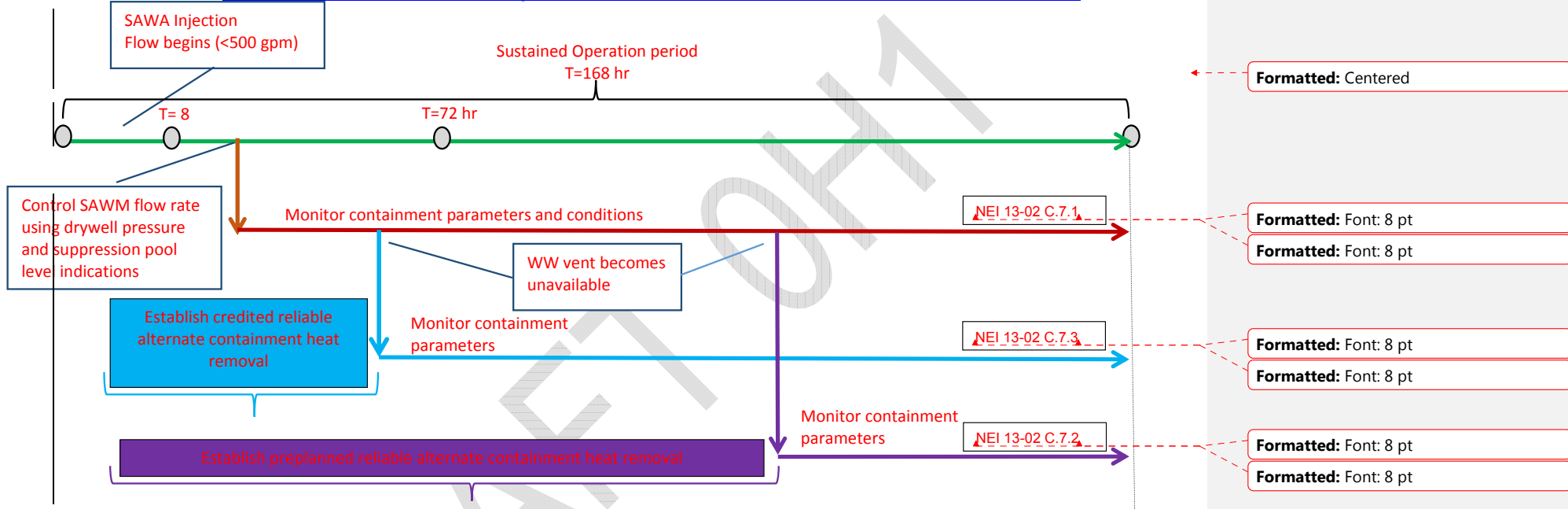
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<b><u>Attachment 1: HCVS/SAWA/SADV Portable Equipment</u></b>				
<i>List portable equipment</i>	<i>BDBEE Venting</i>	<i>Severe Accident Venting</i>	<i>Performance Criteria</i>	<i>Maintenance / PM requirements</i>
<b>Argon Cylinders</b>	<b>X</b>		<b>N/A</b>	<b>Check periodically for pressure, replace or replenish as needed</b>
<b>Nitrogen Cylinders</b>	<b>X</b>	<b>X</b>	<b>TBD</b>	<b>Check periodically for pressure, replace or replenish as needed</b>
<b>FLEX DG (and associated equipment)</b>	<b>X</b>	<b>X</b>	<b>TBD</b>	<b>Per Response to EA-12-049</b>
<b>SAWA Pump (and associated equipment)</b>	<b>X</b>	<b>X</b>	<b>TBD</b>	<b>Per Response to EA-13-109</b>

## Attachment 2A: Sequence of Events Timeline – HCVS



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

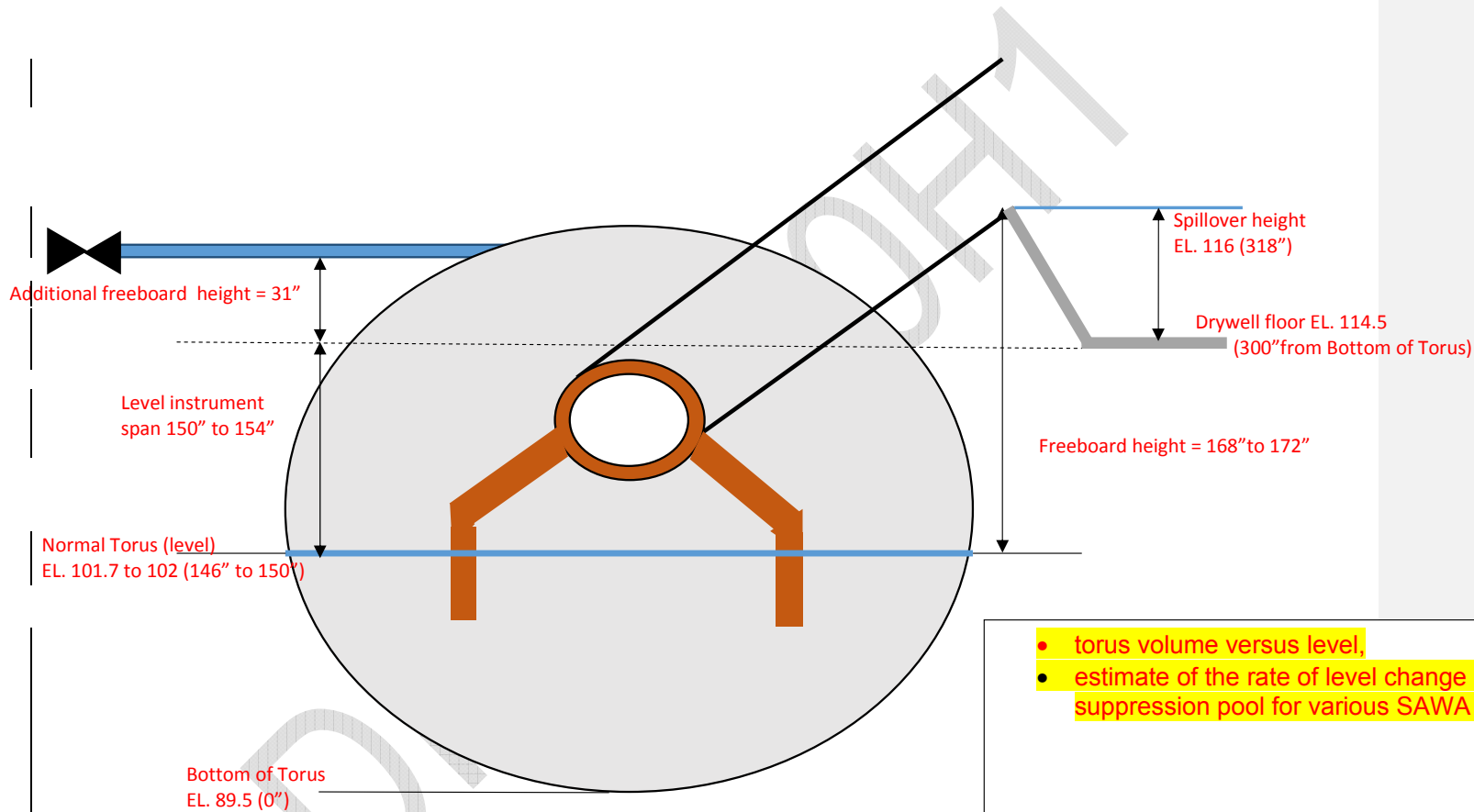


**Attachment 2.1.B: Sequence of Events Timeline – SADV**

N/A

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



- torus volume versus level,
- estimate of the rate of level change in the suppression pool for various SAWA flow rates

### **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 WW Vent (*preliminary*)**

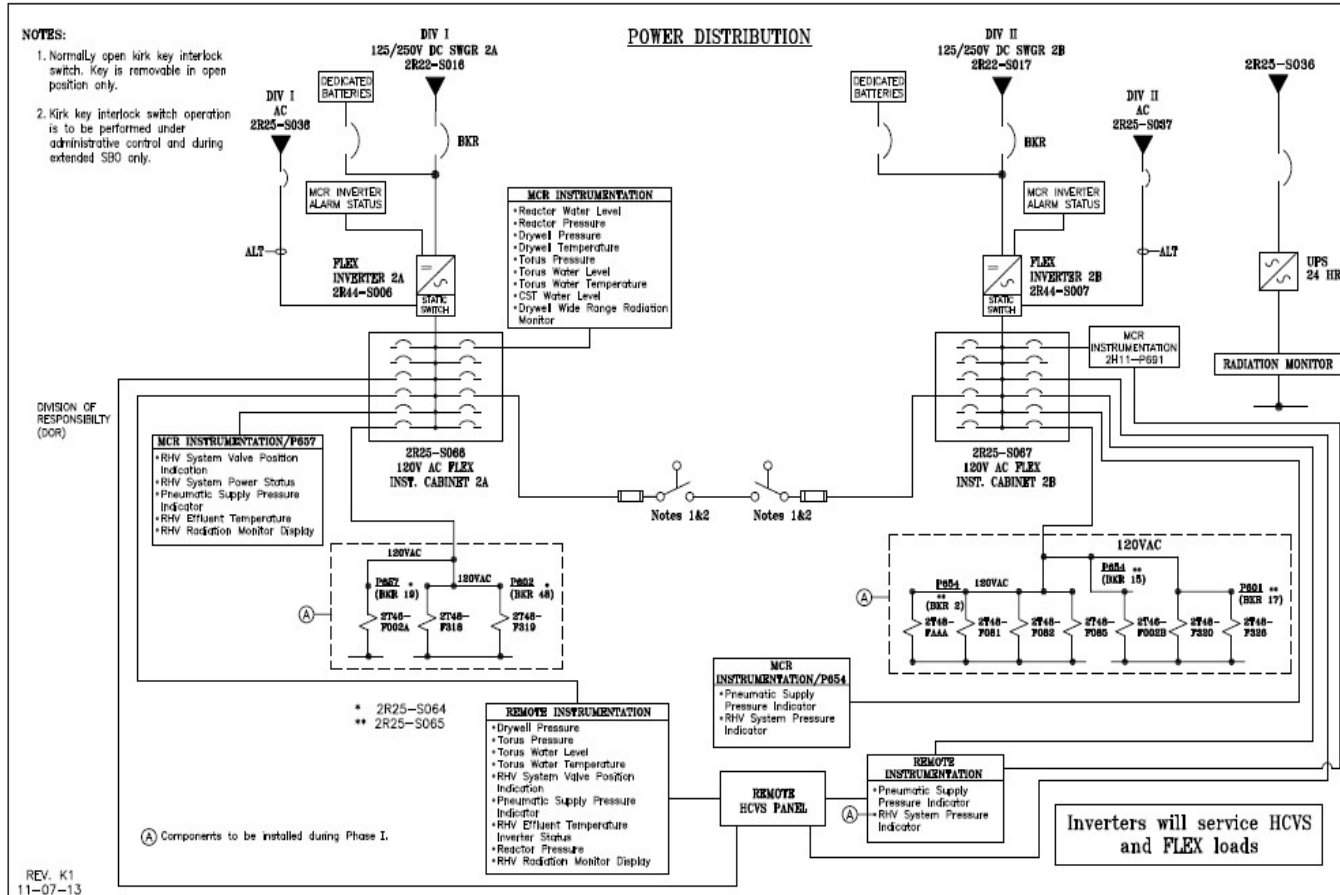
- Piping routing for vent path – WW Vent
  - Demarcate the valves (in the vent piping) between the currently existing and new ones
  - WW Vent Instrumentation Process Flow Diagram
  - Egress and Ingress Pathways to ROS, Battery Transfer Switch, DG Connections and Deployment location
  - Site layout sketch to show location/routing of WW 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

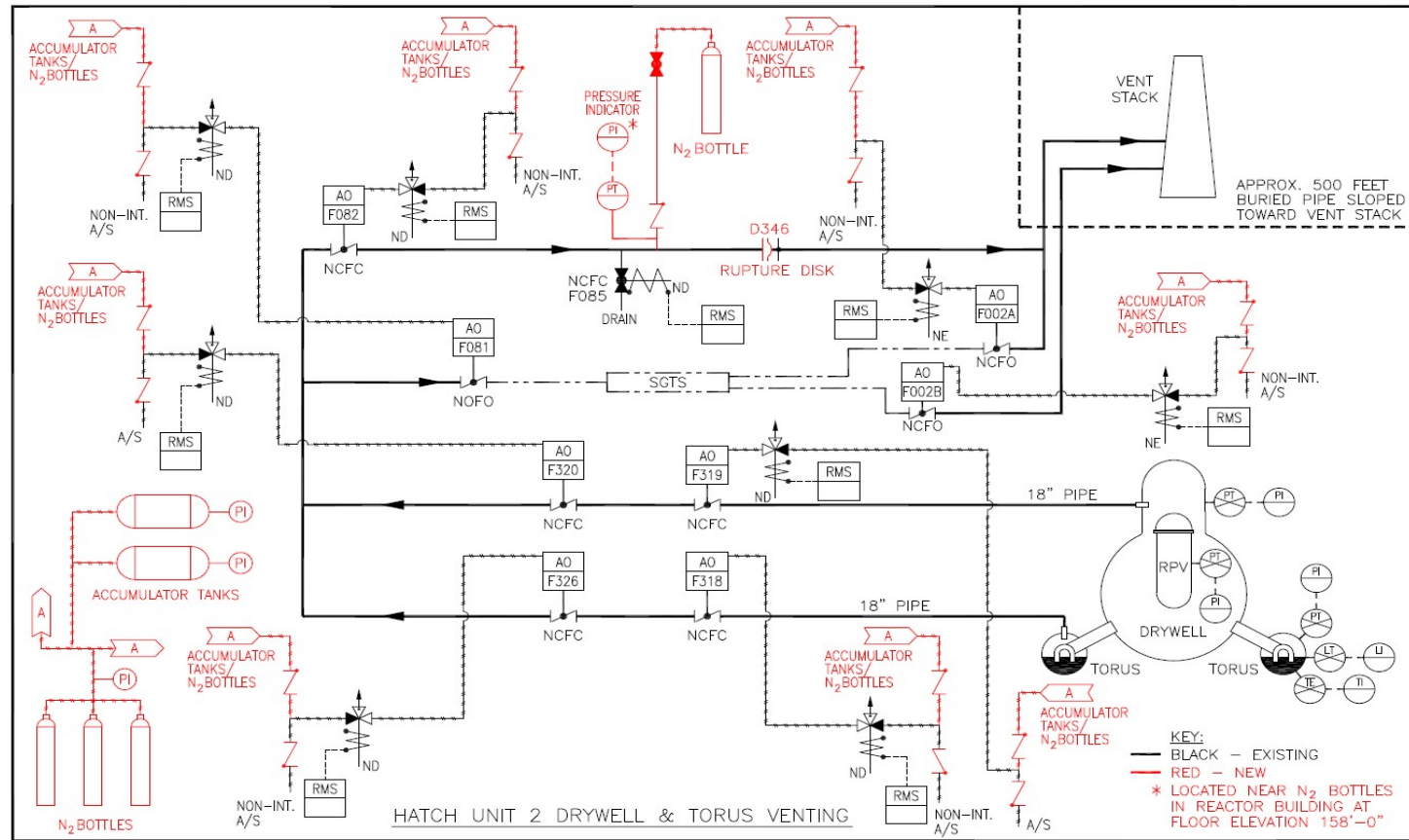
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SAMPLE



Sketch 1: Electrical Layout of System (Unit 2, Unit 1 similar)

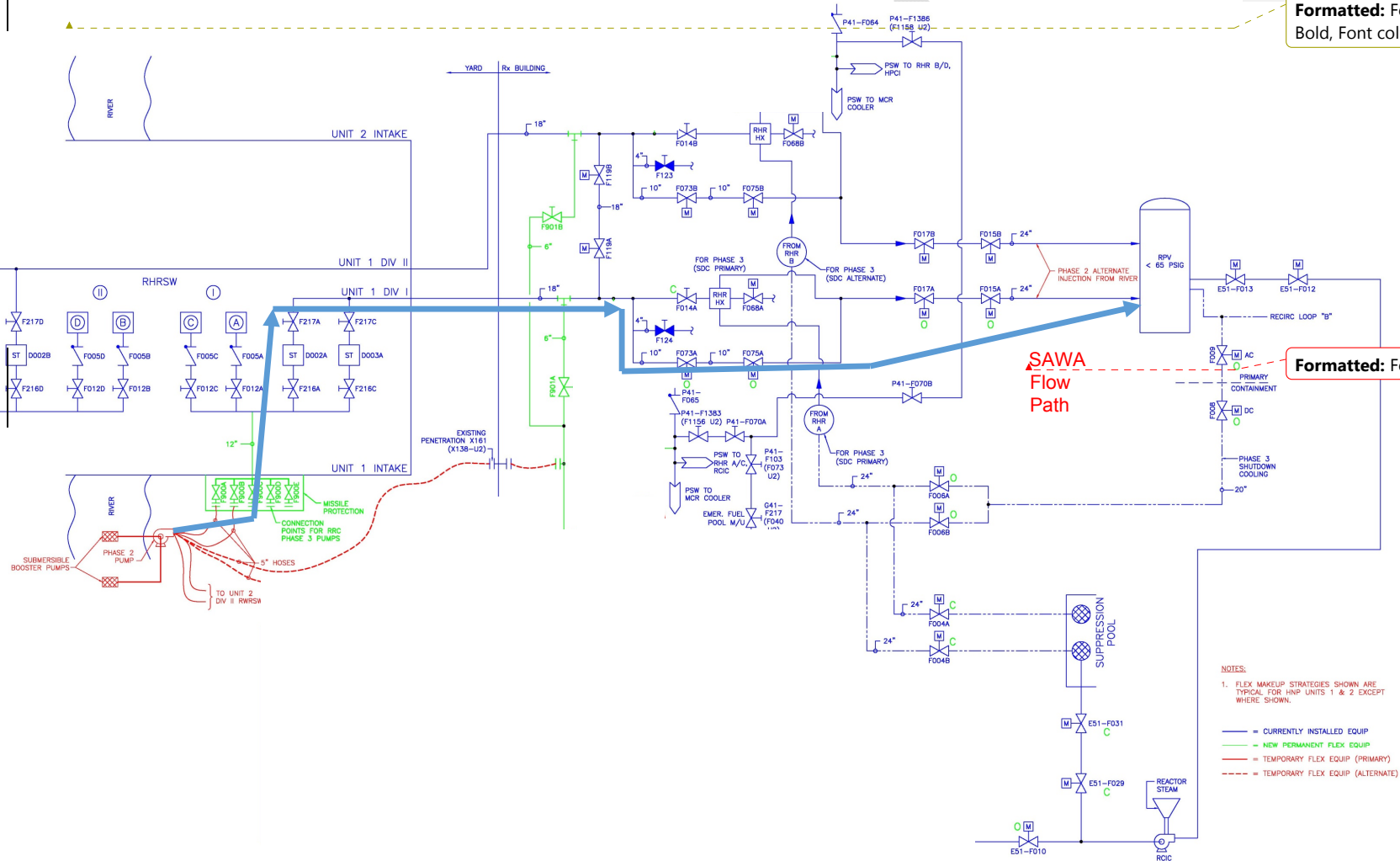
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**Sketch 2: Layout of current HCVS, Unit 2 (Unit 1 similar)**

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



### **Attachment 4: Failure Evaluation Table**

Table 4A: Wet Well HCVS Failure Evaluation Table

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

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**Attachment 5: References**

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

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24. NEI White Paper HCVS-WP-02, HCVS Cyclic Operations Approach
25. NEI White Paper HCVS-WP-03, Hydrogen/CO Control Measures
26. NEI White Paper HCVS-WP-04, FLEX/HCVS Interactions
27. IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power *Generating Stations*,
28. Edwin I. Hatch EA-12-049 (FLEX) Overall Integrated Implementation Plan, Rev 0, February 2013
29. Edwin I. Hatch EA-12-050 (HCVS) Overall Integrated Implementation Plan, Rev 0, February 2013
30. Edwin I. Hatch EA-12-051 (SFP LI) Overall Integrated Implementation Plan, Rev 0, February 2013
31. Edwin I. Hatch Procedure 31EO-EOP-101-1, Emergency Containment Venting (Unit 1)
32. Edwin I. Hatch Procedure 31EO-EOP-101-2, Emergency Containment Venting (Unit 2)
33. Edwin I. Hatch Procedure 31EO-EOP-104-1, Primary Containment Venting for H2 and O2 Control (U1)
34. Edwin I. Hatch Procedure 31EO-EOP-104-2, Primary Containment Venting for H2 and O2 Control (U2)
35. Edwin I. Hatch Procedure 31EO-EOP-012-1, U1 PC Flowchart
36. Edwin I. Hatch Procedure 31EO-EOP-012-2, U2 PC Flowchart
37. Edwin I. Hatch Procedure 31EO-PCG-001-1, U1 PC-G Flowchart
38. Edwin I. Hatch Procedure 31EO-PCG-001-2, U2 PC-G Flowchart
39. Edwin I. Hatch Procedure 31EO-SAG-001-1, U1 SAG-01 Flowchart
40. Edwin I. Hatch Procedure 31EO-SAG-001-2, U2 SAG-01 Flowchart
41. Edwin I. Hatch Procedure 31EO-SAG-002-1, U1 SAG-02 Flowchart
42. Edwin I. Hatch Procedure 31EO-SAG-002-2, U2 SAG-02 Flowchart
43. Edwin I. Hatch Procedure 31EO-TSG-001-0, Technical Support Guidelines
44. Edwin I. Hatch Procedure 31EO-TSG-002-0, Technical Support Appendix J
45. Southern Nuclear Procedure NMP-EP-403, Figure 1, EMG/EDMG Flowchart
46. Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments, SECY-12-0157, ML12344A030
47. NUREG/CR-7110, V1, R1, State-of-the-Art Reactor Consequence Analyses (SOARCA) Project: Peach Bottom Integrated Analysis, ML13150A053

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

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

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

Open Item	Action	Comment
1	Determine location of Dedicated HCVS Battery transfer switch	
2	Determine location of back-up nitrogen bottles	
3	Evaluate location of Portable DG for accessibility under Severe Accident HCVS use	<b>Confirmatory action</b>
4	Confirm suppression pool heat capacity	<b>Confirmatory action</b>
5	Determine location of HCVS Remote Operating Station (ROS)	
6	State which approach or combination of approaches Plant Hatch decides to take to address the control of flammable gases, clearly demarcating the segments of vent system to which an approach applies	
7	Evaluate SGTS Valve Leakage utilizing criteria from NEI HCVS-FAQ-05	<b>Confirmatory action</b>
8	Identify qualification method used for HCVS instruments	
9	Evaluate HCVS monitoring location of Portable DG for accessibility, habitability, staffing sufficiency, and communication capability with Vent- under Severe Accident HCVS use decision makers	Confirmatory action
10	Perform severe accident evaluation for FLEX DG use post 24 hour actions	<b>Confirmatory action</b>
11	Determine the control document for HCVS out of service time criteria	<b>Confirmatory action</b>
	<b>Include ISE Open Items and cross reference to OIP items</b>	

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