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

Table of Contents:

Introduction

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

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

The Order requirements are applied in a phased approach where:

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

The NRC provided an acceptable approach for complying with Order EA-13-109 through Interim Staff Guidance (JLD-ISG-2013-02~~)~~ issued in November 2013 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 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:

- 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 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. ~~OIP for Phase 2 of EA-13-109 is required to be submitted by Licensees to the NRC by December 31, 2015.~~

~~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 the Phase 2 OIP submittal 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 either the Main Control Room (MCR) (some plants have a designated Primary Operating Station (POS) that will be treates at the main operating location for this order) or from a Remote Operating Station (ROS) at the appropriate time based on procedural guidance in response to plant conditions from observed or derived symptoms.
- The vent will utilize Containment Parameters of Pressure, Level and ~~t~~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 ~~r~~Reactor ~~p~~Pressure ~~v~~Vessel (RPV) or ~~primary containment~~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.
- Parameters measured should be ~~Primary~~Drywell Containment pressure, Wetwell level, SAWA flowrate and the HCVS parameters listed above.
- Alternatively SAWA and a Severe Accident Capable Drywell Vent (SADV) strategy may be implemented to meet Phase 2 of Order EA-13-109.
- ~~As an alternative to the SAWA/SAWM alternative venting strategy, SAWA and a Ssevere aAccident Ccapable Drywell Vvent (SADV) designed to 545°F may be implemented to meet Phase 2 of Order EA-13-109.~~
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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.

~~**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 {Site Name} 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 {Quarter and Year}
- Phase 2 (drywell or alternate strategy): ~~Later~~ ~~*[you may want to enter your dates for drywell]*~~ by the startup from the first refueling outage that begins after June 30, 2017 or June 30, 2019, whichever comes first. Currently scheduled for ~~{ no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. Currently scheduled for~~ {Quarter and Year}}

~~*[may need to add more bullets for multi-unit sites]*~~

[Describe and justify any alternative approaches to the guidelines in JLD-ISG-2013-02 and JLD-ISG-2015-01]

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

Part 1: General Integrated Plan Elements and Assumptions

The following extreme external hazards screen-in for {Site Name}

- Seismic, External Flooding, Extreme Cold, High Wind, Extreme High Temperature (only list those that screen-in)

The following extreme external hazards screen out for {Site Name}

- External Flooding, Extreme Cold, High Wind, Extreme High Temperature (only list those that screen out)

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

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

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

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

Applicable EA-12-049 assumptions:

049-1. Assumed initial plant conditions are as identified in NEI 12-06 section 3.2.1.2 items 1 and 2.

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

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

049-4. No additional events or failures are assumed to occur immediately prior to or during the event, including security events except for failure of RCIC or HPCI. (Reference NEI 12-06 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 {Site Specific Time} (time sensitive at a time greater than {Site Specific time}) 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, ({Site Specific Time}) (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

Part 1: General Integrated Plan Elements and Assumptions

analyzed source term (Reference HCVS-FAQ-07).

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

109-05. Classical design basis evaluations and assumptions are not required when assessing the operation of the HCVS. The reason this is not required is that the order postulates an unsuccessful mitigation of an event such that an ELAP progresses to a severe accident with ex-vessel core debris which classical design basis evaluations are intended to prevent. (Reference NEI 13-02 section 2.3.1).

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. 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 is 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. ~~109-11. 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 is expected to require changes to the EPG/SAGs. This may be in the form of a revision or an issue resolution between revisions . .~~

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. 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 is considered to be bounded by assuming a saturated environment for the duration of the event response because of the water/steam interactions.

Part 1: General Integrated Plan Elements and Assumptions

~~109-13. The suppression pool/wetwell of a BWR Mark I/II containment can be considered to not have significant superheat.~~

109-14. RPV depressurization is directed by the EPGs in all cases prior to entry into the SAGs. (reference NEI 13-02 Rev 1, §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-1){Multi-unit, other assumptions from new FAQs being developed.}

Plant Specific HCVS Related Assumptions/Characteristics:

[Plant specific assumptions, particularly related to plant configuration or special design attributes]

PLT-1. {The main stack at Plant PLT can handle the HCVS flow from both units simultaneously. Once outside the reactor building, effluent lines slope downward toward main stack.}

PLT-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.}

PLT-3. {The rupture disk will be manually breeched within 7.3 hours of event initiation}.

PLT-4 {any substantial design conditions for a specific site – Example: plant removed DW vent connection from existing 89-16 HCVS; Plant cooling water is separate RHR cooling water}

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). 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 disk by opening the argon cylinder valve & valve 1/2T48-F407	Manual hand wheels for valves at the argon bottle and at the piping at the argon bottle station	Not required during SA event Only required if performing early venting for FLEX
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 panel	And at ROS
7. Open HCVS vent control valve	Hand switch for valve in the	And at ROS

Part 2: Boundary Conditions for Wet Well Vent

1/2T48-F082	MCR	
8. Align power supplies for all valves and instruments via Inverters 1/2R44-S006 & 1/2R44-S007.	Instruments and controls located in the MCR	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, preferable 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 & 1/244-S007.	Instruments and controls located in the MCR	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

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

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

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

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

- XX Hours, Initiate use of Hardened Containment Vent System (HCVS) per site procedures to maintain containment parameters below design limits and within the limits that allow continued use of RCIC - The reliable operation of HCVS will be met because HCVS meets the seismic requirements identified in NEI 13-02 and will be powered by DC buses with motive force supplied to HCVS valves from {installed accumulators and portable nitrogen storage bottles.} Critical HCVS controls and instruments associated with containment will be DC powered and operated from the MCR or a Remote Operating Station on each unit. The DC power for HCVS will be available as long as the HCVS is required. {Station batteries will provide power for greater than 12 hours,} HCVS battery capacity will be available to extend past 24 hours. In addition, when available Phase 2 FLEX Diesel Generator (DG) can provide power before battery life is exhausted. Thus initiation of the HCVS from the MCR or the Remote Operating Station within XX hours is acceptable because the actions can be performed any time after declaration of an ELAP until the venting is needed at for BDBEE venting. This action can also be

Part 2: Boundary Conditions for Wet Well Vent

performed for SA HCVS operation which occur at a time further removed from an ELAP declaration as shown in Attachment 2A.

- XX Hours {greater than 24 hours}, installed nitrogen bottles will be valved-in to supplement the Nitrogen tank supply. The Nitrogen bottles can be replenished one at a time leaving the other 2 supplying the HCVS. This can be performed at any time prior to 24 hours to ensure adequate capacity is maintained so this time constraint is not limiting.}
- XX Hours {greater than 24 hours}, temporary generators will be installed and connected to {the pigtail to power up battery chargers} using a portable DG to supply power to HCVS critical components/instruments - Time sensitive after ZZ hours. Current battery durations are calculated to last greater than ~~24~~ XX 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. A DG will be maintained in on-site FLEX storage buildings. DG will be transferred and staged via haul routes and staging areas evaluated for impact from external hazards. Modifications to will be implemented to facilitate the connections and operational actions required to supply power within {XX} hours which is acceptable because the actions can be performed any time after declaration of an ELAP until the repowering is needed at greater than 24 hours for HCVS operation. For Phase 2 applicability, the 8-10 hours will change to 6-7 hours and will be validated by the Phase 2 Verification and Validation thus providing power by 7 ours, since i provides power to the SAWA components.
- *[Site Specific actions that are time sensitive for HCVS initiation]*

Discussion of radiological and temperature constraints identified in Attachment 2A

- {XX Hours, Operators override the ……..
- At ZZ 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.}

  [**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 will be located in an area that is accessible to operators, preferable near the ROS.}
- At >24 Hours, temporary generators will be installed and connected {to the pigtail to power up battery chargers} using a portable DG to supply power to HCVS critical components/instruments - Time sensitive after {XX} 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 {GG} hours (Reference X). DG will be staged beginning at approximately {8-10} hour time frame (Reference Y). 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.}

Provide Details on the Vent characteristics

Part 2: Boundary Conditions for Wet Well Vent

Provide Details on the Vent characteristics

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Part 2: Boundary Conditions for Wet Well Vent

the intrinsically safe equipment installed as part of the power sourcing

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

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

Components including instrumentation that are not required to be seismically designed by the design basis of the plant should be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. (reference ISG-JLD-201201 and ISG-JLD-2012-03 for seismic details.)

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

Use of instruments and supporting components with known operating principles that are supplied by manufacturers with commercial quality assurance programs, such as ISO9001. The procurement specifications shall include the seismic requirements and/or instrument design requirements, and specify the need for commercial design standards and testing under seismic loadings consistent with design basis values at the instrument locations.

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

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

Vent Size and Basis

The HCVS wetwell path is designed for venting steam/energy at a nominal capacity of 1% or greater *{or another value of <1%, include the analysis basis of the selected value}* of *{CLTP or Projected Power Uprate at time of implementation}* MWt thermal power at pressure of *{YY}* psig. *[Insert any clarification statements of this power level if it is not the current licensed power level.]* *[If not CLTP then add]* *{The thermal power assumes a power uprate of XX% above the currently licensed thermal power of YYYY MWt.}* This pressure is the lower of the containment design pressure and the PCPL value. The size of the wetwell portion of the HCVS of {XX} inches in diameter {until combines with the common HCVS piping sized at YY inches} which provides adequate capacity to meet or exceed the Order criteria.

Vent Capacity

The 1% {or another value of <1%} value at {Site Name} 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 {has been / will be} confirmed.

{**[Open Item -1:]** Confirm suppression pool heat capacity}

Vent Path and Discharge

{Existing} HCVS vent path at {Plant Name will consist(s)} 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

Part 2: Boundary Conditions for Wet Well Vent

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 plant stack.

- Or –

The HCVS discharge path {will be / is} routed to a point above any adjacent structure *[state any exceptions, for example: The cooling towers have a higher elevation but they are not adjacent to the Reactor Building. The Station's chimney is an adjacent structure, but it is impractical to raise the HCVS above the chimney.]* This discharge point is *{just above that unit's Reactor Building}* *such that* the release point will vent away from emergency ventilation system intake and exhaust openings, main control room location, location of HCVS portable equipment, access routes required following a ELAP and BDBEE, and emergency response facilities; however, these must be considered in conjunction with other design criteria (e.g., flow capacity) and pipe routing limitations, to the degree practical *[Describe basis for routing that does not avoid these areas, i.e., current routing, best position considering all items]*

The detailed design {will / addresses} missile protection to a maximum height of 30 feet from ground elevation, from external events as defined by NEI 12-06 for the outside portions of the selected release stack or structure. *[this should be a design element using reasonable protection features for the screened in hazards from NEI 12-06, engineering should use design basis missile hazards methods in the calculations. Examples could be specific details from the sites FSAR.](reference FAQ HCVS-04)*

Power and Pneumatic Supply Sources

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

Pneumatic power is normally provided by {the non-interruptible air system with backup nitrogen provided from installed nitrogen supply tanks. Following an ELAP event, station air system is lost, and normal backup from installed nitrogen supply tanks is isolated. Therefore, for the first 24 hours, pneumatic force will be supplied from newly installed air accumulator tanks. These tanks will supply the required motive force to those HCVS valves needed to maintain flow through the HCVS effluent piping.}

1. The HCVS flow path valves are *{air-operated valves (AOV) with air-to-open and spring-to-shut. Opening the valves requires energizing an AC powered solenoid operated valve (SOV) and providing motive air/gas. The detailed design will provide a permanently installed power source and motive air/gas supply]* adequate for the first 24 hours *[state if you are crediting FLEX to sustain DC power for >24 hours (If that option is selected during the detailed design, state the capability under the FLEX effort to maintain the DC source is still applicable under the EA-13-109 Order Elements)].* The initial stored motive air/gas will allow for a minimum of *{XX}* valve operating cycles for the HCVS valves for the first 24-hours
2. An assessment of temperature and radiological conditions *{has been / will be}* performed to ensure that operating personnel can safely access and operate controls at the {Remote Operating Station} based on time constraints listed in Attachment 2. *[controls not in the MCR]*
3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (i.e., electric power, N2/air) [*are / will be]* located in areas reasonably protected from defined hazards listed in Part 1 of this report.
4. All valves required to open the flow path *or valves that require manual operation to be closed to prevent*

Part 2: Boundary Conditions for Wet Well Vent

diversion or cross-flow into other systems/units[will be / are] designed for remote manual operation following a ELAP, such that the primary means of valve manipulation does not rely on use of a hand wheel, reach–rod or similar means that requires close proximity to the valve (reference FAQ HCVS-03). *[Describe how you are ensuring accessibility for radiological and environmental conditions, such as use of ice vests or shielding]* Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards listed in Part 1 of this OIP.

5. Access to the locations described above will not require temporary ladders or scaffolding.
   a. *[If the design provides any additional design features, add the information.]*
6. {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.}

Location of Control Panels

The HCVS design allows initiating and then operating and monitoring the HCVS from the Main Control Room (MCR) and *[specify the alternate location]*. The MCR location is protected from adverse natural phenomena and the normal control point for Plant Emergency Response actions. *[Address dose and temperature items for the non-MCR location, Utilize FAQ HCVS-01 in the response]*.

The final location of the ROS is the 147'elevation of the Control Building, one floor below the elevation of the MCR .

[**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

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).

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

[Response if dedicated containment isolation valves are used] {The HCVS uses PCIVs 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. A containment isolation signal will automatically de-energize the SOV causing the AOVs to shut. In a beyond design basis event, steps to manually override the containment isolation function have been incorporated into operating procedures to allow for operation of the HCVS.[for dedicated systems, an option is to maintain the valves closed and de-energized in lieu of having a containment isolation signal}

{*Response if "shared" containment isolation valves are used*} *{The HCVS uses the Containment Purge System containment isolation valves for containment isolation. These containment isolation valves are AOVs and they are air-to-open and spring-to-shut. An SOV must be energized to allow the motive air to open the*

Part 2: Boundary Conditions for Wet Well Vent

valve. Although these valves are shared between the Containment Purge System and the HCVS, separate control circuits are provided to each valve for each function. Specifically:

- *The Containment Purge System control circuit will be used during all "design basis" operating modes including all design basis transients and accidents.*
- *Cross flow potential exists between the HCVS and the Standby Gas Treatment System (SGTS). Resolution involves evaluation of SGTS isolation valve leakage for both inlet and outlet valves, as both interface with the HCVS. If necessary, these valves will be replaced with leak-tight valves. Testing and maintenance will be performed to ensure that the valves remain leak-tight.*
- *An addition cross-flow avenue exists between the HCVS of the two units 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. } [insert high level explanation describing why HCVS effluent will not backup into other plant systems/units that discharge to the stack. This explanation should include why the buoyancy of the vent process fluid will not be sufficient motive force to create backflow]*

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 {is/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. *[If the unit credits CAP, state specific CAP requirement that is maintained, otherwise state your site does not rely on CAP to maintain NPSH for ECCS pumps.]*

- The features that prevent inadvertent actuation are *[site specific list]* {two PCIV's in series powered from different division, a rupture disk, or key lock switches. *[If using a rupture disk for this purpose, but is NOT serving as primary containment boundary (in series with closed valves include "To serve this purpose, the rupture disk burst pressure is set above the maximum calculated design basis accident pressure" OR if rupture disk is serving as primary containment isolation boundary (in series with open valve(s) include "To serve this purpose, the rupture disk burst pressure is set above design pressure,]* 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 {except for components x, y, z. For those components, the structure {has been / will be} analyzed for seismic ruggedness to ensure that any potential failure would not adversely impact the function of the HCVS or other safety related structures or components} *[i.e. seismic category II over category I criteria]*. HCVS components that directly interface with the pressure boundary will be considered safety related, as the existing system is safety related. The containment system limits the leakage or release of radioactive materials to the environment to prevent offsite exposures from exceeding the guidelines of 10CFR100. During normal or design basis operations, this means serving as a pressure boundary to prevent release of radioactive material.

Likewise, any electrical or controls component which interfaces with Class 1E power sources will be considered safety related up to and including appropriate isolation devices such as fuses or breakers, as their failure could adversely impact

Part 2: Boundary Conditions for Wet Well Vent

containment isolation and/or a safety-related power source. The remaining components will be considered Augmented Quality. Newly installed piping and valves will be seismically qualified to handle the forces associated with the seismic margin earthquake (SME) back to their isolation boundaries. Electrical and controls components will be seismically qualified and will include the ability to handle harsh environmental conditions (although they will not be considered part of the site Environmental Qualification (EQ) program).

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

The HCVS instruments, including valve position indication, 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.

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

* The specific qualification method used for each required HCVS instrument will be reported in future 6 month status reports. *[include the specific qualification method used for each instrument if available]*

Monitoring of HCVS

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

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

Part 2: Boundary Conditions for Wet Well Vent

with {replaceable nitrogen bottles and FLEX generators.}

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

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, [has been / will be] designed/analyzed to conform to the requirements consistent with the applicable design codes (e.g., Non-safety, Cat 1, SS and 300# ASME or B31.1, NEMA 4, etc.) for the plant and to ensure functionality following a design basis earthquake.

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

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

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

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*, (Reference xxx) or a substantially similar industrial standard;
- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or
- seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

Part 2: Boundary Conditions for 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 *[has been / 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.
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 {has been / will be} designed to allow initiation, control, and monitoring of venting from {the Main Control Room (MCR) / or specify the alternate location}. This location minimizes plant operators' exposure to adverse temperature and radiological conditions and is 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 / x} hours. Permanently installed equipment will supply air and power to HCVS for 24 hours.

System control:

i. Active: {Control valves and/or PCIVs} are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS {will be / is} designed for {#} open/close cycles under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EPGs and associated implementing EOPs. *[add specific site details if available]* {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 *[describe the feature credited for protection of inadvertent actuation]*

{Rupture disk(s) are provided in the vent line downstream of the CIVs. Rupture disks can be intentionally breached from the [Main Control Room / alternate control location] as directed by applicable procedures. The CIVs must be open to permit vent flow. State what rupture disk burst pressure is based on (PSP, PCPL, design pressure, or other)

- OR –

Key lock switches located in the [Main Control Room / alternate control location] as directed by applicable procedures.

- *OR –*

Other}

Part 2: Boundary Conditions for Wet Well Vent
Part 2 Boundary Conditions for WW Vent: **BDBEE Venting**
Greater Than 24 Hour Coping Detail
Provide a general description of the venting actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed. **Ref: EA-13-109 Section 1.2.4, 1.2.8 / NEI 13-02 Section 4.2.2**
After {24 / x} hours, available personnel will be able to connect supplemental motive air/gas to the HCVS. Connections for supplementing electrical power and motive air/gas required for HCVS {will be / are} located in accessible areas with reasonable protection per NEI 12-06 that minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections {will be / are} pre-engineered quick disconnects to minimize manpower resources. *[State if you are crediting FLEX to sustain power for a BDBEE ELAP. If so, state that the response to NRC EA-12-049 will demonstrate the capability for FLEX efforts to maintain the power source.]* These actions provide long term support for HCVS operation for the period beyond 24 hrs. to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the unit(s) to provide needed action and supplies.
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.* **NEI 13-02 §6.1.2**
Primary Containment Control Flowchart exists to direct operations in protection and control of containment integrity, {including use of the existing Hardened Vent System}. Other site procedures for venting containment using the HCVS include: {31EO-TSG-001-0, Technical Support Guidelines; 31EO-EOP-101-1/2, Emergency Containment Venting; 31EO-EOP-1041/2, Primary Containment Venting for Hydrogen and Oxygen Control.}
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
EA-12-049 Modifications • DCPs SNC467474 and SNC476661 will provide the Inverters that will convert station battery DC power into AC power for use by the end-users needed for HCVS operation. • DCPs SNC440278 and SNC539300 will provide both the air accumulators and the nitrogen bottles needed for pneumatic support of the HCVS air actuators for the first 72 hours following an ELAP event. It will install the means to manually burst the rupture disk in the HCVS header to allow for flow. • DCP SNC469007 will provide forced ventilation to MCR for operator habitability and HCVS equipment controls and instrumentation functionality. EA-13-109 Modifications • A modification will be required to install the dedicated batteries and the disconnect switches needed to supply power to HCVS for the second 12 hours following the ELAP event once station batteries have been depleted. • A modification will be required to install a Remote Operation Station for both units.

Part 2: Boundary Conditions for Wet Well Vent

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

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

Key Venting Parameters:

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

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

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

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

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

HCVS indications for HCVS valve position indication, HCVS pneumatic supply pressure, HCVS effluent temperature, and HCVS system pressure will be installed in the MCR to comply with EA-13-109. {All of the indications listed above will be installed at the Remote Operating Station.}

Notes:

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 EA12-049 were not successfully initiated. Access to the reactor building will be restricted as determined by the RPV water level and core damage conditions. ~~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 (Table 2-1).

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

System control:

i. Active: Same as for BDBEE Venting Part 2. {In addition to the EOPs/SOPs, SAMGs may also direct actions needed for severe accident conditions.}

ii. Passive: Same as for BDBEE Venting Part 2, except {the rupture disk has a burst set pressure which has been determined to be above the maximum inlet header pressure expected during a design basis event. In a severe accident scenario, the pressure from the wet well will be able to burst the rupture disk unassisted, as it will be above the pressure expected during the worst case design basis event.}

Details:

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

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

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]: 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.

Part 2: Boundary Conditions for Wet Well Vent
Part 2 Boundary Conditions for WW Vent: **Severe Accident Venting**
First 24 Hour Coping Detail
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
The operation of the HCVS is governed the same for SA conditions as for BDBEE conditions. Existing guidance in the SAMGs directs the plant staff to consider changing radiological conditions in a severe accident.
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
The same as for BDBEE Venting Part 2 {except ….}
Key Venting Parameters: *List instrumentation credited for the HCVS Actions. Clearly indicate which of those already exist in the plant and what others will be newly installed (to comply with the vent order)*
The same as for BDBEE Venting Part 2 {except ….}
Notes:

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 {POS} or ROS {except for breaching of the rupture disc for anticipatory 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 batteries will provide sufficient electrical power for HCVS operation for greater than {XX} hours. Before station batteries are depleted, portable FLEX diesel generators, as detailed in the response to Order EA-12-049, will be credited to charge the station batteries and maintain DC bus voltage after {XX} 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 station service batteries, which at that point will be backed up by FLEX generators evaluated for SA capability.

Nitrogen bottles that will be located outside of the reactor building and in the immediate area of the ROS} will be available to tie-in supplemental pneumatic sources.

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, argon bottles needed to burst the rupture disk and the nitrogen bottles} needed to supplement the air supply to the AOVs after 24 hours. These will be staged in position for the duration of the event.

Identify modifications*:*

List modifications and describe how they support the HCVS Actions.

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

Part 2: Boundary Conditions for Wet Well Vent

Part 2 Boundary Conditions for WW Vent: **HCVS Venting Portable Equipment Deployment**

Provide a general description of the venting actions using portable equipment including modifications that are proposed to maintain and/or support safety functions.

Ref: EA-13-109 Section 3.1 / NEI 13-02 Section 6.1.2, D.1.3.1

Deployment pathways for compliance with Order EA-12-049 are acceptable without further evaluation needed except in areas around the Reactor Building or in the vicinity of the HCVS piping. Deployment in the areas around the Reactor Building or in the vicinity of the HCVS piping will allow access, operation and replenishment of consumables with the consideration that there is potential Reactor Core Damage and HCVS operation.

Details:

Provide a brief description of Procedures / Guidelines:

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

Operation of the portable equipment is the same as for compliance with Order EA-12-049 thus they are acceptable without further evaluation

HCVS Actions	Modifications	Protection of connections
Identify Actions including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA12-049 (FLEX)

Notes:

Part 3: Boundary Conditions for EA-13-109, ~~SAWA~~Option B.2 ~~Dry Well Vent~~
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 SA-DW 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)* *{The Licensee shall utilize the appropriate subsection (3.1.A or 3.1.B) in the OIP, the other subsection can be marked not applicable (N/A) to their strategy. 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**

Part 3: Boundary Conditions for EA-13-109, ~~SAWA~~Option B.2 ~~Dry Well Vent~~

The operation of the HCVS using SAWA and SAWM/SADV will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1. Initial operator actions will be completed by plant personnel and will include the capability for remote-manual initiation from {the equipment deployment location/HCVS control station}.

Timelines (see attachments 2 and 2.1.A for SAWA, 2.1.A for SAWM, and 2.1.B for SADV) 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 do not assume the core is ex-vessel and the actions taken are appropriate for both in-vessel and ex-vessel core damage conditions.

Part 3.1: Boundary Conditions for SAWA

Table 3.1 – SAWA Manual Actions

Primary Action	Primary Location / Component	Notes
1. Establish HCVS capability in accordance with Part 2 of this guidance.	▪ POS / ROS	▪ Applicable to all SAWA/SAWM and SAWA/SADV strategies
2. Connect SAWA pump / motive component to water source	—River, —Condenser, ▪ TB floor	
3. Connect SAWA pump discharge to injection piping	▪ Use installed piping	▪ SW – RHR emergency fill line
4. Power up {SAWA valves} with {EA-12-049 (FLEX) generator}	▪ RHR valves may be operated from the control room	▪ Should be done as soon as possible
5. Power up SAWA electric pump(s) with ~~049~~ FLEX Generator		
6. Inject to {RPV / DW} using SAWA pump (diesel or electric)		—Initial SAWA injection rate is {500 gpm – or plant-specific number} {put SAWA flow and basis here} ▪
~~2.~~7. Monitor SAWA indications		▪ List indications used/required ○ Pump Flow ○ Valve Position
8. Use SAWM to maintain availability of the WW vent (Section 3.1.A~~B~~) OR Use SADV with SAWA to maintain containment pressure and heat removal (Section 3.1.B)		

Discussion of timeline SAWA identified items

~~There are two timelines:~~

~~SAWA / SAWM is capable of controlling WW level to ensure the WW vent is available for 7 days~~

~~If <7 days, plant specific description of how alternate decay heat removal capabilities will not require the DW vent to be used for containment pressure control for a least 7 days post event~~

~~SAWA / SAWM requires the use of a SADV due to loss of the WW vent prior to 7 days~~

~~Describe the plant modifications required for the SADV in this section~~

~~Injection using SAWA is preferred to be inside the RPV to assist in cooling any remaining debris inside the vessel. The~~

Part 3.1: Boundary Conditions for SAWA

~~water would then follow the path to the DW and cool the core debris that has left the vessel.~~

~~Injection using SAWA is preferred to be inside the RPV to assist in cooling any remaining debris inside the vessel. The water would then follow the path to the DW and cool the core debris that has left the vessel.~~

~~Injection flowrates are determined based on {analysis or assumption / scaling} and are monitored at {provide location}.~~

~~The HCVS is assumed to be available to be placed in service when needed. If anticipatory venting actions taken for EA-12-049 have opened the vent, it may be controlled (closed / opened) for SAWA if desired.~~ HCVS operations are ~~taken~~discussed under Phase 1 of EA-13-109 (Section 2 of this OIP).

- ~~WW~~XX Hours – Establish electrical power and other EA-12-049 actions needed to support the strategies for EA-13-109, Phase 1 and Phase 2. ~~Unless otherwise stated, the actions being taken under EA-12-049 that support the SAWA / SAWM strategies inside the reactor building are assumed to be complete prior to the level in the vessel reaching the 2/3 Core Height.~~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.

~~This is based on the expected gap release from the core occurring at one hour after event initiation.~~

~~Access to the upper areas of the reactor building may be possible based on the gap release being contained within the RPV and WWWetwell areas until the HCVS is opened.~~

- Less than 8 Hours – Initiate SAWA flow to the {DW / 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 ~~venting capability~~operating requirements for ~~Severe Accident Venting~~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

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

The motive force equipment needed to support the SAWA strategy shall be available prior to t=8 hours from the event initiation. ~~(4.2.2.4.1.3.1)~~

The SAWA flow path includes methods to minimize exposure of personnel to radioactive liquids / gases and potentially flammable conditions by inclusion of ~~a check valve to prevent~~ backflow prevention. {The check valve is integral with the pump skid and will close and prevent leakage when the SAWA pump is secured.} {Describe the backflow prevention device here}

Description of SAWA actions for first 24 hours:

Part 3.1: Boundary Conditions for SAWA

T<1 hr=0:

- Reactor scram occurs, coincident with extended loss of AC power. Plant transient is recognized and actions are taken to establish injection flow to the RPV and re-establish electrical power.
- Initial actions are taken to recognize conditions that can lead to rapid core damage and EA-12-049 actions are taken in the reactor building.
- For Severe Accident Conditions it is conservatively assumed that loss of all injection starts at T=0No evaluation required for actions inside the reactor building for SAWA. Expected actions are:
  - *{put in actions}*

Tt=1 – 8 hr:

- Evaluation of cCore 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:
  - *{List actions}occurs. The release is contained inside the RPV and {WW (Mk 1) and containment (Mk II)}. {Discuss particular retention of gap release for your containment design}. Access to upper elevations of the reactor building may be possible due to the retention of the gap source term in the RPV and WW areas.*
  - *It is assumed that reactor building access is securedlimited due to the source term at this time unless otherwise noted.*

Tt=XX:

- Establish electrical power for SAWA systems and indications *using {EA-12-049, or other systems}. {Describe systems used to provide electrical power}*
  - *{step 4 and 5 of table 3.1 above}}*
- Establish flow to the *{RPV or DW}* using SAWA systems. Begin injection at a maximum rate, not to exceed 500 gpm. *{Put in reference for flowrate}*
  - *{steps 2,3,and 6 of table 3.1 above}*

Tt<=8 -12 hr:

- RPV breach occurs and the core re-locates to the pedestal area in the DW.
- If not already performed, establish SAWA flow to the RPV or DW at a flowrate of at most 500 gpm. Continue injection at this rate for {YY4} hours after SAWA injection begins at initial SAWA rate.

Monitor containment conditions:

DW pressure

WW pressure

WW level

Tt<=1412 hrss:

- *{Proceed to SAWM actions (Section 3.1.A) or SADV actions (Section 3.1.B)}*

Monitor containment parameters and lower SAWA flowrate to maintain HCVS operation.

Proceed to SAWM actions (Section 3.B)

Greater Than 24 Hour Coping Detail

Part 3.1: Boundary Conditions for SAWA

Provide a general description of the ~~venting~~ SAWA ~~and SAWM~~ 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, ~~X.X.x~~

SAWA Operation is the same for the full period of sustained operation. If SAWM is employed flow rates will be directed to preserve the availability of the HCVS wetwell vent (see 3.1.A). If SADV is used containment flooding with SAWA will be directed upon loss of the HCVS wetwell vent (see 3.1.B).

Details:

Details of Design Characteristics/Performance Specifications

{SAWA shall be capable of providing a RPV or DW injection ~~rates shall be~~ 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 ~~X.X.X~~ 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, plant-specific dose analysis for the venting of containment during the SA conditions)

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. The indications include (* are minimum) ~~(reference NEI 13-02 rev.1 , section I.1.6)~~

Parameter	Instrument	Location	Power Source / Notes
*DW Pressure			EA-12-049 generator
*WW Level			Station batteries
*SAWA Flow			SAWA pump (skid mounted device)
SAWA pump power			EA-12-049 generator
Valve controls			

Part 3.1: Boundary Conditions for SAWA

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.

Any SAWA component and connections external to protected buildings have been protected against the screened-in hazards of EA-12-049 for the station. {Describe the reasonable protection provided for equipment.} ~~(reference NEI 13-02 rev.1 , section 5.1.1)~~. Portable equipment used for SAWA implementation will meet the protection requirements for storage~~be stored~~ in accordance with the criteria in NEI 12-06.

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

Provide a brief description of Procedures / Guidelines:

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

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

{Provide a brief description of Procedures / Guidelines: to be used for SAWA, likely an FSG}

Identify modifications*:*

List modifications and describe how they support the SAWA~~HCVS~~ Actions.

Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X

{Provide a brief description of modifications planned for SAWA}

Component Qualifications:

State the qualification used for equipment supporting SAWA

Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X

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.

Notes:

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

[state your plant option from the 3 above]

{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 Name) 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. OR {Explain how your plant is bounded by the reference plant and related curves C-2 through C-6}. (C.7.1.4.1)

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). DW Temperature monitoring is not a requirement for compliance with Phase 2 of the order, but some knowledge of temperature characteristics provides information for the operation staff to evaluate plant conditions under a severe accident and provide confirmation to adjust SAWA flow rates. (C.7.1.4.2), C.8.3.1)

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

OR

Part 3.1.A: Boundary Conditions for SAWA/SAWM

{(Plant Name) has a freeboard height of XX feet in the torus, providing an additional YY gallons of water between loss of indication of the torus level and coverage of the WW vent, removing the HCVS from service. The time to reach the level at which the WW vent must be secured is >7days using SAWM flowrates required by analysis.}

OR

{Based on the SAWM flowrates, the torus level indication will be lost at XX hours and the vent will need to be secured at YY hours. However, the containment decay heat at that time will be ZZ and SAWM injection rate will continue to absorb the decay heat and the containment will not reach PCPL, or the limiting containment pressure, whichever is lower, until AAA hours, which is >168 hours from the initiation of ~~SAWA~~ELAP.} (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 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 3.1.A~~2C~~ shows the timeline of events for SAWM. (C.7.1.4.4)

--- OR ----

{SAWM can be maintained at least 72 hours, but less than 7 days:}

[Provide all information required in 3.B.1 and the additional as well as:]

When the HCVS is no longer available, alternate decay heat removal will be accomplished by {describe two or three methods…..} (C.7.2.1, C.7.2.4.1)

[Section C.7.2 describes the rationale for allowing time to establish alternate decay heat removal. The use of SAFER equipment after 72 hours is allowable. The station should explain how alternate decay heat removal will be established prior to exceeding the PCPL or limiting containment pressure, whichever is less and maintained for the Sustained Operating period. Plant modifications and procedures are not required, but possible methods need to be discussed. Include:

- *Equipment needed (ex: heat exchangers, pumps)*
- *General locations of equipment including piping and power connections*
- *Evaluation of accessibility to locations to get equipment and accomplish actions*
- *Common tools and equipment needed to install the proposed method*
- *Special equipment needed that will not be typically available on-site (if applicable)] C.7.2.4.1, C.7.2.4.2*
- *Discussion of required in-service time, including the time to establish reliable alternate decay heat removal systsem*

Attachment ~~2C~~ 3.1.A shows the timeline of events for SAWM. (C.7.1.4.4)

--- OR ----

{SAWM can be maintained <72 hours:}

[Provide information required in 3.B.1 and 3.B.2. In addition, provide the following as well:]

[Provide detailed information on how alternate reliable decay heat removal will be implemented for one method from the time the WW vent cannot be preserved until the end of the 7 day Sustained Operation period. (C.7.3.1)

- *Include a functional level description of guidelines that will be used to provide power to instrumentation needed to support alternate reliable containment heat removal and alternate pressure control*
- *A functional level description of procedures that will be used to manage SAWA flow so that the WW vent is*

Part 3.1.A: Boundary Conditions for SAWA/SAWM

preserved through the Sustained Operation period. (C.7.3.2.3, C.6.3)

- *A listing of installed, on-site and off-site portable equipment that will be utilized to support the alternate reliable containment heat removal and pressure control strategy including any modifications necessary to connect and utilize the equipment for the one method selected. (C.7.3.2.4)*
- *A listing of instrumentation that will be utilized to implement the alternate reliable containment heat removal and pressure strategy. (C.7.3.2.5)*
- *A timeline showing the sequence of events from when the WW vent is no longer preserved through the 7 day Sustained Operation period. Attachment 2C shows the timeline of events for SAWM. (C.7.3.2.6)*
- *Plant specific analysis that demonstrates the alternate reliable containment heat removal and pressure control strategy maintains the containment pressure below the PCPL or design pressure, whichever is lower for the duration of the 7 day Sustained Operation period. (C.7.3.2.7)]*

Table 3.1.B – SAWM Manual Actions

Primary Action	Primary Location / Component	Notes
1. Lower SAWA injection rate to control WW level and decay heat removal		■ Control to maintain containment and WW parameters to ensure WW vent remains operational. ■ 100 gpm minimum unless analysis shows otherwise
2. Control to SAWM flow rate for containment control / decay heat removal		■ List Monitored indications o Flow o WW level o DW press ■ Describe SAWM control methods
3. Establish alternate source of decay heat removal		■ *[If <7days from event, see applicable section asbove for required information]*
4. Secure SAWA / SAWM ~~unless needed for alternate decay heat removal~~		■ Done after the Sustained Operation period, ~~or~~ when reliable alternate containment decay heat removal is established.

SAWM Time Sensitive Actions

Time Sensitive SAWM Actions:

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

SAWM **Severe Accident Operation**

Part 3.1.A: Boundary Conditions for SAWA/SAWM

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

It is anticipated that SAWM will only be used in Severe Accident Events based on presumed failure of injection systems. ~~The operating requirements for SAWM are the same as for the HCVS as described in NEI 13-02 applicable sections.~~

First 24 Hour Coping Detail

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

Given the initial conditions for EA-13-109:

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

Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x

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

Once the SAWA initial low rate has been established for 4 hours, the flow will be reduced ~~to 100 gpm while~~ monitoring DW pressure and torus level. ~~This will continue until the torus level is rising and DW pressure is stable or lowering, indicating that SAWM flow rate at 100 gpm is greater than the decay heat production. At that point,~~ SAWM flow rate can be lowered to maintain containment parameters and preserve the WW vent path. SAWM~~A~~ will be capable of injectioning ~~at a minimum of 100 gpm~~ for the period of S~~first 7 days of s~~ustained O~~o~~peration.

Greater Than 24 Hour Coping Detail

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

Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x

{SAWM can be maintained >7 days:}

The SAWM flow strategy will be the same as the first 24 hours until 'alternate reliable containment heat removal and pressure control' is reestablished. SAWM flow strategy uses the SAWA flow path. *{No additional modifications are being made for SAWM.}*

---- OR ---

{SAWM can be maintained at least 72 hours, but less than 7 days:}

The SAWM flow strategy will be the same as the first 24 hours until the WW vent is no longer functional (for at least 72 hours, but less than 7 days). Once the WW vent is no longer functional, SAWM flow strategy will be controlled based on DW pressure and minimum SAWM flowrate.

The time until the WW vent is unavailable is dependent upon torus level and SAWM injection rate.

- The torus level indication is expected to survive XX hours, *{leaving a freeboard volume in the torus of YY gallons.*

Part 3.1.A: Boundary Conditions for SAWA/SAWM
○ *With SAWM flow of ~~100~~ XX gpm, this will provide ZZ hours until the WW vent is unavailable.* ○ *This is conservative, based on not taking into consideration torus boil-off or WW vent flow after the level indication is lost.}* The SAWM flow will be maintained until 'alternate reliable containment heat removal and pressure control is established'. SAWM flow strategy uses the SAWA flow path. No additional modifications are being made for SAWM. *{sites will need to describe the proposed actions and tooling need to connect the alternate reliable containment heat removal and pressure control'}* ***---- OR ---*** *{SAWM can be maintained <72 hours:}* The SAWM flow strategy will be the same as the first 24 hours until the WW vent is no longer functional. SAWM flow strategy uses the SAWA flow path. *{No additional modifications are being made for SAWM.}* Modifications will be installed to provide for alternate reliable containment heat removal and pressure control prior to the loss of the HCVS functionality*{sites to provide details on the modifications planned}*
Details:
Details of Design Characteristics/Performance Specifications **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X**
SAWM shall be capable monitoring the containment parameters (DW pressure and Suppression Pool Level) to provide guidance on when injection rates shall be reduced ~~from 500 gpm to 100 gpm or lower~~, until alternate containment decay heat/pressure control is established. SAWA will be capable of injection for the period of Sustained Operation.~~SAWA flow capability of a minimum of 100 gpm will be maintained for the Sustained Operation period~~
Equipment Locations/Controls/Instrumentation *Describe location for SAWM monitoring and control.* **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.X**
The SAWM control location is the same as the SAWA control location. *[Or describe alternate location]* Local indication of SAWM flow is provided at *{the pump skid or other location}* by installed flow instrument qualified to operate under the expected environmental conditions. *{Injection flowrate is controlled ~~by the RHR injection valves from the MCR~~by_________________ located at _________, being powered by the FLEX DG installed under EA-12-049. The RHR flow indicators will not work at the low flow rates for SAWM, so communications are established between the SAWM control location and the MCR.* 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 / DW}*.

Part 3.1.A: Boundary Conditions for SAWA/SAWM
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 / equivalent} and are the same as listed in section 2 of this OIP. The SAWM flow instrumentation will be qualified for the expected environmental conditions expected when needed.}
Notes:

Part 3.1.B: Boundary Conditions for SAWA/SADV

Applicability of WW Design Considerations

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.

Table 3.1.C – SADV Manual Actions

Primary Action	Primary Location / Component	Notes
1. Monitor Suppression Pool level and DW pressure. Close WW vent when no longer operational.		■ **List indications:** o **DW press** o **Suppression Pool level** o **WW valve position**
2. Continue to flood containment with SAWA		
3. Operate SADV to control DW pressure		
4. Secure SAWA / SADV unless needed for alternate decay heat removal		Done when reliable alternate containment decay heat removal is established.

Timeline for SADV

~~Develop a timeline for SADV~~ *{Describe timeline for SADV actions from the time the WW vent is no longer operational}*

Timeline for SADV is developed (Attachment ~~2D~~3.1.B) and includes the following:

{SAWM is used for containment heat removal keeping containment pressure less than PCPL or design pressure whichever is lower. When the WW vent is no longer able to vent containment and control containment pressure, the SADV (545 Deg F) is used for containment pressure control.}

- SAWA / SAWM requires the use of a SADV due to loss of the WW vent prior to 7 days
  - Describe the plant modifications required for the SADV in this section

Severe Accident Venting

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

Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x

Part 3.1.B: Boundary Conditions for SAWA/SADV
The venting requirements for SAWA with a SADV are the same as for the HCVS as described in NEI 13-02 applicable sections.
First 24 Hour Coping Detail
Provide a general description of the SADV actions for first 24 hours using installed equipment including station modifications that are proposed. {SAWA injection is established as detailed in Part 3.1. The plant will also implement the SAWM actions in Part 3.1.B and establish conditions to maximize the availability of the WW vent. When the WW vent path is no longer functional, then the SADV will be placed in service. } **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x**
{Provide site specific details}
Greater Than 24 Hour Coping Detail
Provide a general description of the SADV actions for greater than 24 hours using portable and installed equipment including station modifications that are proposed. **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section X.X.x**
{The SADV will be placed in service to control containment pressure and remove decay heat once the WW vent is no longer functional. Describe the actions needed to control the SADV including instrumentation being used.} ~~*{Provide site specific details}*~~
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.* **Ref: EA-13-109 Section X.X.X / NEI 13-02 Section 6.1.2**
{Provide site specific details}
Identify modifications*:* *List modifications and describe how they support the SADV Actions.*
{Provide site specific details}

Part 3.1.B: Boundary Conditions for SAWA/SADV
Key Venting Parameters: *List instrumentation credited for the SADV Actions.*
The vent parameters for HCVS are as listed in Section 2 of this OIP. The same criteria apply to the SADV except that the temperature qualification for SADV and common SADV – HCVS components is 545 deg F. *{Additional Parameters used for SADV are (if any):}*

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 ~~all modes of operation and during~~ Severe Accidents.

Procedures:

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

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

- appropriate conditions and criteria for use of the HCVS
- when and how to place the HCVS in operation,
- the location of system components,
- instrumentation available,
- normal and backup power supplies,
- directions for sustained operation, including the storage location of portable equipment,
- training on operating the portable equipment, and
- testing of portable equipment

[If the plant utilizes CAP for ECCS pump NPSH] {The procedures should state that "use of the vent may impact NPSH."}

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

The provisions for out-of-service requirements for HCVS/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:

Part 4: Programmatic Controls, Training, Drills and Maintenance

- 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.
- Initiate action to implement appropriate compensatory actions

Describe training plan

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

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

Personnel expected to perform direct execution of the {HVCS/SAWA/SAWM/SADV 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 {HVCS/SAWA/SAWM/SADV actions, ~~HCVS~~systems or strategies}. Training content and frequency will be established using the Systematic Approach to Training (SAT) process.

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

Identify how the drills and exercise parameters will be met.

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

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

{The Licensee should demonstrate use of the HCVS/SAWA/SAWM/SADV 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 or SADV to provide decay heat removal and containment pressure control.

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* {HVCS/SAWA/SAWM/SADV} ~~*HCVS/SAWA/SAWM/SADV*~~ *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).*

Part 4: Programmatic Controls, Training, Drills and Maintenance

- *Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.*
- *Preventive maintenance should be determined based on equipment type and expected use. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.*
- *Existing work control processes may be used to control maintenance and testing.*

- {HVCS/SAWA/SAWM/SADV} ~~HCVS/SAWA/SAWM/SADV~~ *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/SAWM/SADV } ~~HCVS/SAWA/SAWM/SADV~~ *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/SADV} ~~HCVS/SAWA/SAWM/SADV~~ 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.

{Site Name} 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[1] and the interfacing system boundary valves not used to maintain containment integrity during Mode 1, 2 and 3. For HCVS valves, this test may be performed concurrently with the control logic test described below.	Once per every[2] operating cycle
Cycle the HCVS and installed SAWA check valves not used to maintain containment integrity during unit operations[3]	Once per every other[4] operating cycle
Perform visual inspections and a walk down of HCVS and installed SAWA/SADV components	Once per every other[4] operating cycle
Functionally test the HCVS radiation monitors.	Once per operating cycle

Part 4: Programmatic Controls, Training, Drills and Maintenance

Leak test the HCVS/SADV.	1. Prior to first declaring the system functional; 2. Once every three operating cycles thereafter; and 3. After restoration of any breach of system boundary within the buildings
Validate the HCVS operating procedures by conducting an open/close test of the HCVS control function from its control location and ensuring that all HCVS vent path and interfacing system boundary valves[5] move to their proper (intended) positions.	Once per every other operating cycle

[1] Not required for HCVS and SAWA check valves.
[2] After two consecutive successful performances, the test frequency may be reduced to a maximum of once per every other operating cycle.
[3] Not required if integrity of check function (open and closed) is demonstrated by other plant testing requirements.
[4] After two consecutive successful performances, the test frequency may be reduced by one operating cycle to a maximum of once per every fourth operating cycle.
[5] Interfacing system boundary valves that are normally closed and fail closed under ELAP conditions (loss of power and/or air) do not require control function testing under this 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:

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 *{Include date changes in this column}*
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		

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}*
Hold preliminary/conceptual design meeting			
Submit Overall Integrated Implementation Plan	December 2015		
Submit 6 Month Status Report	June 2016		
Submit 6 Month Status Report	December 2016		
Submit 6 Month Status Report	June 2017		
U2 Design Engineering On-site/Complete			
Submit 6 Month Status Report	December 2017		
Operations Procedure Changes Developed			
Site Specific Maintenance Procedure Developed			
Training Complete			
U2 Implementation Outage	*May 2018*		
Procedure Changes Active	May 2018		
U2 Walk Through Demonstration/Functional Test			
U1 Design Engineering On-site/Complete			
Submit 6 Month Status Report			
Submit 6 Month Status Report			
U1 Implementation Outage			
U1 Walk Through Demonstration/Functional Test			
Submit Completion Report			

Part 5: Milestone Schedule
Notes:

Attachment 1: HCVS/SAWA/SADV Portable Equipment

List portable equipment	*BDBEE Venting*	*Severe Accident Venting*	*Performance Criteria*	*Maintenance / PM requirements*
Argon Cylinders	**X**		**N/A**	**Check periodically for pressure, replace or replenish as needed**
Nitrogen Cylinders	**X**	**X**	**TBD**	**Check periodically for pressure, replace or replenish as needed**
FLEX DG (and associated equipment)	**X**	**X**	**TBD**	**Per Response to EA-12-049**
SAWA Pump (and associated equipment)	**X**	**X**	**TBD**	**Per Response to EA-123-04109**

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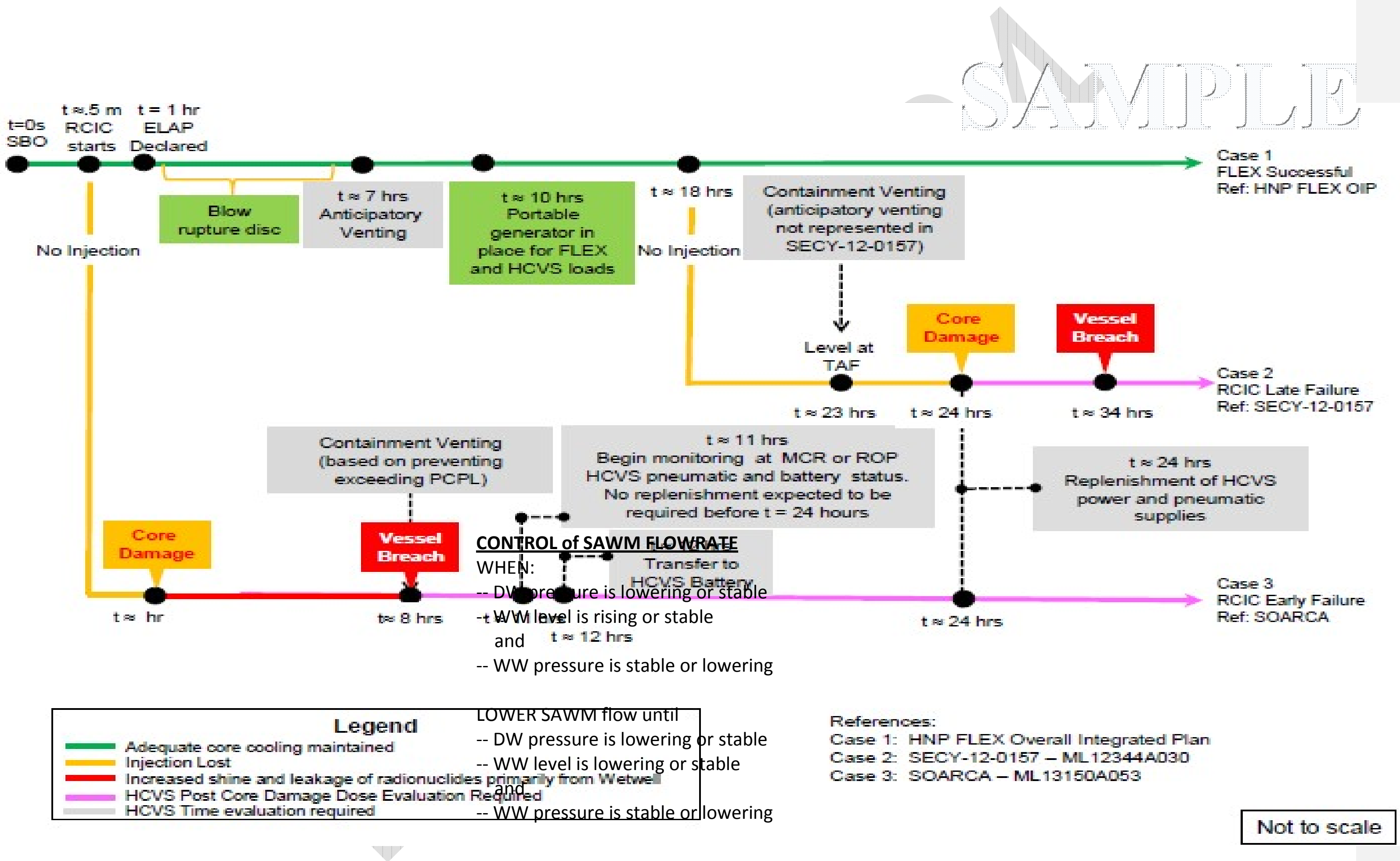

CONTROL of SAWM FLOWRATE

WHEN:

-- DW pressure is lowering or stable

-- WW level is rising or stable

and

-- WW pressure is stable or lowering

LOWER SAWM flow until

-- DW pressure is lowering or stable

-- WW level is lowering or stable

and

-- WW pressure is stable or lowering

Attachment 2A: Sequence of Events Timeline – HCVS

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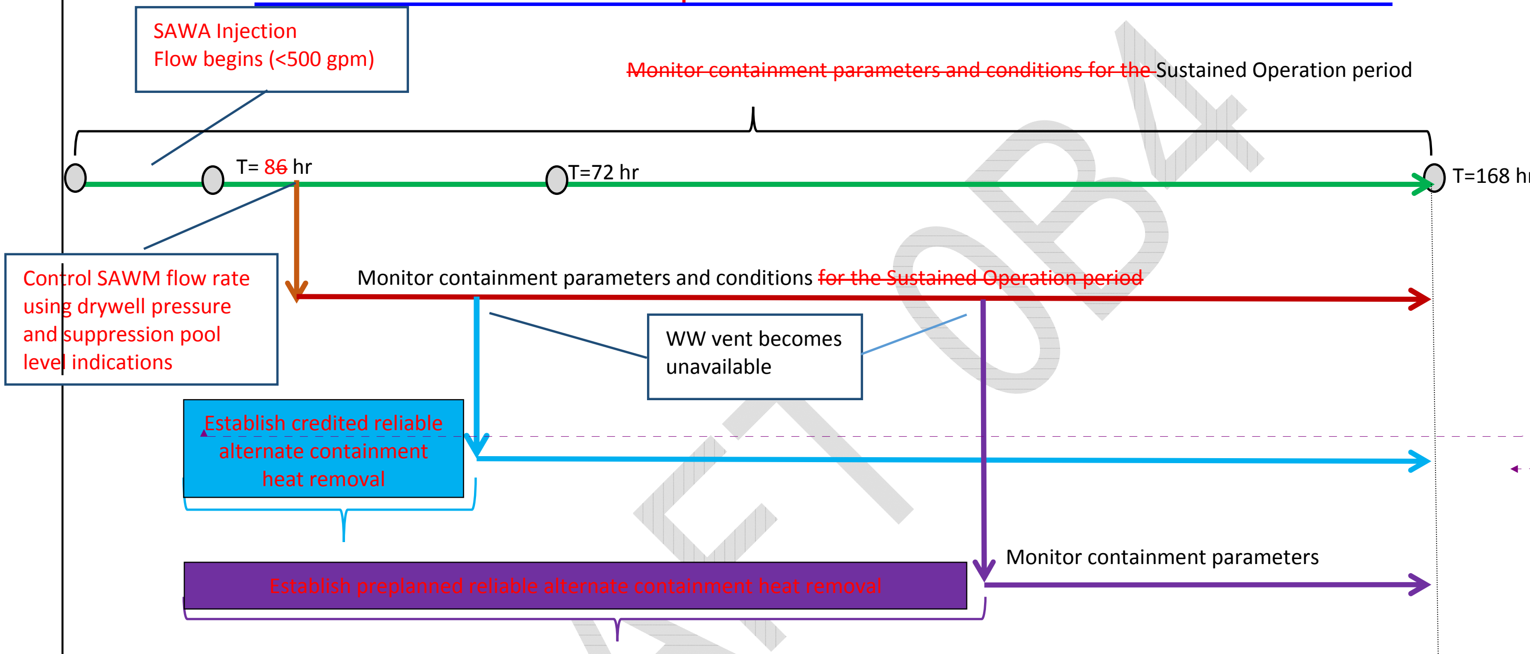
SAWA Injection Begins

SAWA Injection Begins

Attachment 2B2.1.A: Sequence of Events Timeline – SAWA / SAWM



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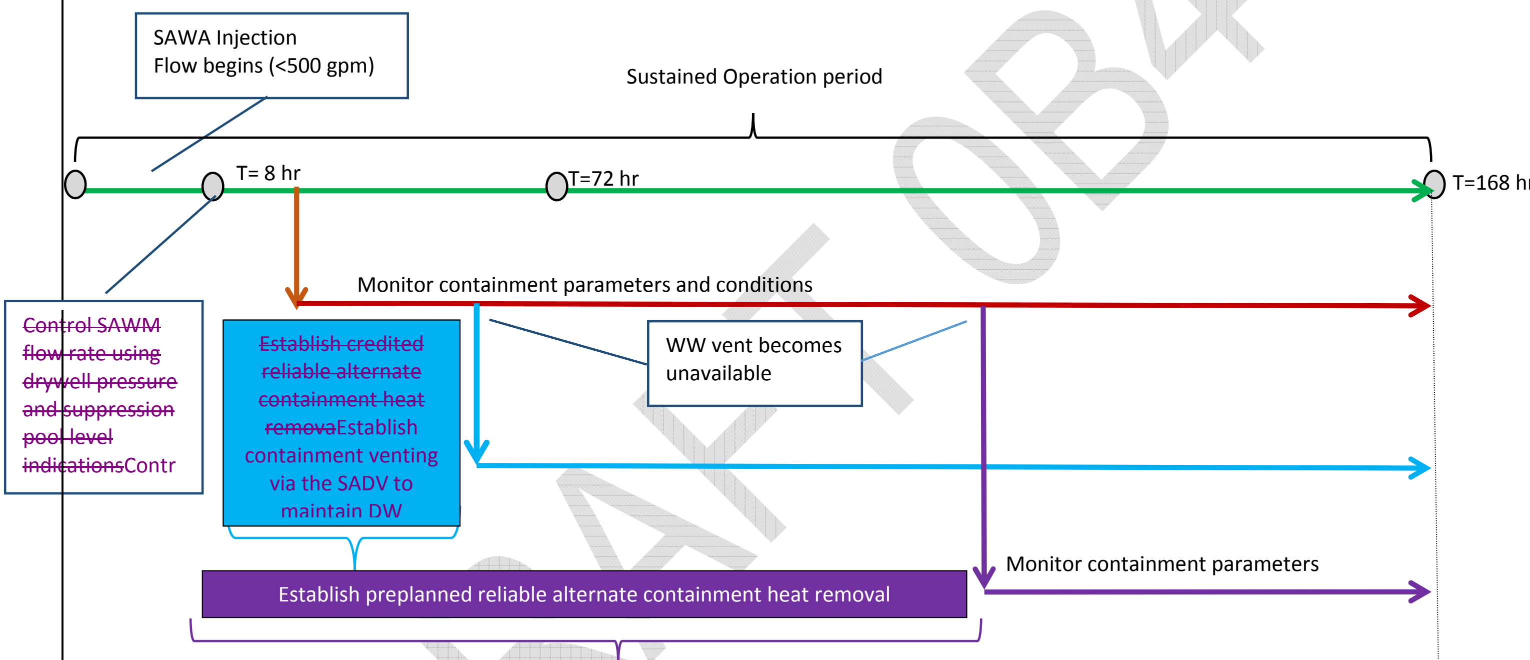
~~Attachment 2C: Sequence of Events Timeline – SAWM~~

Attachment 2B: Sequence of Events Timeline - SAWA

Attachment 2C: Sequenceof Events Timeline - SAWM

Attachment 2.1.B2D: Sequence of Events Timeline – SADV



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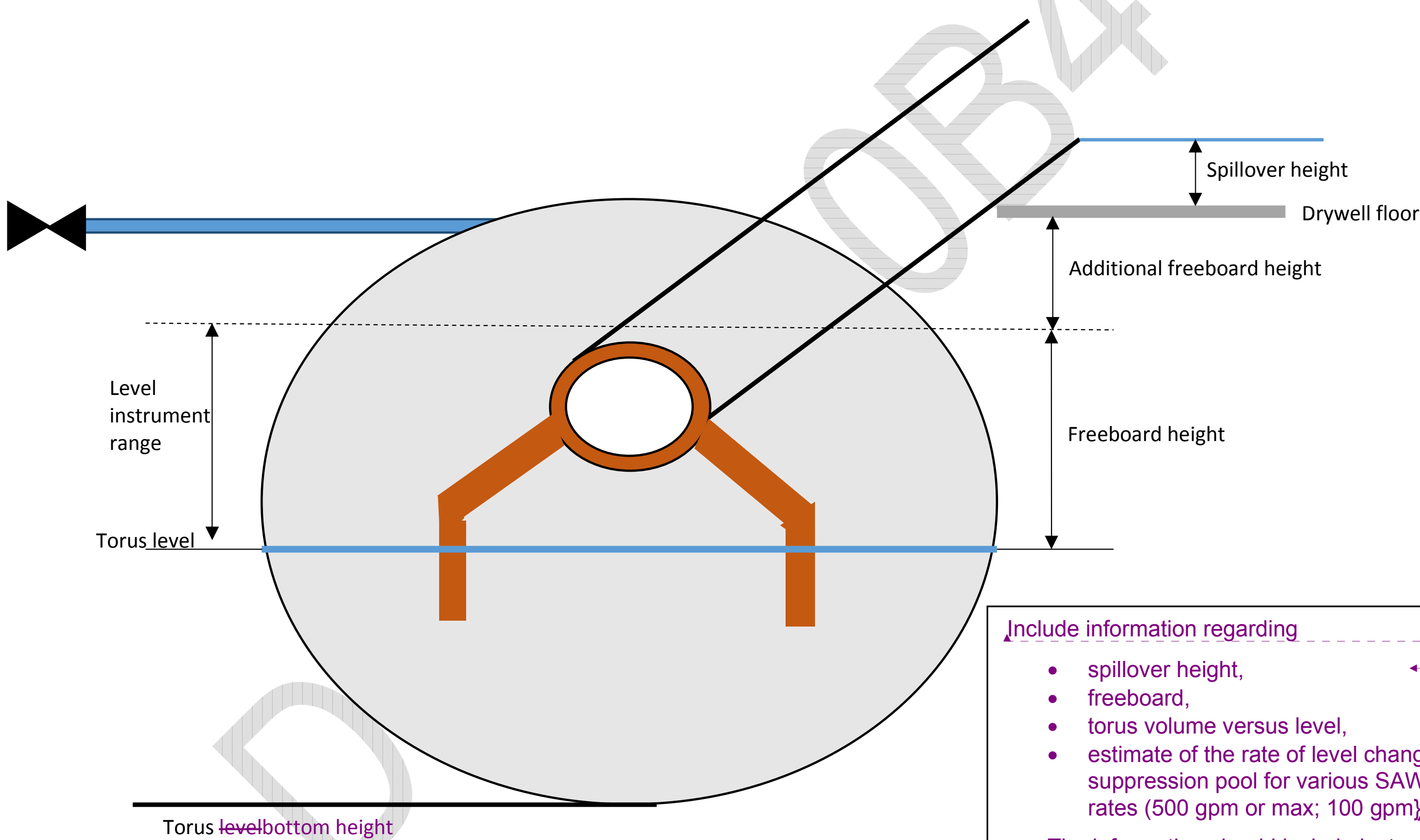
Attachment 2.1.C: SAWA / SAWM Plant-Specific Datum

{Add Plant-specific data for spillover height, freeboard, instrument range, etc.}



Include information regarding

- spillover height,
- freeboard,
- torus volume versus level,
- estimate of the rate of level change in the suppression pool for various SAWA flow rates (500 gpm or max; 100 gpm).

The information should include instrumentation used to monitor containment water level and SAWA flow rate.

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Attachment 2D: Sequence of Events Timeline -

Attachment 3: Conceptual Sketches

Attachment 2C: Sequence of Events Timeline - SAWM

(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)*

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- 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) or P&ID Layout of SADV (preliminary)

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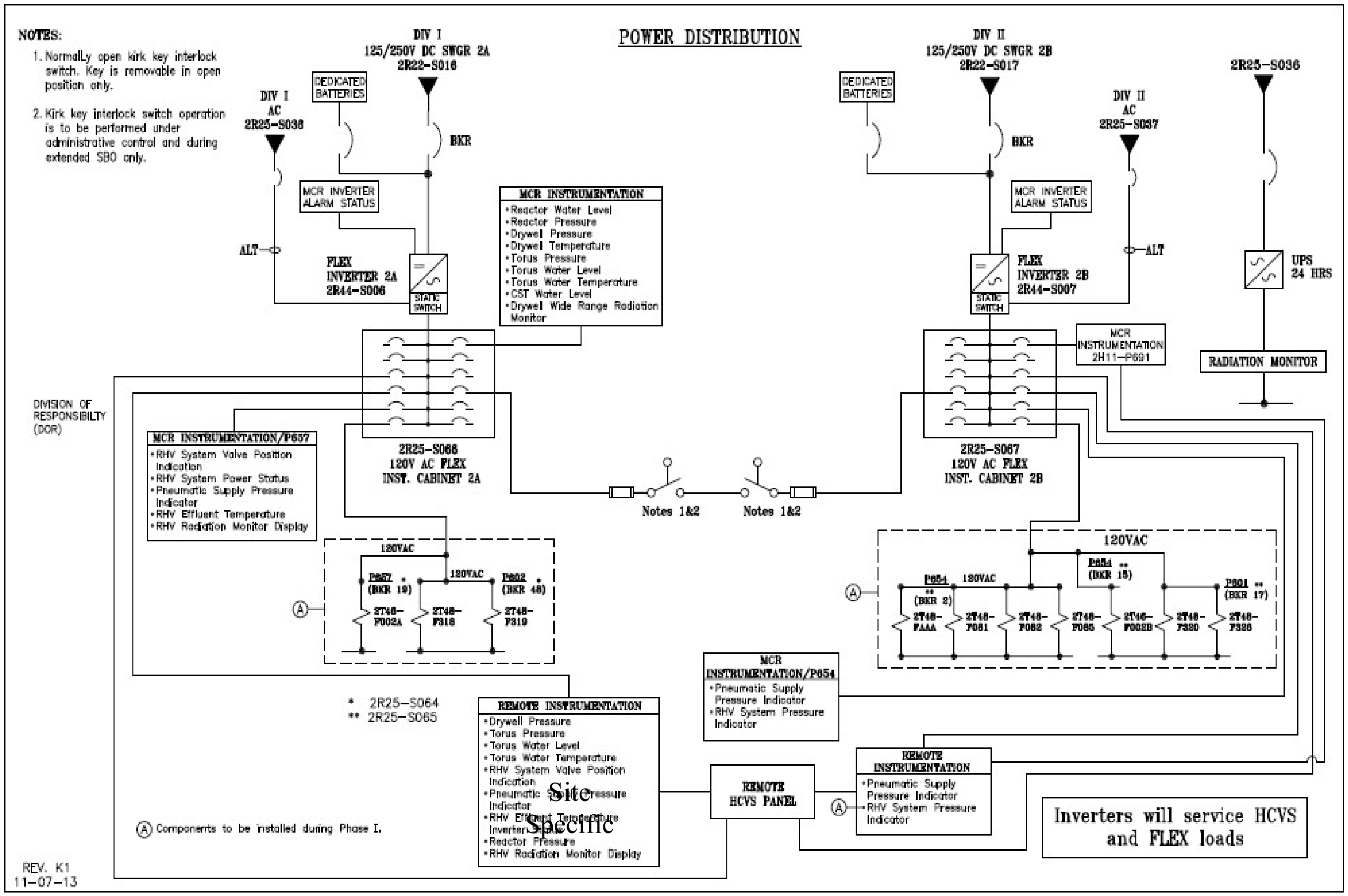
- Piping routing for SAWA path
  - SAWA instrumentation process paths
  - SAWA connections
  - Include a piping and instrumentation diagram of the vent system. Demarcate the valves (in the vent piping) between the currently existing and new ones.
  - Ingress and egress paths to and from control locations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

---OR---

- Piping routing for vent path – SADV

- Demarcate the valves (in the vent piping) between the currently existing and new ones
- SADV 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 SADV piping and associated components. This should include relative locations both horizontally and vertically



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

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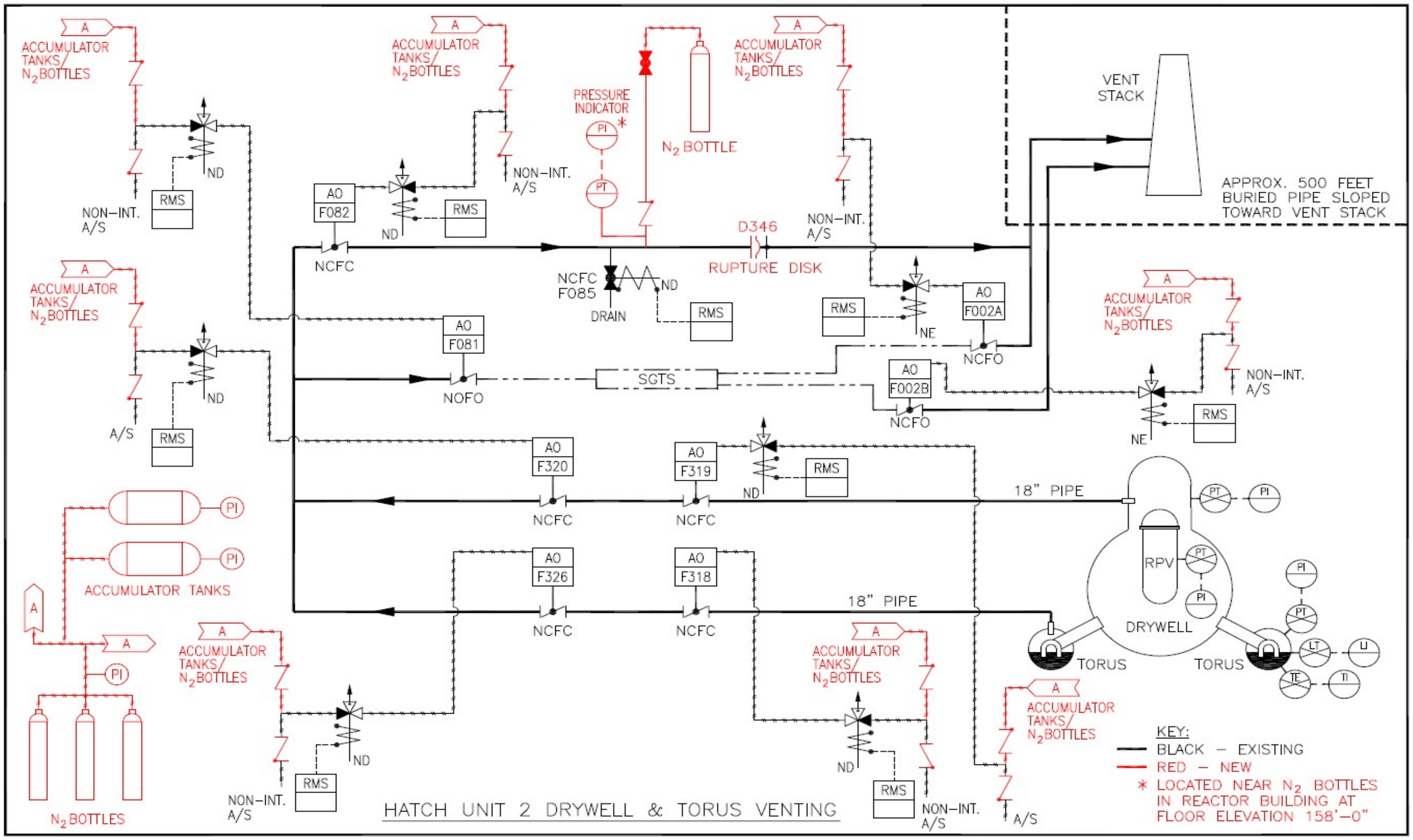

Sketch 2: Layout of current HCVS, Unit 2 (Unit 1 similar)

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

Attachment 4: Failure Evaluation Table

Table 4A: Wet Well HCVS Failure Evaluation Table

Functional Failure Mode	Failure Cause	Alternate Action	Failure with Alternate Action Impact on Containment Venting?
Failure of Vent to Open on Demand	Valves fail to open/close due to loss of normal 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

Comment [td1]: Do we need to put in SAWA / SAWM / SADV failures?

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 FAQ HCVS-01, HCVS Primary Controls and Alternate Controls and Monitoring Locations
15. NEI FAQ HCVS-02, HCVS Dedicated Equipment
16. NEI FAQ HCVS-03, HCVS Alternate Control Operating Mechanisms

17. NEI FAQ HCVS-04, HCVS Release Point
18. NEI FAQ HCVS-05, HCVS Control and ‘Boundary Valves’
19. NEI FAQ HCVS-06, FLEX Assumptions/HCVS Generic Assumptions
20. NEI FAQ HCVS-07, Consideration of Release from Spent Fuel Pool Anomalies
21. NEI FAQ HCVS-08, HCVS Instrument Qualifications
22. NEI FAQ HCVS-09, Use of Toolbox Actions for Personnel
23. NEI White Paper HCVS-WP-01, HCVS Dedicated Power and Motive Force
24. NEI White Paper HCVS-WP-02, HCVS Cyclic Operations Approach
25. NEI White Paper HCVS-WP-03, Hydrogen/CO Control Measures
26. NEI White Paper HCVS-WP-04, FLEX/HCVS Interactions
27. IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power *Generating Stations*,
28. {Plant Site} EA-12-049 (FLEX) Overall Integrated Implementation Plan, Rev 0, February 2013
29. {Plant Site} EA-12-050 (HCVS) Overall Integrated Implementation Plan, Rev 0, February 2013
30. {Plant Site} EA-12-051 (SFP LI) Overall Integrated Implementation Plan, Rev 0, February 2013

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

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

Attachment 7: List of Overall Integrated Plan Open Items

Open Item	Action	Comment
1	Confirm suppression pool heat capacity	
2	Evaluate location of Portable DG for accessibility under Severe Accident HCVS use	Confirmatory action

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Notes from update:

Include closure of open items from ISG and calls in table as well as in text where applicable.

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