Entergy

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John A. Dent, Jr.
Site Vice President

December 17, 2015

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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SUBJECT: Pilgrim Nuclear Power Station's Third Six-Month Status Report, Phase 2 Overall Integrated Plan, and Responses to Phase 1 Interim Staff Evaluation Open Items in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

Pilgrim Nuclear Power Station
Docket No. 50-293
License No. DPR-35

REFERENCES:

1. NRC Order Number EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013 (Accession No. ML13143A334).
2. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 2013 (Accession No. ML13304B836).
3. NRC Endorsement of Industry "Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109), Rev 0" (Accession No. ML14128A219).
4. NEI 13-02, "Industry Guidance for Compliance with NRC Order EA-13-109, To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 2013.
5. Entergy's Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 30, 2014.

LETTER NUMBER 2.15.082

Dear Sir or Madam:

On June 6, 2013, the U. S. Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to Entergy Nuclear Operations, Inc. (Entergy). Reference 1 was immediately effective and directs Entergy to install a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris. Specific requirements are outlined in Attachment 2 of Reference 1.

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Reference 1 required submission of a Phase 1 overall integrated plan pursuant to Section IV, Condition D. Reference 3 endorses industry guidance document NEI 13-02, Revision 0 (Reference 4) with clarifications and exceptions identified in Reference 2. Reference 5 provided the Entergy overall integrated plan.

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. References 2 and 4 provide direction regarding the content of the status reports. The purpose of this letter is to provide the third six-month status report pursuant to Section IV, Condition D, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The attached status report (Attachment 1) provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

Reference 1 also requires submission of an overall integrated plan (OIP) by December 31, 2015, for Phase 2 of the order. Therefore, along with the Phase 1 six-month status report, the OIP for Phase 2 of the Order pursuant to Section IV, Condition D.2, of Reference 1 is enclosed as Attachment 2.

Additionally, PNPS's responses to the Phase 1 Interim Staff Evaluation Open Items are contained in Attachment 3.

Entergy plans to permanently cease operation of PNPS no later than June 1, 2019. The Hardened Containment Vent System Phase 1 and Phase 2 strategies documented in this submittal are accurate descriptions of the current planned modifications and/or strategies to satisfy the requirements of NRC Order EA-13-109.

This letter contains no new regulatory commitments.

Should you have any questions concerning the content of this letter, please contact Mr. Everett (Chip) Perkins, Jr. at (508) 830-8323.

I declare under penalty of perjury that the foregoing is true and correct; executed on December 17, 2015.

Sincerely,

John A. Dent, Jr.
Site Vice President

JAD/rmb

Attachments: 1] Pilgrim Nuclear Power Station's Third Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

2] Pilgrim Nuclear Power Station's Phase 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

3] Pilgrim Nuclear Power Station's Responses to Phase 1 Interim Staff Evaluation Open Items

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ATTACHMENT 1

To

PNPS Letter 2.15.082

Pilgrim Nuclear Power Station's
Third Six-Month Status Report in Response to June 6, 2013 Commission Order
Modifying Licenses with Regard to Reliable Hardened Containment Vents
Capable of Operation Under Severe Accident Conditions
(Order Number EA-13-109)

(3 pages)

Attachment 1

PNPS Letter 2.15.082

Pilgrim Nuclear Power Station's Third Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

1 Introduction

Pilgrim Nuclear Power Station (PNPS) developed an Overall Integrated Plan (OIP) (Reference 1 in Section 8), documenting the installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2. This attachment provides an update of milestone accomplishments since submittal of the Phase 1 OIP and the First and Second Six Month Status Report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since the development of the OIP (Reference 1), and are current as of December 18, 2015.

- The Overall Integrated Plan was issued on June 30, 2014.
- The First Six Month Status Report was issued on December 16, 2014
- The Second Six Month Status Report was issued on June 30, 2015
- The Interim Staff Evaluation (ISE) was received on March 24, 2015

3 Milestone Schedule Status

The following provides an update to Part 5 of the OIP. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Milestone	Target Completion Date	Activity Status	Comments
Complete HCVS Gap Analysis	June 2014	Complete	
Submit Overall Integrated Plan	June 2014	Complete	
Submit 6 Month Status Report	December 2014	Complete	
Submit 6 Month Status Report	June 2015	Complete	
Submit 6 Month Status Report	December 2015	Complete	Simultaneous with Phase 2 OIP
Design Engineering On-site/Complete	July 2016	Started	

Milestone	Target Completion Date	Activity Status	Comments
Submit 6 Month Status Report	June 2016	Not Started	
Operations Procedure Changes Developed	December 2016	Not Started	
Site Specific Maintenance Procedure Developed	December 2016	Not Started	
Submit 6 Month Status Report	December 2016	Not Started	
Training Complete	December 2016	Not Started	
Implementation Outage	March 2017	Not Started	
Procedure Changes Active	March 2017	Not Started	
Walk Through Demonstration/Functional Test	March 2017	Not Started	
Submit Completion Report	June 2017	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the Phase 1 OIP (Reference 1).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

As noted in this submittal cover letter, Entergy plans to permanently cease operation of PNPS no later than June 1, 2019. The Hardened Containment Vent System Phase 1 and Phase 2 strategies documented in this submittal are accurate descriptions of the current planned modifications and/or strategies to satisfy the requirements of NRC Order EA-13-109.

6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

PNPS has received the Interim Staff Evaluation (ISE) with Open Items identified (Reference 7). These open items have been addressed in an attachment to this status report submittal.

7 Interim Staff Evaluation Impacts

There are no potential impacts to the Interim Staff Evaluation identified at this time.

8 References

The following references support the updates to the Phase 1 OIP described in this enclosure.

1. Pilgrim's Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 30, 2014.
2. NRC Order Number EA-13-109, "Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" dated June 6, 2013.
3. NEI 13-02, "Industry Guidance for Compliance with NRC Order EA-13-109, To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 2013.
4. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 2013 (Accession No. ML13304B836).
5. NRC Endorsement of Industry "Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109) Rev 0" (Accession No. ML14128A219).
6. Nuclear Regulatory Commission Audits of Licensee Responses to Phase 1 of Order EA-13-109 to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions (Accession No. ML14126A545).
7. Nuclear Regulatory Commission Interim Staff Evaluation dated March 24, 2015, "Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents). (Accession No. ML15043A754) (PNPS Letter 1.15.016).

ATTACHMENT 2

To

PNPS Letter 2.15.082

Pilgrim Nuclear Power Station's
Phase 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions
(Order Number EA-13-109)

(50 pages)

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 Torus 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 is included with this Phase 2 OIP submittal.

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

The Phase 2 actions can be summarized as follows:

- The PNPS FLEX Severe Accident Strategy is based on the use of Severe Accident Water Addition (SAWA), Severe Accident Water Management (SAWM), and Severe Accident Wetwell Venting (SAWV) to achieve safe shutdown conditions in the best manner possible for the given Beyond-Design-Basis External Event (BDBEE). The "HCVS Phase 2" Strategy is a seamless transition of the FLEX SAWA / SAWM / SAWV Strategy, i.e., Phase 2 is simply an extension of the FLEX Phase 1 Severe Accident Strategy that is implemented as early as possible to mitigate core damage as shown in the Attachment 2 Figures of the EA-13-109 Phase 1 Overall Integrated Plan (OIP) with the SAWM injection rates controlled to utilize the available Torus water capacity as effectively as possible to continue with only Wetwell (Torus) venting for the event duration.
- Utilization of Severe Accident Water Addition (SAWA) to initially inject water into the Reactor Pressure Vessel (RPV).
- Utilization of Severe Accident Water Management (SAWM) to control injection and Torus level to ensure the HCVS (Phase 1) Wetwell vent (SAWV) will remain functional for the removal of decay heat from Containment.

- Ensure that the decay heat can be removed from the Containment for at least 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 DW pressure control.
- The SAWA and SAWM actions will be manually activated and controlled from areas that are accessible during severe accident conditions.
- Parameters measured include Containment pressure, Torus level, SAWA flowrate and the HCVS parameters listed above.

Part 1: General Integrated Plan Elements and Assumptions

Extent to which the guidance, JLD-ISG-2013-02, JLD-ISG-2015-01 and NEI 13-02 (Revision 1), are being followed. Identify any deviations.

Include a description of any alternatives to the guidance. A technical justification and basis for the alternative needs to be provided. This will likely require a pre-meeting with the NRC to review the alternative.

Ref: JLD-ISG-2013-02, JLD-ISG-2015-01

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

- The Hardened Containment Vent System (HCVS) will be comprised of installed and portable equipment and operating guidance:
    - Severe Accident Wetwell Vent (SAWV) – Permanently installed vent from the Torus to the Main Plant Stack.
    - Severe accident Water Addition (SAWA) – A combination of permanently installed and portable equipment to provide a means to add water to the RPV following a severe accident and monitor system and plant conditions.
    - Severe Accident Water Management (SAWM) strategies and guidance for controlling the water addition to the RPV for the sustained operating period. (reference attachment 2.1.D)
- Phase 1 (Wetwell): by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Currently scheduled for 2Q2017.
- Phase 2 (Alternate Strategy): by the startup from the first refueling outage that begins after June 30, 2017 or June 30, 2019, whichever comes first. Currently scheduled for 2Q2019.

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

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

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

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

The following extreme external hazards screen-in for PNPS:

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

The following extreme external hazards screen out for PNPS:

- External Flooding

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

Part 1: General Integrated Plan Elements and Assumptions

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 Time = 1 hour an ELAP is declared and actions begin as defined in EA-12-049 compliance.

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

049-8. Deployment resources are assumed to begin arriving at Time = 6 hours 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). This is further addressed in HCVS-FAQ-12.

109-02. Portable equipment can supplement the installed equipment after 24 hours provided the portable equipment credited meets the criteria applicable to the HCVS. An example is use of FLEX portable air supply equipment that is credited to recharge air lines for HCVS components after 24 hours. The FLEX portable air supply used must be demonstrated to meet the "SA Capable" criteria that are defined in NEI 13-02 Section 4.2.4.2 and Appendix D Section D.1.3. This assumption does not apply to Phase 2 SAWA/SAWM because SAWA equipment needs to be connected and placed in service within 8 hours from the time of the loss of RPV injection. (Reference HCVS-FAQ-12).

109-03. SFP level is maintained with either on-site or off-site resources such that the SFP does not contribute to the analyzed source term (Reference HCVS-FAQ-07).

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

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

Part 1: General Integrated Plan Elements and Assumptions

109-06. HCVS manual actions that require minimal operator steps and can be performed in the postulated thermal and radiological environment at the location of the step(s) (e.g., load stripping, control switch manipulation, 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, but these actions are in areas that are accessible and well shielded from radiological effects.

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. This is further addressed in HCVS-FAQ-11.

109-08. Use of MAAP Version 4 or higher provides adequate assurance of the plant conditions (e.g., RPV water level, temperatures, etc.) assumed for Order EA-13-109 BDBEE and SA HCVS operation. (reference FLEX MAAP Endorsement ML13190A201) Additional analysis using RELAP5/MOD 3, GOTHIC, PCFLUD, LOCADOSE and SHIELD are acceptable methods for evaluating environmental conditions in areas of the plant provided the specific version utilized is documented in the analysis. MAAP Version 5 was used to develop EPRI Technical Report 3002003301 to support drywell temperature response to SAWA under severe accident conditions.

109-09. NRC Published Accident evaluations (e.g. SOARCA, SECY-12-0157, and NUREG 1465) as related to Order EA-13-109 conditions are acceptable as references. (Reference NEI 13-02 section 8).

109-10. Permanent modifications installed or planned per EA-12-049 are assumed implemented and may be credited for use in EA-13-109 Order response.

109-11. This Overall Integrated Plan is based on Emergency Operating Procedure (EOP) changes consistent with EPG/SAGs Revision 3 as incorporated per the sites EOP/SAMG procedure change process. This assumption does not apply to Phase 2 SAWM because SAWM is not part of Revision 3. (Reference to Attachment 2.1.D for SAWM SAMG Changes approved by the BWROG Emergency Procedures Committee).

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

109-13. The Suppression Pool / Wetwell of a BWR Mark I Containment is considered to be bounded by assuming a saturated environment for the duration of the event response because of the water/steam interactions.

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

109-15. The Severe Accident impacts are assumed on one unit only due to the site compliance with NRC Order EA-12-049. However, each BWR 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). This is further addressed in HCVS-FAQ-10.

<u>Plant Specific HCVS Related Assumptions/Characteristics:</u>

None.

Part 2: Boundary Conditions for Wetwell Vent

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

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

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

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

See attached sequence of events timeline (Attachment 2A)

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Provide Details on the Vent characteristics

Provide Details on the Vent characteristics

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

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

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

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

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

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

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

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

Part 2: Boundary Conditions for Wetwell Vent

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

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

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

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

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

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

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

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

The HCVS shall include means to prevent inadvertent actuation.

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

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

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

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

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

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

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

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

Use of instruments and supporting components with known operating principles that are supplied by manufacturers with 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

Part 2: Boundary Conditions for Wetwell Vent

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.

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Part 2: Boundary Conditions for Wetwell 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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Identify modifications:

List modifications and describe how they support the HCVS Actions.

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

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).

Part 2: **Boundary Conditions for Wetwell Vent**
Part 2 Boundary Conditions for WW Vent: **BDBEE Venting**
Refer to the EA-13-109 Phase 1 Overall Integrated Plan.
Notes: For the BDBEE Case #1 where the FLEX Strategy is successfully implemented, Wetwell venting is initiated at 16 Hours after Shutdown when or before the Suppression Pool exceeds 281°F.

Part 2: **Boundary Conditions for Wetwell 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**
Refer to the EA-13-109 Phase 1 Overall Integrated Plan.
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**
Refer to the EA-13-109 Phase 1 Overall Integrated Plan.
First 24 Hour Coping Detail
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Part 2: Boundary Conditions for Wetwell Vent

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

Identify modifications:

List modifications and describe how they support the HCVS Actions.

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

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).

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Notes: For the postulated Short-Term Severe Accident Case #2B (refer to EA-13-109 Phase 1 OIP), the Containment Maximum Allowable Working Pressure (MAWP) 62 PSIG Limits are not exceeded when the FLEX injection is initiated by 8 Hours, thereby preventing Containment failure and cooling the overheated core debris, with Wetwell Venting shortly thereafter (at 10 Hours) when Torus Bottom Pressure is at or above the PCPL. It should be considered that, as soon as H2 gas evolution begins and the Torus Bottom Pressure approaches the PCPL value of 60 psig, that Wetwell Venting will be initiated and will mitigate the peak pressure that occurs with continued H2 generation.

Part 2: Boundary Conditions for Wetwell 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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Details

Provide a brief description of Procedures / Guidelines:

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Identify modifications:

List modifications and describe how they support the HCVS Actions.

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Part 2: Boundary Conditions for Wetwell Vent

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

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).

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Notes: The HCVS Torus Vent at PNPS includes an 8" Air-Operated Butterfly Valve AO-5025 capable of venting the Wetwell (Torus) airspace through an 8" branch line between the two Primary Containment Isolation Valves (PCIVs) AO-5042A & B from 20" Torus Penetration X-227. The HCVS Torus Vent flow path via AO-5042B & AO-5025 connects to the 20" discharge line downstream of the Standby Gas Treatment System (SGTS) filter trains. The vent flow path is isolated from the SGTS by Air-Operated Discharge Valves AO-N-108 & 112 on the SGTS outlet where the vent 8" piping connects to the 20" discharge piping to the plant's Main Stack that includes a buried piping run from the plant out to the Main Stack.

Part 2: Boundary Conditions for Wetwell 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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Details:

Provide a brief description of Procedures / Guidelines:

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

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

HCVS Actions	Modifications	Protection of connections
Refer to the EA-13-109 Phase 1 Overall Integrated Plan.		

Notes: A condensate drain trap, manual isolation valves, and flex hose quick-connect fittings have been installed downstream of SGTS Piping Drain Valve 44-HO-114 as part of the FLEX modifications. Prior to venting, a pre-staged flexible hose is connected to this fitting and routed to the Torus Room to drain condensate from the vent pipeline.

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

General:

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

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

This Part is divided into the following sections:

3.1: Severe Accident Water Addition (SAWA)

3.1.A: Severe Accident Water Management (SAWM)

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

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

SAWA and SAWM or SADV Actions supporting SA conditions that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walkthrough of deployment). Actions already identified under the HCVS part of this template need not be repeated here.

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

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

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

The operation of the HCVS using SAWA and SAWM/SADV will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1. Initial operator actions will be completed by plant personnel and will include the capability for remote-manual initiation from the MCR using control switches. In addition, HCVS operation may occur at the ROS.

Timelines (see attachments to the Phase 1 OIP) were developed to identify required operator response times and actions.

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 the Phase 1 OIP for this Order.	■ MCR or ROS	■ Applicable to SAWA/SAWM strategy
2. Connect FLEX Pump discharge to FLEX injection piping.	■ HPCI/RCIC connection is the primary connection point via external connection to the CST. Same connection as FLEX, external to Reactor Building. RHR is the backup and is in the Auxiliary Bay Building.	■ No hose connections within the Reactor Building are required for RPV make-up.
3. Connect FLEX Pump to water source.	■ Primary connection is the normal UHS intake water source.	■ The location of this source, as well as the location of the FLEX Pump, is not challenged by severe accident radiological conditions.
4. Power SAWA/HCVS components with EA-12-049 (FLEX) generator.	■ One FLEX Portable 480 VAC 3-PH 150 kW Diesel Generator (DG) will normally be pre-staged in the Turbine Building Truck Lock, which is adjacent to the AC Switchgear and DC System Battery Rooms. This DG is thereby capable of early deployment (within 4 Hours) during any Station Black-Out (SBO) and is capable of maintaining both 125 VDC Battery Divisions, and the 250 VDC Battery, charged and operating indefinitely. There are additional 86 kW DGs in the dual FLEX Storage sites that are deployable within 6 Hours to perform the same functions.	■ No changes required to the original EA-12-049 strategy.

Part 3.1: Boundary Conditions for SAWA

5. Inject to RPV using FLEX Pump (diesel).	■ SAWA flow control will be provided by variable speed pump controller and by throttling valves at a Strainer Cart; both of which are outside Rx Bldg.	■ Initial SAWA flow rate is 300 gpm per Calculation M1380 (see Phase 1 OIP).
6. Monitor SAWA indications.	■ Total flow and SFP flow meters are included in the Strainer Cart. ■ Containment parameters monitored at MCR.	■ Strainer Cart is outside reactor building and is not challenged by severe accident radiological conditions.
7. Use SAWM to maintain availability of the Torus Vent (Part 3.1.A).	■ MCR for indication ■ FLEX Pump location for flow control.	■ Monitor DW pressure and Wetwell level in MCR ■ Control SAWA flow with variable speed pump controller and by throttling valves at the Strainer Cart as-needed.

Discussion of timeline SAWA identified items

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

- 8 Hours – Establish electrical power and other EA-12-049 actions needed to support the strategies for EA-13-109, Phase 1 and Phase 2. Action being taken within the Reactor Building under EA-12-049 conditions after RPV level lowers to 2/3 core height are consistent with the radiological conditions assuming permanent Containment shielding remains intact. All other actions required are assumed to be in-line with the FLEX timeline submitted in accordance with the EA-12-049 requirements.
- 8 Hours – Initiate SAWA flow to the RPV. Having the HCVS in service will assist in minimizing the peak DW pressure during the initial cooling conditions provided by SAWA.

Severe Accident Operation

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

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

It is anticipated that SAWA will be used in Severe Accident Events based on presumed failure of injection systems or presumed failure to implement an injection system in a timely manner leading to core damage, as is required to be considered by EA-13-109 regardless of the adequacy of the FLEX Strategy to prevent such core damage. The SAWA Strategy includes both portable and installed equipment that is also used for the FLEX Strategy, i.e., SAWA utilizes the same injection equipment and methods as FLEX and may be used to recover from any failure to initially implement the FLEX Strategy, or utilize alternative but equivalent equipment if needed.

Part 3.1: Boundary Conditions for SAWA

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

The SAWA flow path includes methods to minimize exposure of personnel to radioactive liquids / gases and potentially flammable conditions by inclusion of backflow prevention. Backflow from the reactor/Containment through the FLEX Pumps is prevented by check valves in the RCIC/HPCI system.

Description of SAWA actions for first 24 hours:

T < 1 hr:

- No evaluation required for actions inside the Reactor Building for SAWA. Expected actions are:
  - Begin preparations to connect SAWA hose to the primary injection point, CST, outside the Reactor Building. Any actions performed inside the Reactor Building will be for evaluation of conditions (depending on the BDB Event) or preparatory activities in well shielded normally accessible areas of Secondary Containment that will be at effectively normal radiation dose rates. There will be no unusual restrictions imposed on Reactor Building access by the FLEX Strategy, any restrictions will be based on actual dose rates.

T = 1 – 8 hrs:

- Evaluation of core gap and early in-vessel release impact to Reactor Building access for SAWA will be performed as-needed. It is assumed that Reactor Building access is limited due to the source term at this time unless otherwise noted. The FLEX, HCVS, and Severe Accident strategies anticipate or plan activities only in readily accessible areas of Secondary Containment. These areas are well shielded and contain the alternate locations for instrument indications and backup Nitrogen (N2) supplies for HCVS and Safety-Relief Valve (SRV) operation. There are no required activities in the Torus Compartment, RHR Quad Rooms, TIP Room, or other high radiation dose areas. Areas that may have elevated dose rates following core damage or RPV breach are only considered accessible for potential activities early in the ELAP, when dose rates are still in the normal range. This includes localized areas that have line-of-sight exposure to HCVS vent piping. Expected actions are:
  - Same as Table 2-1 "HCVS Operator Manual Actions" in Phase 1 OIP.
- Connect FLEX Pump to water supply at normal UHS intake water source (Step 3 of Table 3.1).
- Establish electrical power to HCVS and SAWA using EA-12-049 generator (Step 4 of Table 3.1).
- Establish initial flow of 300 gpm to the RPV using SAWA systems (Step 5 of Table 3.1).

T ≤ 8 – 24 hrs:

- Continue injection for 16 hours after SAWA injection begins at initial SAWA rate.

T ≥ 24 hrs:

- Proceed at 24 hours to MDRIR-based SAWM injection rates - SAWM actions (Part 3.1.A) (Step 7 of Table 3.1 above).

Part 3.1: Boundary Conditions for SAWA

Greater Than 24 Hour Coping Detail

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

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

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

Details:

Details of Design Characteristics/Performance Specifications

SAWA shall be capable of providing an RPV injection rate of 300 gpm within 8 hours of a loss of all RPV injection following an ELAP/Severe Accident. SAWA shall meet the design characteristics of the HCVS.

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

Equipment Locations/Controls/Instrumentation

PNPS has performed a site specific evaluation to justify the use of a lower site unique initial SAWA flow rate. Consequently, PNPS will assume an initial flow rate of 300 gpm. This initial flow rate will be established within 8 hours of the loss of all RPV injection following an ELAP/Severe Accident and will be maintained for 16 hours before reduction to the flow rate that allows continued flooding of the RPV & DW Core Debris at the Minimum Debris Retention Injection Rate (MDRIR) based flow rate with only Wetwell venting.

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

The flow path will be from the FLEX Pump suction at the UHS intake, through the FLEX Pumps and associated hoses and Strainer Cart to the connection point at the CST Vault Backflow from the Reactor / Containment through the FLEX Pumps is prevented by check valves in the RCIC / HPCI Systems.

DW pressure and Wetwell level will be monitored and flow rate will be adjusted by adjusting the variable speed engine-driven FLEX Pump and throttling the manual valves located on the SAWA Strainer Cart. Communication will be established between the MCR and the SAWA flow control location.

The FLEX Pump suction source is a significant distance from the discharge of the HCVS pipe (Main Plant Stack) with substantial structural shielding and distance between the HCVS pipe and the pump deployment location. FLEX Pump and diesel driven generator refueling will also be accomplished using portable transfer pumps and truck-mounted fuel dispensing tanks.

Initial 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).

Part 3.1: Boundary Conditions for SAWA

DC-powered electrical equipment and instrumentation will be powered from the battery chargers that are repowered from the EA-12-049 generator(s) to maintain the battery capacities during the Sustained Operating period and 120 VAC powered instrumentation, including the Post-Accident Monitoring (PAM) System, will be repowered directly from the same generators.

Parameter	Instrument	Location	Power Source / Notes
Wide Range Primary Containment Pressure (0 to 225 psig) 120 VAC Panel Y3/Y4	PI-1001-600A/B	MCR Panels C170/C171	Repower via EA-12-049 FLEX Diesel Generator
Torus Water Level (0 to 300 inches) 120 VAC Y3/Y4	LI-1001-604A/B	MCR Panels C170/C171	Repower via EA-12-049 FLEX Diesel Generator
SAWA Flow	FLEX Pump Flow Indicator / Totalizer	FLEX Strainer Cart	Battery Operated (one year replaceable Li-Ion)

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

Equipment Protection

Any SAWA component and connections external to protected buildings have been protected against the screened-in hazards of EA-12-049 for the station. The connection for the FLEX Pump injection is protected by the CST Vault Missile Protection Enclosure. Portable equipment used for SAWA implementation will meet the protection requirements for storage in accordance with the criteria in NEI 12-06 Revision 0.

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

Provide a brief description of Procedures / Guidelines:
Confirm that procedure/guidance exists or will be developed to support implementation.

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

- Connect FLEX Pump discharge to CST that connects with RCIC / HPCI.
- Power SAWA / HCVS components with EA-12-049 (FLEX) generator using FLEX procedures.
- Start FLEX Pump to establish SAWA flow.
- Adjust flow rate using skid mounted flow indicator and variable speed FLEX Pump

Part 3.1: Boundary Conditions for SAWA

Identify modifications:

List modifications and describe how they support the SAWA Actions.

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

None.

Component Qualifications:

State the qualification used for equipment supporting SAWA

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

Permanently installed plant equipment shall meet the same qualifications as described in Part 2 of the Phase 1 OIP. Temporary/Portable equipment shall be qualified and stored to the same requirements as FLEX equipment as specified in NEI 12-06 Rev 0.

Notes: The postulated Short-Term STSBO Severe Accident scenario Case #2B (refer to EA-13-109 Phase 1 OIP), includes the immediate or early failure of the steam-driven RCIC & HPCI Systems and results in the most rapid core overheating, damage, and RPV breach, which occurs at 8.2 Hours after Shutdown. This allows sufficient time for the FLEX Low Pressure Injection Source to be deployed and begin RPV injection at 300 GPM for RPV and core debris cooling while venting is initiated at the PCPL with the Wetwell at or above 250°F due to the combination of steam and Hydrogen (H2) gas pressure from the core overheating. The 300 GPM injection is continued until the Wetwell is cooled below 250°F, at which time the FLEX injection rate is reduced from 300 GPM to the SAWM injection rates that conservatively bounds the EOP Minimum Debris Retention Injection Rate (MDRIR) which maintains the core debris completely cooled while preserving the ability to continue Wetwell Venting for Containment Heat Removal and purging of the steam-diluted Hydrogen gas.

Part 3.1.A: Boundary Conditions for SAWA/SAWM

Time periods for maintaining SAWM actions such that the WW vent remains available

SAWM Actions supporting SA conditions that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walkthrough of deployment). Actions already identified under the HCVS part of this template need not be repeated here.

There are three time periods for the maintaining SAWM actions such that the Wetwell Vent remains available to remove decay heat from the Containment:

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

Ref: NEI 13-02 Appendix C.7

SAWM can be maintained for >7 days without the need for a drywell vent to maintain pressure below PCPL.

Basis for SAWM time frame

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

PNPS has performed a site specific evaluation to determine the initial SAWA flow rate. PNPS will establish an initial flow rate of 300 gpm.

This initial flow rate will be established within 8 hours of the loss of all RPV injection following an ELAP/Severe Accident and will be maintained for 16 hours before reduction to the flow rate that allows continued flooding of the RPV & DW Core Debris at the Minimum Debris Retention Injection Rate (MDRIR) based flow rates with only Wetwell Venting for the duration of the event.

Instrumentation relied upon for SAWM operations is Drywell Pressure, Torus level, and SAWA flow. Except for SAWA flow, SAWM instruments are initially powered by station batteries and then 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

Part 3.1.A: Boundary Conditions for SAWA/SAWM

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. The time to reach the level at which the Torus Vent must be secured is >7days using SAWM flowrates (C.6.3, C.7.1.4.3).

Table 3.1.B – SAWM Manual Actions

Primary Action	Primary Location / Component	Notes
1. Lower SAWA injection rate to control Torus Level and decay heat removal	• Containment parameters monitored in the MCR • Flow control at FLEX Pump and Strainer Cart	■ Control to maintain Containment and Torus parameters to ensure Torus vent remains functional. ■ MDRIR-Based SAWM flow rate minimum capability is maintained for greater than 7 days ■ SAWA/SAWM flow rates will be controlled using variable speed pump controller at the Pump Skid and by throttling valves at the Strainer Cart.
2. Control to SAWM flowrate for Containment control / decay heat removal	• Flow control at FLEX Pump and Strainer Cart	■ SAWM flow rates will be monitored using the following instrumentation o SAWA Flow o Torus Level o Containment Pressure ■ SAWM flow rates will be controlled using a variable speed pump controller at the Pump Skid and by throttling valves at the Strainer Cart.
3. Establish alternate source of decay heat removal	• Yard	■ >7 days
4. Secure SAWA / SAWM	• FLEX Pump • FLEX Strainer Cart	■ When reliable alternate Containment decay heat removal is established.

SAWM Time Sensitive Actions

Time Sensitive SAWM Actions:

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

Part 3.1.A: Boundary Conditions for SAWA/SAWM

SAWM **Severe Accident Operation**

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

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

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

First 24 Hour Coping Detail

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

Given the initial conditions for EA-13-109:

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

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

SAWA will be established as described 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 16 hours, the flow will be reduced while monitoring DW pressure and Torus level. SAWM flowrate can be lowered to maintain Containment parameters and preserve the Tours Vent path. SAWM will be capable of injection for the period of Sustained Operation.

Greater Than 24 Hour Coping Detail

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

Ref: EA-13-109 Section 1.2.4, 1.2.8, Attachment 2, Section B.2.2, B.2.3 / NEI 13-02 Section 4.2.2, Appendix C, Section C.7

<u>SAWM can be maintained >7 days</u>:

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.

Part 3.1.A: Boundary Conditions for SAWA/SAWM

Details:

Details of Design Characteristics/Performance Specifications

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

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

Equipment Locations/Controls/Instrumentation

Describe location for SAWM monitoring and control.

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

The SAWM control location is the same as the SAWA control location. Local indication of SAWM flow rate is provided at the SAWA Strainer Cart by a portable flow instrument qualified to operate under the expected environmental conditions. The SAWA flow instrument is battery powered and can operate for one-year on two replaceable Li-Ion batteries. Communications will be established between the SAWM control location and the MCR.

SAWM injection flow rates will be controlled using the variable engine speed pump controller and by throttling valves at the Strainer Cart.

Torus level and DW pressure are read in the Main Control Room using indicators powered by the FLEX DG installed under EA-12-049. These indications are used to control SAWM flowrate to the RPV.

Key Parameters:

List instrumentation credited for the SAWM Actions.

Parameters used for SAWM are:

- DW Pressure
- Torus Level
- SAWM Flowrate

The Drywell Pressure and Torus Level instruments are qualified to RG 1.97 and are the same as listed in Part 2 of the Phase 1 OIP. The SAWM flow instrumentation is portable, included with the FLEX Strainer Cart, and was selected for the expected environmental conditions.

Notes: The SAWA / SAWM Strategy is simplified to the point that it could be successfully implemented using only the SAWM Flowmeters & Totalizers on the FLEX Strainer Cart for at least the initial 7 days.

Part 3.1.B: Boundary Conditions for SAWA/SADV
Applicability of WW Design Considerations
This section is not applicable to PNPS.
Table 3.1.C – SADV Manual Actions
Timeline for SADV
Severe Accident Venting
First 24 Hour Coping Detail
Greater Than 24 Hour Coping Detail
Details:

Part 4: Programmatic Controls, Training, Drills and Maintenance

Identify how the programmatic controls will be met.

Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality addressing the impact of temperature and environment

Ref: EA-13-109 Section 1.2.10, 3.1, 3.2 / NEI 13-02 Sections 5, 6.1.2, 6.1.3, 6.2

Program Controls:

The HCVS venting actions will include:

- Site procedures and programs are being developed in accordance with NEI 13-02 to address use and storage of portable equipment relative to the Severe Accident defined in NRC Order EA-13-109 and the hazards applicable to the site per Part 1 of this OIP.
- Routes for transporting portable equipment from storage location(s) to deployment areas have been developed. The identified paths and deployment areas will be analyzed for potential radiation effects to ensure they remain fully accessible during Severe Accidents.

Procedures:

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

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

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

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

The provisions for out-of-service requirements for HCVS/SAWA functionality are applicable in Modes 1, 2 and 3.

- If for up to 90 consecutive days, the primary or alternate means of HCVS/SAWA operation are non-functional, no compensatory actions are necessary.
- If for up to 30 days, the primary and alternate means of HCVS/SAWA operation are nonfunctional, no compensatory actions are necessary.
- If the out of service times exceed 30 or 90 days as described above, the following actions will be performed through the sites corrective action program:

Part 4: Programmatic Controls, Training, Drills and Maintenance

- The cause(s) of the non-functionality
- The actions to be taken and the schedule for restoring the system to functional status and prevent recurrence
- Initiate action to implement appropriate compensatory actions, and
- Restore full HCVS functionality at the earliest opportunity not to exceed one full operating cycle.

Describe training plan

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

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

Personnel expected to perform direct execution of the HCVS/SAWA/SAWM actions will receive necessary training in the use of plant procedures for system operations when normal and backup power is available and during ELAP conditions. The training will be refreshed on a periodic basis and as any changes occur to the HCVS/SAWA/SAWM actions, systems or strategies. Training content and frequency will be established using the Systematic Approach to Training (SAT) process.

Identify how the drills and exercise parameters will be met.

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

The Licensee should demonstrate use of the HCVS/SAWA/SAWM system in drills, tabletops, or exercises as follows:

- *Hardened Containment vent operation on normal power sources (no ELAP).*
  - *During FLEX demonstrations (as required by EA-12-049: Hardened Containment vent operation on backup power and from primary or alternate location during conditions of ELAP/loss of UHS with no core damage. System use is for Containment heat removal AND Containment pressure control.*
  - *HCVS operation on backup power and from primary or alternate location during conditions of ELAP/loss of UHS with core damage. System use is for Containment heat removal AND Containment pressure control with potential for combustible gases (Demonstration may be in conjunction with SAG change).*
  - *Operation for sustained period with SAWA and SAWM to provide decay heat removal and Containment pressure control.*

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

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

Part 4: Programmatic Controls, Training, Drills and Maintenance

Describe maintenance plan:

Describe the elements of the maintenance plan

- *The maintenance program should ensure that the HCVS/SAWA/SAWM equipment reliability is being achieved in a manner similar to that required for FLEX equipment. Standard industry templates (e.g., EPRI) and associated bases may be developed to define specific maintenance and testing.*
    - *Periodic testing and frequency should be determined based on equipment type, expected use and manufacturer's recommendations (further details are provided in Part 6 of this document).*
    - *Testing should be done to verify design requirements and/or basis. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.*
    - *Preventive maintenance should be determined based on equipment type and expected use. The basis should be documented and deviations from vendor recommendations and applicable standards should be justified.*
    - *Existing work control processes may be used to control maintenance and testing.*
- *HCVS/SAWA permanent installed equipment should be maintained in a manner that is consistent with assuring that it performs its function when required.*
    - *HCVS/SAWA permanently installed equipment should be subject to maintenance and testing guidance provided to verify proper function.*
- *HCVS/SAWA non-installed equipment should be stored and maintained in a manner that is consistent with assuring that it does not degrade over long periods of storage and that it is accessible for periodic maintenance and testing.*

Ref: EA-13-109 Section 1.2.13 / NEI 13-02 Section 5.4, 6.2

PNPS will utilize the standard EPRI industry PM process (Similar to the Preventive Maintenance Basis Database) for establishing the maintenance calibration and testing actions for HCVS/SAWA/SAWM components.
The control program will include maintenance guidance, testing procedures and frequencies established based on type of equipment and considerations made within the EPRI guidelines.

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

Part 4: Programmatic Controls, Training, Drills and Maintenance

Table 4-1: Testing and Inspection Requirements

Description	Frequency
Cycle the HCVS and installed SAWA valves[1] and the interfacing system boundary valves not used to maintain Containment integrity during Mode 1, 2 and 3. For HCVS valves, this test may be performed concurrently with the control logic test described below.	Once per every[2] operating cycle.
Cycle the HCVS and installed SAWA check valves not used to maintain Containment integrity during unit operations[3].	Once per every other[4] operating cycle.
Perform visual inspections and a walk down of HCVS and installed SAWA components.	Once per every other[4] operating cycle.
Functionally test the HCVS radiation monitor.	Once per operating cycle.
Leak test the HCVS.	1. Prior to first declaring the system functional; 2. Once every three operating cycles thereafter; and 3. After restoration of any breach of system boundary within the buildings.
Validate the HCVS operating procedures by conducting an open/close test of the HCVS control function from its control location and ensuring that all HCVS vent path and interfacing system boundary valves[5] move to their proper (intended) positions.	Once per every other operating cycle.

[1] Not required for HCVS and SAWA check valves.

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

[3] Not required if integrity of check function (open and closed) is demonstrated by other plant testing requirements.

[4] After two consecutive successful performances, the test frequency may be reduced by one operating cycle to a maximum of once per every fourth operating cycle.

Part 4: Programmatic Controls, Training, Drills and Maintenance

[5] Interfacing system boundary valves that are normally closed and fail closed under ELAP conditions (loss of power and/or air) do not require control function testing under this part. Performing existing plant design basis functional 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:

The PCIVs are required for Containment integrity during Modes 1-3 and thus are excluded from EA-13-109 testing requirements. These PCIVs are tested per the PNPS design basis requirements to ensure valve operability and leakage tightness.

Part 5: Milestone Schedule

Provide a 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:

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Phase 2 Milestone Schedule:

Phase 2 Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Submit Overall Integrated Implementation Plan	Dec 2015	Complete	Separate submittal from Phase 1 update
Submit 6 Month Status Report	June 2016		
Submit 6 Month Status Report	Dec 2016		
Submit 6 Month Status Report	June 2017		
Submit 6 Month Status Report	Dec 2017		
Design Engineering On-site/Complete	Jan 2018	Not Started	
Submit 6 Month Status Report	Jun 2018		

Part 5: Milestone Schedule

Submit 6 Month Status Report	Dec 2018		
Operations Procedure Changes Developed	Dec 2018	Not Started	
Site Specific Maintenance Procedure Developed	Dec 2018	Not Started	
Training Complete	Dec 2018	Not Started	
Implementation Outage	Feb 2019	Not Started	
Walk Through Demonstration/Functional Test	Feb 2019	Not Started	
Procedure Changes Active	Feb 2019	Not Started	
Submit Completion Report	April 2019	Not Started	

Attachment 1: HCVS/SAWA Portable Equipment

List portable equipment	*BDBEE Venting*	*Severe Accident Venting*	*Performance Criteria*	*Maintenance / PM requirements*
The portable equipment listed below supports SAWA/SAWM (Phase 2). For a list of Phase 1 HCVS Equipment, refer to the Phase 1 Overall Integrated Plan and associated 6 month updates				
FLEX DG (including cable, connectors, etc.)	**X**	**X**	**150 & 86 kW DGs**	**Per Response to EA-12-049**
FLEX Pump (including dual strainer, flowmeter, flexible hose, fittings, etc.)	**X**	**X**	**300 gpm for first 16 hours and MDRIR-Based Flowrates for at least the first 7 days**	**Per Response to EA-13-109**

Attachment 2A: Sequence of Events Timeline – HCVS

Refer to the EA-13-109 Phase 1 Overall Integrated Plan (page 40 of 58).

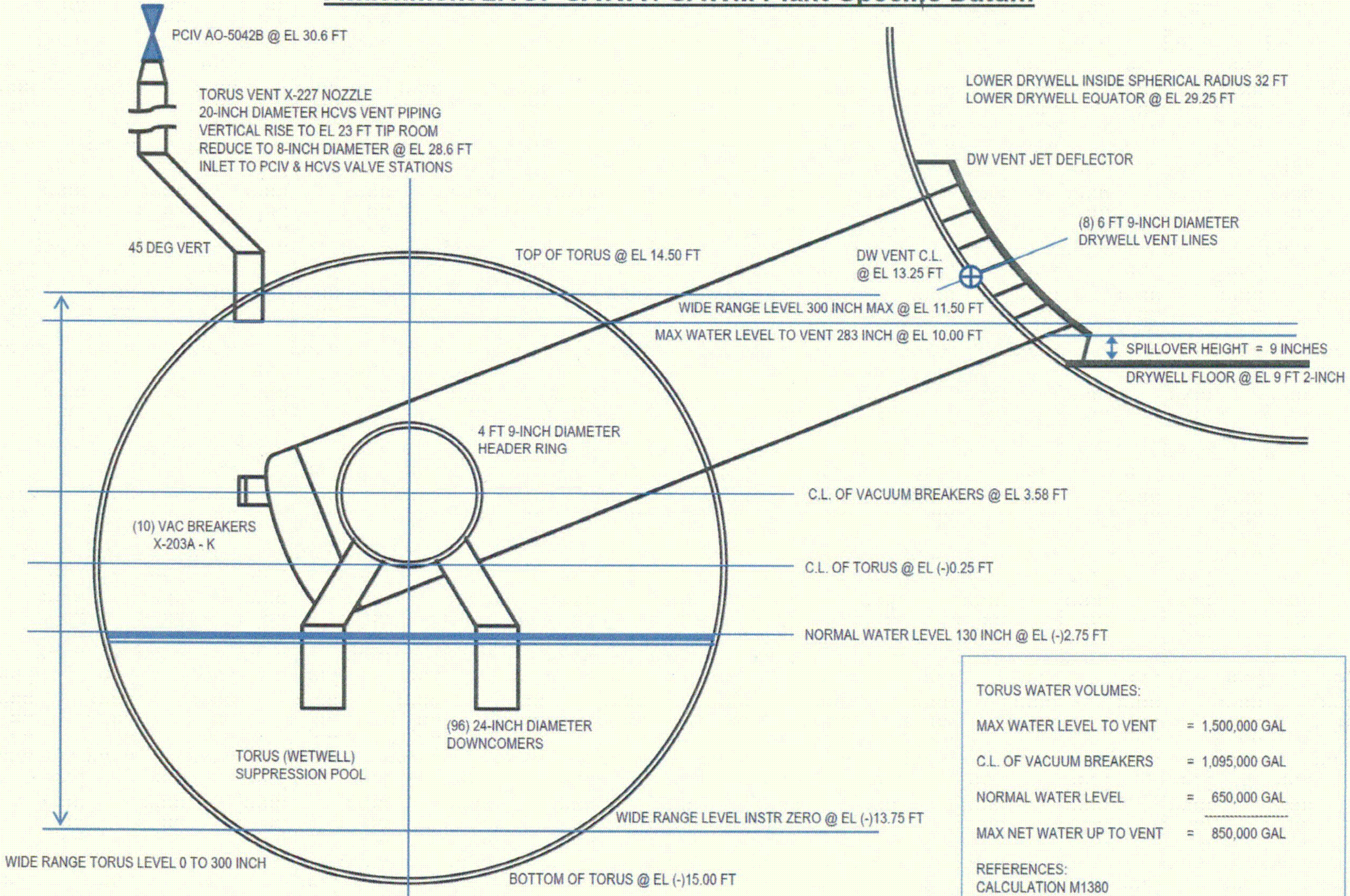
Attachment 2.1.A: Sequence of Events Timeline – SAWA / SAWM

Refer to the EA-13-109 Phase 1 Overall Integrated Plan (Case 2A and 2B Graphs; page 41 and 42 of 58).

Attachment 2.1.B: Sequence of Events Timeline – SADV

This is not applicable to PNPS.

Attachment 2.1C: SAWA / SAWM Plant-Specific Datum



NOTE: CALCULATION M1380 CASE 2B SHORT-TERM SBO WITH NO RPV INJECTION FOR 8 HOURS IS THE BOUNDING S.A. ANALYSIS.
FLEX SAWA INJECTION @ 300 GPM FROM 8 TO 24 HOURS FOLLOWED BY MDRIR-BASED INJECTION & WETWELL VENTING @ 10 HOURS.
NET TORUS WATER ADDITION AFTER 30 DAYS IS LESS THAN 850,000 GAL WITH WETWELL VENTING ABOVE 220 DEGF.

TORUS WATER VOLUMES:

MAX WATER LEVEL TO VENT	=	1,500,000 GAL
C.L. OF VACUUM BREAKERS	=	1,095,000 GAL
NORMAL WATER LEVEL	=	650,000 GAL
MAX NET WATER UP TO VENT	=	850,000 GAL

REFERENCES:
CALCULATION M1380
DRAWINGS:

M23	M8649SH1	
C1A1-8	C1A5-11	C1A50-5
C1A51-7	C1A57-6	C153

Attachment 2.1.D: SAWM SAMG Approved Language

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

Actual Approved Language that will be incorporated into site SAMG*

Cautions:

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

Priorities:

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

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

Methods:

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

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

Attachment 3: Conceptual Sketches

Refer to the EA-13-109 Phase 1 Overall Integrated Plan for the following sketches:

Electrical

- **HCVS Electrical Layout Drawing**

Flow and Control Diagrams

- **P&ID Layout of HCVS**

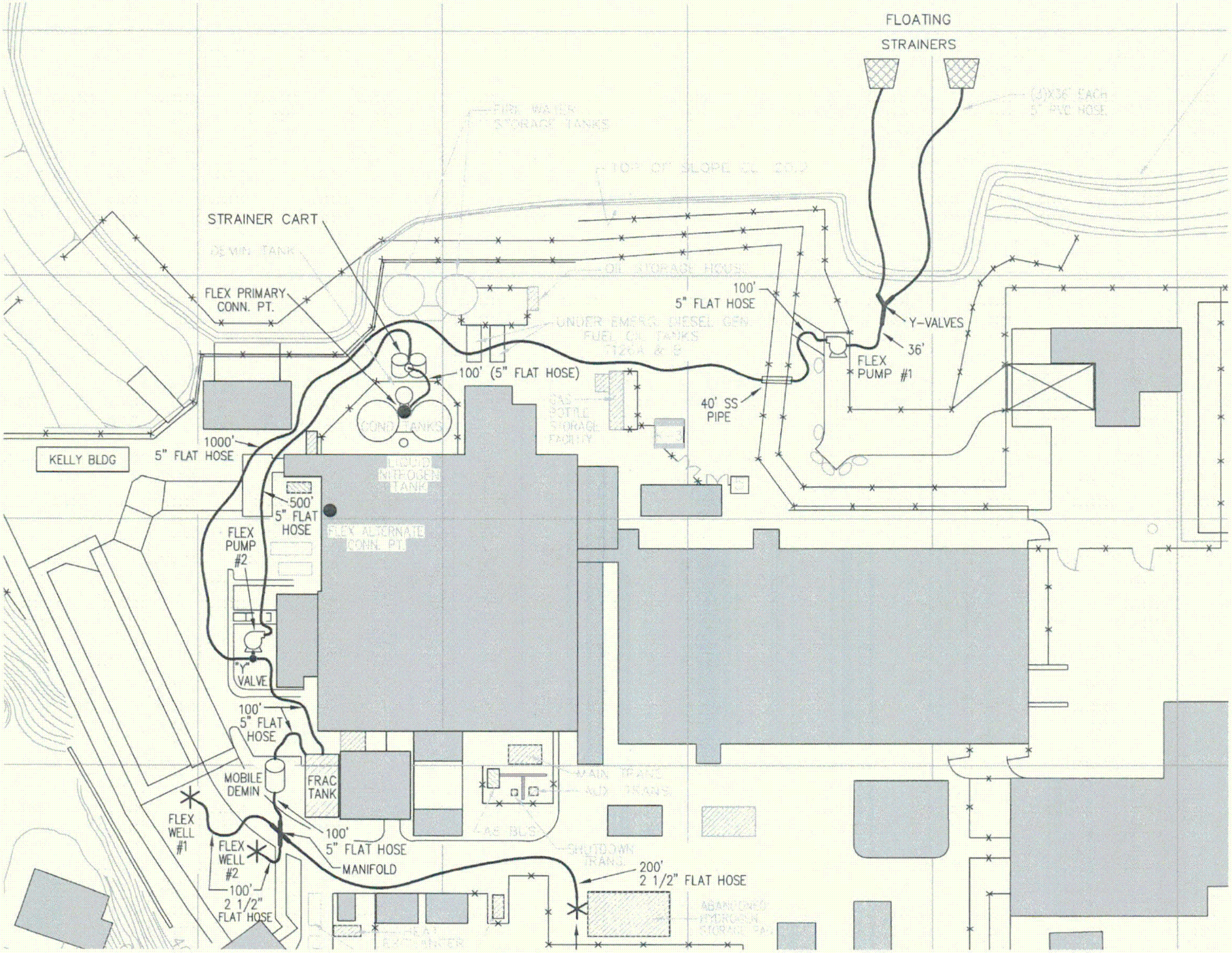
Plant Layout

- **HCVS Local Panel**
- **HCVS Local Panel (Detail A)**
- **Condensate Drain Hose Connection**
- **Standby Gas Treatment System Isolation**

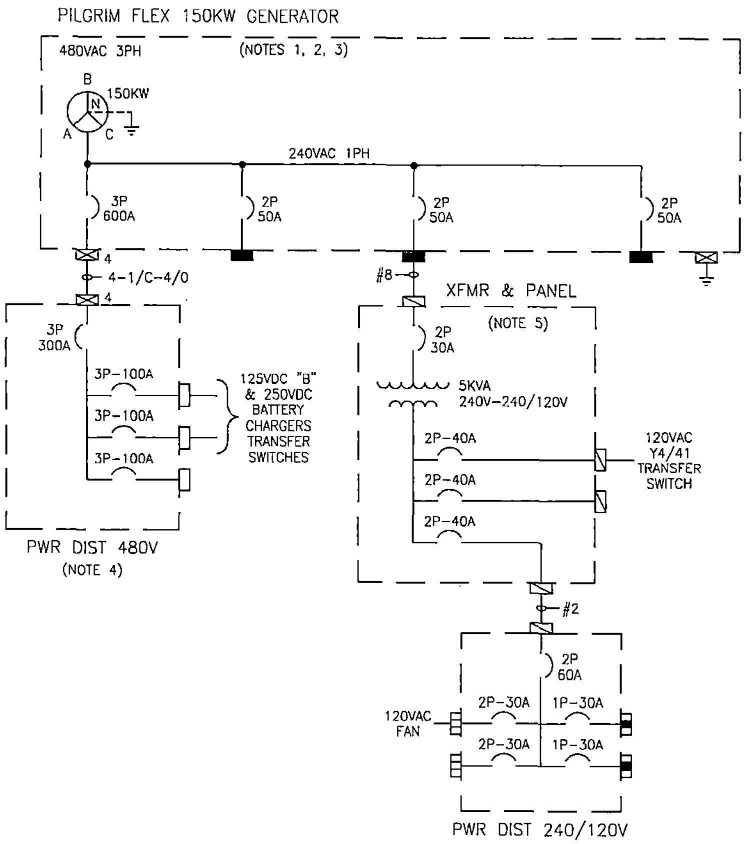
Additional Phase 2 Sketches:

Sketch 1: FLEX / SAWA Equipment Location

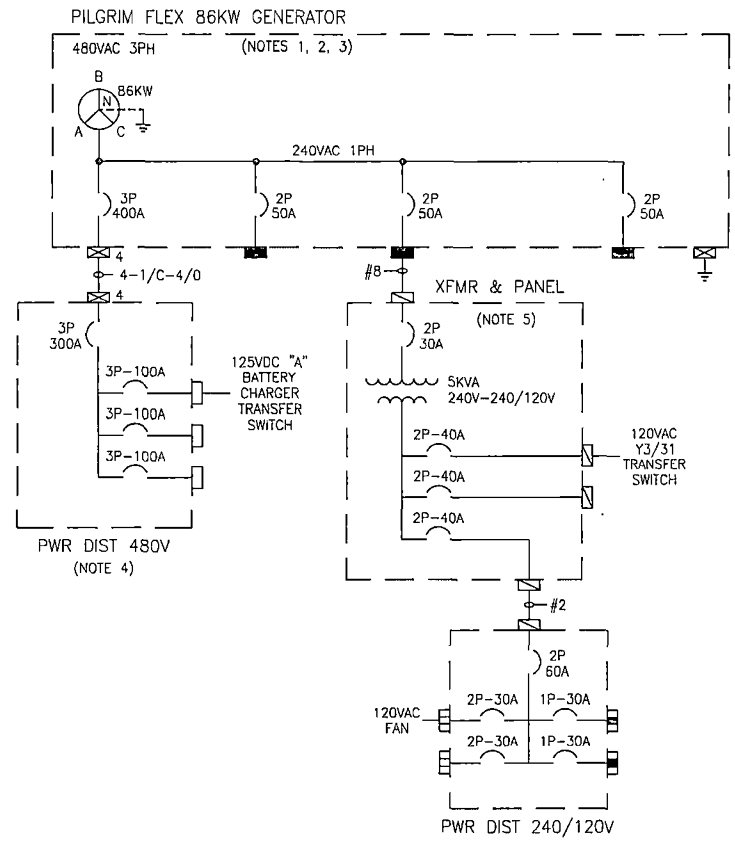
Sketch 2: FLEX / SAWA Power Distribution



Sketch 1: FLEX / SAWA Equipment Location



FLEX GENERATOR SUPPORTING 125VDC & 250VDC BATTTERY CHARGERS
120VAC PANEL Y4/Y41 & BATTERY ROOM FAN



FLEX GENERATOR SUPPORTING 125VDC BATTTERY CHARGER
120VAC PANEL Y3/Y31 & BATTERY ROOM FAN

Sketch 2: FLEX / SAWA Power Distribution

Attachment 4: **Failure Evaluation Table**

Refer to the EA-13-109 Phase 1 Overall Integrated Plan.

Attachment 5: References

1. *Regulatory Documents*

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

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

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

D. Order EA-12-051, Reliable SFP Level Instrumentation, dated March 12, 2012

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

F. JLD-ISG-2012-01, Compliance with Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated August 29, 2012

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

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

I. 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

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

K. NEI 13-02, Industry Guidance for Compliance with Order EA–13–109, Revision 1, Dated April 2015

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

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

N. NEI FAQ HCVS-01, HCVS Primary Controls and Alternate Controls and Monitoring Locations

O. NEI FAQ HCVS-08, HCVS Instrument Qualifications

P. NEI FAQ HCVS-09, Use of Toolbox Actions for Personnel

Q. NEI White Paper HCVS-WP-02, HCVS Cyclic Operations Approach

R. NEI White Paper HCVS-WP-04, FLEX/HCVS Interactions

S. NUREG/CR-7110, Rev. 1, State-of-the-Art Reactor Consequence Analysis Project, Volume 1: Peach Bottom Integrated Analysis

T. SECY-12-0157, Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments, 11/26/12

U. PNPS FSAR, Rev. 28, Final Safety Analysis Report

V. JLD-ISG-2015-01, Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions, dated March 2015

W. NEI HCVS-FAQ-10, Severe Accident Multiple Unit Response

X. NEI HCVS-FAQ-11, Plant Response During a Severe Accident

Y. NEI HCVS-FAQ-12, Radiological Evaluations on Plant Actions Prior to HCVS Initial Use

Z. NEI HCVS-FAQ-13, Severe Accident Venting Actions Validation

2. *Standards*

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

3. *Overall Integrated Plans*

A. PNPS EA-12-049 (FLEX) Overall Integrated Implementation Plan, Rev 0, February 2013

B. PNPS EA-13-109 (HCVS) Overall Integrated Implementation Plan, Rev 0, June 2014

4. *Calculations*

A. Calculation M1380, Rev. 0, PNPS FLEX Strategy Thermal-Hydraulic Analysis

5. *Procedures*

A. FSG 5.9.2.4, Rev. 0, FLEX Low Pressure Injection – Seawater through CST Injection Point to RPV

6. *Engineering Change Packages*

A. EC-42259, Rev. 0, PNPS FLEX Strategy Master EC For Beyond-Design-Basis External Events (BDBEEs) Diverse & Flexible Coping Strategy (Flex) Implementation

B. EC-45555, Rev. 0, FLEX Alternate Power To 125VDC and 250VDC Battery Chargers (Base EC)

C. EC-45556, Rev. 0, FLEX Alternative Power To 120VAC Panels (Base EC)

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

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

Attachment 7: List of Overall Integrated Plan Open Items

Phase 1 and ISE Open Items are addressed as part of the Phase 1 OIP updates.

Phase 2 Open Item	Action	Comment
1	No Open Items	

ATTACHMENT 3

To

PNPS Letter 2.15.082

Pilgrim Nuclear Power Station's
Responses to Phase 1 Interim Staff Evaluation Open Items

(6 pages)

Attachment 3 – Response to Phase 1 Interim Staff Evaluation Open Items

OI #	Action	ISE Section	PNPS Response
1	Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one (1) percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.	Section 3.2.2.1 Section 3.2.2.2	The PNPS HCVS is capable of venting the equivalent of (1) percent of licensed/rated thermal power and the Torus is capable of absorbing the decay heat from full power to (1) one percent licensed/rated thermal power to maintain the integrity of primary containment. Calculations M1387 "Hardened Containment Vent Capacity" and M1380 "PNPS FLEX Strategy Thermal-Hydraulic Analysis" together validate the vent capacity for 1% licensed/rated thermal power at Containment Design Pressure (56 psig) and at the expected actual peak Wetwell venting conditions (Containment Design Temperature of 281°F at the Saturation Pressure of 35 psig). The analysis of the Suppression Pool (Torus) capacity, temperature, and overall thermal balance when using Torus Venting for Containment Heat Removal, including reduced venting capacities at lower pressures and the net change to Torus water inventory, is all included in Calculation M1380. These Calculations were issued as a part of the PNPS FLEX Modification, Engineering Change (EC) 42259 and associated EC 46812. These documents are available for NRC Review on the ePortal.

Attachment 3 – Response to Phase 1 Interim Staff Evaluation Open Items

OI #	Action	ISE Section	PNPS Response
2	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Section 3.2.2.3 Section 3.2.11	The PNPS HCVS utilizes the Main Stack for discharge. In accordance with the PNPS FSAR (12.2.1.2) the Main Stack is a PNPS Class I structure, as part of Secondary Containment System. As noted within the FSAR, portions of the Secondary Containment System are not designated to be functional during or after a tornado and, as such, the Main Stack was designed for the anticipated sustained high wind loads but not specifically designed to withstand extreme tornado wind loading. Seismic and sustained wind loading are included in the design criteria for the Main Stack and, in this application, the high wind loads were indicated as the controlling parameter for the stack design. Calculation C15.0.3360 documents a review of the design basis requirements, design criteria, and acceptance criteria for the Main Stack and this analysis was performed to assess the stack to ensure compliance with FSAR design basis requirements. This document is available for NRC Review on the ePortal.
3	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Section 3.2.1 Section 3.2.2.4 Section 3.2.2.5 Section 3.2.2.1 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.2 Section 3.2.6	The HCVS Phase 1 design change package, along with supporting calculations, will identify the anticipated conditions during ELAP and a Severe Accident and confirm the capability for operating personnel to safely access and operate controls and support equipment. The FLEX, HCVS, and Severe Accident strategies anticipate or plan activities only in readily accessible areas of Secondary Containment. These areas are well shielded and contain the alternate locations for instrument indications and backup Nitrogen (N2) supplies for HCVS and Safety-Relief Valve (SRV) operation. There are no required activities in the Torus Compartment, RHR Quad Rooms, TIP Room, or other high radiation dose areas. Areas that may have elevated dose rates following core damage or RPV breach are only considered accessible for potential activities early in the ELAP, when dose rates are still in the normal range. This includes localized areas that have line-of-sight exposure to HCVS vent piping.

Attachment 3 – Response to Phase 1 Interim Staff Evaluation Open Items

OI #	Action	ISE Section	PNPS Response
4	Provide a description confirming that the HCVS discharges to a point above main plant structures.	Section 3.2.2.3	The planned HCVS design utilizes the Main Stack as the discharge point. The top of the Main Stack is at elevation 400 feet. The next highest plant structure is the stack tower structure attached to the Reactor Building. The stack tower structure houses the auxiliary boiler stack, and the ventilation exhaust duct. The top of the weather cap, over the ventilation exhaust duct, is at approximately elevation 190 feet. The distance from the vent stack centerline to the centerline of the Reactor, is approximately 700 feet. Refer to PNPS site drawings FLEX-01, M22, M28, & C332A.
5	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Section 3.2.2.9	The required instrumentation and controls (existing and new) are identified on page 18 of the PNPS HCVS OIP (June 2014). The existing instrumentation relied upon by HCVS provide indication of Drywell & Wetwell Pressure, Wetwell Level & Temperature, Reactor Pressure and HCVS Valve Position Indication. The proposed new instrumentation includes indication of HCVS Effluent Temperature, System Pressure, Flow & Radiation Dose Rate, and Pneumatic Supply Pressure. The PNPS HCVS detailed design is currently in progress. The design change package will issue documentation for the qualification of the components required for HCVS.
6	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6	The proposed HCVS Battery System design criteria includes requirements for a minimum of 24 hours of operation with no recharging. The alternate power source for the Battery Charger / Power Supply will be provided by a FLEX Diesel Generator before the end of the initial 24 hour period, which will extend the operation of the HCVS instrumentation indefinitely. The PNPS FLEX Generator loading calculation, PS262, was issued as a part of the PNPS FLEX Modification, EC 42259 and associated ECs, to establish the capacity requirements for the FLEX Generators. This document is available for NRC Review on the ePortal. Analyses to establish the required capacity of the HCVS Battery System and any required updating of the FLEX DG loading calculation will be issued as part of the detailed HCVS Phase 1 design change package.

Attachment 3 – Response to Phase 1 Interim Staff Evaluation Open Items

OI #	Action	ISE Section	PNPS Response
7	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6	Calculation M1386 "HCVS Vent Valves AO-5025 and AO-5042B Backup N2 System" and Drawing C3102 were issued as a part of the PNPS FLEX Modification, EC 42259 and associated EC 46820, to establish the HCVS Nitrogen System design. These documents are available for NRC Review on the ePortal.
8	Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Section 3.2.2.3 Section 3.2.2.5 Section 3.2.2.9 Section 3.2.2.10	The PNPS HCVS detailed design change package, along with supporting calculations, will finalize the anticipated conditions during ELAP events and a Severe Accident and confirm the capability of the components to perform their functions. The EC will also issue documentation and discuss the qualification of any new components required for HCVS.
9	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	Section 3.2.2.5	The EP-Communications (EP-Comms) design change package has been implemented in support of the PNPS FLEX modifications. The HCVS design change package will evaluate the EP-Comms equipment required to support the HCVS. There are no significant changes anticipated for the EP-Comms capabilities that were established for the FLEX Strategy.
10	Make available for NRC staff audit descriptions of design details that minimize unintended cross flow of vented fluids within a unit including: the final method to isolate HCVS from SBGT, all interfacing discharges to the plant stack, and control of all penetrations to the HCVS envelope.	Section 3.2.2.7	Calculation M1388 "HCVS Unintended Cross Flow Evaluation" was issued as part of the PNPS FLEX Modification, EC 42259 and associated EC 46812, to address this requirement for the FLEX Strategy. The PNPS HCVS detailed design is currently in progress. This calculation will be updated as-needed for Severe Accident/ELAP conditions as part of the HCVS design change package. This document is available for NRC Review on the ePortal.

Attachment 3 – Response to Phase 1 Interim Staff Evaluation Open Items

OI #	Action	ISE Section	PNPS Response
11	Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.	Section 3.2.2.9	The PNPS HCVS detailed design is currently in progress. The PNPS FLEX, HCVS, and Severe Accident mitigation strategies prevent exceeding the design capabilities of Primary Containment by initiating Torus Venting at or before exceeding the Torus Bottom Pressure Primary Containment Pressure Limit (PCPL) value of 60 PSIG. Calculation M1380 "PNPS FLEX Strategy Thermal-Hydraulic Analysis" evaluates the Severe Accident Hydrogen (H2) production and shows that saturated steam temperature & pressure will combine with the H2 and N2 gas pressurization up to the Maximum Allowable Working Pressure (MAWP) for the Torus at 62 psig for the Short-Term Station Blackout (STSBO) Case, which is based on the minimum time before core damage and RPV breach. There is a potentially higher peak pressure of 82 psig for the Long-Term Station Blackout (LTSBO) Case, where core damage and overheating occur later, after some time period on the order of 8 eight hours or longer during which there is successful operation of RCIC or HPCI for core cooling, then the H2 gas pressure and N2 gas pressure, together with the saturated steam pressure at that point in time, can significantly exceed the Torus Bottom Pressure PCPL value of 60 PSIG when the Wetwell is at 281°F, although the Drywell Head Leakage Pressure Limit of 80 PSIG is not exceeded if Wetwell Venting is initiated at that time, which would be expected based on the use of EOPs or SAGs. It is considered that, as soon as H2 gas evolution begins and the Torus Bottom Pressure approaches the PCPL value of 60 psig, Wetwell Venting will be initiated and will mitigate the peak pressure that occurs with continued H2 generation. This document is available for NRC Review on the ePortal.

Attachment 3 – Response to Phase 1 Interim Staff Evaluation Open Items

OI #	Action	ISE Section	PNPS Response
12	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	Section 3.2.2.6	The HCVS will be utilized to maintain the pressure within the containment Primary Containment Pressure Limit (PCPL), in accordance with EOPs and SAGs. This will minimize any leakage through containment penetrations and associated primary containment isolation valves. The HCVS piping is of welded construction and the number of boundary valves is minimized. Potential leakage from HCVS boundary isolation valves will be addressed for Severe Accident conditions including consideration of hydrogen and combustible gases and radiological isotopes as part of the HCVS design change package. The PNPS HCVS detailed design is currently in progress.

References to be placed on ePortal:

[1] Calculation M1380 Rev 0 PNPS FLEX STRATEGY THERMAL-HYDRAULIC ANALYSIS

[2] Calculation M1386 Rev 0 HCVS Vent Valves A0-5025 and A0-5042B Backup N2 System

[3] Calculation M1387 Rev 0 Hardened Containment Vent Capacity

[4] Calculation M1388 Rev 0 HCVS Unintended Cross Flow Evaluation

[5] Calculation C15.0.3360 Rev 1 MAIN STACK STRUCTURAL EVALUATION

[6] Calculation PS262 Rev 0 FLEX Diesel Generator Loading

[7] Drawing FLEX-01 Rev 0 PNPS FLEX EQUIPMENT LAYOUT

[8] Drawing M22 Rev7 EQUIPMENT LOCATION REACTOR BUILDING SECTION CC

[9] Drawing M28 Rev 8 EQUIPMENT LOCATION MAIN STACK & FILTER BUILDING PLANS & SECTIONS

[10] Drawing C332A Rev 10 MISCELLANEOUS STRUCTURES STACK PLAN, ELEVATION & DETAILS

[11] Drawing C3102 Rev 0 (EC46820) N2 CYLINDER SUPPORT BACKUP N2 SUPPLY TO AO-5025 & AO-5042B