Exelon Generation.

Order No. EA-13-109

RS-15-302

December 15, 2015

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

Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-63 and DPR-69
NRC Docket Nos. 50-220 and 50-410

Subject: Phase 1 (Updated) and 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)

References:

1. NRC Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013
2. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions", Revision 0, dated April 2015
3. NEI 13-02, "Industry Guidance for Compliance With Order EA-13-109, BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions", Revision 1, dated April 2015
4. Exelon Generation Company, LLC's Answer 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 26, 2013
5. Exelon Generation Company, LLC 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 27, 2014
6. Exelon Generation Company, LLC December 2014 (First) Six-Month Status Report 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 December 16, 2014 (FLL-14-035)
7. Exelon Generation Company, LLC Second Six-Month Status Report 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, 2015 (RS-15-153)

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8. NRC letter to Exelon Generation Company, LLC, Nine Mile Point Nuclear Station, Unit 1 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC No. MF4481), dated March 26, 2015
9. NRC letter to Exelon Generation Company, LLC, Nine Mile Point Nuclear Station, Unit 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC No. MF4482), dated February 11, 2015

On June 6, 2013, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to require their BWRs with Mark I and Mark II containments to take certain actions to ensure that these facilities have a hardened containment vent system (HCVS) to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in 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). Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 requires submission of an Overall Integrated Plan (OIP) by June 30, 2014 for Phase 1 of the Order, and an OIP by December 31, 2015 for Phase 2 of the Order. The interim staff guidance (Reference 2) provides direction regarding the content of the OIP for Phase 1 and Phase 2. Reference 2 endorses industry guidance document NEI 13-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial response regarding reliable hardened containment vents capable of operation under severe accident conditions. Reference 5 provided the Nine Mile Point Nuclear Station, Units 1 and 2, Phase 1 OIP. References 6 and 7 provided the first and second six-month status reports pursuant to Section IV, Condition D.3 of Reference 1 for Nine Mile Point Station.

The purpose of this letter is to provide both the third six-month update for Phase 1 of the Order pursuant to Section IV, Condition D.3, of Reference 1, and the OIP for Phase 2 of the Order pursuant to Section IV, Condition D.2 of Reference 1, for Nine Mile Point Nuclear Station, Units 1 and 2. The third six-month update for Phase 1 of the Order is incorporated into the HCVS Phase 1 and Phase 2 overall integrated plan document which provides a complete updated Phase I OIP, a list of the Phase 1 OIP open items, and addresses the NRC Interim Staff Evaluation open items for Phase 1 contained in References 8 and 9. Future six-month status reports will provide the updates for both Phase 1 and Phase 2 OIP implementation in a single status report.

Reference 3, Section 7.0 contains the specific reporting requirements for the Phase 1 and Phase 2 OIP. The information provided in Enclosures 1 and 2 provides the Nine Mile Point Nuclear Station, Units 1 and 2 HCVS Phase 1 and Phase 2 OIP, respectively, pursuant to Reference 2. The enclosed Phase 1 and Phase 2 OIPs are based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the Enclosures, will be provided in the six-month Phase 1 and Phase 2 OIP updates required by Section IV, Condition D.3, of Reference 1.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of December 2015.

Respectfully submitted,

James Barstow
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosures:

1. Nine Mile Point Nuclear Station, Unit 1, Overall Integrated Plan for Phase 1 and Phase 2 Requirements for Reliable Hardened Containment Vent System (HCVS) Capable of Operation Under Severe Accident Conditions
2. Nine Mile Point Nuclear Station, Unit 2, Overall Integrated Plan for Phase 1 and Phase 2 Requirements for Reliable Hardened Containment Vent System (HCVS) Capable of Operation Under Severe Accident Conditions

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region I
NRC Senior Resident Inspector – Nine Mile Point Nuclear Station
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Enclosure 1

Nine Mile Point Nuclear Station, Unit 1

Overall Integrated Plan for Phase 1 and Phase 2 Requirements for Reliable Hardened Containment Vent System (HCVS) Capable of Operation Under Severe Accident Conditions

(64 pages)

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Introduction

In 1989, the NRC issued Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," (Reference 2) to all licensees of Boiling Water Reactors (BWRs) with Mark I containments to encourage licensees to voluntarily install a hardened wetwell vent. In response, licensees installed a hardened vent pipe from the suppression pool to some point outside the secondary containment envelope (usually outside the reactor building). Some licensees also installed a hardened vent branch line from the drywell.

On March 19, 2013, the Nuclear Regulatory Commission (NRC) Commissioners directed the staff per Staff Requirements Memorandum (SRM) for SECY-12-0157 (Reference 26) 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 Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accidents*, June 6, 2013 (Reference 4). 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 (Reference 6) and JLD-ISG-2015-01 issued in April 2015 (Reference 31). These ISGs endorse the compliance approach presented in NEI 13-02 Revisions 0 and 1, *Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents* (Reference 9), 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 these 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 EA-13-109.

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: Per the Generic OIP, at the Licensee's option, the December 2015 six month update for Phase 1 may be independent of the Phase 2 OIP submittal, but will require separate six month updates for Phases 1 and 2 until each phase is in compliance. Exelon has not selected this option.

The Nine Mile Point Unit 1 (NMP1) venting actions for the EA-13-109, Phase 1 severe accident capable venting scenario can be summarized by the following:

- The Hardened Containment Vent System (HCVS) will be initiated via manual action from either the Main Control Room (MCR) and/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. Specifically, valves located at the ROS are required to be manually opened before operation from the MCR can commence. Also, in case the HCVS flow path valves or the Argon purge flow cannot be opened from the MCR, the ROS provides a back-up means of opening the valve(s) that does not require electrical power or control circuitry.
- The vent will utilize Containment Parameters of Pressure and Suppression Pool 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 spare N2 bottles prior to the installed motive force being exhausted. Also, connections will be installed if it is desired to connect a portable air compressor.
- Venting actions will be capable of being maintained for a sustained period of up to 7 days.

The Phase 2 actions can be summarized as follows:

- Utilization of Severe Accident Water Addition (SAWA) to initially inject water into the Reactor Pressure Vessel (RPV). Although SAWA to the Drywell (DW) is an option, Exelon has selected SAWA injection to the RPV.
- Utilization of Severe Accident Water Management (SAWM) to control injection and Suppression Pool level to ensure the HCVS (Phase 1) wetwell vent (SAWV) will remain functional for the removal of decay heat from containment.

- Ensure that the decay heat can be removed from the containment for seven (7) days using the HCVS or describe the alternate method(s) to remove decay heat from the containment from the time the HCVS is no longer functional until alternate means of decay heat removal are established that make it unlikely the 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 should be Drywell pressure, Suppression Pool level, SAWA flowrate and the HCVS parameters listed above.

Note: Although EA-13-109 Phase 2 allows selecting SAWA and a Severe Accident Capable Drywell Vent (SADV) strategy, Exelon has selected SAWA and SAWM.

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, 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 NMP1 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 Suppression Pool to the top of the Reactor Building.
  - Severe Accident Water Addition (SAWA) – A combination of permanently installed and portable equipment to provide a means to add water to the 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)
- Unit 1 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.
- Unit 1 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 NMP1:

- Seismic, tornado, external flooding, extreme cold temperature, extreme high temperature, and ice/ snow

The following extreme external hazards screen out for NMP1:

- Straight wind

Key Site assumptions to implement NEI 13-02 strategies.

Provide key assumptions associated with implementation of HCVS Phase 1 Strategies.

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

Mark I/II Generic HCVS Related Assumptions:

Part 1: General Integrated Plan Elements and Assumptions

Applicable EA-12-049 (Reference 3) assumptions:

049-1. Assumed initial plant conditions are as identified in NEI 12-06, §3.2.1.2, items 1 and 2 (Reference 8).

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

049-3. Assumed reactor transient boundary conditions are as identified in NEI 12-06, §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 the failure of the Emergency Cooling System (ECS) (Reference NEI 12-06, §3.2.1.3, item 9)(Reference 8).

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.

049-6. At time=1 hour (time sensitive at a time greater than 1 hour) an ELAP is declared and actions begin as defined in EA-12-049 compliance.

049-7. The HCVS system will include a dedicated 125 VDC battery panel sized for 24-hours of HCVS operation. Beyond 24 hours FLEX power will be provided via the #12 station battery board. (NEI 12-06, section 3.2.1.3 item 8)

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

049-9. All activities associated with EA-12-049 (FLEX) that are not specific to implementation of the HCVS, including such items as debris removal, communication, notifications, Spent Fuel Pool (SFP) level and makeup, security response, opening doors for cooling, and initiating conditions for the events, 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 (Reference 4) generic assumptions:

109-1. Site response activities associated with EA-13-109 actions are considered to have no access limitations associated with radiological conditions while Reactor Pressure Vessel (RPV) level is above 2/3 core height (core damage is not expected). This is further addressed in HCVS-FAQ-12.

109-2. Additional N2 bottles will be available and meet the criteria applicable to HCVS to provide motive force beyond 24 hours. Also, 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 can be connected to recharge air lines for HCVS components after 24 hours. The FLEX portable air supply if used must be demonstrated to meet the "SA Capable" criteria that are defined in NEI 13-02 Section 4.2.4.2 and Appendix D Section D.1.3 (Reference 9). 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).

109-3. SFP Level is maintained with either on-site or off-site resources such that the SFP does not contribute to the analyzed source term (Reference HCVS-FAQ-07 [18]).

109-4. Existing containment components design and testing values are governed by existing plant containment criteria (e.g., Appendix J) and are not subject to the testing criteria from NEI 13-02 (Reference HCVS-FAQ-05 [16] and NEI 13-02, §6.2.2 [9]).

109-5. Classical design basis evaluations and assumptions are not required when assessing the operation of the HCVS. The reason that this is not required is that the order postulates an unsuccessful mitigation of an

Part 1: General Integrated Plan Elements and Assumptions

event such that an ELAP progresses to a severe accident with ex-vessel core debris that classical design basis evaluations are intended to prevent (Reference NEI 13-02, §2.3.1 [9]).

109-6. HCVS manual actions require minimal operator steps and can be performed in the postulated thermal 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[12]). This assumption does not apply to Phase 2 SAWA/SAWM because SAWA equipment needs to be connected and placed in service within 8 hours from the time of the loss of RPV injection and will require more than minimal operator action.

109-7. HCVS dedicated equipment is defined as vent process elements that are required for the HCVS to function in an ELAP event that progresses to core melt ex-vessel (Reference HCVS-FAQ-02 [13] and White Paper HCVS-WP-01 [21]). 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.

109-8. Use of MAAP Version 4 or higher provides adequate assurance of the plant conditions (e.g., RPV water level, temperatures, etc.) assumed for Order EA-13-109 Beyond Design Basis External Event (BDBEE) and SA HCVS operation (Reference FLEX MAAP Endorsement ML13190A201 [29]). Additional analysis using RELAP5/MOD 3, GOTHIC, and MICROSHIELD, etc., are acceptable methods for evaluating environmental conditions in other portions of the plant, provided that 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.

109-9. NRC Published Accident evaluations (e.g. SOARCA, SECY-12-0157, NUREG 1465) as related to Order EA-13-109 conditions are acceptable as references (Reference NEI 13-02, §8 [9]).

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

109-11. This Overall Integrated Plan is based on Emergency Operating Procedure (EOP) changes consistent with Emergency Procedures Guidelines/Severe Accident Guidelines (EPG/SAGs) Revision 3 as incorporated per the site's EOP/Severe Accident Procedure (SAP) procedure change process. This assumption does not apply to Phase 2 SAWM because SAWM is not part of revision 3. (Refer 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 Main Control Room is adequately protected from excessive radiation dose as 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 [12] and HCVS-FAQ-09).

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

109-14. RPV depressurization is directed by the EPGs in all cases prior to entry into the SAGs. (reference NEI 13-02 Rev 1 §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-01) This is further addressed in HCVS-

Part 1: General Integrated Plan Elements and Assumptions

FAQ-10.

Plant Specific HCVS Related Assumptions/Characteristics:

NMP1-1	EA-12-049 (FLEX) actions to restore power are sufficient to ensure continuous operation of non-dedicated containment instrumentation identified in Part 2, Key Venting Parameters of the OIP.
NMP1-2	Modifications that allow a FLEX generator to be connected to a 600 volt safety related bus are assumed to have been installed such that a FLEX generator can be credited for HCVS operation beyond the initial 24-hour sustained operational period.
NMP1-3	The rupture disk will be manually breached from the MCR and/or ROS if required for anticipatory venting during an ELAP.
NMP1-4	The Plant layout of buildings and structures are depicted in Sketch 2C. Note the Main Control Room is located in the turbine building and has substantial structural walls and features independent of the Reactor Building. The HCVS vent routing is all internal to the Reactor Building up to where it penetrates the Reactor Building roof and exhausts to the atmosphere (see Sketch 2A).
NMP1-5	The HCVS internal piping above the metal sided non-missile protected refueling floor and the HCVS external piping is all above 30-feet from ground level, consists solely of large bore (10-inch nominal diameter) piping and its piping supports, and the piping has less than 300 square feet of cross section. The HCVS external piping meets the reasonable protection requirements of HCVS-WP-04 (Reference 32).

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

NMP1 plans to install a WW flow path that has two dedicated primary containment isolation valves and a downstream rupture disc that is routed totally separate from the other unit and with no interconnected systems. The discharge is routed separately through a pipe that discharges above the unit's Reactor Building roof and is totally separate from NMP2. Each NMP unit will have dedicated motive power (Pressurized N2) for HCVS valves, Argon Purge system, and DC power for HCVS components that is not shared with any other function and that does not rely on FLEX for the first 24 hours, with the clarification that existing containment instrumentation (pressure and WW level) are not considered HCVS components and power for existing containment instrumentation is through the FLEX Diesel Generator (DG) provided through the actions for EA-12-049. Also, the FLEX DG may be credited for recharging the HCVS battery after 24 hours.

The operation of the HCVS will be designed to minimize the reliance on operator actions in response to hazards listed in Part 1. Initial operator actions will be completed by trained plant personnel and will include the capability for remote-manual initiation from the HCVS control station. A list of the remote manual actions performed by plant personnel to open the HCVS vent path can be found in the following table (Table 2-1). A HCVS ELAP Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4.

Part 2: Boundary Conditions for Wetwell Vent

Table 2-1 HCVS Remote Manual Actions

Primary Action	Primary Location / Component	Notes
1. Enable the N2 motive air for the HCVS valves and enable the Argon purge system.	MCR & ROS	Required step to open N2 and Argon manual isolation valves before commencing operation from the control room. Alternate control via manual valves at the ROS.
2. Isolate leak-off connection upstream of the rupture disc.	ROS	Required step to prevent venting into the Reactor Building through the small leak-off path (3-way valve).
3. Breach the Rupture Disc by opening the Argon Purge Line for the specified amount of time.	MCR or ROS	Required for anticipatory venting and potentially for severe accident containment pressure depending on the final selected rupture disc burst pressure.
4. Open Wetwell PCIVs.	Key locked hand switches in the MCR panel.	To meet Requirement 1.2.5, PCIV operation at the ROS can be done with reposition of motive air valves.
5. Align generator to HCVS battery charger.	At ROS	Prior to depletion of the HCVS battery supply, actions will be required to recharge the battery at a time greater than 24 hours.
6. Replace N2 motive power bottles or align portable compressor. Replenish Argon bottles.	Replacement Nitrogen bottles will be located at the ROS or another hardened location. Replacement Argon bottles will be at ROS or another hardened location such as the FLEX building.	Prior to depletion of the pressurized gas sources, actions will be required to connect back-up sources at a time greater than 24 hours. Argon replenishment only required if severe accident conditions are present. A branch connection will be installed to allow for connecting a portable air compressor for HCVS valve motive force.

Attachment 2A, Sequence of Events Timeline, was developed to identify required operator response times and potential environmental constraints. This timeline is based upon the following three sequences:

1. Sequence 1 is based upon the action response times developed for FLEX when utilizing anticipatory venting in a BDBEE without core damage.
2. Sequence 2 is based on SECY-12-0157 long-term station blackout (LTSBO) (or ELAP) with a failure of RCIC after a black start where failure occurs because of subjectively assuming over injection. For NMP1, which does not have RCIC, it is assumed that the Emergency Cooling System (ECS) fails to operate at 18 hours due to a lack of makeup water for cooling. This time could be as soon as 8 hours, should FLEX fail to provide makeup water for the ECS condensers.
3. Sequence 3 is based on NUREG-1935 (SOARCA) results for a prolonged SBO (or ELAP) with

Part 2: Boundary Conditions for Wetwell Vent

loss of RCIC case without black start. For NMP1, it is assumed that the ECs fail to operate.

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

- Approximately 8 hours, initiate use of the HCVS per site procedures to maintain containment pressure below the lower of the primary containment pressure limit (PCPL) or containment design pressure. Initiation of the HCVS can be completed with the actions outlined in Table 2-1. The reliable operation of HCVS will be met because HCVS meets the seismic requirements identified in NEI 13-02 and will be powered by dedicated HCVS batteries with motive force supplied to HCVS valves from installed nitrogen storage bottles. HCVS controls and HCVS instrumentation will be provided from a panel installed in the MCR. Other containment parameter instrumentation associated with operation of the HCVS is available in the MCR. Operation of the system will be available from the MCR and/or a ROS. Dedicated HCVS batteries will provide power for a minimum of 24 hours. Therefore, initiation of the HCVS from the MCR and/or the ROS within 8 hours is acceptable because of the simplicity and limited number of operator actions. Placing the HCVS in operation to maintain containment parameters within design limits for either BDBEE or SA venting would occur at a time further removed from ELAP declaration as shown in Attachment 2.
- 24 hours, replace/install additional nitrogen bottles or install portable air compressor. The nitrogen station will have an extra connection to allow for connection of a portable air compressor in lieu of replacing N2 bottles. This can be performed at any time prior to 24 hours to ensure adequate capacity is maintained so this time constraint is not limiting.
- 24 hours, connect back-up power to HCVS battery charger. The HCVS batteries are calculated to last a minimum of 24 hours (ISE Open Item #7). The HCVS battery charger will be able to be re-powered from the 600VAC bus that will be re-powered from a portable diesel generator (DG) put in place for FLEX. The DG will be staged and placed in service within 8 hours (Reference 1) and therefore will be available prior to being required. In the event that the DG is not available, a local connection will allow a small portable generator staged outside of the turbine building to be connected to the battery charger to provide power.
- Within 24 hours, the permanently installed Argon bottles at the ROS will be replaced, as required, to maintain sustained operation. Note that Argon purging is required only if the ELAP progresses to severe accident conditions.

[ISE OPEN ITEM-7: Perform final sizing evaluation for HCVS batteries/battery charger and incorporate into FLEX DG loading calculation.]

Discussion of radiological, temperature, other environmental constraints identified in Attachment 2A

- Actions to initiate HCVS operation are taken from the MCR and/or from the ROS in the Turbine Building. Both locations have significant shielding and/or physical separation from radiological sources. Non-radiological habitability for the MCR is being addressed as part of the NMP1 FLEX response. The ROS location in the Turbine Building has no heat sources as the area is opened to the turbine building surrounding areas (i.e., ROS is not enclosed in a separate room).
- Actions to replenish the pneumatic supply will be completed from the Turbine Building. The HCVS pneumatic supply, HCVS batteries and ROS are located on grade elevation 261' in the Turbine Building. The HCVS piping will exit the Reactor Building on the east side of the Reactor Building approximately 140' from ground elevation. Therefore, the location for pneumatic supply replenishment is shielded from

Part 2: Boundary Conditions for Wetwell Vent

the HCVS piping by the Reactor and Turbine Buildings.

- Actions to install the FLEX Portable DG will occur on the south side of the NMP1 Turbine Building and within the south end of the Turbine Building itself. The locations for installation (and control) of the DG are therefore shielded from HCVS piping by the Reactor Building and the Turbine Building. In the event that this DG cannot be operated, the backup portable generator would be connected to the battery charger in the Turbine Building, similar to replacement of the pneumatic supply.

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

Power and Pneumatic Supply Sources (EA-13-109, Section 1.2.5 & 1.2.6 / NEI 13-02, Section 4.2.3, 2.5, 4.2.2, 4.2.6, 6.1)
Provide a discussion of electrical power requirements, including a description of dedicated 24 hour power supply from permanently installed sources. Include a similar discussion as above for the valve motive force requirements. Indicate the area in the plant from where the installed/dedicated power and pneumatic supply sources are coming.

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

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, and 1.2.12 / NEI 13-02, Section 2.3,2.4, 4.1.1, 4.1.6, 4.1.7, 5.1, & Appendix H)
State which approach or combination of approaches the plant will take to address the control of flammable gases, clearly demarcating the segments of vent system to which an approach applies.

Part 2: Boundary Conditions for Wetwell Vent

Unintended Cross Flow of Vented Fluids (EA-13-109, Section 1.2.3, 1.2.12 / NEI 13-02, Section 4.1.2, 4.1.4, 4.1.6 and Appendix H)
Provide a description to eliminate/minimize unintended cross flow of vented fluids with emphasis on interfacing ventilation systems (e.g. SGTS). What design features are being included to limit leakage through interfacing valves or Appendix J type testing features?

Prevention of Inadvertent Actuation (EA-13-109, Section 1.2.7/NEI 13-02, Section 4.2.1)
The HCVS shall include means to prevent inadvertent actuation.

Component Qualifications (EA-13-109, Section 2.1 / NEI 13-02, Section 5.1)
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)
Provide 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 JLD-ISG-2012-01 and JLD-ISG-2012-03 for seismic details.)

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

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

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

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

Part 2: Boundary Conditions for Wetwell Vent

Vent Size and Basis

The HCVS wetwell path is designed for venting steam/energy at a minimum capacity of 1% of 1850 MW thermal power at pressure of 35 psig (ISE Open Item #2). This pressure is the lower of the drywell design pressure (62 psig), the PCPL (43.4 psig) and the torus design pressure (35 psig). The size of the wetwell vent piping for the majority of HCVS piping is 10 inches in diameter with two short 8-inch diameter sections through existing floor penetrations which provides adequate capacity to meet or exceed the Order criteria.

[ISE OPEN ITEM-2: Perform final vent capacity calculation for the Torus HCVS piping confirming 1% minimum capacity.]

Vent Capacity

The 1% value at NMP1 assumes that the Torus has sufficient capacity to absorb the decay heat generated for a minimum of 3 hours without allowing containment pressure to exceed 43 psig (PCPL) after which point decay heat is less than or equal to 1%. The vent would then be able to prevent containment pressure from increasing above the PCPL. The duration of Torus decay heat absorption capability has been confirmed (Reference 30). The sizing for 1% assumes nominal suppression pool water level.

Vent Path and Discharge

The HCVS vent path at NMP1 utilizes the existing penetration piping for the Containment Vent and Purge System from the Torus up to the first Primary Containment Isolation Valve, VLV-201-16. The torus (wetwell) vent piping tees off from the existing penetration piping described above. The dedicated HCVS piping then continues up through the Reactor Building and exits the Reactor Building roof on the east side to a discharge point approximately 3' above the highest point of the Reactor Building roof or any nearby structure.

The HCVS vent path will include two PCIVs dedicated to the HCVS function with a downstream rupture disc. After the HCVS flow path is opened, the downstream PCIV will be used to control HCVS flow by closing and reopening. The rupture disc will serve as the secondary containment pressure boundary to prevent PCIV leakage from being released to the outside during a design basis loss of coolant accident (DB LOCA). The Argon purge system can be used to breach the rupture disc if HCVS venting is required prior to the containment pressure exceeding the rupture disc setpoint. The NMP1 vent path is completely separate from the Nine Mile Point Unit 2 (NMP2) vent path.

The current design for the external piping meets the reasonable tornado missile protection criteria of HCVS-WP-04. The HCVS internal piping above the metal sided non-missile protected refueling floor and the external piping consists solely of large bore piping and its supports, is above 30 feet from ground level, and these internal and external pipe sections have less than 300 square feet of cross section.

Power and Pneumatic Supply Sources

All electrical power required for operation of HCVS components will be provided by dedicated HCVS batteries with a minimum capacity capable of providing power for 24 hours without recharging. A preliminary sizing evaluation has been completed. A final confirmatory evaluation will be completed as part of the detailed design process when selection of electrical components is finalized (Ref ISE Open Item #7). A battery charger is provided that requires a 240 VAC supply. This will be provided by a dedicated 600 VAC to 120/240 VAC transformer, which will be powered from a 600 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. In addition, a connection point that utilizes standard electrical connections will be provided for a portable generator for sustained operation of the HCVS.

Part 2: Boundary Conditions for Wetwell Vent

For the first 24 hours following the event, the motive supply for the AOVs will be dedicated nitrogen gas bottles that will be permanently installed and available. These bottles will be sized such that they can provide motive force for at least 8 cycles of vent path operation (2 Primary Containment Isolation Valves (PCIVs)). Eight cycles is defined as the initial opening of the two PCIVs followed by closing and reopening the downstream PCIV. A preliminary sizing evaluation has been completed. A final evaluation will be completed as part of the detailed design process when selection of the system AOVs is finalized (ISE Open Item #8).

[ISE OPEN ITEM-8: Perform final sizing evaluation for pneumatic Nitrogen (N2) supply.]

Supplemental motive force (e.g., additional nitrogen gas bottles and/or air compressor), portable generators, and enough fuel for an additional 48 hours of operation will be stored on site in an area that is reasonably protected from assumed hazards consistent with the requirements of NEI 12-06. Pre-engineered quick disconnects will be provided to connect a portable air compressor as supplemental motive force supply.

1. The HCVS flow path valves are air-operated valves (AOV) that are air-to-open and spring-to-shut. Opening the valves requires energizing a DC powered solenoid operated valve (SOV) and providing motive air/gas. A backup means of operation is also available that does not require energizing or repositioning the SOV.

2. An assessment of temperature and radiological conditions will be performed to ensure operating personnel can safely access and operate controls at the ROS based on time constraints listed in Attachment 2. (ISE Open Item #6)

[ISE OPEN ITEM-6: Perform confirmatory environmental condition evaluation for the Turbine Building in the vicinity of the ROS and HCVS dedicated pneumatic supply and batteries.]

3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (electric power, N2/air) will be located in areas reasonably protected from the hazards listed in Part 1 of this report.

4. All valves required to open the flow path will be designed for remote manual operation following an ELAP, such that the primary means of valve manipulation does not rely on use of a handwheel, reachrod, or similar means requiring close proximity to the valve (HCVS-FAQ-03, Reference 14). Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards in Part 1 of this OIP.

5. Access to the locations described above will not require temporary ladders or scaffolding.

Location of Control Panels

The HCVS design allows for initiation, operation, and monitoring of the HCVS from either the MCR and/or the ROS. The MCR location is protected from adverse natural phenomena and is the normal control point for HCVS operation and Plant Emergency Response actions.

The ROS will be located in the Turbine Building. This location is protected from adverse natural phenomena, is readily accessible, well ventilated and is shielded from the HCVS piping by the Reactor Building. The NMP1 Turbine Building was designed to seismic loads in accordance with the building code and is considered

Part 2: Boundary Conditions for Wetwell Vent

seismically robust. The ROS area includes the location of the HCVS support equipment – nitrogen pneumatic supply, argon purge supply, and dedicated battery.

Hydrogen

As required by EA-13-109, Section 1.2.11, the HCVS design will include an Argon purge system that will be connected just downstream of the second PCIV. It will be designed to prevent hydrogen detonation downstream of the second PCIV. The Argon purge system will have a switch for the control valve in the MCR to allow opening the purge for the designated time, but it will also allow for local operation in the ROS in case of a DC power or control circuit failure. The Argon purge will only be utilized following severe accident conditions when hydrogen is being vented. The installed capacity for the Argon purge system will be sized for 8 purges within the first 24 hours of the ELAP. This number of vent cycles is the same value used for sizing the PCIV motive air supply. The number of purge cycles may be reduced based on plant-specific analysis. The design will allow for Argon bottle replacement for continued operation past 24 hours.

The Argon purge system can also be used to breach the rupture disc if venting is required before reaching the rupture disc setpoint. The MCR panel will include an indication of Argon pressure to the HCVS path to verify that the Argon purge system flow is occurring.

Unintended Cross Flow of Vented Fluids

The HCVS for NMP1 is fully independent of NMP2 with separate discharge points. Therefore, the capacity at each unit is independent of the status of the other unit's HCVS.

Refer to the P&ID (Sketch 2A). The NMP1 HCVS flowpath is dedicated to the HCVS function. Although the HCVS flow path primary containment penetration is shared with the Containment Vent and Purge System, the HCVS and the Containment Vent and Purge System flow paths have separate PCIVs. The Containment Vent and Purge System PCIVs are normally closed, except during infrequent vent and purge operations, and fail closed upon loss of electrical power, instrument air and upon a containment isolation signal. The PCIVS are leak tight and tested in accordance with the 10CFR50 Appendix J program. They are safety related and fully qualified in accordance with the Environmental Qualification (EQ) Program for NMP1. Since the HCVS flow path does not share any PCIVS with another flowpath and has no connections downstream of the PCIVs, the HCVS flowpath is considered a dedicated flow path with no interconnected systems.

Prevention of Inadvertent Actuation

EOP/EPG operating procedures provide clear guidance that the HCVS is not to be used to defeat containment integrity during any design basis transients and accident. In addition, the HCVS will be designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error. These design features include two normally closed/fail closed, in-series PCIVs that are air-to-open and spring-to-shut. A DC SOV must be energized to allow the motive air to open the valve. Although the same DC and motive air source will be used for each valve, separate control circuits including key-locked switches will be used for the two redundant valves to address single point vulnerabilities that may cause the flow path to inadvertently open. Power to the DC SOVs will be maintained de-energized and the key-lock switch will be required to be actuated to power the solenoids. Manual valves on the pneumatic supply from the nitrogen tanks will be locked in their normal position to maintain the valve closed. In addition, the NMP1 design has a rupture disc.

Note that NMP1 does not credit containment accident pressure (CAP) for its DB LOCA. Regardless, preventing inadvertent operation is addressed.

Part 2: Boundary Conditions for Wetwell Vent

Component Qualifications
HCVS components that directly interface with the primary containment pressure boundary and the HCVS rupture disc will be classified as safety-related in accordance with the design basis for NMP1. Likewise, any electrical or controls component which interfaces with Class 1E power sources will be classified as safety related up to applicable isolation devices (e.g., fuses, breakers), as their failure could adversely impact containment isolation and/or a safety-related power source. All safety-related components will be seismically and environmentally qualified in accordance with the design basis of the plant. Additional functionality evaluations for severe accident/boundary conditions specified in NEI 13-02 will be performed. All remaining HCVS components will be classified as augmented quality.

The HCVS components downstream of the PCIVs, are located in seismically designed and constructed structures, including the ROS, pneumatic supply station, HCVS batteries, and HCVS battery charger.

Qualification includes consideration of environmental conditions specified in NEI 13-02. HCVS components will be evaluated to ensure functionality following a design basis earthquake. Components that interface with the HCVS will be routed in seismically qualified structures or the structure will be analyzed for seismic ruggedness to ensure that any potential failure would not adversely impact the function of the HCVS or other safety related structures or components.

Instrumentation and controls components will also be evaluated for environmental conditions postulated for a severe accident, although these evaluations will not be considered part of the site Environmental Qualification (EQ) program.

HCVS instrumentation performance (e.g., accuracy and precision) need not exceed that of similar plant installed equipment. Additionally, radiation monitoring instrumentation accuracy and range will be sufficient to determine a transition from no core damage to core damage. The HCVS components and components that interface with the HCVS are routed in seismically qualified structures.

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

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., IS09001) where the procurement specifications include the applicable seismic requirements, design requirements, and applicable testing.
2. Demonstration of seismic reliability via methods that predict performance described in IEEE 344-2004.
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

Instrument	**Qualification Method***
HCVS Process Temperature	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Process Radiation Monitor	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Valve Position Indication	ISO9001 / IEEE 344-2004 / Demonstration

Part 2: Boundary Conditions for Wetwell Vent

HCVS Pneumatic Supply Pressure	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Electrical Power Supply Availability	ISO9001 / IEEE 344-2004 / Demonstration
HCVS Argon System Purge Pressure	ISO9001 / IEEE 344-2004 / Demonstration

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

[ISE OPEN ITEM-11: Complete evaluation for environmental/seismic qualification of HCVS components.]

Monitoring of HCVS

The NMP1 wetwell HCVS will be capable of being remote-manually operated during sustained operations from a control panel located in the main control room (MCR) after manual operation of a 3-way valve and N2 and Argon isolation valves at the ROS is complete and will meet the requirements of Order element 1.2.4. The MCR is a readily accessible location with no further evaluation required (Generic Assumption 109-12). Additionally, to meet the intent for a secondary control location of section 1.2.5 of the Order, a readily accessible Remote Operating Station (ROS) will also be incorporated into the HCVS design as described in NEI 13-02 section 4.2.2.1.2.1. The controls and indications at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, extended loss of AC power (ELAP), and inadequate containment cooling. An evaluation will be performed to determine accessibility to the location, habitability, staffing sufficiency, and communication capability with Vent-use decision makers.

The wetwell HCVS will include means to monitor the status of the vent system in the MCR and to monitor DC power, Argon pressure, and N2 pressure at the ROS. The proposed design for the HCVS includes control switches in the MCR with valve position indication. The HCVS controls will meet the environmental and seismic requirements of the Order for the plant severe accident with an ELAP. The ability to open/close these valves multiple times during the event's first 24 hours will be provided by dedicated motive air and DC power. Beyond the first 24 hours, the ability to maintain these valves open or closed will be maintained by sustaining the motive air and DC power.

The wetwell HCVS will include indications for effluent temperature, valve position, and effluent radiation levels at the MCR. Other important information on the status of supporting systems (i.e., DC power source status, Argon pressure, and pneumatic supply pressure) will also be included in the design and located to support HCVS operation.

Other instrumentation that supports HCVS function will be provided in the MCR. This includes existing containment pressure and wetwell level indication. This instrumentation is not required to validate HCVS function and is therefore not powered from the dedicated HCVS batteries. However, these instruments are expected to be available since the FLEX DG supplies the station battery charger for these instruments and will be installed prior to depletion of the station batteries.

Component reliable and rugged performance

The HCVS vent path components that directly interface with the containment pressure boundary and the HCVS rupture disc and downstream piping will be classified as safety-related in accordance with the design basis for the plant. In addition, any electrical or controls component which interfaces with Class 1E power sources will

Part 2: Boundary Conditions for Wetwell Vent

be classified as safety related, as their failure could adversely impact containment isolation and/or a safety related power source. All safety-related components will be seismically qualified in accordance with the NMP1 design basis. All other HCVS components, including piping and supports, electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) will be designed for reliable and rugged operational performance that is capable of ensuring HCVS functionality following a design basis earthquake as required per Section 2.2 of EA- 13-109.

For the HCVS instruments that are required after a potential seismic event, the following methods will be used to verify that the design and installation is reliable / rugged and therefore capable of ensuring HCVS functionality following a seismic event. Applicable instruments are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated severe accident event conditions in the area of instrument component use using one or more of the following methods:

- demonstration of seismic motion consistent with that of existing design basis loads at the installed location.
- substantial history of operational reliability in environments with significant vibration with a design envelope inclusive of the effects of seismic motion imparted to the instruments proposed at the location.
- adequacy of seismic design and installation is demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations (Reference 28), or a substantially similar industrial standard.
- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges)
- seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

HCVS components are located in the Reactor Building and Turbine Building. The Reactor Building and Control Building are safety-related, seismic class I structures. The Turbine Building is seismically designed in accordance with the plant design basis and will be evaluated for 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.

The instrumentation/power supplies/cables/connections (components) will be qualified for temperature, pressure, radiation level, and total integrated radiation dose up to 7 days for the Effluent Vent Pipe and HCVS ROS location. The qualification for the equipment by the supplier will be validated by NMP for the specific location at NMP1 to ensure that the bounding conditions envelope the specific plant conditions.

Conduit design will be in accordance with Seismic Class 1 criteria.

The HCVS components mounted external to seismic 1, concrete structures meet the reasonable protection criteria of HCVS-WP-04. Specifically, large bore piping and its supports, located above 30 feet from grade level and not protected from missiles have less than 300 square feet of piping cross section.

Augmented quality requirements will be applied to the components installed in response to this Order unless higher quality requirements apply.

Part 2: Boundary Conditions for WW Vent – BDBEE Venting

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

Ref: EA-13-109, Section 1.1.4 /NEI 13-02, Section 2.2

First 24 Hour Coping Detail

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

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

The operation of the HCVS will be designed to minimize reliance on operator actions for response to an ELAP and severe accident events. Immediate operator actions will be completed by qualified plant personnel from either the MCR or the HCVS ROS using remote-manual actions. The operator actions required to open a vent path are as described in Table 2-1. Remote-manual is defined in this report as a non-automatic power operation of a component and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR and/or will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report.

Permanently installed electrical power and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Power will be provided by installed batteries for up to 24 hours before generators will be required to be functional.

System control:

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

ii. Passive: Inadvertent actuation protection is provided by use of key-locked switches for both the HCVS power supply actuation and valve operation. The normal state of the system is de-energized and isolated. In addition, a rupture disc is located downstream of the PCIVs to prevent secondary containment bypass leakage.

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 / NEI 13-02, Section 4.2.2

Actions required to extend venting beyond 24 hours include replenishment of pneumatic supplies, replenishment of electrical supply, and if severe accident conditions are reached, replenishment of the Argon purge gas.

Part 2: Boundary Conditions for WW Vent – BDBEE Venting

The pneumatic supply station will be installed in the Turbine Building ROS area and will include a nitrogen bottle station and a connection for a portable air compressor. The connection will utilize pre-engineered quick disconnect fitting. The location of the pneumatic supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and refueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The Argon supply station will be installed in the Turbine Building ROS area and will include an Argon bottle station with additional connections for extra Argon bottles. Connections will utilize pre-engineered quick disconnect fittings. The location of the Argon supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the Argon supplies include replacement of Argon bottles. Sufficient Argon bottles will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The HCVS batteries and battery charger will also be installed in the Turbine Building ROS area. This will include battery capacity sufficient for 24-hour operation. The normal power supply to the HCVS controls and instruments will be provided by the #12 Station Battery Bus, which in turn is re-powered by a 600 VAC diesel generator connected to the #12 Station Battery Charger as part of the FLEX response. A design change to install portable generator connections to this bus has been completed in support of EA-12-049 (Reference 1). In the event that power is not restored to the bus, a local 240 VAC connection to the UPS will allow the UPS to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

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

Details:

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

Primary Containment Control Flowcharts exist to direct operations in protection and control of containment integrity. These flowcharts have been revised as part of the EPG/SAGs Revision 3 updates and associated EOP/SAP implementation. HCVS-specific procedure guidance will be developed and implemented to support HCVS implementation.

Identify modifications:
List modifications and describe how they support the HCVS Actions.

EA-12-049 Modifications

- A modification to install a connection point to allow a FLEX portable diesel generator to be connected to electrical DC power bus #12 has been installed. This will allow the DG to power the HCVS equipment and battery charger.

Part 2: Boundary Conditions for WW Vent – BDBEE Venting

EA-13-109 Modifications:

- A modification will be required to install the HCVS pneumatic supply station.
- A modification will be required to install the dedicated HCVS batteries and battery charger.
- A modification will be required to install required HCVS instrumentation and controls, including a radiation monitor. This also includes installation of control panels in the MCR and the ROS.
- A modification will be required to install dedicated HCVS piping and PCIVs and rupture disc.
- A modification will be required to install the dedicated Argon purge system needed to prevent hydrogen detonation in the piping.

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

Initiation, operation and monitoring of the HCVS venting will rely on the following key parameters and indicators. Indication for these parameters will be installed at the locations indicated below to comply with EA-13-109.

Key Parameter	Component Identifier	Indication Location
HCVS Effluent temperature	TBD	MCR
HCVS Effluent radiation	TBD	MCR
HCVS Valve position indication	TBD	MCR
HCVS DC Power Voltage/Conditions	TBD	ROS
HCVS Pneumatic supply pressure	TBD	ROS
HCVS Purge System pressure	TBD	MCR/ROS

Initiation and cycling of the HCVS will be controlled based on several existing MCR key parameters and indicators which are qualified to the existing plant design basis. (Reference NEI 13-02 Section 4.2.2.1.9 [9])

Key Parameter	Component Identifier	Indication Location
Drywell pressure	PI 201.2-106A PI 201.2-483A	MCR
Torus pressure	PI 201.2-595A	MCR
Torus level	LI 201.2-595D LI 58-05A	MCR

Notes: None

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

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

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

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

First 24 Hour Coping Detail

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

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

The operation of the HCVS will be designed to minimize the reliance on operator actions for response to an ELAP and severe accident events. Progression of the ELAP into a severe accident assumes that the FLEX strategies identified in the response to Order EA-12-049 have not been effective. Access to the Reactor Building will be restricted as determined by the RPV water level and core damage conditions. Immediate operator actions will be completed by operators from both the MCR and the ROS using manual actions. The operator actions required to open a vent path are as described in Table 2-1. Remote-manual is defined in this plan as a non-automatic power operation of a component and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting under primary procedural protocol.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR and will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report. A preliminary evaluation of travel pathways for dose and temperature concerns has been completed and travel paths identified. A final evaluation of environmental conditions will be completed as part of detailed design for confirmation.

[ISE OPEN ITEM-6: Complete evaluation for environmental conditions and confirm the travel path accessibility.]

Permanently installed power, Argon purge, and motive air/gas capable will be available to support operation and monitoring of the HCVS for 24 hours. Power will be provided by the installed batteries for up to 24 hours before generators will be required to recharge the HCVS batteries.

System control:

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

Greater Than 24 Hour Coping Detail

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

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

Specifics are the same as for BDBEE Venting Part 2 with the clarification that Argon resupply is necessary following severe accident conditions.

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

Part 2: Boundary Conditions for WW Vent – Severe Accident Venting
needed action and supplies. The ROS is located in the Turbine Building. The Turbine Building is outside of the secondary containment boundary. The HCVS piping will exit the Reactor Building on the east side. Therefore, the Reactor Building provides shielding for the Turbine Building. A preliminary evaluation of radiological and temperature concerns was completed. A final evaluation will be completed when the location of the ROS is finalized.
Details:
Provide a brief description of Procedures / Guidelines: *Confirm that procedure/guidance exists or will be developed to support implementation.*
The operation of the HCVS will be governed under the same for SA conditions as for BDBEE conditions. Existing guidance in the SAMGs directs the plant staff to consider changing radiological conditions in a severe accident.
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
Modifications are the same as for BDBEE Venting Part 2.
Key Venting Parameters: *List instrumentation credited for the HCVS Actions. Clearly indicate which of those already exist in the plant and what others will be newly installed (to comply with the vent order).*
Key venting parameters are the same as for BDBEE Venting Part 2.
Notes: None

Part 2: Boundary Conditions for WW Vent – 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

Same as BDBEE Venting Part 2.

Severe Accident Venting

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

Ref: EA-13-109, Section 1.2.8, 1.2.9 / NEI 13-02, Section 2.5, 4.2.2, 4.2.4, 6.1.2

The same support functions that are used in the BDBEE scenario would be used for severe accident venting.

The ROS (the location of the HCVS DC power source, Argon purge, and motive force) and the FLEX DG location will be evaluated to confirm accessibility under severe accident conditions.

Details:

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

The operation of the HCVS will be governed the same for SA conditions as for BDBEE conditions. Existing guidance in the SAMG directs the plant staff to consider changes in radiological conditions in a severe accident.

Identify modifications:
List modifications and describe how they support the HCVS Actions.

The same as for BDBEE Venting Part 2.

Key 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).

The same as for BDBEE Venting Part 2.

Notes: None

Part 2: Boundary Conditions for WW Vent – 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

Venting actions using portable equipment include the following:

- Replacement and replenishment of pneumatic supply sources. This includes the option of replacing nitrogen bottles or connecting a portable air compressor. Equipment sufficient for an additional 48 hours of vent operation beyond the 24-hour installed supply would be pre-staged in the FLEX storage building. Installation of the HCVS includes installation of a pneumatic supply header that includes pneumatic regulators and utilizes standard pneumatic connections.
- Replacement and replenishment of Argon purge gas supply sources. This includes replacing the Argon bottles. Equipment sufficient for an additional 48 hours of vent operation beyond the 24-hour installed supply would be pre-staged in the FLEX storage building.
- Establishing temporary power to repower the battery charger. Option 1 is to connect the FLEX DG to Station Battery Charger # 12, which provides power to Station Battery Bus # 12 that in turn powers the HCVS equipment and battery charger. Option 1 would be completed as part of the FLEX response strategy and occurs to the south and inside the NMP1 Turbine Building. Option 2, to be taken if the FLEX DG cannot be connected to the Station Battery Charger #12, is to connect a small portable generator to the HCVS battery charger. Option 2 would be taken locally at the battery charger. Either of these actions will also require the generators to be refueled. A one line diagram of the electrical system to be installed is included in sketch 1A.

Details:

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

Implementation procedures are being developed to address all HCVS operating strategies, including deployment of portable equipment. Direction to enter the procedure for HCVS operation will be given in the EOPs, the site ELAP procedure, and the SAPs (refer to Part 4 for general information on procedures).

There is minimal impact to deployment actions since the HCVS discharge pipe will be located on the east side of the Reactor Building and deployment areas are the Northwest or on the South side of the Turbine Building. Therefore, the procedures/guidelines for HCVS actions are the same as for support equipment section.

Strategy	Modifications	Protection of connections
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA-12-049 (FLEX)

Notes: None

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 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 with minor manual operation from the ROS first. In addition, HCVS valve operation, as required by EA-13-109 Requirement 1.2.5, may occur at the ROS.

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

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

Part 3.1: Boundary Conditions for SAWA

(The flooding condition is not the limiting external event since the flooding event will have greater than 24 hour warning allowing the Unit to be shutdown, placed in Mode 4, and mitigating equipment deployed prior to the flood induced ELAP)

Table 3.1 – SAWA Manual Actions

Primary Action	Primary Location/ Component	Notes
1. Establish HCVS capability in accordance with Part 2 of this OIP.	• MCR and/or ROS.	• Applicable to SAWA/SAWM strategy.
2. Connect FLEX (SAWA) pump discharge to FLEX injection piping.	• Flow path is thru a permanent standpipe in the 261' elevation of the Turbine Building grade elevation (Outside of the Reactor Building). • Flow path is thru the NMP1 Feedwater System. No power operated valves are required to be operated. • Five small manual valves will need to be verified closed to provide boundary isolation points for SAWA.	• No hose connections within the Reactor Building or entry into the Reactor Building are required for RPV make-up. • A hose connection is provided on the standpipe.
3. Connect FLEX (SAWA) pump to water source.	• At the Screen House, connect suction hose to diesel driven pump, and connect pump discharge to hose.	• The location of this source, as well as the location of the FLEX (SAWA) pump, is not challenged by severe accident radiological conditions. From this location, the flow is to the Turbine Building standpipe (action #2, above).
4. Power SAWA/HCVS components with EA-12-049 (FLEX) generator.	• At Turbine Building south side close to the battery board room doors.	• No changes required to the original EA-12-049 strategy.
5. Inject to RPV using FLEX (SAWA) pump (diesel).	• SAWA flow control is at the FLEX (SAWA) pump discharge 3-valve manifold. • Requires opening and then controlling flow using a manual valve.	• No MOVs or other power operated valves required. • Initial SAWA flow rate is 263 gpm.
6. Monitor SAWA indications.	• Local SAWA flow indicator by FLEX (SAWA) pump • Containment parameters monitored at MCR.	• The proposed solution is to provide a flow instrument in the SAWA flow path and to use technology that does not require

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

		electrical power or that can be supplied with electrical power using a small DC battery for extended periods (minimum of 7 days).
7. Use SAWM to maintain availability of the WW vent (Part 3.1.A).	• MCR for indication of containment parameters. • FLEX (SAWA) pump location for flow control.	• Monitor DW pressure and Suppression Pool level. • Control SAWA flow with manual valve at FLEX (SAWA) pump.

Discussion of timeline SAWA identified items

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

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

Part 3.1: Boundary Conditions for 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 of injection systems in a timely manner. This does not preclude the use of the SAWA system to supplement or replace the EA-12-049 injection systems if desired. SAWA will consist of both portable and installed equipment.

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

The SAWA flow path includes methods to minimize exposure of personnel to radioactive liquids / gases and potentially flammable conditions by inclusion of backflow prevention. The FLEX (SAWA) pump check valve is integral with the pump skid and will close and prevent leakage when the FLEX (SAWA) pump is secured. The Feedwater lines have installed check valves qualified for accident scenarios to prevent reverse flow from the RPV.

Description of SAWA actions for first 24 hours:

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

Table 3.2 – SAWA Manual Actions Timeline

Time	Action	Notes
T<1 hour	• Connect SAWA hose at the Turbine Building standpipe (outside of the Reactor Building) *(Step 2 of Table 3.1)*.	• No evaluation required for actions inside Reactor Building.
T=1-7* hours	• Complete actions started at T<1 hour *(Step 2 of Table 3.1)*. • Connect FLEX (SAWA) pump to water supply at screen house *(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 flow of 263 gpm to the RPV using SAWA systems. *(Step 5 of Table 3.1)*.	• Evaluate core gap and early in vessel release impact to Reactor Building access for SAWA actions. It is assumed that Reactor Building access is limited due to the source term at this time unless otherwise noted. (Refer to HCVS-FAQ-12 for actions in T=1-8 hour timeframe.
T≤8-12 hours	• Monitor and Maintain SAWA flow at 263 gpm for four hours *Step 6 of Table 3.1)*.	• SAWA flow must commence at T=8 hours but should be done as soon as motive force is available.
T≤12 hours	• Proceed to SAWM actions per Part 3.1.A *(Step 7 of Table 3.1)*.	• SAWA flow may be reduced to 53 gpm four hours following SAWA initiation.
*The assumed times of T=1 hour to T=8 hours to establish the bounds of applicability of radiological evaluations have been reduced to T=1 hour to T=7 hours in order to provide sufficient margin to inform operator action feasibility evaluations and will be further informed by emergency response dose assessment activities during an actual event. This accounts for the one hour gap between 7 and 8 hours in this time line.		

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

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

Equipment Locations/Controls/Instrumentation NMP1 has not performed a site specific evaluation to justify the

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

use of a lower site unique initial SAWA flow rate. Consequently, NMP1 will assume an initial flow rate of 263 gpm. This is based on the Industry generic value of 500 gpm multiplied by (NMP1 rated thermal power [1850 MWt]/reference plant thermal power [3514 MWt]). 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 four hours before reduction to the Wetwell vent preservation flow rate.

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 will be 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 (SAWA) pump suction at the screen house, through the FLEX (SAWA) pump hoses to the riser at the 261' elevation of the Turbine Building (grade elevation), by hardpipe through the Feedwater System to the RPV. This flow path does not require energizing any power operated valves. Backflow from the reactor/containment through the SAWA firewater to Feedwater piping is prevented by the Feedwater system isolation check valves (CKV-31-01R and CKV-31-02R).

DW pressure and Suppression Pool level will be monitored and flow rate will be adjusted by throttling the manual valves located on the FLEX (SAWA) pump manifold or throttled at valve BV-29-412 in the Turbine Building if final dose assessments determine throttling at the pump is not acceptable. Communication will be established between the MCR and the SAWA flow control location.

The FLEX (SAWA) pump suction source is a significant distance from the discharge of the HCVS pipe with substantial structural shielding between the HCVS pipe and the pump deployment location. FLEX (SAWA) pump and diesel driven generator refueling will also be accomplished using portable transfer pumps, towable fuel containers, and fuel from the NMP2 Emergency Diesel Generator (EDG) fuel oil storage tanks. NMP1 EDG storage tanks would be also available except in a flood condition. See mechanical and electrical sketches in attachments, plant layout sketches in the assumptions part and a list of actions elsewhere in this part.

Evaluations of actions outside the Reactor Building 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 SA Conditions). Evaluation of actions inside the Reactor Building for projected SA conditions (radiation/temperature) will be performed to determine that personnel can complete the initial and support activities without exceeding the ERO-allowable dose for equipment operation or site safety standards (reference HCVS-FAQ-12).

Electrical equipment and instrumentation will be powered from the power sources noted in the table below with portable generators to maintain battery capacities during the Sustained Operating period. The indications noted with an * are minimum required instruments.

Parameter	Instrument	Location	Power Source / Notes
DW Pressure*	PI 201.2-106A	MCR	RPS Channel 12 (Battery 12) via EA-12-049 generator and battery charger RG 1.97 qualified

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

Suppression Pool Level*	LI 201.2-595D	MCR	RPS Channel 12 (Battery 12 via EA-12-049 generator and battery charger RG 1.97 qualified
SAWA Flow*	• FLEX (SAWA) Pump Flow indicator	• FLEX (SAWA) Pump	• Self-powered from internal battery

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

SAWA installed component and connections external to protected buildings will be protected against the screened-in hazards of EA-12-049 for the station. 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

Procedural guidance will be developed for the following:

1. Connect FLEX (SAWA) pump discharge to Turbine Building standpipe that leads to Feedwater System.
2. Power SAWA/HCVS components with EA-12-049 (FLEX) generator using FSG.
3. Start FLEX (SAWA) pump to establish SAWA flow.
4. Adjust SAWA flow using SAWA flow indication to establish and maintain an initial flow of 263 gpm.

*Where an FSG is referenced, it will be the same FSG reference with the same steps used for FLEX.

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

The list of modifications, below, is limited to those required to upgrade EA-12-049 equipment to meet EA-13-109 Phase 2 requirements.

Electrical Modifications:

- None

Mechanical Modifications:

- None

Instrument Modifications:

- No permanent modification to the station. Flow Meter will be a temporary instrument installed in the hose

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

or pump discharge manifold.

Component Qualifications:

State the qualification used for equipment supporting SAWA.

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

Permanently installed plant equipment shall meet the same qualifications as described in Part 2 of this OIP. Temporary/Portable equipment shall be qualified and stored to the same requirements as FLEX equipment as specified in NEI 12-06, Rev 0. SAWA components are not required to meet NEI 13-02, Table 2-1 design conditions.

Notes:

None

Part 3.1.A: Boundary Conditions for SAWA/SAWM

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

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

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

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

Ref: NEI 13-02 Appendix C.7

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

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

Basis for SAWM time frame

SAWM can be maintained >7 days:

NMP1 has not performed a site specific evaluation to justify the use of a lower site unique initial SAWA flow rate. Consequently, NMP1 will assume an initial flow rate of 263 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 four hours before reduction to the Wetwell vent preservation flow rate.

Instrumentation relied upon for SAWM operations is Drywell Pressure and Suppression Pool 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). The SAWA flow instrument will be a local indication on the FLEX (SAWA) pump that is self-powered from an internal power supply capable of being replenished, if needed, through the Sustained Operation period. If SAWA flow must be controlled from within the Turbine Building by feedwater valve BV-29-412 then an alternate flow instrument location will also be required.

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

Suppression Pool level indication is maintained throughout the Sustained Operation period, so the HCVS remains in-service. The current NMP1 Suppression Pool level indication spans to the HCVS wetwell penetration. The time to reach the level at which the WW vent must be secured is >7 days using SAWM flowrates (C.6.3, C.7.1.4.3).

Procedures will be developed that control the Suppression Pool level, while ensuring the DW pressure indicates the core is being cooled, whether in-vessel or ex-vessel. Procedures will dictate conditions during which SAWM flowrate should be adjusted (up or down) using suppression pool level and DW pressure as controlling parameters to remove the decay heat from the containment (this is similar to the guidance currently provided in the BWROG SAMGs) (C.7.1.4.3).

Attachment 2.1.A shows the timeline of events for SAWA / SAWM (C.7.1.4.4).

Table 3.1.B – SAWM Manual Actions

Primary Action	Primary Location/ Component	Notes
1. Lower SAWA injection rate to control Suppression Pool Level and decay heat removal.	• Containment parameters at the MCR. • Flow control at FLEX (SAWA) pump valve manifold or throttled at valve BV-29-412 in the Turbine Building if dose assessments determine throttling from the pump is not acceptable.	• Control to maintain containment and WW parameters to ensure WW vent remains functional. • 53 gpm minimum capability is maintained for greater than 7 days.
2. Control SAWM flowrate for containment control/decay heat removal.	• Flow control at FLEX (SAWA) pump valve manifold or throttled at valve BV-29-412 in	• SAWM flowrate will be monitored using the following instruments:

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

	the Turbine Building if dose assessments determine throttling from the pump is not acceptable.	– SAWA Flow Meter – Suppression Pool Level – Drywell Pressure • SAWM flowrate will be controlled by throttling the manual valve.
3. Establish alternate decay heat removal.	Various locations	SAWM strategy can preserve the wetwell vent path for >7 days.
4. Secure SAWA / SAWM.	Various locations	When alternate decay heat removal is established.

SAWM Time Sensitive Actions

Time Sensitive SAWM Actions:

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

SAWM Severe Accident Operation

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

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

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

First 24 Hour Coping Detail

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

Given the initial conditions for EA-13-109:

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

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

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

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

Greater Than 24 Hour Coping Detail

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)

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

SAWM can be maintained >7 days:

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

Details:

Details of Design Characteristics/Performance Specifications

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

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

Equipment Locations/Controls/Instrumentation

Describe location for SAWM monitoring and control.

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

The SAWM control location is the same as the SAWA control location. The SAWA flow instrument is available at the FLEX (SAWA) pump.

Injection flowrate is controlled by throttling a manual valve at the FLEX (SAWA) pump valve manifold or throttled at valve BV-29-412 in the Turbine Building if dose assessments determine throttling from the pump is not acceptable.

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

Key Parameters:

List instrumentation credited for the SAWM Actions.

Parameters used for SAWM are:

- Drywell Pressure
- Suppression Pool Level
- SAWM Flowrate

The Drywell pressure and Suppression Pool level instruments are qualified to RG 1.97 and are the same as listed in Part 2 of this OIP. The SAWM flow instrumentation will be qualified for the expected environmental conditions expected when needed.

Notes:

None

Part 3: Boundary Conditions for EA-13-109, Option 2 (Phase 2)
Part 3.1.B: Boundary Conditions for SAWA/SADV
Applicability of WW Design Considerations
This section is not applicable to NMP1.
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 3.1, 3.20 / NEI 13-02, Section 6.1.2, 6.1.3, 6.2

Program Controls:

The HCVS venting actions will include:

- Site procedures and programs are being developed in accordance with NEI 13-02 to address use and storage of portable equipment relative to the Severe Accident defined in NRC Order EA-13-109 and the hazards applicable to the site per Part 1 of this OIP.
- Routes for transporting portable equipment from storage location(s) to deployment areas will be developed as the response details are identified and finalized. The identified paths and deployment areas will be accessible when the HCVS is required to be functional including during Severe Accidents.

Procedures:

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

The HCVS and SAWA procedures will be developed and implemented following plant processes for initiating or revising procedures and contain the following details:

- appropriate conditions and criteria for use of the HCVS and SAWA
- when and how to place the HCVS and SAWA in operation
- location of system components
- instrumentation available
- normal and backup power supplies
- directions for sustained operation (Reference 9), including the storage and location of portable equipment
- location of the remote control HCVS operating station (panel)
- training on operating the portable equipment
- testing of portable equipment

NMP1 does not credit Containment Accident Pressure (CAP) for ECCS pump NPSH.

Provisions will be established for out-of-service requirements of the HCVS and compensatory measures that comply with the criteria from NEI 13-02 (Reference 9).

NMP1 will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in the HCVS Program Document:

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

Part 4: Programmatic Controls, Training, Drills and Maintenance

functional, no compensatory actions are necessary.

- If for up to 30 days, the primary and alternate means of HCVS/SAWA operation are non-functional, no compensatory actions are necessary.
- If the out of service times exceed 30 or 90 days as described above, the following actions will be performed through the site corrective action program:
  - Determine the cause(s) of the non-functionality,
  - Establish the actions to be taken and the schedule for restoring the system to functional status and to 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 in drills, tabletops, or exercises for HCVS operation 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

Part 4: Programmatic Controls, Training, Drills and Maintenance

NMP1 will utilize the guidance provided in NEI 13-06 and 14-01 (References 10 and 11) for guidance related to drills, tabletops, or exercises for HCVS operation. In addition, NMP1 will integrate these requirements with compliance to any rulemaking resulting from the NTTF Recommendations 8 and 9.

Describe 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 and expected use (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

NMP1 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.

NMP1 will implement the following operation, testing and inspection requirements for the HCVS and SAWA to ensure reliable operation of the system.

Table 4-1: Testing and Inspection Requirements

Description	Frequency
Cycle the HCVS and installed SAWA valves[1] and the interfacing system 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	Once per every other[4] operating cycle

Part 4: Programmatic Controls, Training, Drills and Maintenance

integrity during unit operations[3].	
Perform visual inspections and a walk down of HCVS and installed SAWA components.	Once per every other[4] operating cycle
Functionally test the HCVS radiation monitors.	Once per operating cycle
Leak test the HCVS.	(1) Prior to first declaring the system functional; (2) Once every three operating cycles thereafter; and (3) After restoration of any breach of system boundary within the buildings
Validate the HCVS operating procedures by conducting an open/close test of the HCVS control function from its control location and ensuring that all HCVS vent path and interfacing system valves[5] move to their proper (intended) positions.	Once per every other operating cycle

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

Notes:
PCIVs are required for containment integrity during Modes 1-3 and thus are excluded from EA-13-109 testing requirements. However, these PCIVs are tested per by the NMP1 design basis requirements to ensure valve operability and leakage tightness. Refer to generic assumption 109-4.

Part 5: Milestone Schedule

Provide a milestone schedule. This schedule should include:

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

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

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

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6-month status reports.

Phase 1 Milestones:

Milestone	Target Completion Date	Activity Status	Comments
Hold preliminary/conceptual design meeting	November 2013	Complete	
Submit Overall Integrated Implementation Plan	Jun 2014	Complete	
Submit 6 Month Status Report	Dec 2014	Complete	
Submit 6 Month Status Report	Jun 2015	Complete	
Submit 6 Month Status Report	Dec. 2015	Complete with this submittal	Simultaneous with Phase 2 OIP
Design Engineering Complete	April 2016	Started	
Maintenance and Operation Procedure Changes Developed, Training Complete	February 2017	Not Started	
Implementation Outage	April 2017	Not Started	
Procedure Changes Active, Walk-Through Demonstration/Functional Test	April 2017	Not Started	
Submit Completion Report	June 2017	Not started	

Part 5: Milestone Schedule

Phase 2 Milestone Schedule:

Phase 2 Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Submit Overall Integrated Implementation Plan	December 2015	Complete with this submittal	Simultaneous with Phase 1 Updated OIP
Hold preliminary/conceptual design meeting	June 2015	Complete	
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		
Submit 6 Month Status Report	June 2018		
Submit 6 Month Status Report	Dec 2018		
Design Engineering Complete	April 2018	Not Started	
Maintenance and Operation Procedure Changes Developed, Training Complete	February 2019	Not Started	
Implementation Outage	April 2019	Not Started	
Procedure Changes Active, Walk-Through Demonstration/Functional Test	April 2019	Not Started	
Submit Completion Report	June 2019	Not started	

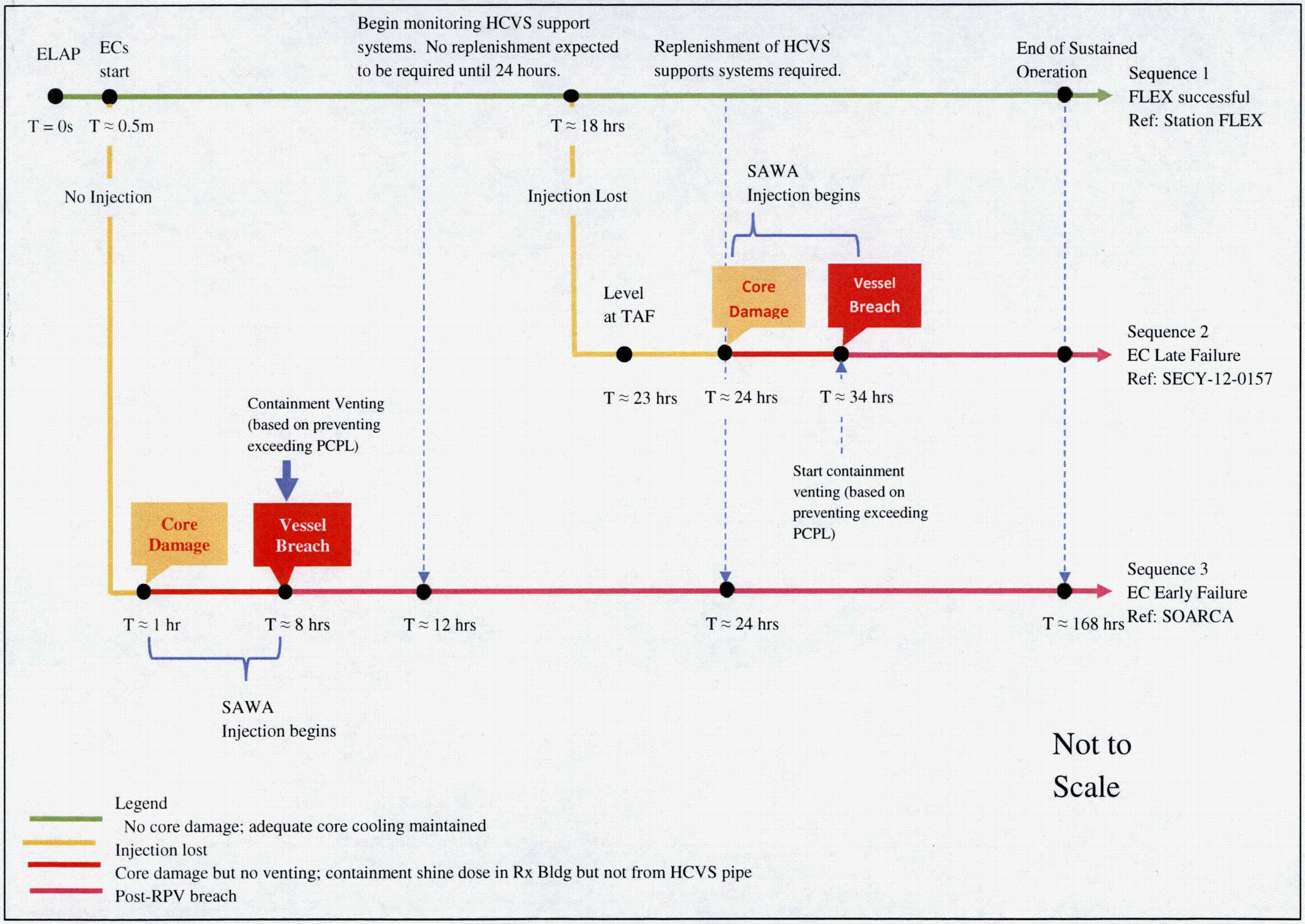
Notes:

None

Attachment 1: HCVS/SAWA/SADV Portable Equipment

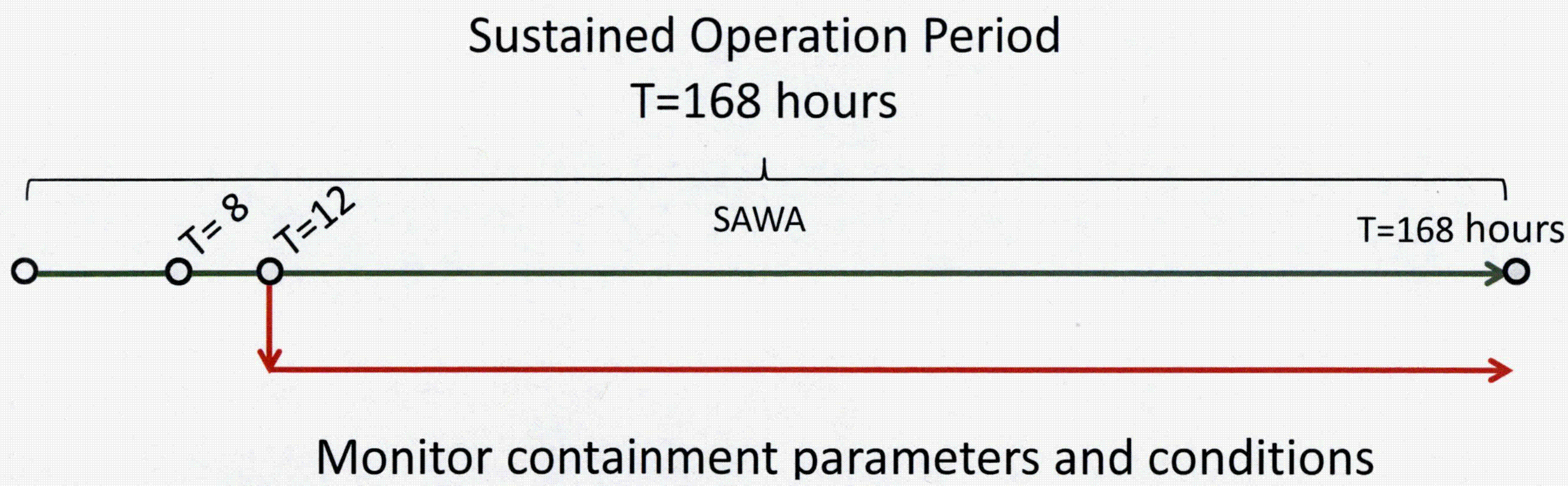
List portable equipment	*BDBEE Venting*	*Severe Accident Venting*	*Performance Criteria*	*Maintenance / PM requirements*
Nitrogen Cylinders	X	X	X Bottles @ X psig (Later)	Check periodically for pressure, replace or replenish as needed
Argon Cylinders	NA	X	X Bottles @ X psig (Later)	Check periodically for pressure, replace or replenish as needed
FLEX DG	X	X	450 KW 600 VAC	Per response to EA-12-049
FLEX/SAWA Pump	X	X	263 gpm @ 260 psig (2000 rpm)	Per response to EA-12-049
Portable Air Compressor (optional)	X	X	Later	Per vendor manual
Small Portable Generator (optional)	X	X	Later	Per vendor manual

Attachment 2A: Sequence of Events Timeline - HCVS



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

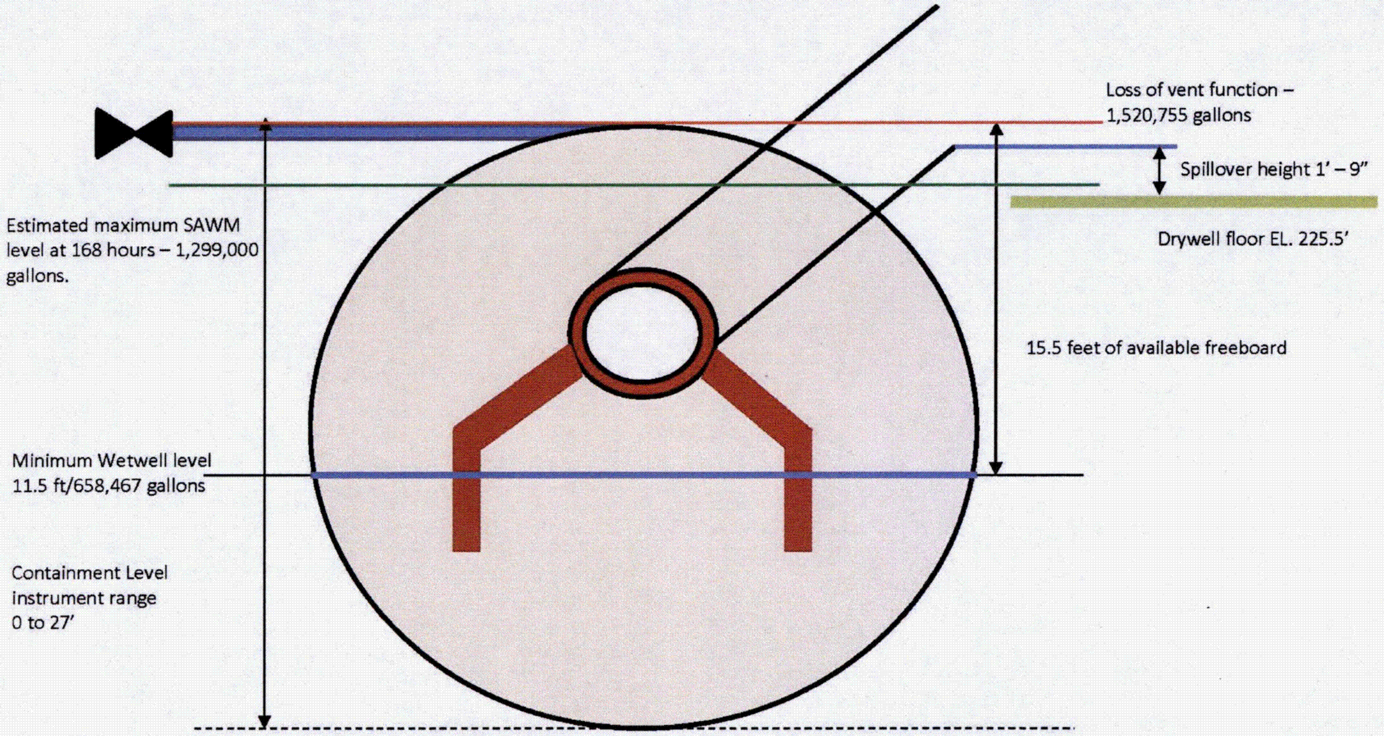
Time	Action
T=0 hours	Start of ELAP
T=8 hours	Initiate SAWA flow at 263 gpm as soon as possible but no later than 8 hours
T=12 hours	Throttle SAWA flow to 53 gpm 4 hours after initiation of SAWA flow
T=168 hours	End of Sustained Operation



Attachment 2.1.B Sequence of Events Timeline – SADV

This Attachment is not applicable to NMP1

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



DRAWING NOT TO SCALE

Notes:

1. NMP1 torus level indication is to top of torus (27 feet), the same elevation as the vent line tap.
2. The SAWM maximum level shown at 168 hours is a conservative calculation based on water addition only. It does not reflect mass loss due to venting. This is preliminary, bounding information only.
3. SAWA injection flowrates are 263 gpm for the 1st 4 hours and lowered to 53 gpm for the remainder. Once torus level reaches 6 feet above nominal height:
    - At a flowrate of 263 gpm the average rate of rise is 0.241 ft/hour*
    - At a flowrate of 53 gpm the average rate of rise is 0.049 ft/hour*

   *Does not consider mass loss rate of steam leaving containment through wetwell vent path.

Attachment 2.1.D: SAWM SAMG Approved Language

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

Actual Approved Language that will be incorporated into site SAMG*

Cautions:

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

Priorities:

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

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

Methods:

Identify systems and capabilities to add water to the RPV or 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.

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

Attachment 3: Conceptual Sketches

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

Sketch 1A and 1B: Electrical Layout of System *(preliminary)*

- Instrumentation Process Flow
- Electrical Connections

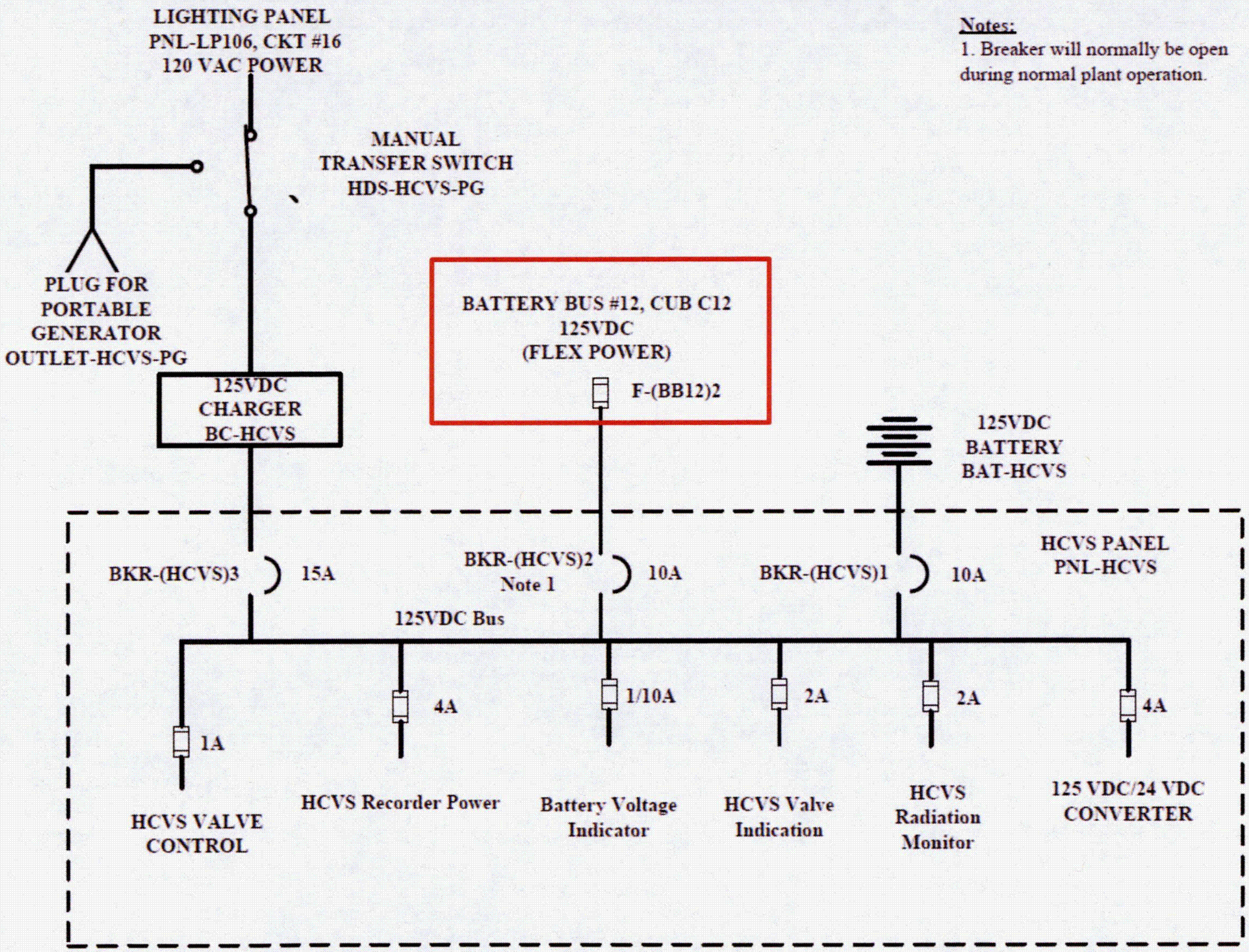
Sketch 2A, 2B, and 2C: P&ID Layout of WW Vent, ROS, and HCVS Plan Overview *(preliminary)*

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

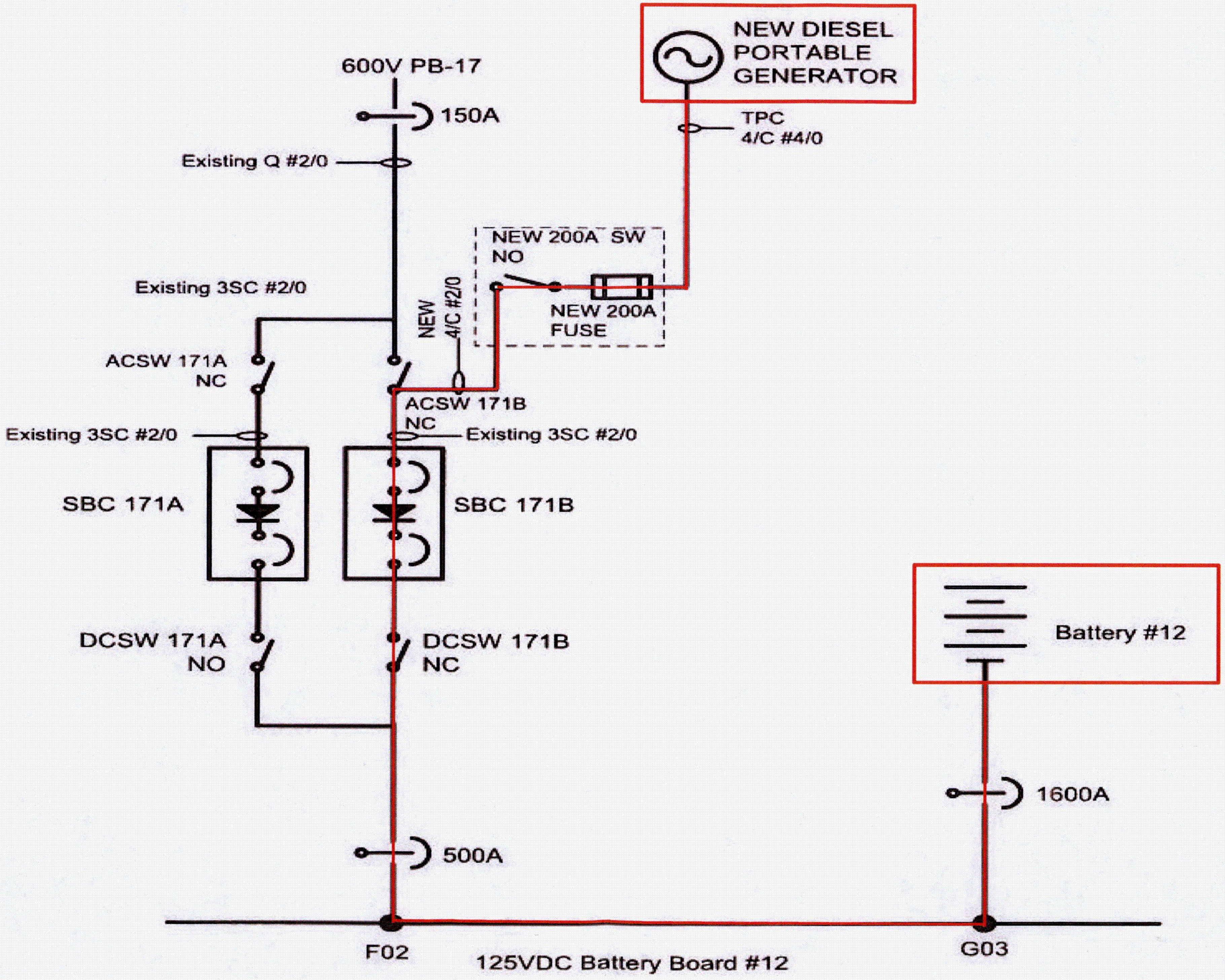
Sketch 3A.1, 3.A.2, and 3A.3: P&ID Layout of SAWA *(preliminary)*

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

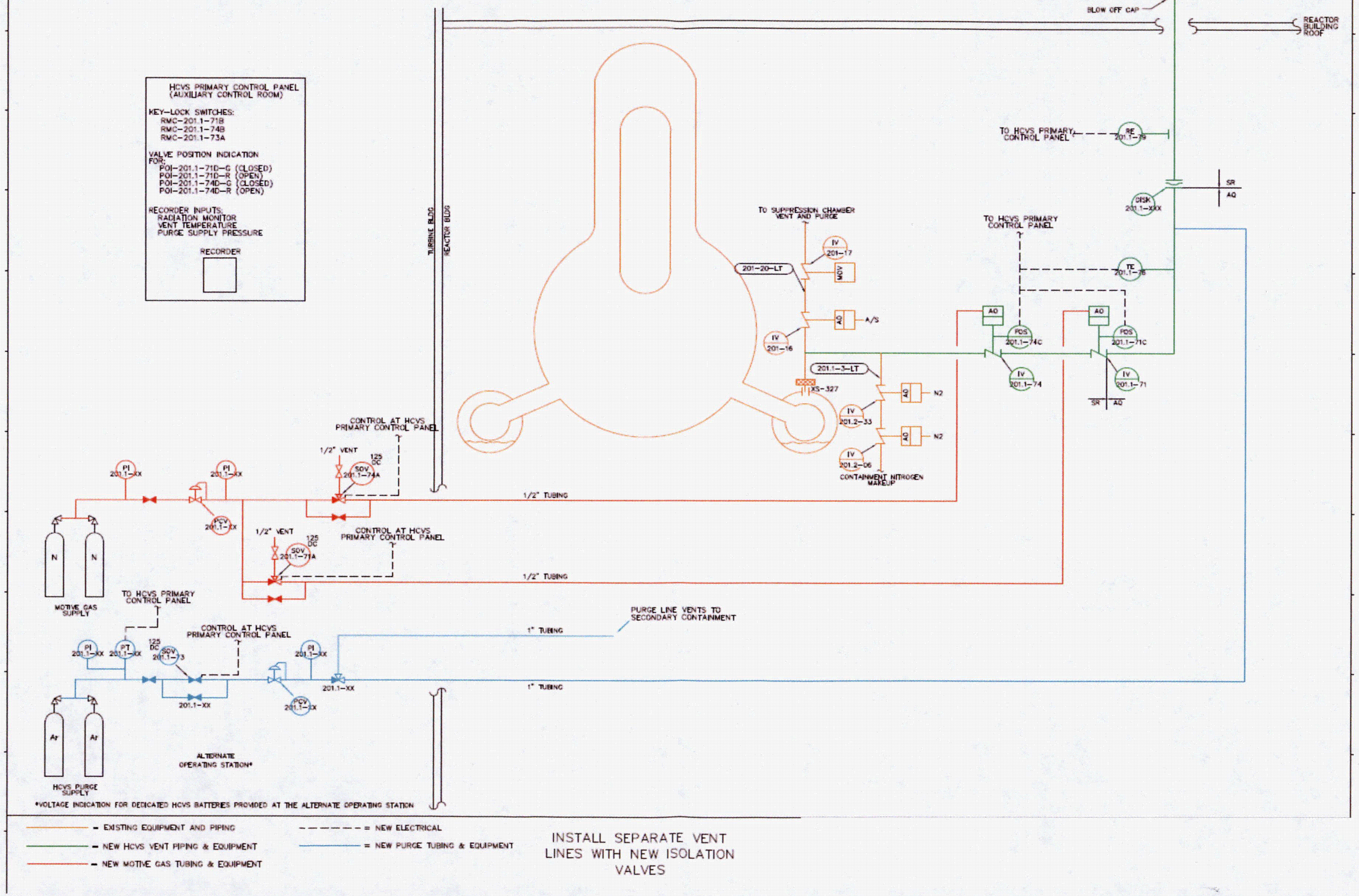
Sketch 1A: Electrical Layout of System - HCVS



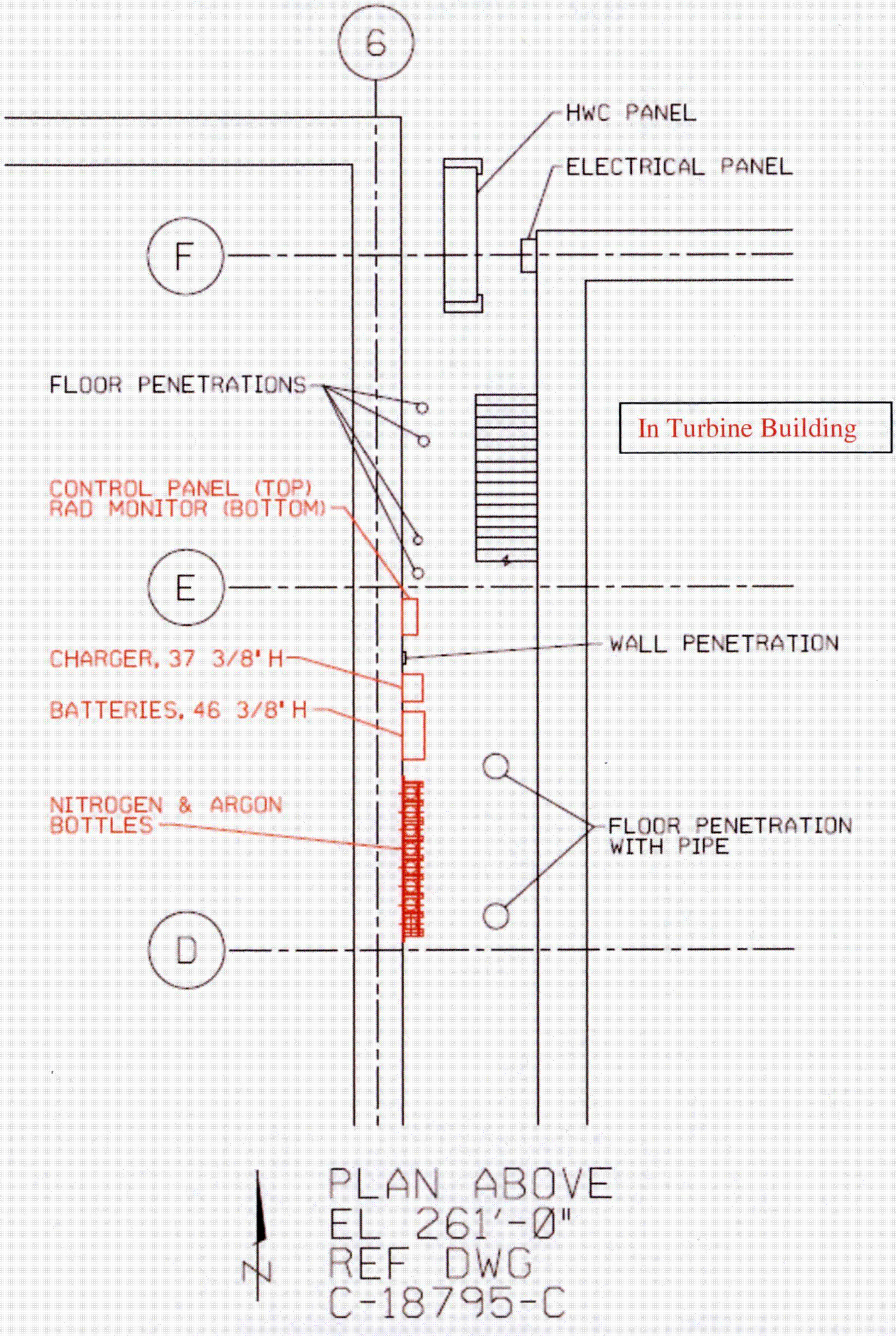
Sketch 1B: Electrical Connections – HCVS and SAWA



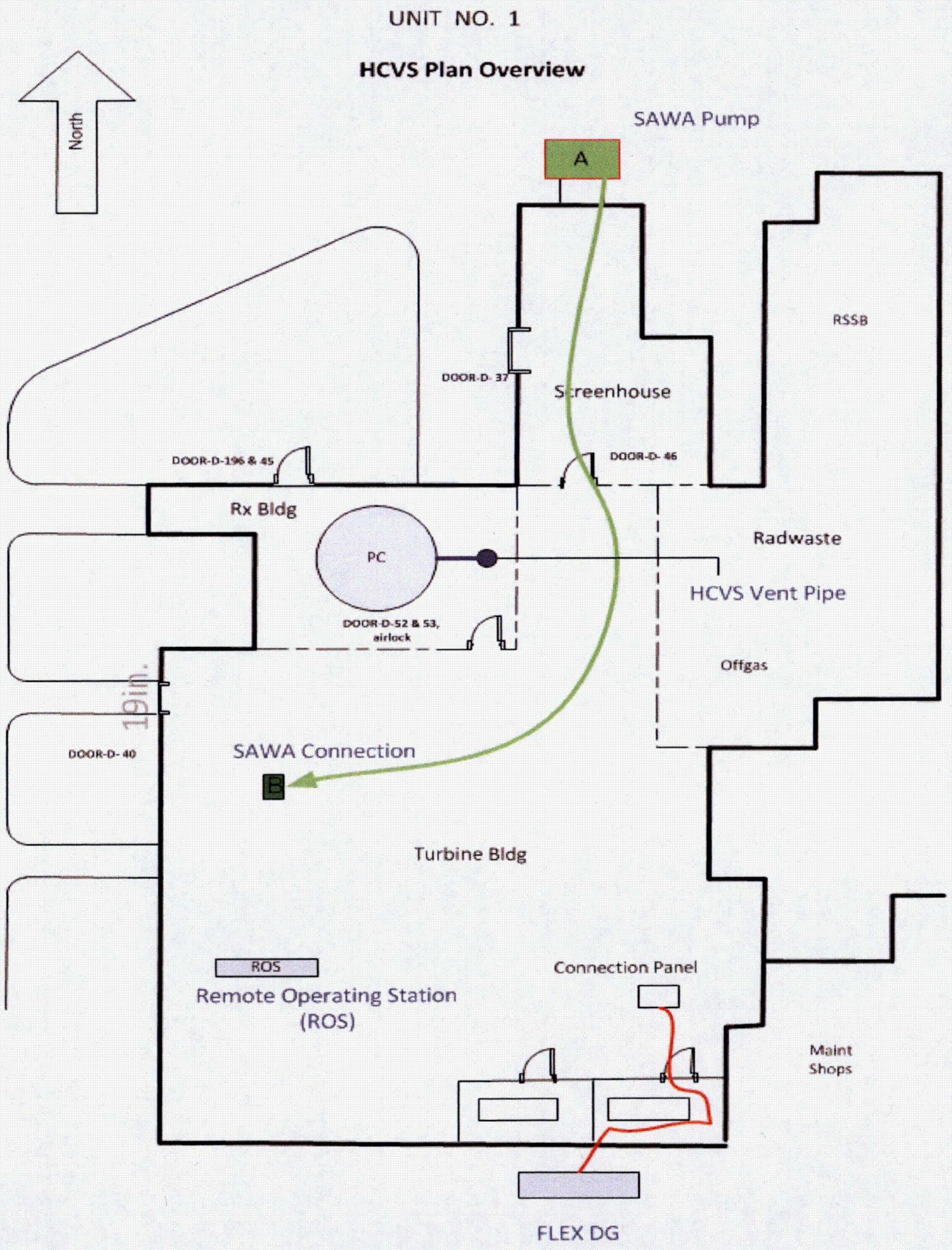
Sketch 2A: **P&ID Layout of WW Vent**



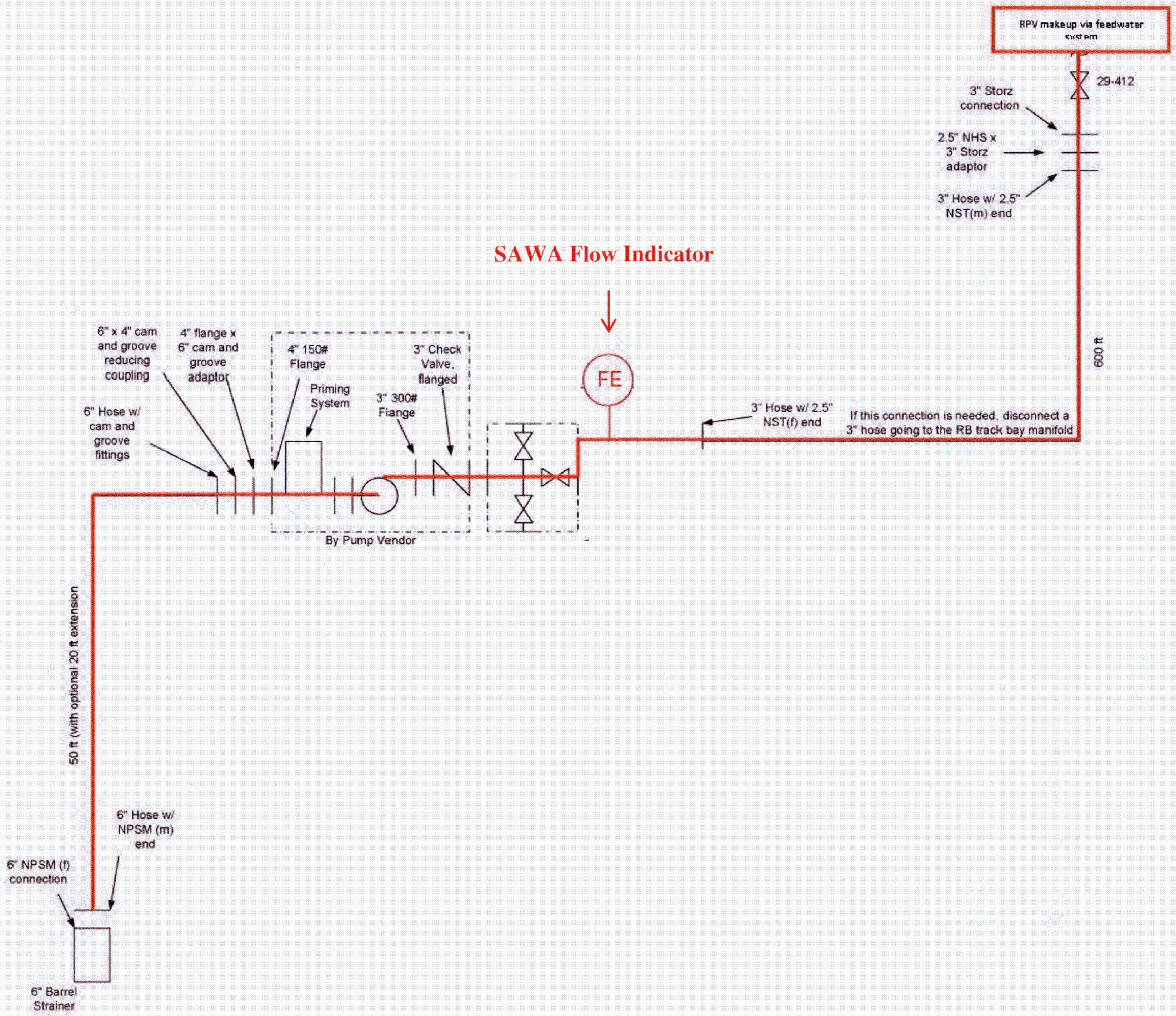
Sketch 2B: Remote Operating Station



Sketch 2C: HCVS Plan Overview

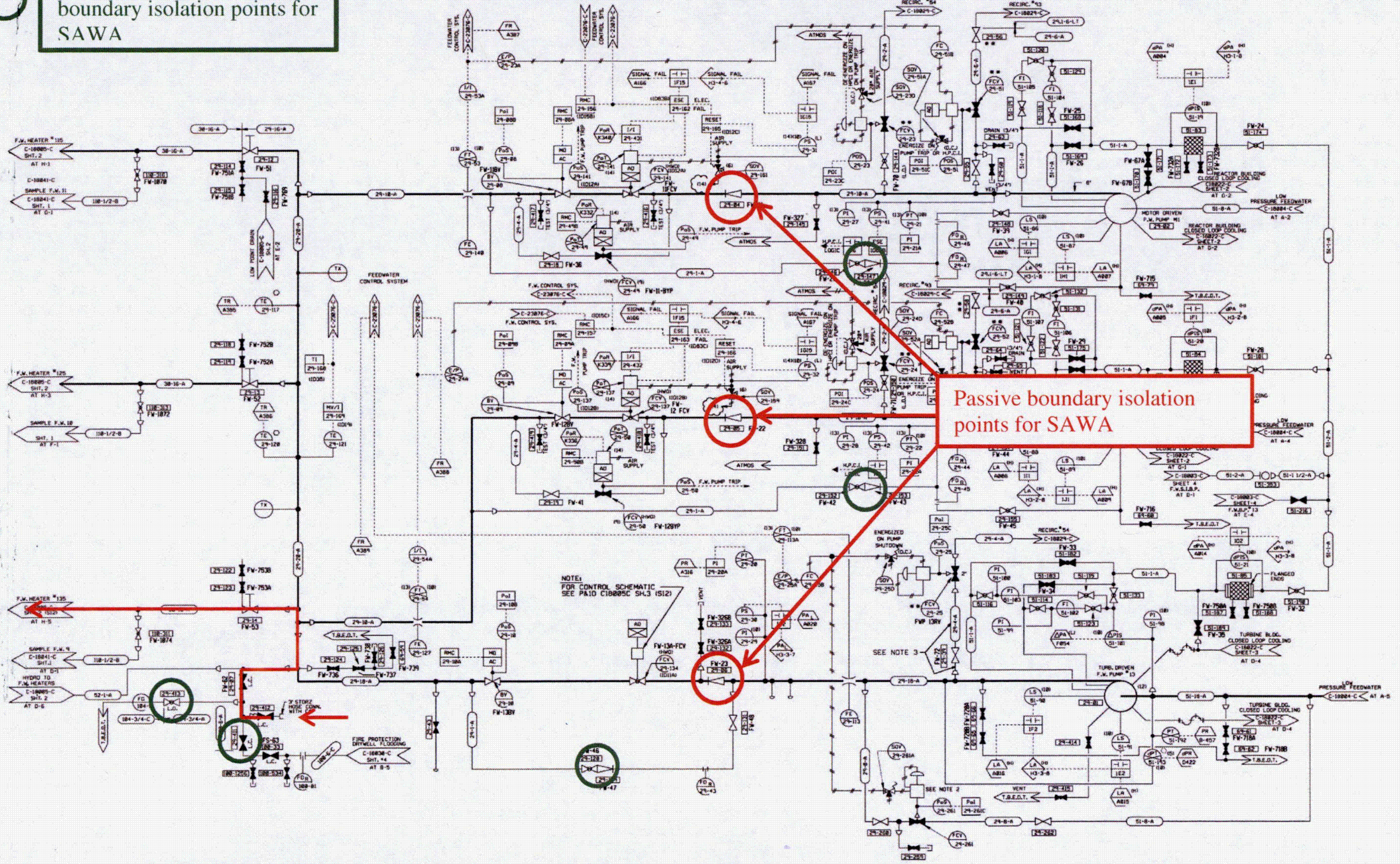


Sketch 3A.1: P&ID Layout of SAWA



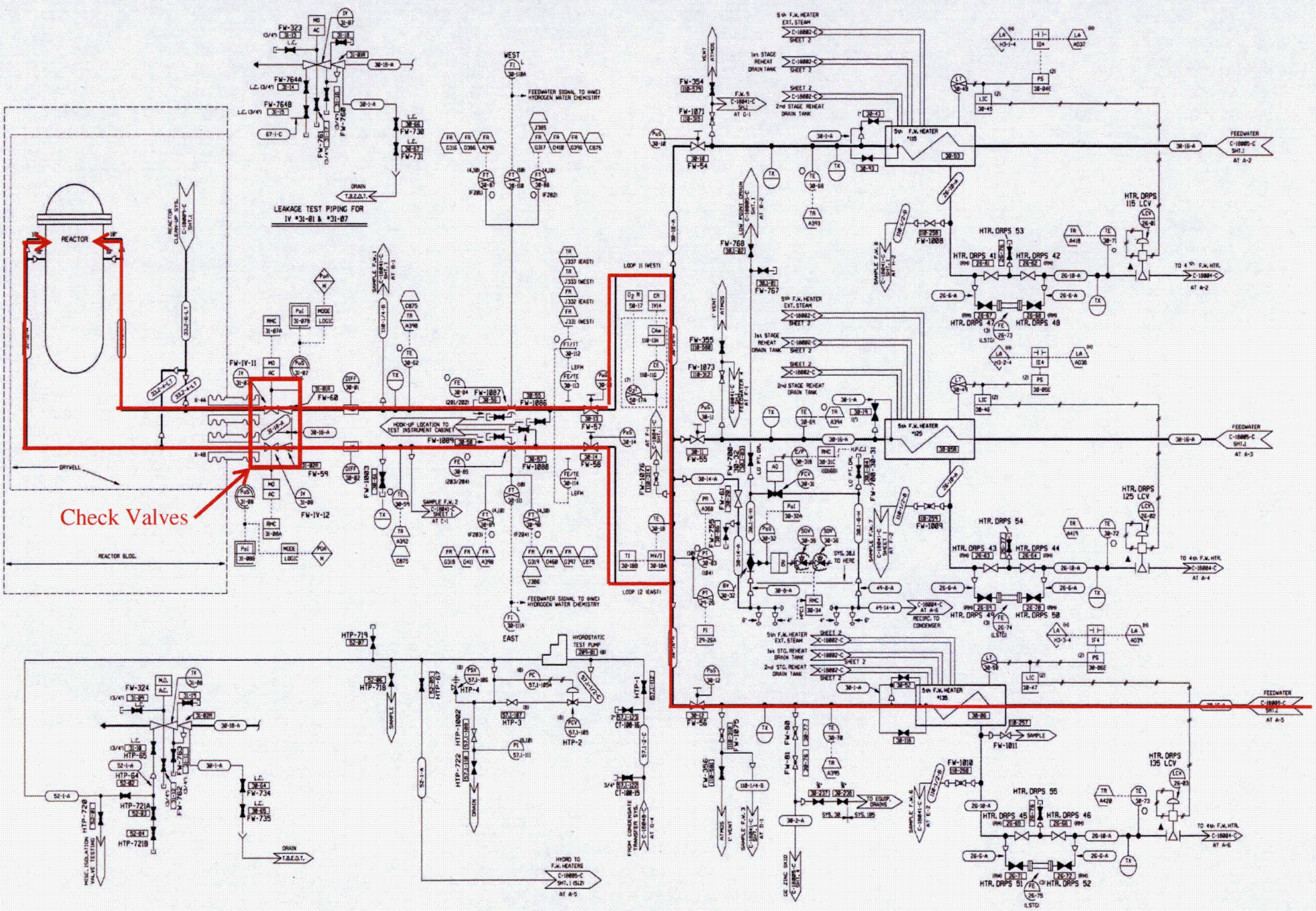
Verify closed to provide boundary isolation points for SAWA

Sketch 3A.2: P&ID Layout of SAWA



Feedwater System

Sketch 3A.3: P&ID Layout of SAWA



Feedwater System

Attachment 4: Failure Evaluation Table

Table 4A: Wetwell HCVS Failure Evaluation Table

Functional Failure Mode	Failure Cause	Alternate Action	Failure with Alternate Action Prevents Containment Venting?
Fail to Vent (Open) on Demand	Valves fail to open/close due to loss of normal AC power/DC batteries.	None required – system SOVs utilize dedicated 24-hour power supply.	No
	Valves fail to open/close due to depletion of dedicated power supply.	Recharge system with provided portable generators.	No
	Valves fail to open/close due to complete loss of power supplies.	Manually operate backup pneumatic supply/vent lines at ROS.	No
	Valves fail to open/close due to loss of normal pneumatic supply.	No action needed. Valves are provided with dedicated motive force capable of 24-hour operation.	No
	Valves fail to open/close due to loss of alternate pneumatic supply (long term).	Replace bottles as needed and/or recharge with portable air compressors.	No
	Valve fails to open/close due to SOV failure.	Manually operate backup pneumatic supply/vent lines at ROS.	No
Fail to stop venting (Close) on demand	Not credible as there is not a common mode failure that would prevent the closure of at least 1 of the 2 valves needed for venting. Both valves designed to fail shut.	N/A	No
Spurious Opening	Not credible as key-locked switches prevent mispositioning of the HCVS PCIVs and additionally, DC power for the solenoid valve is normally de-energized.	N/A	No
Spurious Closure	Valves fail to remain open due to depletion of dedicated power supply.	Recharge system with provided portable generators.	No
	Valves fail to remain open due to complete loss of power supplies.	Manually operate backup pneumatic supply/vent lines at ROS.	No
	Valves fail to remain open due to loss of alternate pneumatic supply (long term).	Replace bottles as needed and/or recharge with portable air compressors.	No

Attachment 5: References

1. Report of Full Compliance with March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated June 8, 2015 (ML15159A385) for NMP1
2. Generic Letter 89-16, Installation of a Hardened Wetwell Vent, dated September 1, 1989
3. Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated March 12, 2012
4. Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated June 6, 2013
5. JLD-ISG-2012-01, Compliance with Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated August 29, 2012
6. JLD-ISG-2013-02, Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated November 14, 2013
7. 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
8. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, dated August 2012
9. NEI 13-02, Industry Guidance for Compliance with Order EA–13–109, Revision 1, Dated April 2015
10. NEI 13-06, Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents and Events, Revision 0, dated March 2014
11. NEI 14-01, Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents, Revision 0, dated March 2014
12. NEI HCVS-FAQ-01, HCVS Primary Controls and Alternate Controls and Monitoring Locations
13. NEI HCVS-FAQ-02, HCVS Dedicated Equipment
14. NEI HCVS-FAQ-03, HCVS Alternate Control Operating Mechanisms
15. NEI HCVS-FAQ-04, HCVS Release Point
16. NEI HCVS-FAQ-05, HCVS Control and 'Boundary Valves'
17. NEI HCVS-FAQ-06, FLEX Assumptions/HCVS Generic Assumptions
18. NEI HCVS-FAQ-07, Consideration of Release from Spent Fuel Pool Anomalies
19. NEI HCVS-FAQ-08, HCVS Instrument Qualifications
20. NEI HCVS-FAQ-09, Use of Toolbox Actions for Personnel
21. NEI White Paper HCVS-WP-01, HCVS Dedicated Power and Motive Force
22. NEI White Paper HCVS-WP-02, HCVS Cyclic Operations Approach
23. NEI White Paper HCVS-WP-03, Hydrogen/CO Control Measures
24. Not Used
25. NUREG/CR-7110, Rev. 1, State-of-the-Art Reactor Consequence Analysis Project, Volume 1: Peach Bottom Integrated Analysis
26. 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
27. NMP1 UFSAR, Rev. 23, Updated Final Safety Analysis Report
28. IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
29. FLEX MAAP Endorsement ML13190A201
30. N1-2014-004, MAAP 4.0.6 Analysis of Nine Mile Point Unit 1 Loss of All AC Power Scenario With Successful FLEX Short Term
31. JLD-ISG-2015-01, Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions, dated April 2015
32. NEI White Paper HCVS-WP-04, Missile Evaluation for HCVS Components 30 Feet Above Grade, Revision 0, dated August 17, 2015
33. NEI HCVS-FAQ-10, Severe Accident Multiple Unit Response
34. NEI HCVS-FAQ-11, Plant Response During a Severe Accident

35. NEI HCVS-FAQ-12, Radiological Evaluations on Plant Actions Prior to HCVS Initial Use
36. NEI HCVS-FAQ-13, Severe Accident Venting Actions Validation

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

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

Attachment 7: List of Overall Integrated Plan Open Items

The following tables provide a summary of the open items documented in the Phase 1 Overall Integrated Plan or the Interim Staff Evaluation (ISE) and the status of each item.

Open Item	*Open Items from 01P*	*Status*
1.	*Perform final sizing evaluation for HCVS batteries and battery charger and include in FLEX DG loading calculation.*	*Deleted (closed to ISE open item number 7 below)*
2.	*Perform final vent capacity calculation for the Torus HCVS piping confirming 1 % minimum capacity.*	*Deleted (closed to ISE open item number 2 below)*
3.	*Perform final sizing evaluation for pneumatic Nitrogen (N2) supply.*	*Deleted (closed to ISE open item number 8 below)*
4.	*Perform confirmatory environmental condition evaluation for the Turbine Building in the vicinity of the Remote Operating Station (ROS) and HCVS dedicated pneumatic supply and batteries.*	*Deleted (closed to ISE open item numbers 6 and 11 below)*
5.	*State which approach or combination of approaches the plant determines is necessary to address the control of combustible gases downstream of the HCVS control valve.*	*Deleted (closed to ISE open item number 3 below)*
6.	*Complete evaluation for environmental/seismic qualification of HCVS components.*	*Deleted (closed to ISE open item numbers 9 and 11 below)*
7.	*Complete evaluation for environmental conditions and confirm the travel path accessibility.*	*Deleted (closed to ISE open item number 6 below)*
8.	*Perform radiological evaluation for Phase 1vent line impact on ERO response actions.*	*Not Started*

Open Item	*Interim Staff Evaluation (ISE) Open Items*	*Status*
1	*Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.*	*Started. As discussed in the December 2015 OIP submittal, the NMP1 design complies with the reasonable tornado protection criteria of HCVS-WP-04.*
2	*Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject*	*Started.*

	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.	
3	*Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.*	*Started. As discussed in the December 2015 OIP submittal, the NMP1 design will use an Argon purge system to prevent the possibility of hydrogen detonation and deflagration.*
4	*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.*	*Not Started*
5	*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.*	*Started. As discussed in the December 2015 OIP, the NMP1 wetwell vent line has a dedicated HCVS flowpath from the wetwell penetration PCIVs to the outside with no interconnected system. The discharge point meets the guidance of HCVS-FAQ-04.*
6	*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.*	*Started*
7	*Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.*	*Started*
8	*Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.*	*Started*
9	*Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.*	*Not Started*
10	*Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.*	*Started*
11	*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.*	*Started*

Phase 2 Open Item	**Action**	**Comment**
1	*Perform radiological evaluation to determine the SAWA flow control point location.*	*Not Started*
2		
3		

Enclosure 2

Nine Mile Point Nuclear Station, Unit 2

Overall Integrated Plan for Phase 1 and Phase 2 Requirements for Reliable Hardened Containment Vent System (HCVS) Capable of Operation Under Severe Accident Conditions

(66 pages)

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Introduction

In 1989, the NRC issued Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," (Reference 2) to all licensees of Boiling Water Reactors (BWRs) with Mark I containments to encourage licensees to voluntarily install a hardened wetwell vent. In response, licensees installed a hardened vent pipe from the suppression pool to some point outside the secondary containment envelope (usually outside the reactor building). Some licensees also installed a hardened vent branch line from the drywell.

On March 19, 2013, the Nuclear Regulatory Commission (NRC) Commissioners directed the staff per Staff Requirements Memorandum (SRM) for SECY-12-0157 (Reference 26) 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 Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accidents*, June 6, 2013 (Reference 4). 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 (ISG) (JLD-ISG-2013-02) issued in November 2013 (Reference 6) and JLD-ISG-2015-01 issued in April 2015 (Reference 31). These ISGs endorse the compliance approach presented in NEI 13-02 Revisions 0 and 1, *Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents* (Reference 9), 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 these 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 EA-13-109.

The submittals required are:

- OIP for Phase 1 of EA-13-109 was required to be submitted by Licensees to the NRC by June 30, 2014. The NRC requires periodic (6-month) updates for the HCVS actions being taken. The first update for Phase 1 was due December 2014, with the second due June 2015.
- OIP for Phase 2 of EA-13-109 is required to be submitted by Licensees to the NRC by December 31, 2015. It is expected the December 2015 six month update for Phase 1 will be combined with the Phase 2 OIP submittal by means of a combined Phase 1 and 2 OIP.
- Thereafter, the 6-month updates will be for both the Phase 1 and Phase 2 actions until complete, consistent with the requirements of Order EA-13-109.

Note: At the Licensee's option, the December 2015 six month update for Phase 1 may be independent of the Phase 2 OIP submittal, but will require separate six month updates for Phases 1 and 2 until each phase is in compliance. NMP2 is providing a combined OIP for December 2015 submittal.

NMP2 venting actions for the EA-13-109, Phase 1 severe accident capable venting scenario can be summarized by the following:

- The Hardened Containment Vent System (HCVS) will be initiated via manual action at the Remote Operating Station (ROS) combined with control from either the Main Control Room (MCR) or the ROS at the appropriate time based on procedural guidance in response to plant conditions from observed or derived symptoms. The ROS provides backup manual operation of the HCVS valves and purge system as required per Order EA-13-109 Requirement 1.2.5. 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 has the capacity to operate for 24 hours with installed equipment. Replenishment of the motive force will be by use of portable equipment once the installed motive force is exhausted.
- Venting actions will be capable of being maintained for a sustained period of up to 7 days.

The Phase 2 actions can be summarized as follows:

- Utilization of Severe Accident Water Addition (SAWA) to initially inject water into the Reactor Pressure Vessel (RPV) or Drywell.
- Utilization of Severe Accident Water Management (SAWM) to control injection and Suppression Pool level to ensure the HCVS (Phase 1) wetwell vent (SAWV) will remain functional for the removal of decay heat from containment.
- Ensure that the decay heat can be removed from the containment for seven (7) days using the HCVS or describe the alternate method(s) to remove decay heat from the containment from the

time the HCVS is no longer functional until alternate means of decay heat removal are established that make it unlikely the 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 should be Drywell pressure, Suppression Pool level, SAWA flowrate and the HCVS parameters listed above.

Note: Although EA-13-109 Phase 2 allows selecting SAWA and a Severe Accident Capable Drywell Vent (SADV) strategy, Exelon has selected SAWA and SAWM.

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-2015-01

Compliance will be attained for Nine Mile Point Unit 2 (NMP2) with no known deviations to the guidelines in JLD-ISG-2013-02, JLD-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 Suppression Pool to the top of the Reactor Building.
  - Severe Accident Water Addition (SAWA) – A combination of permanently installed and portable equipment to provide a means to add water to the 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 2nd quarter 2016.
- Phase 2 (alternate strategy): by the startup from first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. Currently scheduled for 2nd quarter 2018.

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 NMP2:

- Seismic, external flooding, tornado, extreme cold, extreme high temperature, and ice/snow

The following extreme external hazards screen out for NMP2:

- Straight wind

Key Site assumptions to implement NEI 13-02 strategies.
Provide key assumptions associated with implementation of HCVS Phase 1Strategies

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

Mark I/II Generic HCVS Related Assumptions:

Applicable EA-12-049 (Reference 3) assumptions:

049-1. Assumed initial plant conditions are as identified in NEI 12-06, §3.2.1.2, items 1 and 2 (Reference 8).

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

049-3. Assumed reactor transient boundary conditions are as identified in NEI 12-06, §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 the failure of Reactor Core Isolation Cooling (RCIC) (Reference NEI 12-06, §3.2.1.3, item 9 [8]).

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.

049-6. At time=1 hour actions begin as defined in EA-12-049 compliance.

049-7. The HCVS system will include a dedicated 125 VDC battery panel sized for 24-hours of HCVS operation. Beyond 24 hours FLEX power will be provided from a 600VAC bus that will be repowered from the portable FLEX diesel generator. (NEI 12-06, section 3.2.1.3 item 8)

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

049-9. All activities associated with EA-12-049 (FLEX) that are not specific to implementation of the HCVS, including such items as debris removal, communication, notifications, Spent Fuel Pool (SFP) level and makeup, security response, opening doors for cooling, and initiating conditions for the events, 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 (Reference 4) generic assumptions:

109-1. Site response activities associated with EA-13-109 actions are considered to have no access limitations associated with radiological conditions while Reactor Pressure Vessel (RPV) level is above 2/3 core height (core damage is not expected). This is further addressed in HCVS-FAQ-12.

109-2. Portable equipment can supplement the installed equipment after 24 hours provided the portable equipment credited meets the criteria applicable to the HCVS. An example is use of FLEX portable air supply equipment that is credited to recharge air lines for HCVS components after 24 hours. The FLEX portable air supply used must be demonstrated to meet the "SA Capable" criteria that are defined in NEI 13-02 Section 4.2.4.2 and Appendix D Section D.1.3 (Reference 9). 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).

109-3. SFP Level is maintained with either on-site or off-site resources such that the SFP does not contribute to the analyzed source term (Reference HCVS-FAQ-07 [18]).

109-4. Existing containment components design and testing values are governed by existing plant containment criteria (e.g., Appendix J) and are not subject to the testing criteria from NEI 13-02 (Reference HCVS-FAQ-05 [16] and NEI 13-02, §6.2.2 [9]).

109-5. Classical design basis evaluations and assumptions are not required when assessing the operation of the HCVS. The reason that 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 that classical design basis evaluations are intended to prevent (Reference NEI 13-02, §2.3.1 [9]).

109-6. HCVS manual actions require minimal operator steps and can be performed in the postulated thermal 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[12]). This assumption does not apply to Phase 2 SAWA/SAWM because SAWA equipment needs to be connected and placed in service within 8 hours from the time of the loss of RPV injection and will require more than minimal operator action.

109-7. HCVS dedicated equipment is defined as vent process elements that are required for the HCVS to function in an ELAP event that progresses to core melt ex-vessel (Reference HCVS-FAQ-02 [13] and White Paper HCVS-WP-01 [21]). 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.

109-8. Use of MAAP Version 4 or higher provides adequate assurance of the plant conditions (e.g., RPV water level, temperatures, etc.) assumed for Order EA-13-109 Beyond Design Basis External Event (BDBEE) and SA HCVS operation (Reference FLEX MAAP Endorsement ML13190A201 [29]). Additional analysis using RELAP5/MOD 3, GOTHIC, and MICROSHIELD, etc., are acceptable methods for evaluating environmental conditions in other portions of the plant, provided that 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.

109-9. NRC Published Accident evaluations (e.g., SOARCA, SECY-12-0157, NUREG 1465) as related to Order EA-13-109 conditions are acceptable as references (Reference NEI 13-02, §8 [9]).

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

109-11. This Overall Integrated Plan is based on Emergency Operating Procedure (EOP) changes consistent with Emergency Procedures Guidelines/Severe Accident Guidelines (EPG/SAGs) Revision 3 as incorporated per the site's EOP/Severe Accident Procedure (SAP) procedure change process. This assumption does not apply to Phase 2 SAWM because SAWM is not part of revision 3. (Refer 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 Main Control Room is adequately protected from excessive radiation dose as 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 [12] and HCVS-FAQ-09).

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

109-14. RPV depressurization is directed by the EPGs in all cases prior to entry into the SAGs. (reference NEI 13-02 Rev 1 §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-01) This is further addressed in HCVS-FAQ-10.

Plant Specific HCVS Related Assumptions/Characteristics:

NMP2-1 EA-12-049 (FLEX) actions to restore power are sufficient to ensure continuous operation of non-dedicated containment instrumentation identified in the instrument table under the Component Qualification section of this OIP.

NMP2-2 Modifications that allow a FLEX generator to be connected to a 600 volt safety related bus are assumed

	to have been installed such that a FLEX generator can be credited for HCVS operation beyond the initial 24-hour sustained operational period.
NMP2-3	The rupture disk will be manually breached if required for anticipatory venting during an ELAP.
NMP2-4	The Plant layout of buildings and structures are depicted in Sketches 3B and 3C. Note the Main Control Room is located on the turbine deck elevation. The Control Building has substantial structural walls and features independent of the Reactor Building. The HCVS vent stack external to the Reactor Building is indicated on Sketch 2A.
NMP2-5	The HCVS external piping is all above 30-feet from ground level, consists solely of large bore (16-inches nominal diameter) piping and its piping supports, and has less than 300 square feet of cross section. The HCVS external piping meets the reasonable protection requirements of HCVS-WP-04.

Part 2: Boundary Conditions for Wetwell Vent

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

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

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

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

See attached sequence of events timeline (Attachment 2A).

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

The operation of the HCVS has been designed to minimize the reliance on operator actions in response to hazards listed in Part 1. Initial operator actions will be completed by trained plant personnel and will include the capability for remote-manual initiation from the HCVS control station. A list of the remote manual actions performed by plant personnel to open the HCVS vent path can be found in the following table (Table 2-1). A HCVS ELAP Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4.

Table 2-1 HCVS Remote Manual Actions

Primary Action	Primary Location/ Component	Notes
1. Open inner track bay door.	Reactor Building Track Bay	Action only required in winter months to keep Track bay >50 °F.
2. Isolate three-way valve leak-off connection upstream of the rupture disc. Open Nitrogen and Argon isolation valves.	ROS, 2CPS-V168 (Three-way Valve) 2CPS-V150 (Nitrogen Isolation Valve) 2CPS-V160A thru F (Argon isolation valves)	Required step to prevent venting into the Reactor Building through the small leak-off path.
3. Breach the rupture disc by unlocking and opening the purge isolation valve.	ROS, 2CPS-V140A; or MCR, 2CPS-SOV140	
4. As soon as disc is breached, close purge isolation valve.	ROS, 2CPS-V140A or MCR, 2CPS-SOV140	
5. Open Suppression Chamber inboard Containment Isolation Valve (CIV) 2CPS*AOV109.	Key-locked switch for 2CPS-SOV109A at HCVS Control Panel in MCR	Alternate control via manual valves at ROS.

Part 2: Boundary Conditions for Wetwell Vent

6. Open Suppression Chamber outboard Containment Isolation Valve (CIV) 2CPS*AOV111.	Key-locked switch for 2CPS-SOV111A at HCVS Control Panel in MCR	Alternate control via manual valves at ROS.
7. Open HCVS Isolation Valve [2CPS-AOV134].	Key-locked switch for 2CPS-AOV134A at HCVS Control Panel in MCR	Alternate control via manual valves at ROS.
8. Monitor electrical power status, and HCVS conditions.	HCVS Control Panel in MCR	This action not required for alternate control.
9. Connect back-up power to HCVS battery charger.	Reactor Building Track Bay	Prior to depletion of the dedicated HCVS power supply batteries (no less than 24 hours from initiation of ELAP). Not necessary if FLEX diesel generator is operating.
10. Replenish pneumatic supply with replaceable Nitrogen bottles or portable air compressor. Replenish purge supply with replaceable Argon bottles.	Reactor Building Track Bay	Prior to depletion of the pneumatic/purge supply (no less than 24 hours from initiation of ELAP).

Attachment 2A, Sequence of Events Timeline, was developed to identify required operator response times and potential environmental constraints. This timeline is based upon the following three sequences:

1. Sequence 1 is based upon the action response times developed for FLEX when utilizing anticipatory venting in a BDBEE without core damage.
2. Sequence 2 is based on NUREG-1935 (SOARCA) results for an ELAP with early loss of RCIC.
3. Sequence 3 is based on a SECY-12-0157 SBO (ELAP) with failure of RCIC because of subjectively assuming over injection.

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

- 7 Hours, Initiate use of HCVS per site procedures to maintain containment parameters within the limits that allow continued use of RCIC (Section A4.3 Reference 24). Initiation of the HCVS is completed first with manipulation of a three way valve and isolation valves at the ROS, then the manipulation of 4 switches located within the MCR or manipulation of manual bypass valves at the ROS. The reliable operation of HCVS will be met because HCVS meets the seismic requirements identified in NEI 13-02 and will be powered by dedicated HCVS batteries with motive force supplied to HCVS valves from installed nitrogen storage bottles. HCVS controls and HCVS instrumentation will be provided from a panel installed in the MCR. Other containment parameter instrumentation associated with operation of

Part 2: Boundary Conditions for Wetwell Vent

the HCVS is available in the MCR. Operation of the system will be available from either the MCR or a ROS. Dedicated HCVS batteries will provide power for greater than 24 hours. Therefore, as action is only required in one location other than the MCR, initiation of the HCVS within 7 hours is achievable due to the simplicity and limited number of operator actions. Placing the HCVS in operation to maintain containment parameters within design limits for either BDBEE or SA venting would occur at a time further removed from ELAP declaration as shown in Attachment 2.

- 24 Hours, Replace additional nitrogen bottles. Also, the nitrogen station will have a connection so that an air compressor can be connected; however, this is not the planned method to replenish the motive air supply beyond 24 hours.
- 24 Hours, Replace Argon bottles, as required, to maintain sustained operation. Note that Argon purging is required only if the ELAP progresses to severe accident conditions.
- 24 Hours, Connect back-up power to HCVS battery charger. The HCVS batteries are calculated to last a minimum of 24 hours (ISE Open Item #8). The HCVS battery charger will be able to be re-powered either from a 600VAC bus that will be re-powered from a portable diesel generator (DG) put in place for FLEX or locally (Reactor Building Track Bay) from a small portable generator. The DG will be staged and placed in service within 8 hours (Reference 1) and therefore will be available prior to being required. In the event that the DG is not available, a local connection will allow a small portable generator to be connected to the battery charger to provide power. Connection of a small portable generator is achievable within 24 hours.

  [ISE OPEN ITEM-8: Perform final sizing evaluation for HCVS batteries/battery charger and incorporate in FLEX DG loading calculation.]

<u>Discussion of radiological, temperature, other environmental constraints identified in Attachment 2A</u>

- Actions to initiate HCVS operation are taken from the MCR or from the ROS in the Reactor Building Track Bay. Both locations have significant shielding and physical separation from radiological sources. Non-radiological habitability for the MCR has been addressed as part of the FLEX response (Reference 1). The location in the Reactor Building Track Bay has no heat sources and will have open doors to provide ventilation if necessary.
- Actions to replenish the pneumatic and Argon purge supplies will be completed from the Reactor Building Track Bay. The Reactor Building Track Bay is located on the Northeast side of the Reactor Building. The HCVS will exit the Reactor Building on the west side of the Reactor Building approximately 60' from ground elevation which is at elevation 261'. Therefore, the location for pneumatic and Argon supply replenishment is shielded from the HCVS piping by the Reactor Building itself and is greater than 100' away from the piping.
- Actions to install the DG will occur on the East side of the NMP2 Control Building and within the Control Building itself. The Control Building is located on the south side of the Reactor Building. The locations for installation (and control) of the DG are therefore shielded from HCVS piping by the Reactor Building and is greater than 100' away from the piping. In the event that this DG cannot be operated, the backup portable generator would be connected to the UPS in the Reactor Building Track Bay, which is also a shielded location.

Part 2: Boundary Conditions for Wetwell Vent

Provide Details on the Vent characteristics

Vent Size and Basis (EA-13-109, Section 1.2.1 / NEI 13-02, Section 4.1.1)
What is the plants licensed power? Discuss any plans for possible increases in licensed power (e.g. MUR, EPU). What is the nominal diameter of the vent pipe in inches? Is the basis determined by venting at containment design pressure, 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)
Provide a description of Vent path, release path, and impact of vent path on other vent element items.

Power and Pneumatic Supply Sources (EA-13-109, Section 1.2.5 & 1.2.6 / NEI 13-02, Section 4.2.3, 2.5, 4.2.2, 4.2.6, 6.1)
Provide a discussion of electrical power requirements, including a description of dedicated 24 hour power supply from permanently installed sources. Include a similar discussion as above for the valve motive force requirements. Indicate the area in the plant from where the installed/dedicated power and pneumatic supply sources are coming.

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

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, and 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)
State qualification criteria based on use of a combination of safety related and augmented quality dependent on

Part 2: Boundary Conditions for Wetwell Vent

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)
Provide 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 JLD-ISG-2012-01 and JLD-ISG-2012-03 for seismic details.)

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

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

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

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

Vent Size and Basis
NMP2 is licensed to operate at a thermal power of 3988MW due to a recent extended power uprate project. There are no current plans to further increase the power level.

The HCVS wetwell path is designed for venting steam/energy at a minimum capacity of 1% of 3988 MW thermal power at pressure of 45 psig (ISE Open Item #3) assuming nominal suppression pool water level. This pressure is the lower of the containment design pressure and the Primary Containment Pressure Limit (PCPL) value, which are both 45 psig. The size of the wetwell portion of the HCVS is ≥ 12 inches in diameter which provides adequate capacity to meet or exceed the Order criteria, as confirmed in the vent capacity calculation.

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[ISE OPEN ITEM-3: Perform final vent capacity calculation for the HCVS piping confirming 1% minimum capacity.]

Vent Capacity

The 1% value at NMP2 assumes that the suppression pool has sufficient capacity to absorb the decay heat generated for a minimum of 3 hours without allowing containment pressure to exceed 45 psig (PCPL) after which point decay heat is less than or equal to 1%. The vent would then be able to prevent containment pressure from increasing above the PCPL. The duration of suppression pool decay heat absorption capability has been confirmed (Reference 30).

Vent Path and Discharge

The HCVS vent path at NMP2 utilizes existing Containment Purge System piping from the suppression chamber and drywell up to the Standby Gas Treatment System isolation valves (2GTS*AOV101 and 2GTS*SOV102). The inboard primary containment isolation valves (PCIV) on the suppression chamber line will be relocated from inside the containment to outside the containment. The outboard PCIV will be relocated to provide room for the inboard valve. The suppression chamber piping exits the containment into the Reactor Building and continues for approximately 140' until it ties into a combined Drywell/Wetwell 20" header. New 16" piping will tie into this header upstream of 2GTS*AOV101/SOV102. A new air-operated valve will be provided in this piping, which will serve as the means to control HCVS flow. Although this control valve is not a PCIV, it is designed and fabricated to the same requirements as the HCVS PCIVs. A rupture disc will be added downstream of this control valve to serve as the secondary containment pressure boundary and to prevent secondary containment bypass leakage due to valve leakage during a design basis LOCA. The discharge piping will exit through the Reactor Building wall approximately 60' above ground elevation and will be routed over to and up the Northwest side of the Reactor Building to a discharge point approximately 3' above the highest point of the Reactor Building roof. The NMP2 vent path is completely separate from the Nine Mile Point Unit 1 (NMP1) vent path. The external piping meets the reasonable protection requirements of HCVS-WP-04 for tornado missiles (Refer to NMP2-5 assumption).

Power and Pneumatic Supply Sources

All electrical power required for operation of HCVS components will be provided by dedicated HCVS batteries with a minimum capacity capable of providing power for 24 hours without recharging. An evaluation has been completed as part of the detailed design process (ISE Open Item #8). A battery charger is provided that requires a 120 VAC supply. This will be provided by a 120 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. In addition, a connection point that utilizes standard electrical connections will be provided for a portable generator for sustained operation of the HCVS.

For the first 24 hours following the event, the motive supply for the air-operated valves (AOVs) will be nitrogen gas bottles that will be pre-installed and available. These bottles will be sized such that they can provide motive force for at least 8 cycles of a vent path, which includes two openings for each of the two PCIVs (2CPS*AOV109 and *AOV111) and at least 8 openings of the HCVS isolation valve, 2CPS-AOV134. A final evaluation will be completed as part of the detailed design process when selection of the system AOVs is finalized (ISE Open Item #9).

[ISE OPEN ITEM-9: Perform final sizing evaluation for pneumatic Nitrogen (N2) supply.]

The permanent motive force supply and HCVS batteries will be located at the ROS in the Reactor Building Track Bay. Supplemental motive force (e.g., additional nitrogen gas bottles, air compressor), portable

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generators, and enough fuel for an additional 48 hours of operation will be stored on site in an area that is reasonably protected from assumed hazards consistent with the requirements of NEI 12-06. Pre-engineered quick disconnects will be provided to connect the supplemental motive force supply.

1. The HCVS flow path valves are AOVs that are air-to-open and spring-to-shut. Opening the valves requires energizing a DC powered solenoid operated valve (SOV) and providing motive air/gas. A backup means of operation is also available that does not require energizing or repositioning the SOV.
2. An assessment of temperature and radiological conditions has been performed in ECP-13-000087 and calculation H21C-114 to ensure operating personnel can safely access and operate controls at the ROS based on time constraints listed in Attachment 2A.
3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (electric power, N2/air) will be located in areas reasonably protected from the hazards listed in Part 1 of this report.
4. All valves required to open the flow path will be designed for remote manual operation following an ELAP, such that the primary means of valve manipulation does not rely on use of a handwheel, reach–rod, or similar means requiring close proximity to the valve (Reference FAQ HCVS-03, Reference 14). In addition, the PCIVs and HCVS isolation valve will have a handwheel as an optional means of operation. Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards listed in Part 1 of this OIP.
5. Access to the locations described above for the primary means of valve manipulation will not require temporary ladders or scaffolding.

Location of Control Panels

A control panel is located in the MCR which allows for the operating and monitoring of the HCVS. A secondary location for HCVS operation is the ROS located in the Reactor Building Track Bay. Both locations are protected from adverse natural phenomena and are sufficiently shielded. The MCR is the normal control point for HCVS operation and Plant Emergency Response actions.

The ROS will be located in the Reactor Building Track Bay. The Track Bay is a seismic category I structure and is also designed to withstand tornado missiles (including the outer door) (ISE Open Item #2).

[ISE OPEN ITEM-2: Perform seismic evaluation of Reactor Building Track Bay.]

Hydrogen

As required by EA-13-109, Section 1.2.11, the HCVS design will include an Argon purge system that will be connected just downstream of the HCVS isolation valve. It will be designed to prevent hydrogen detonation downstream of that valve. However, the Argon purge system is required to be used only if the ELAP progresses to severe accident conditions which result in the creation of hydrogen. The Argon purge system will have a switch for the control valve in the MCR to allow opening the purge for the designated time, but it will also allow for local operation in the ROS in case of a DC power or control circuit failure. The installed capacity for the Argon purge system will be sized for 6 purges within the first 24 hours of the ELAP. Evaluation N2-MISC-003, "MAAP Analysis to Support SAWA Strategy" shows that in a severe accident, NMP2 would not be expected to exceed 6 vent cycles in the first 24-hour period. The design allows for Argon bottle replacement for continued operation past 24 hours.

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The Argon purge system can also be used to breach the rupture disc. The MCR panel will include an indication of vent line pressure upstream of the disc to show when the disc has burst due to the increased Argon pressure.

Unintended Cross Flow of Vented Fluids
The HCVS for NMP2 is fully independent of NMP1 with separate discharge points. Therefore, the capacity at each unit is independent of the status of the other unit's HCVS. The only interfacing system with the HCVS is the Standby Gas Treatment System (SGTS). There are two parallel interface isolation valves separating the SGTS and the HCVS discharge piping (one 20" air operated butterfly valve and one 2" AC solenoid operated globe valve).

The interface valves between the HCVS and the SGTS are normally-closed, fail-closed (spring and solenoid operated) valves. Upon initiation of an ELAP and associated loss of instrument air, the valves would automatically shut due to spring pressure or loss of power to the solenoid. Therefore, no additional power is necessary. These boundary valves are located at a high point of the SGTS piping. When closed, the leakage is minimized. At slow leakage rates, there would be no motive force to move any accumulated hydrogen away from the high point of the piping, thereby preventing a combustible mixture in any areas of the Reactor Building. A test connection will be added downstream of the boundary valves to facilitate Appendix J type testing of the interface valves. Testing and maintenance will be performed to ensure that the valves remain within established leakage criteria.

Prevention of Inadvertent Actuation
EOPs/Emergency Response Guidelines provide clear guidance that the HCVS is not to be used to defeat containment integrity during any design basis transients and accident. In addition, the HCVS is designed to provide features that prevent inadvertent HCVS flow path actuation due to a design error, equipment malfunction, or operator error. The PCIVs and HCVS isolation valve are opened when a SOV is energized via a switch in the MCR. These switches are key-locked such that an Operator cannot inadvertently turn the switch. In addition, manual valves which bypass the SOV are also locked closed to prevent inadvertent actuation from actions at the ROS. The SOV and bypass valve on the purge line are also locked to prevent an inadvertent actuation of the purge system.

NMP2 does not credit containment accident pressure for ECCS operation.

Component Qualifications
The replacement primary containment isolation valves will maintain their safety-related classification to meet existing design basis requirements. The valves have been specified to be designed to perform their design basis function as well as have the ability to operate in the beyond design basis scenario. Likewise, any electrical or controls component which interfaces with Class 1E power sources will be classified as safety related up to applicable isolation devices (e.g., fuses, breakers), as their failure could adversely impact containment isolation and/or a safety-related power source. All safety-related components will be seismically and environmentally qualified in accordance with the design basis of the plant.

All components dedicated solely to the HCVS are classified as augmented quality.

Qualification includes consideration of environmental conditions specified in NEI 13-02. HCVS components will be evaluated to ensure functionality following a design basis earthquake.

Instrumentation and controls components have been selected such that they will be able to operate in the beyond design basis environmental conditions, although these evaluations will not be considered part of the site Environmental Qualification (EQ) program.

Part 2: Boundary Conditions for Wetwell Vent

HCVS instrumentation performance (e.g., accuracy and precision) need not exceed that of similar plant installed equipment. Radiation monitoring equipment accuracy will be sufficient to determine a transition from no core damage to core damage.

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

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO9001) where the procurement specifications include the applicable seismic requirements, design requirements, and applicable testing.
2. Demonstration of seismic reliability via methods that predict performance described in IEEE 344-2004. (Reference 28)
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

Instrument	Qualification Method
HCVS Process Temperature (RTD)	IEEE 344-2004
HCVS Process Pressure (Pressure Transmitter)	IEEE 344-2004
HCVS Process Radiation Monitor	IEEE 344-2004
HCVS Process Valve Position	IEEE 344-2004
HCVS Pneumatic Supply Pressure (Pressure Gauge)	IEEE 344-2004
HCVS Argon Pressure Indication (Pressure Gauge)	IEEE 344-2004
HCVS Electrical Power Supply Availability (Yokogawa Recorder)	IEEE 344-2004

[ISE OPEN ITEMS-10 and 12: Complete evaluation for environmental/seismic qualification of HCVS components.]

Monitoring of HCVS

The NMP2 wetwell HCVS will be capable of being manually operated during sustained operations from a control panel located in the MCR and will meet the requirements of Order element 1.2.4. The MCR is a readily accessible location with no further evaluation required. MCR dose associated with HCVS operation conforms to GDC 19/Alternate Source Term (AST) for radiation shielding considerations (HCVS-FAQ-01, Reference 12). Additionally, to meet the intent for a secondary control location of section 1.2.5 of the Order, a readily accessible ROS is incorporated into the HCVS design as described in NEI 13-02, section 4.2.2.1.2.1 (Reference 9). The controls at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, ELAP, and inadequate containment cooling.

Part 2: Boundary Conditions for Wetwell Vent

The wetwell HCVS will include indications for HCVS valve position, Argon system pressure, temperature, and effluent radiation levels to aid operator verification of HCVS function. Other important information on the status of supporting systems, such as power source status and pneumatic supply pressure, will also be included in the design and located to support HCVS operation. This instrumentation will be powered from the dedicated HCVS batteries, which provide a minimum of 24-hour supply.

Other instrumentation that supports HCVS function will be provided nearby in the MCR. This includes existing drywell pressure and Suppression Pool level indication. This instrumentation is not required to validate HCVS function and is therefore not powered from the dedicated HCVS batteries. However, these instruments are expected to be available since the DG that supports HCVS battery charger function after 24 hours also supplies the battery charger for these instruments and will be installed prior to depletion of the station batteries. (Reference [1])

The HCVS instruments, including valve position indication, temperature instrumentation, radiation monitoring, and support system monitoring, are qualified as previously described.

Component reliable and rugged performance

All safety-related components are seismically qualified in accordance with the NMP2 design basis. All other HCVS components, including piping and supports, electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) will be seismically designed or be designed for reliable and rugged operation performance that is capable of ensuring HCVS functionality following a design basis earthquake as required per Section 2.2 of EA-13-109.

For the HCVS instruments that are required after a potential seismic event, the following methods will be used to verify that the design and installation is reliable / rugged and therefore capable of ensuring HCVS functionality following a seismic event. Applicable instruments are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated severe accident event conditions in the area of instrument component use using one or more of the following methods:

- demonstration of seismic motion consistent with that of existing design basis loads at the installed location.
- substantial history of operational reliability in environments with significant vibration with a design envelope inclusive of the effects of seismic motion imparted to the instruments proposed at the location.
- adequacy of seismic design and installation is demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 28 or a substantially similar industrial standard).
- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges).
- seismic qualification using seismic motion consistent with that of existing design basis loading at the

Part 2: Boundary Conditions for Wetwell Vent

installation location.

HCVS components are located in the Reactor Building, Control Building, and Reactor Building Track Bay which are all safety-related, seismic class I structures.

The instrumentation/power supplies/cables/connections (components)/conduits will be qualified for temperature, pressure, seismic g values, radiation level, and total integrated radiation dose up to 7 days for the Effluent Vent Pipe and HCVS ROS location. The qualification for the equipment by the supplier will be validated by NMP for the specific location at NMP2 to ensure that the bounding conditions envelope the specific plant conditions.

The only portion of the HCVS system not contained within a seismic, missile protected structure is the vent pipe external to the Reactor Building. However, the external piping meets the tornado reasonable protection criteria of HCVS-WP-04. All external components are limited to large bore piping and its supports, are located above 30' from ground level, and the piping cross section is less than 300 square feet. The vent pipe penetration through the Reactor Building wall is protected from a direct missile which would have any chance of entering the Reactor Building by the steam tunnel vent hood which is located in front of the penetration.

Augmented quality requirements will be applied to the components installed in response to this Order unless higher quality requirements apply.

Part 2: Boundary Conditions for WW Vent – BDBEE Venting

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

Ref: EA-13-109, Section 1.1.4 /NEI 13-02, Section 2.2

First 24 Hour Coping Detail

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

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

The HCVS has been designed to minimize reliance on operator actions for response to an ELAP and severe accident events. Immediate operator actions will be completed by qualified plant personnel from either the MCR or the HCVS ROS using remote-manual actions. The operator actions required to open a vent path are as described in Table 2-1. Remote-manual is defined in this report as a non-automatic power operation of a component and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting.

Following alignment of the three way valve and gas isolation valves (Table 2-1) at the ROS, the HCVS has been designed to allow initiation, control, and monitoring of venting from the MCR and will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report.

Permanently installed electrical power, Argon purge gas, and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Power will be provided by installed batteries for up to 24 hours before generators will be required to be functional.

System control:

i. Active: PCIVs are operated in accordance with EOPs/SAPs to control containment pressure. The HCVS is designed for a minimum of 8 open/close cycles of the vent path under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EOPs.

ii. Passive: Inadvertent actuation protection is provided by use of key-locked switches for HCVS system SOVs and locked manual bypass valves. In addition, a rupture disc is provided downstream of the HCVS flow path valves to preclude valve leakage during a design basis LOCA. The rupture disc would prevent flow following inadvertent opening of the PCIVs provided containment pressure does not exceed the rupture disc setpoint.

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 / NEI 13-02, Section 4.2.2

Actions required to extend venting beyond 24 hours include replenishment of the HCVS pneumatic and Argon purge system stored gases and recharging the electrical supply.

The pneumatic supply station will be installed in the Reactor Building Track Bay and will include a nitrogen

Part 2: Boundary Conditions for WW Vent – BDBEE Venting

bottle station with an additional connection for an extra nitrogen bottle or for a portable air compressor. Connections will utilize pre-engineered quick disconnect fittings. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and fueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The Argon purge system is required only if the ELAP progresses to severe accident conditions and hydrogen is being vented. It will likewise be in the Reactor Building Track bay and will include an Argon bottle station. Actions to replenish the Argon supplies include replacement of Argon bottles or refilling from an outside source. Sufficient argon will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The HCVS batteries and battery charger will also be installed in the Reactor Building Track Bay. The UPS will include battery capacity sufficient for 24-hour operation. The normal power supply to the UPS will be provided from a 120 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. A design change to install portable generator connections to this bus is being completed in support of EA-12-049 (Reference 1). In the event that power is not restored to the bus, a local connection will allow the battery charger to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

Details:

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

Primary Containment Control Flowcharts exist to direct operations in protection and control of containment integrity. These flowcharts are being revised as part of the EPG/SAGs Revision 3 updates and associated EOP/SAP implementation. HCVS-specific procedure guidance will be developed and implemented to support HCVS implementation.

Identify modifications:
List modifications and describe how they support the HCVS Actions.

EA-12-049 Modifications:

- A modification to install a connection point to allow a diesel generator to be connected to electrical power bus 2EJS*US1 is being installed. This will allow the DG to power the HCVS battery charger.

EA-13-109 Modifications:

A single modification package has been developed to detail the following modifications:

- Relocation and replacement of the existing Containment Purge System inboard containment isolation valve 2CPS*AOV109 to outside of containment and replacement of outboard containment isolation valve 2CPS*AOV111.
- Installation of dedicated HCVS piping including the HCVS isolation valve and rupture disc from the combined wetwell/drywell piping upstream of 2GTS*AOV101/SOV102 to the HCVS discharge
- Installation of the HCVS pneumatic supply and Argon purge station.

Part 2: Boundary Conditions for WW Vent – BDBEE Venting

- Installation of a dedicated HCVS battery system including a battery charger.
- Installation of required HCVS instrumentation and controls, including radiation monitors. This also includes installation of control panels in the MCR and the ROS.

Key Venting Parameters:

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

Initiation, operation and monitoring of the HCVS venting will rely on the following key parameters and indicators. Indication for these parameters will be installed in the MCR or ROS to comply with EA-13-109:

Key Parameter	Component Identifier	Indication Location
HCVS Process Temperature	2CPS-TE138	MCR
HCVS Process Pressure	2CPS-PT135	MCR
HCVS Process Radiation Monitor	2CPS-RE136	MCR
HCVS Process Valve Position	2CPS-AOV134-O 2CPS-AOV134-C	MCR
HCVS Pneumatic Supply Pressure	2CPS-PI151	ROS
HCVS Argon Supply Pressure	2CPS-PI161	ROS
HCVS Electrical Power Supply Availability (Yokogawa Recorder)	N/A (Each channel of the recorder has a component identifier.)	MCR

Initiation and cycling of the HCVS will be controlled based on several existing MCR key parameters and indicators which are qualified to the existing plant design: (Reference NEI 13-02, Section 4.2.2.1.9 [9]):

Key Parameter	Component Identifier	Indication Location
Drywell pressure	2CMS*PI2A	MCR
Suppression Chamber pressure	2CMS*PI7A	MCR
Suppression Pool level	2CMS*LI9A 2CMS*LI11A	MCR

Notes: None

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

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

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

First 24 Hour Coping Detail

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

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

The HCVS has been designed to minimize reliance on operator actions for response to an ELAP and severe accident events. Progression of the ELAP into a severe accident assumes that the FLEX strategies identified in the response to Order EA-12-049 have not been effective. Immediate operator actions will be completed by operators from either the MCR or the HCVS ROS using remote-manual actions. The operator actions required to open a vent path are as described in Table 2-1. Remote-manual is defined in this plan as a non-automatic power operation of a component and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting under primary procedural protocol.

The HCVS has been designed to allow initiation, control, and monitoring of venting from the MCR and will be able to be operated from an installed ROS as part of the response to this Order. Both locations minimize plant operators' exposure to adverse temperature and radiological conditions and are protected from hazards assumed in Part 1 of this report. A preliminary evaluation of travel pathways for dose and temperature concerns has been completed and travel paths identified (ISE Open Item #7). A final evaluation of environmental conditions will be completed as part of detailed design for confirmation.

[ISE OPEN ITEM-7: Confirm travel path accessibility.]

Permanently installed electrical power, Argon purge gas, and motive air/gas capability will be available to support operation and monitoring of the HCVS for 24 hours. Power will be provided by installed batteries for up to 24 hours before generators will be required to be functional.

System control:

i. Active: PCIVs are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS is designed for a minimum of 8 open/close cycles of the vent path under severe accident conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EOPs. The configuration of the new pneumatic supplies allows the HCVS system controls to override the containment isolation circuit on the PCIVs needed to vent containment.

ii. Passive: Inadvertent actuation protection is provided by use of key-locked switches for HCVS system SOVs and locked manual bypass valves. In addition, a rupture disc is provided downstream of the HCVS flow path valves to preclude valve leakage during a design basis LOCA.

Greater Than 24 Hour Coping Detail

Provide a general description of the venting actions for greater than 24 hours using portable and installed

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

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

Actions required to extend venting beyond 24 hours include replenishment of the HCVS pneumatic and Argon purge system stored gases and recharging the electrical supply.

The pneumatic supply station will be installed in the Reactor Building Track Bay and will include a nitrogen bottle station with an additional connections for an extra nitrogen bottle or a for a portable air compressor. Connections will utilize pre-engineered quick disconnect fittings. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and fueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The Argon purge system is required only if the ELAP progresses to severe accident conditions and hydrogen is being vented. It will likewise be in the Reactor Building Track bay and will include an Argon bottle station. Actions to replenish the Argon supplies include replacement of Argon bottles or refilling from an outside source. Sufficient Argon will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The HCVS batteries and battery charger will also be installed in the Reactor Building Track Bay. The UPS will include battery capacity sufficient for 24-hour operation. The normal power supply to the UPS will be provided from a 120 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. A design change to install portable generator connections to this bus is being completed in support of EA-12-049 (Reference 1). In the event that power is not restored to the 600 VAC bus, a local connection to the UPS will allow the UPS to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

Both the pneumatic and Argon supply stations and the HCVS batteries/battery charger are located in the Reactor Building Track Bay on the Northeast side of the Reactor Building. The track bay is outside of the secondary containment boundary. The HCVS piping will exit the Reactor Building on the west-southwest side of the Reactor Building and be routed to the west-northwest side of the building before going vertical to the top of the building. Therefore, the Reactor Building provides shielding for the Reactor Building Track Bay. A preliminary evaluation of radiological and temperature concerns was completed (ISE Open Item #7). A final evaluation will be completed when the location of the ROS is finalized.

[ISE OPEN ITEM-7: Perform final environmental evaluation of the ROS location.]

Details:

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

Primary Containment Control Flowcharts exist to direct operations in protection and control of containment integrity. Similarly, severe accident procedures exist for when EOP actions do not halt the progression of the BDBEE to severe accident. These flowcharts/procedures are being revised as part of the EPG/SAGs Revision 3 updates and associated EOP/SAP implementation. HCVS-specific procedure guidance will be developed and implemented to support HCVS implementation.

Part 2: <u>Boundary Conditions for WW Vent</u> – Severe Accident Venting
Identify modifications: *List modifications and describe how they support the HCVS Actions.*
Modifications are the same as for BDBEE Venting Part 2.
Key Venting Parameters: *List instrumentation credited for the HCVS Actions. Clearly indicate which of those already exist in the plant and what others will be newly installed (to comply with the vent order).*
Key venting parameters are the same as for BDBEE Venting Part 2.
Notes: None

Part 2: Boundary Conditions for WW Vent – 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

Venting will require support from the HCVS batteries, battery charger, and pneumatic supply station being installed. These provide a minimum of 24-hour operation on installed supplies and provide connection points for additional pneumatic supplies (nitrogen bottles or compressor) and electrical supplies (portable generator).

Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the MCR or ROS.

The pneumatic supply station will be installed in the Reactor Building Track Bay and will include a nitrogen bottle station with additional connections for extra nitrogen bottles or connection of a portable air compressor. Connections will utilize pre-engineered quick disconnect fittings. The location of the pneumatic supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the pneumatic supplies include replacement of nitrogen bottles or installation and fueling of a portable air compressor. Sufficient nitrogen bottles will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The Argon purge system is required only if the ELAP progresses to severe accident conditions and hydrogen is being vented. The Argon supply station will likewise be in the Reactor Building Track bay and will include an Argon bottle station with additional connections for extra Argon bottles or connection for replenishment from an outside source. Connections will utilize pre-engineered quick disconnect fittings. The location of the Argon supply station will be evaluated for reasonable protection per Part 1 of this OIP and modified as required for compliance. Actions to replenish the Argon supplies include replacement of Argon bottles or refilling from an outside source. Sufficient Argon will be staged to support operations for an additional 48 hours beyond the initial 24-hour coping period following the ELAP event.

The HCVS batteries and battery charger will also be installed in the Reactor Building Track Bay. The UPS will include battery capacity sufficient for 24-hour operation. The normal power source for the UPS is a dedicated 600 VAC to 120/240 VAC transformer, which will be powered from a 600 VAC bus that will be re-powered by a diesel generator as part of the FLEX response. A design change to install portable generator connections to this bus is being completed in support of EA-12-049 (Reference 1). In the event that power is not restored to the 600 VAC bus, a local 240 VAC connection to the UPS will allow the UPS to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

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

Part 2: Boundary Conditions for WW Vent – Support Equipment Functions

The same support functions that are used in the BDBEE scenario would be used for severe accident venting.

Details:

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

Primary Containment Control Flowcharts exist to direct operations in protection and control of containment integrity. Similarly, severe accident procedures exist for when EOP actions do not halt the progression of the BDBEE to severe accident. These flowcharts/procedures are being revised as part of the EPG/SAGs Revision 3 updates and associated EOP/SAP implementation. HCVS-specific procedure guidance will be developed and implemented to support HCVS.

Identify modifications:
List modifications and describe how they support the HCVS Actions.

- The FLEX modification to add connection points for the FLEX 600 VAC generator to connect to the 600 VAC bus supports re-powering the HCVS battery charger.
- HCVS modification to add piping and connection points at a suitable location in the Reactor Building Track Bay to connect portable N2 bottles or air compressor for motive force to HCVS components after 24 hours. Provide the capabilities to replace Argon bottles or refill from an external Argon supply. Install HCVS batteries and battery charger with applicable connection to 600 VAC bus and connection for small portable generator.
- HCVS connections required for portable equipment will be protected from all applicable screened-in hazards and located such that operator exposure to radiation and occupational hazards will be minimized. Structures to provide protection of the HCVS connections will be constructed to meet the requirements identified in NEI-12-06 section 11 (Reference 8) for screened in hazards.

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

- Local control features of the FLEX DG electrical load and fuel supply.
- Pressure gauge on supplemental Nitrogen bottles.
- Pressure gauge on Argon Purge System supply.

Notes: None

Part 2: Boundary Conditions for WW Vent – 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

Venting actions using portable equipment include the following:

- Replacement and replenishment of pneumatic supply sources. This includes the option of replacing nitrogen bottles or connecting a portable air compressor. Equipment sufficient for an additional 48 hours of vent operation beyond the 24-hour installed supply would be pre-staged in the FLEX storage building. Installation of the HCVS includes installation of a pneumatic supply header that includes pneumatic regulators and utilizes standard pneumatic connections.
  Replacement of the Argon supply source. Equipment sufficient for an additional 48 hours of vent operation beyond the 24-hour installed supply would be pre-staged in the FLEX storage building.
- Establishing temporary power to repower the battery charger. Option 1 is to connect the FLEX DG to 2EJS*US1, which provides power to EHS*MCC102 that in turn powers the HCVS transformer and battery charger. Option 1 would be completed as part of the FLEX response strategy and occurs to the east and inside the NMP2 Control Building. Option 2, to be taken if the FLEX DG cannot be connected to 2EJS*US1, is to connect a small portable generator to the battery charger. Option 2 would be taken locally at the battery charger. Either of these actions will also require the generators to be refueled. A one line diagram of the electrical system to be installed is included in Attachment 3.

Details:

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

Implementation procedures are being developed to address all HCVS operating strategies, including deployment of portable equipment. Direction to enter the procedure for HCVS operation will be given in the EOPs, the site ELAP procedure, and the SAPs (refer to Part 4 for general information on procedures).

There is minimal impact to deployment actions since the HCVS discharge pipe will be located on the Northwest side of the Reactor Building and deployment areas are either on the East/Northeast side of the Reactor Building or on the South side of the Reactor Building. Therefore, the procedures/guidelines for HCVS actions are the same as for support equipment section.

Strategy	Modifications	Protection of connections
Per compliance with Order EA-12-049 (FLEX)	N/A	Per compliance with Order EA-12-049 (FLEX)

Notes: None

Part 3: Boundary Conditions for EA-13-109, Option 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, at MCC/Busses in the Control Building and locally at the intake structure. In addition, HCVS operation may occur at the ROS on the 261'elevation in the Reactor Building Trackbay (grade elevation).

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

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

Part 3.1: Boundary Conditions for SAWA

Table 3.1 – SAWA Manual Actions

Primary Action	Primary Location/ Component	Notes
1. Establish HCVS capability in accordance with Part 2 of this OIP.	• MCR or ROS	• Applicable to SAWA/SAWM strategy.
2. Connect FLEX (SAWA) pump discharge to injection piping.	• Reactor Building 289' elevation/RHR "A"	• Perform Reactor Building portions of deployment first.
3. Connect FLEX (SAWA) pump to water source.	• Intake/outside screenhouse building	•
4. Power SAWA/HCVS components with EA-12-049 (FLEX) generator.	• Outside Control Building/Inside Control Building Division I Switchgear Room	•
5. Inject to RPV using FLEX (SAWA) pump (diesel).	• RB Trackbay at valve manifold	• Initial SAWA flow rate is 300 gpm.
6. Monitor SAWA indications.	• RB Trackbay (RHR LPCI valve position in MCR)	• Pump flow. • Valve position indication.
7. Use SAWM to maintain availability of the WW vent (Part 3.1.A).	• RB Trackbay at valve manifold	• Monitor DW pressure and Suppression Pool level • Control SAWA flow at valve manifold.

Discussion of timeline SAWA identified items

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

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

Part 3.1: Boundary Conditions for 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 of injection systems in a timely manner. This does not preclude the use of the SAWA system to supplement or replace the EA-12-049 injection systems if desired. SAWA will consist of both portable and

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

installed equipment.

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

The SAWA flow path includes methods to minimize exposure of personnel to radioactive liquids / gases and potentially flammable conditions by inclusion of backflow prevention. The FLEX (SAWA) pump check valve is integral with the pump skid and will close and prevent leakage when the SAWA pump is secured. RHR LPCI injection mode has installed ECCS backflow prevention devices (2RHS*V16A) qualified for accident scenarios.

Description of SAWA actions for first 24 hours:

Table 3.2 – SAWA Manual Actions Timeline

Time	Action	Notes
T<1 hour	• Connect SAWA hose in Reactor Building and route hose to RB Trackbay *(Step 2 of Table 3.1).* • Remove threaded cap and install hose fittings. • Close 2CNG-V621. • Open 2RHS*V70.	• No evaluation required for actions inside Reactor Building.
T=1-7* hours	• Complete actions started at T<1 hour *(Step 2 of Table 3.1).* • Connect FLEX (SAWA) pump to water supply at intake structure *(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 flow of at least 300 gpm to the RPV using SAWA systems. *(Step 5 of Table 3.1).*	• Evaluate core gap and early in vessel release impact to Reactor Building access for SAWA actions. It is assumed that reactor building access is limited due to the source term at this time unless otherwise noted. (Refer to HCVS-FAQ-12 for actions in T=1-7 hour timeframe.
T≤8-14 hours	• Monitor and Maintain SAWA flow at 300 gpm for six hours *Step 6 of Table 3.1).*	• SAWA flow must commence at T=8 hours but should be done as soon as motive force is available.
T≤14 hours	• Proceed to SAWM actions per Part 3.1.A *(Step 7 of Table 3.1).*	• SAWA flow may be reduced to 100 gpm six hours following SAWA initiation.
*The assumed times of T=1 hour to T=8 hours to establish the bounds of applicability of radiological evaluations have been reduced to T=1 hour to T=7 hours in order to provide sufficient margin to inform operator action feasibility evaluations and will be further informed by emergency response dose assessment activities during an actual event. This accounts for the one hour gap between 7 and 8 hours in this time line.		

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.

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

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

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

Equipment Locations/Controls/Instrumentation

Nine Mile Point Unit 2 performed a site specific evaluation to justify the use of a lower initial SAWA 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 six hours before reduction to the Wetwell vent preservation flow rate. The reason for this approach is to be within the capacity of a single FLEX (SAWA) pump so that the deployment time can be reduced as short as possible and within 8 hours. MAAP version 5.03 was used to perform this evaluation and the results demonstrate acceptable containment performance in terms of drywell temperature, pressure and wetwell water level (Reference 37). The evaluation was performed to obtain results consistent with Figures C-2 through C-5 of NEI 13-02 Revision 1. A sensitivity case using 500 gpm for 4 hours was also performed and found that the containment response for the base case (300 gpm for 6 hours) is virtually the same as the sensitivity case (500 gpm for 4 hours).

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

The flow path will be from the FLEX suction at the intake structure for the plant Ultimate Heat Sink (UHS) through the FLEX (SAWA) pump and valve manifold having connections for the SAWA (FLEX) pump and the hose that will deliver SAWA flow to a second valve manifold. Hose connected to the pump valve manifold will be routed to a second valve manifold where SAWA flow indication and control will be provided. This valve manifold will also provide minimum flow and freeze protection for the pump. From this second valve manifold, hose will be routed to the permanent SAWA connection point located within the Reactor Building on the "A" loop of Residual Heat Removal (RHR) via a 3-inch connection consisting of a threaded pipe connection with cap, a manual valve (2RHS*V70) and necessary piping. The manual valve at the connection will be manually opened when the hose is connected. Once the SAWA components are deployed and connected, the SAWA flow path is completed by opening the RHR Low Pressure Coolant Injection (LPCI) valve 2RHS*MOV24A with backflow prevention provided by installed containment isolation check valve 2RHS*V16A. Cross flow into other portions of the RHR system will be isolated by ensuring closure of the MOVs from the MCR. DW pressure and Suppression Pool level will be monitored and flow rate will be adjusted by use of the FLEX (SAWA) pump control valve at the valve manifold that also contains the SAWA flow indication. Alternately, the flow indication and flow control may be from the pump discharge. Communication will be established between the MCR and the SAWA flow control location.

Motor Operated Valves (MOVs) and containment instrumentation required for SAWA will be powered from the

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

FLEX diesel generators connected in the Control Building Switchgear Rooms as described in the EA-12-049 compliance documents. The MOV will be operated in a load sequence with other loads to limit the potential for overloading the FLEX DGs. The FLEX DGs are located near the Control Building which is significantly away from the discharge of the HCVS at the Northwest side of the Reactor Building. Refueling of the FLEX DG will be accomplished from the EDG fuel oil tanks as described in the EA-12-049 compliance documents. The Intake structure is a significant distance from the discharge of the HCVS pipe with substantial structural shielding between the HCVS pipe and the pump deployment location. Pump refueling will also be accomplished from the EDG fuel oil tanks as described in the EA-12-049 compliance documents. See mechanical and electrical sketches in attachments, plant layout sketches in the assumptions part and a list of actions elsewhere in this part.

Evaluations of actions outside the Reactor Building 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 SA Conditions). Evaluation of actions inside the Reactor Building for projected SA conditions (radiation/temperature) will be performed to determine that personnel can complete the initial and support activities without exceeding the ERO-allowable dose for equipment operation or site safety standards (reference HCVS-FAQ-12).

Electrical equipment and instrumentation will be powered from the power sources noted in the table below with portable generators to maintain battery capacities during the Sustained Operating period. The indications include (* are minimum required instruments).

Parameter	Instrument	Location	Power Source / Notes
DW Pressure*	2CMS*PI2A	Indicator in Main Control Room El 306' on 2CEC*PNL601	Division I battery via EA-12-049 generator and battery charger RG 1.97 qualified
Suppression Pool Level*	2CMS*LI9A	Indicator in Main Control Room El 306' on 2CEC*PNL601	Division I battery via EA-12-049 generator and battery charger RG 1.97 qualified
SAWA Flow*	FLEX (SAWA) Pump Flow indicator	FLEX six-valve manifold deployed to RB Trackbay El 261' grade elev or at the pump discharge	Self-powered from internal battery
Valve indications and controls	MCR Panels	Main Control Room El 306' on 2CEC*PNL601	2EHS*MCC103-17C via 2EJS*US1 via EA-12-049 generator

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

Equipment Protection

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SAWA installed components and connections external to protected buildings will be protected against the screened-in hazards of EA-12-049 for the station. 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

1. Connect FLEX (SAWA) pump discharge to RHR piping.
   - Remove threaded cap and install hose fittings.
   - Close 2CNS-V621.
   - Open 2RHS*V70.
2. Connect FLEX (SAWA) pump to intake using FSG*.
3. Power SAWA/HCVS components with EA-12-049 (FLEX) generator using FSG.
4. Verify other RHR modes are isolated using Control Room switches.
5. Open 2RHS*MOV24A to lineup injection to RPV using SAWA pump.
6. Start FLEX (SAWA) pump to establish SAWA flow.
7. Adjust SAWA flow at valve manifold and using SAWA flow indication to establish and maintain 300 gpm.

*Where an FSG is referenced, it will be the same FSG reference with the same steps used for FLEX.

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

The list of modifications reflects changes required to upgrade the modifications for EA-12-049 to meet EA-13-109 Phase 2 requirements.

Electrical Modifications:

- None

Mechanical Modifications:

- Increase hose size for SAWA flow rate (300 gpm)
- Construct valve manifold
- Hose length/location of valve manifold may need changes based on hydraulic calculation/radiological evaluation

Instrument Modifications:

- SAWA flow instrument

Component Qualifications:

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

State the qualification used for equipment supporting SAWA.

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

Permanently installed plant equipment shall meet the same qualifications as described in Part 2 of this OIP. Temporary/Portable equipment shall be qualified and stored to the same requirements as FLEX equipment as specified in NEI 12-06, Rev 0. SAWA components are not required to meet NEI 13-02, Table 2-1 design conditions.

Notes:

None

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

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

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

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

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

Ref: NEI 13-02 Appendix C.7

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

Basis for SAWM time frame

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

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

NMP2 is not bounded by the evaluations performed in BWROG TP-2015-008 and therefore is not representative of the reference plant in NEI 13-02 figures C-2 through C-6. NMP2 will use an initial SAWA flow rate (300 gpm) that is lower than evaluated by BWROG TP-2015-008 and Reference 27 of NEI 13-02 Rev 1 (500 gpm).

NMP2 performed a site specific evaluation to justify the use of a lower initial SAWA 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 six hours before reduction to the Wetwell vent preservation flow rate. The reason for this approach is to be within the capacity of a single FLEX pump so that the deployment time can be reduced as short as possible and within 8 hours. MAAP version 5.03 was used to perform this evaluation and the results demonstrate acceptable containment performance in terms of drywell temperature, pressure and wetwell water level. The evaluation was performed to obtain results consistent with Figures C-2 through C-5 of NEI 13-02 Revision 1. A sensitivity case using 500 gpm for 4 hours was also performed and found that the containment response for the base case (300 gpm for 6 hours) is virtually the same as the sensitivity case (500 gpm for 4 hours).

Instrumentation relied upon for SAWM operations is Drywell Pressure and Suppression Pool level and SAWA flow. Except for SAWA flow, SAWM instruments are initially powered 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). The SAWA flow instrument will be self-powered from an internal power supply capable of being replenished, if needed, through the Sustained Operation period. DW Temperature monitoring is not a requirement for compliance with Phase 2 of the Order, but some knowledge of temperature characteristics provides information for the operation staff to evaluate plant conditions under a severe accident and provide confirmation to adjust SAWA flow rates. (C.7.1.4.2, C.8.3.1)

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

Procedures will be developed that control the Suppression Pool level, while ensuring the DW pressure indicates the core is being cooled, whether in-vessel or ex-vessel. Procedures will dictate conditions during which SAWM flowrate should be adjusted (up or down) using suppression pool level and DW pressure as controlling parameters to remove the decay heat from the containment. (This is similar to the guidance currently provided in the BWROG SAMGs.) (C.7.1.4.3)

Attachment 2.1.A shows the timeline of events for SAWA / SAWM. (C.7.1.4.4)

Table 3.1.B – SAWM Manual Actions

Primary Action	Primary Location/ Component	Notes
1. Lower SAWA injection rate to control Suppression Pool Level and decay heat removal.	RB Trackbay at valve manifold	• Control to maintain containment and WW parameters to ensure WW vent remains functional. • 100 gpm minimum capability is maintained for greater than 7 days.
2. Control SAWM flowrate for containment control/decay heat removal.	MCR RB Trackbay at valve manifold	• SAWM flowrate will be monitored using the following instruments: – SAWA Flow

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

		– Suppression Pool Level – Drywell Pressure • SAWM flowrate will be controlled using the manual valve at the six valve manifold.
3. Establish alternate decay heat removal.	Various locations	SAWM strategy can preserve the wetwell vent path for >7 days.
4. Secure SAWA / SAWM.	RB Trackbay at valve manifold	When alternate decay heat removal is established.

SAWM Time Sensitive Actions

Time Sensitive SAWM Actions:

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

SAWM Severe Accident Operation

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

Ref: EA-13-109 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, Section 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 6 hours, the flow will be reduced while monitoring DW pressure and Suppression Pool level. SAWM flowrate can be lowered to maintain containment parameters and preserve the WW 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.

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

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

SAWM can be maintained >7 days:

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

Details:

Details of Design Characteristics/Performance Specifications

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

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

Equipment Locations/Controls/Instrumentation

Describe location for SAWM monitoring and control.

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

The SAWM control location is the same as the SAWA control location. Local indication of SAWM flow rate is provided at the six valve manifold by installed flow instrument qualified to operate under the expected environmental conditions. The SAWA flow instrument is self-powered by an internal power supply. Communications will be established between the SAWM control location and the MCR.

Injection flowrate is controlled by FLEX manual valve located on the six valve manifold, or at pump discharge.

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

Key Parameters:

List instrumentation credited for the SAWM Actions.

Parameters used for SAWM are:

- Drywell Pressure
- Suppression Pool Level
- SAWM Flowrate

The Drywell pressure and Suppression Pool level instruments are qualified to RG 1.97 and are the same as listed in Part 2 of this OIP. The SAWM flow instrumentation will be qualified for the expected environmental conditions expected when needed.

Notes:

None

Part 3: Boundary Conditions for EA-13-109, Option 2
Part 3.1.B: **Boundary Conditions for SAWA/SADV**
Applicability of WW Design Considerations
This section is not applicable to NMP2.
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 3.1, 3.20 / NEI 13-02, Section 6.1.2, 6.1.3, 6.2

Program Controls:

The HCVS venting actions will include:

- Site procedures and programs are being developed in accordance with NEI 13-02 to address use and storage of portable equipment relative to the Severe Accident defined in NRC Order EA-13-109 and the hazards applicable to the site per Part 1 of this OIP.
- Routes for transporting portable equipment from storage location(s) to deployment areas will be developed as the response details are identified and finalized. The identified paths and deployment areas will be accessible when the HCVS is required to be functional including during Severe Accidents.

Procedures:

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

The HCVS and SAWA procedures will be developed and implemented following plant processes for initiating or revising procedures and contain the following details:

- appropriate conditions and criteria for use of the HCVS and SAWA
- when and how to place the HCVS and SAWA in operation
- location of system components
- instrumentation available
- normal and backup power supplies
- directions for sustained operation (Reference 9), including the storage and location of portable equipment
- location of the remote control HCVS operating station (panel)
- training on operating the portable equipment
- testing of portable equipment

NMP2 does not utilize Containment Accident Pressure (CAP) for ECCS pump NPSH.

Provisions will be established for out-of-service requirements of the HCVS and compensatory measures that comply with the criteria from NEI 13-02 (Reference 9).

NMP2 will establish provisions for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in the HCVS Program Document:

The provisions for out-of-service requirements for HCVS/SAWA 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.

Part 4: Programmatic Controls, Training, Drills and Maintenance

- If for up to 30 days, the primary and alternate means of HCVS/SAWA operation are non-functional, no compensatory actions are necessary.
- If the out of service times exceed 30 or 90 days as described above, the following actions will be performed through the site corrective action program:
  - Determine the cause(s) of the non-functionality,
  - Establish the actions to be taken and the schedule for restoring the system to functional status and to 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 in drills, tabletops, or exercises for HCVS operation 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

NMP2 will utilize the guidance provided in NEI 13-06 and 14-01 (References 10 and 11) for guidance related to drills, tabletops, or exercises for HCVS operation. In addition, NMP2 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:

- *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 and expected use (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

NMP2 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.

NMP2 will implement the following operation, testing and inspection requirements for the HCVS and SAWA to ensure reliable operation of the system.

Table 4-1: Testing and Inspection Requirements

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

Part 4: Programmatic Controls, Training, Drills and Maintenance

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 valves[5] move to their proper (intended) positions.	Once per every other operating cycle

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

Notes:
Per generic assumption 109-4, existing containment component's design and testing values are governed by existing plant containment criteria (e.g., Appendix J) and are not subject to the testing criteria from NEI 13-02 (Reference HCVS-FAQ-05 [16] and NEI 13-02, §6.2.2 [9]).

Part 5: Milestone Schedule

Provide a milestone schedule. This schedule should include:

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

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

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

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6-month status reports.

Milestone	Target Completion Date	Activity Status	Comments
Hold preliminary/conceptual design meeting	Nov 2013	Complete	
Submit Overall Integrated Implementation Plan	Jun 2014	Complete	
Submit 6 Month Status Report	Dec 2014	Complete	
Design Engineering Complete	Mar 2015	Complete	
Submit 6 Month Status Report	Jun 2015	Complete	
Operations Procedure Changes Developed	Dec 2015	Started	
Site Specific Maintenance Procedure Developed	Dec 2015	Started	
Submit 6 Month Status Report	Dec. 2015	Complete with this submittal	Simultaneous with Phase 2 OIP
Training Complete	Feb 2016		
NMP2 Implementation Outage	Apr 2016		
Procedure Changes Active	Apr 2016		
Walk Through Demonstration/Functional Test	Apr 2016		
Submit Completion Report	June 2016		

Phase 2 Milestone Schedule:

Part 5: Milestone Schedule

Phase 2 Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Submit Overall Integrated Implementation Plan	Dec 2015	Complete with this submittal	
Hold preliminary/conceptual design meeting	Jan 2016		
Submit 6 Month Status Report	June 2016		
Submit 6 Month Status Report	Dec 2016		
Design Engineering On-site/Complete	Mar 2017		
Submit 6 Month Status Report	June 2017		
Operations Procedure Changes Developed	Dec 2017		SAMG Revision
Site Specific Maintenance Procedure Developed	Dec 2017		Expect to be N/A
Submit 6 Month Status Report	Dec 2017		
Training Complete	Feb 2018		
Implementation Outage	April 2018		
Procedure Changes Active	April 2018		
Walk Through Demonstration/Functional Test	April 2018		
Submit Completion Report	June 2018		

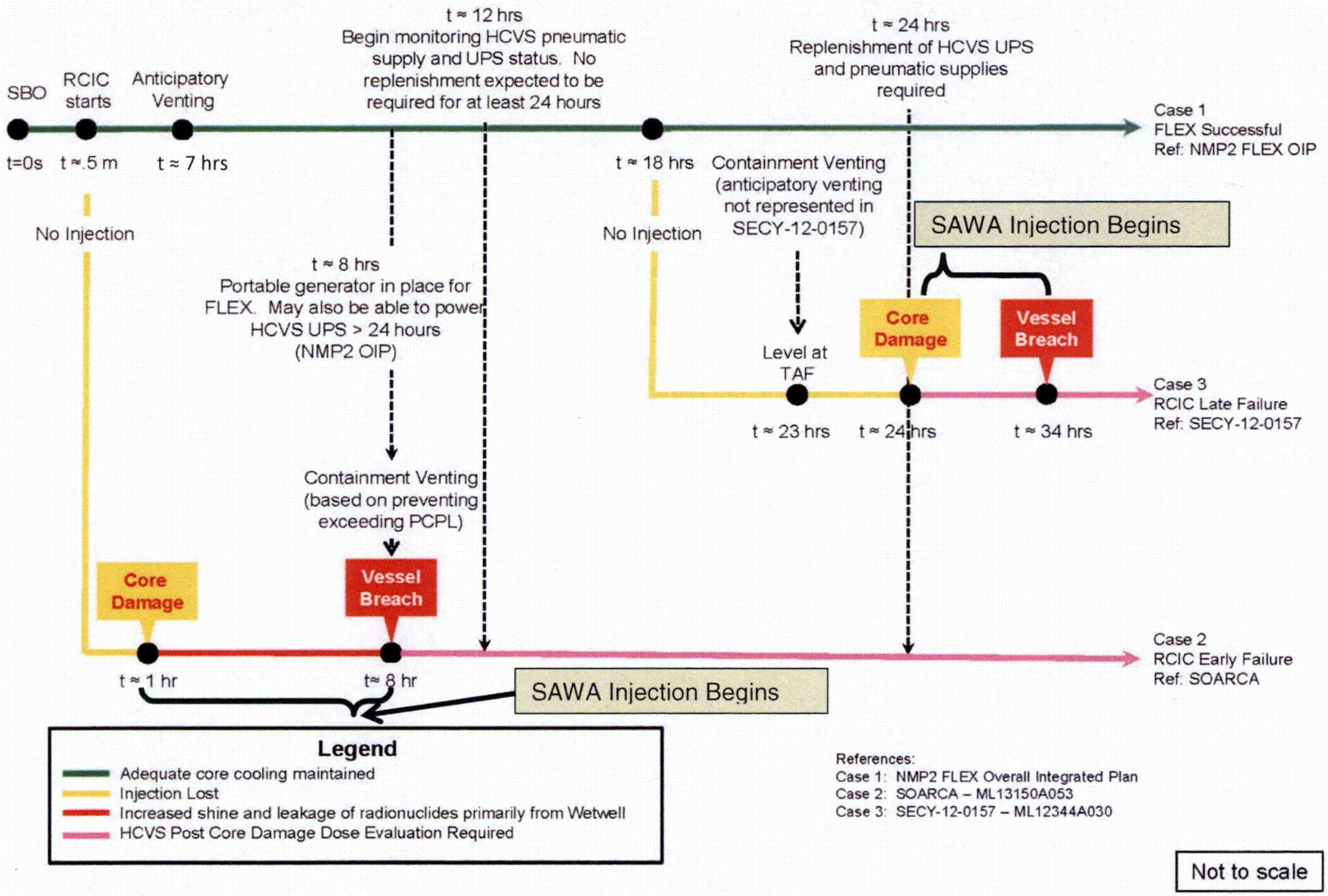
Notes:

None

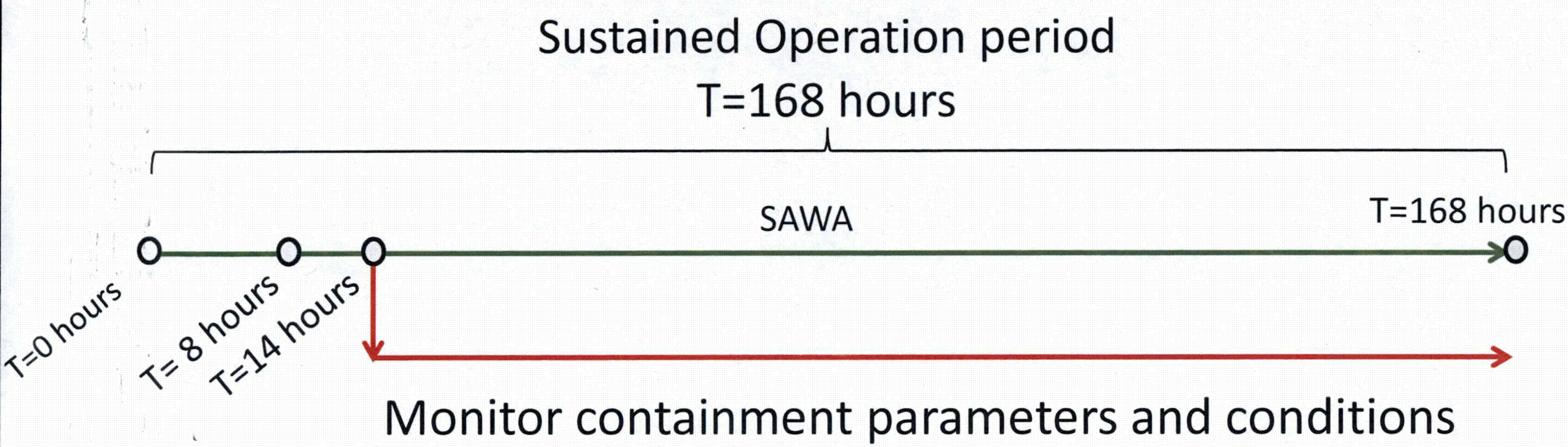
Attachment 1: HCVS/SAWA/SADV Portable Equipment

List portable equipment	*BDBEE Venting*	*Severe Accident Venting*	*Performance Criteria*	*Maintenance / PM requirements*
Nitrogen Cylinders	X	X	2 x Size 300 (or similar) cylinders, initial pressure of 2640 psig	Check periodically for pressure, replace or replenish as needed.
Argon Cylinders	NA	X	12 x Size 300 (or similar) cylinders, initial pressure of 2640 psig	Check periodically for pressure, replace or replenish as needed.
FLEX DG	X	X	450kW, 600V	Per response to EA-12-049.
FLEX/SAWA Pump	X	X	300 gpm @ 260 psig (2000 rpm)	Per response to EA-12-049.
Portable Air Compressor (optional)	X	X	Later	Per vendor manual.
Small Portable Generator (optional)	X	X	Later	Per vendor manual.

Attachment 2A: Sequence of Events Timeline - HCVS



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

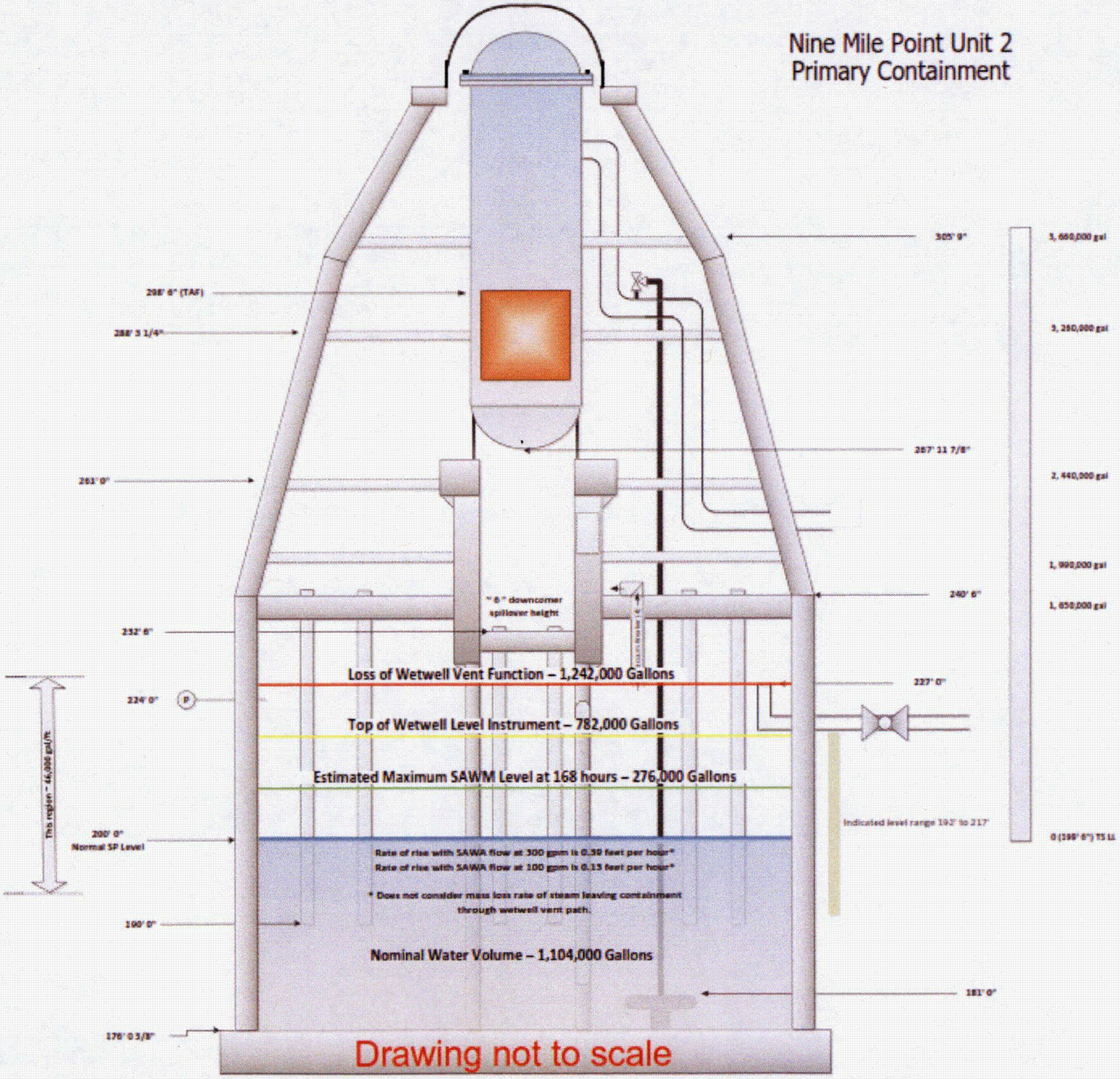


Time	Action
T=0 hours	Start of ELAP
T=8 hours	Initiate SAWA flow at 300 gpm as soon as possible but no later than 8 hours
T=14 hours	Throttle SAWA flow to 100 gpm 6 hours after initiation of SAWA flow
T=168 hours	End of Sustained Operation

Attachment 2.1.B: Sequence of Events Timeline – SADV

Not applicable to NMP2

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



Attachment 2.1.D: SAWM SAMG Approved Language

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

Actual Approved Language that will be incorporated into site SAMG*

Cautions:

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

Priorities:

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

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

Methods:

Identify systems and capabilities to add water to the RPV or 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.

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

Attachment 3: Conceptual Sketches

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

Sketch 1A and 1B: Electrical Layout of HCVS System *(preliminary)*

- Instrumentation Process Flow
- Electrical Connections

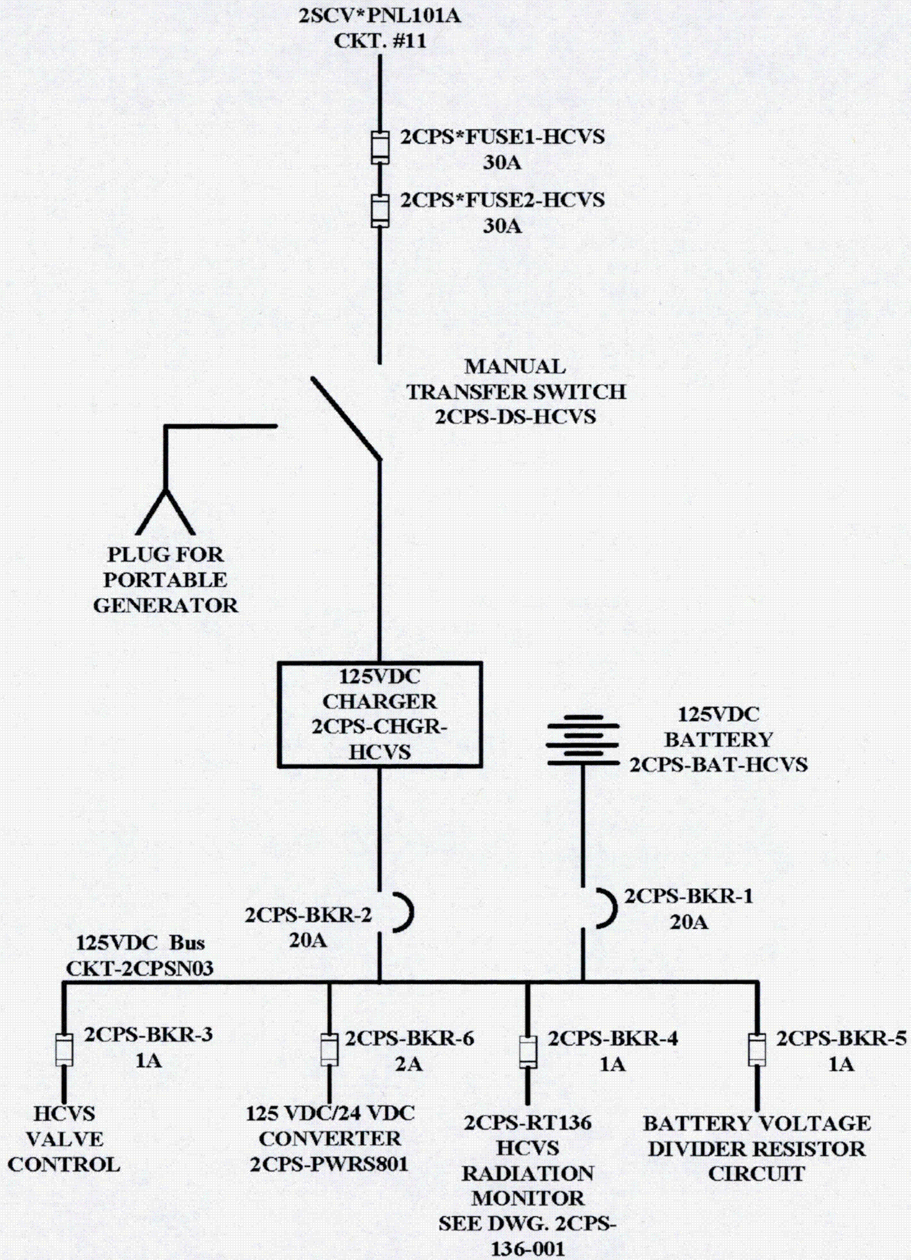
Sketch 2A, 2B, and 2C: P&ID Layout of WW Vent, Pathways, and Site Layout *(preliminary)*

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

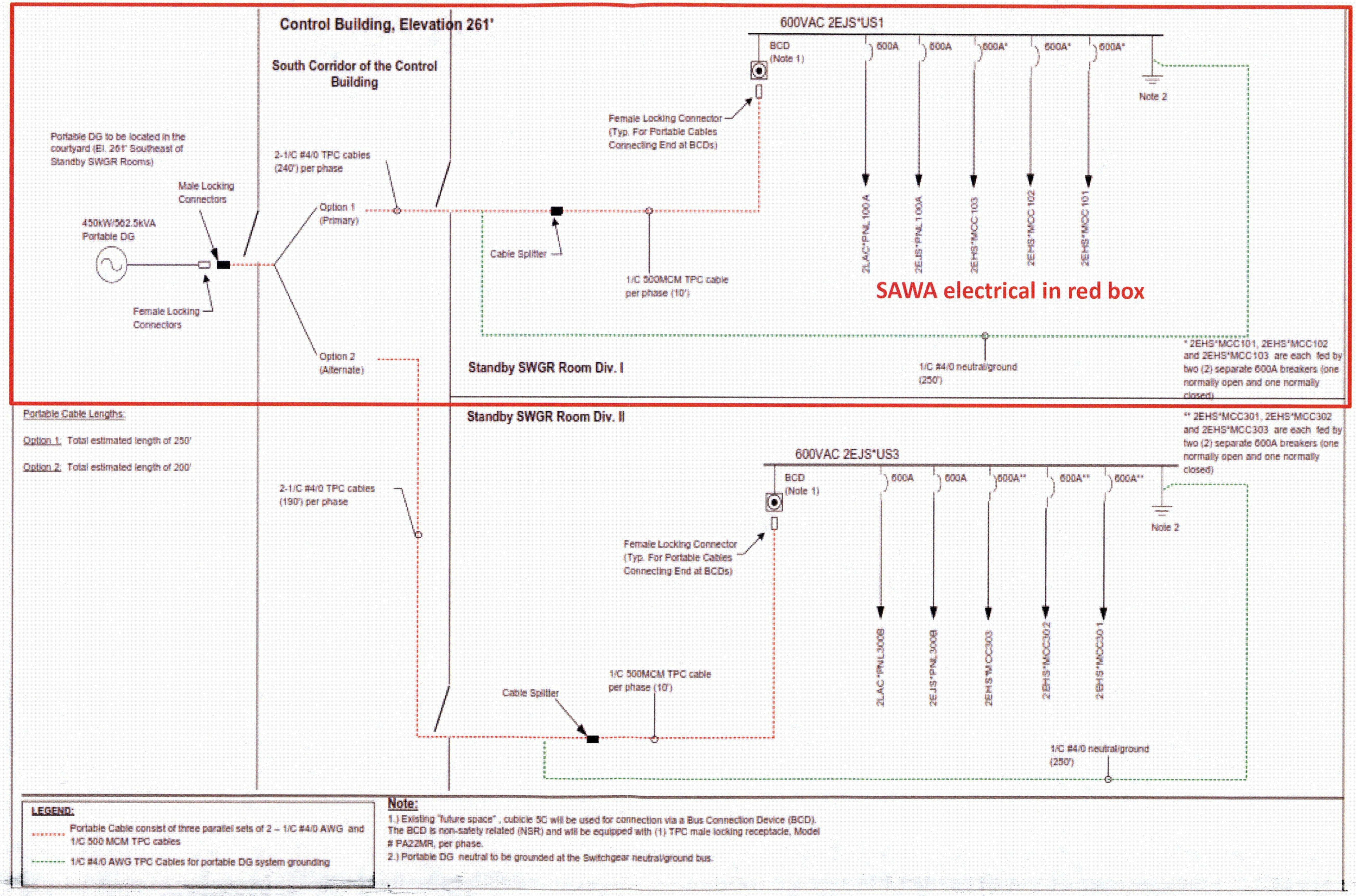
Sketch 3: P&ID Layout of SAWA, Pathways and Site Layout *(preliminary)*

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

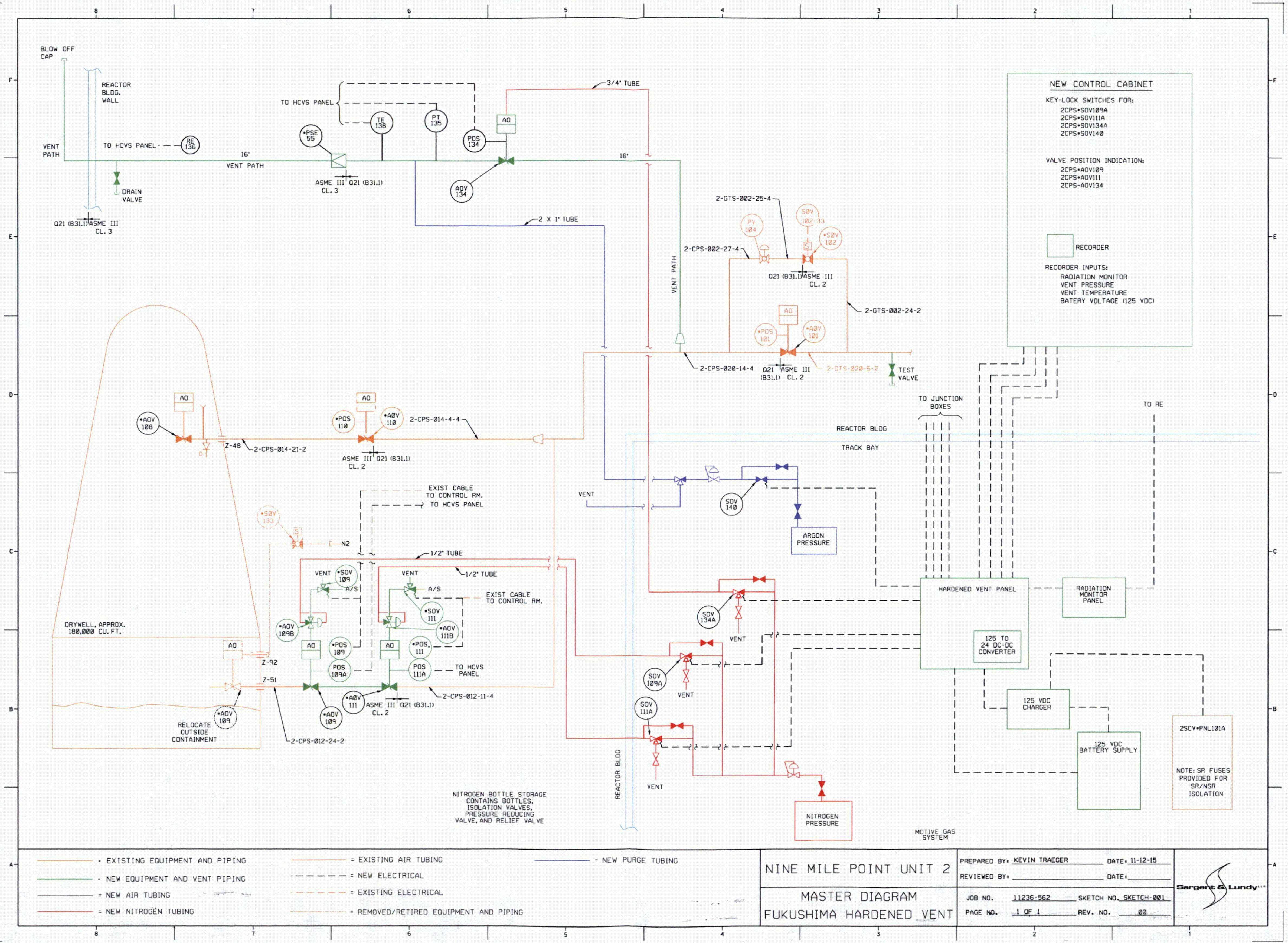
Sketch 1A: Electrical Layout of System - HCVS



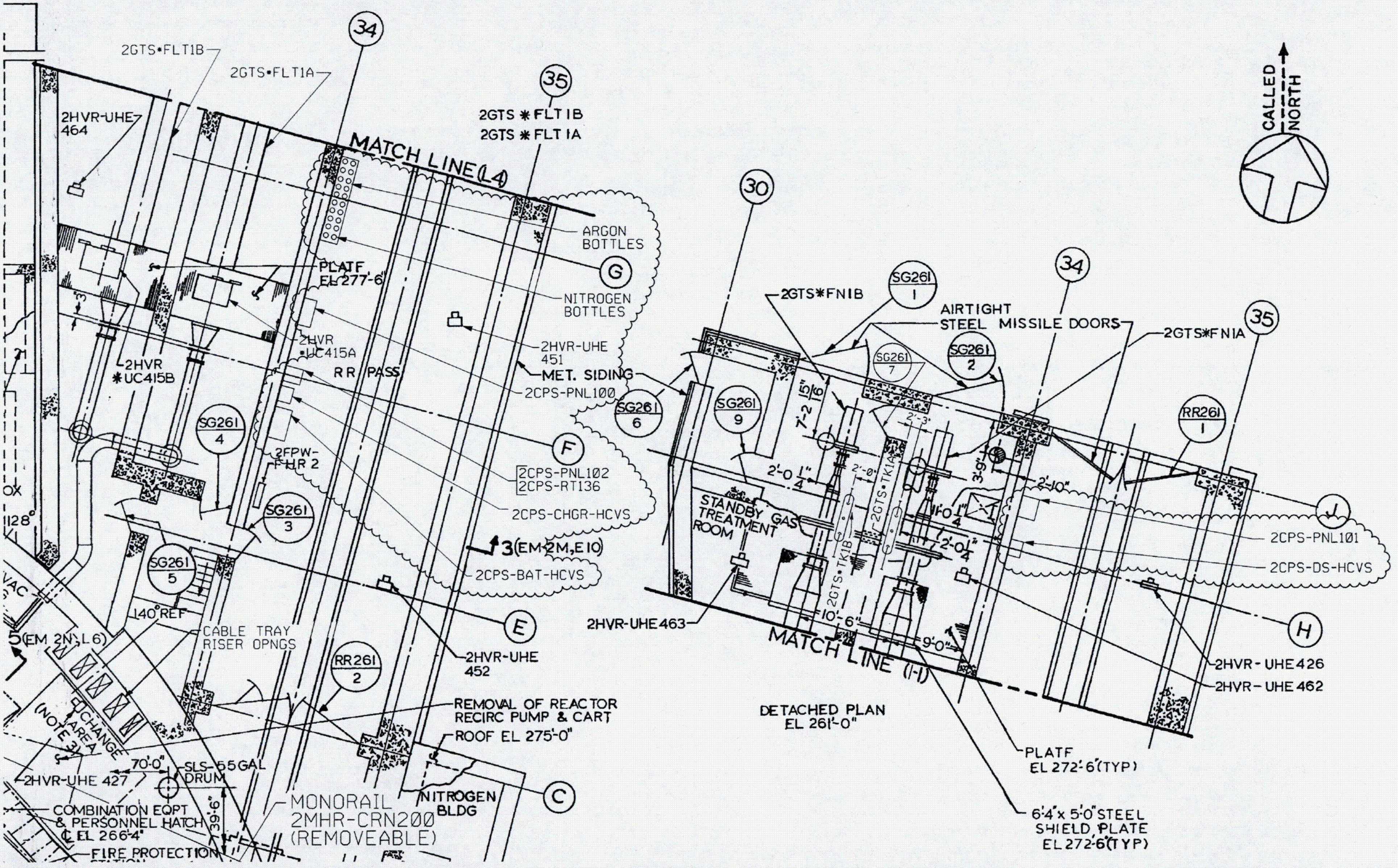
Sketch 1B: Electrical Connections – HCVS and SAWA



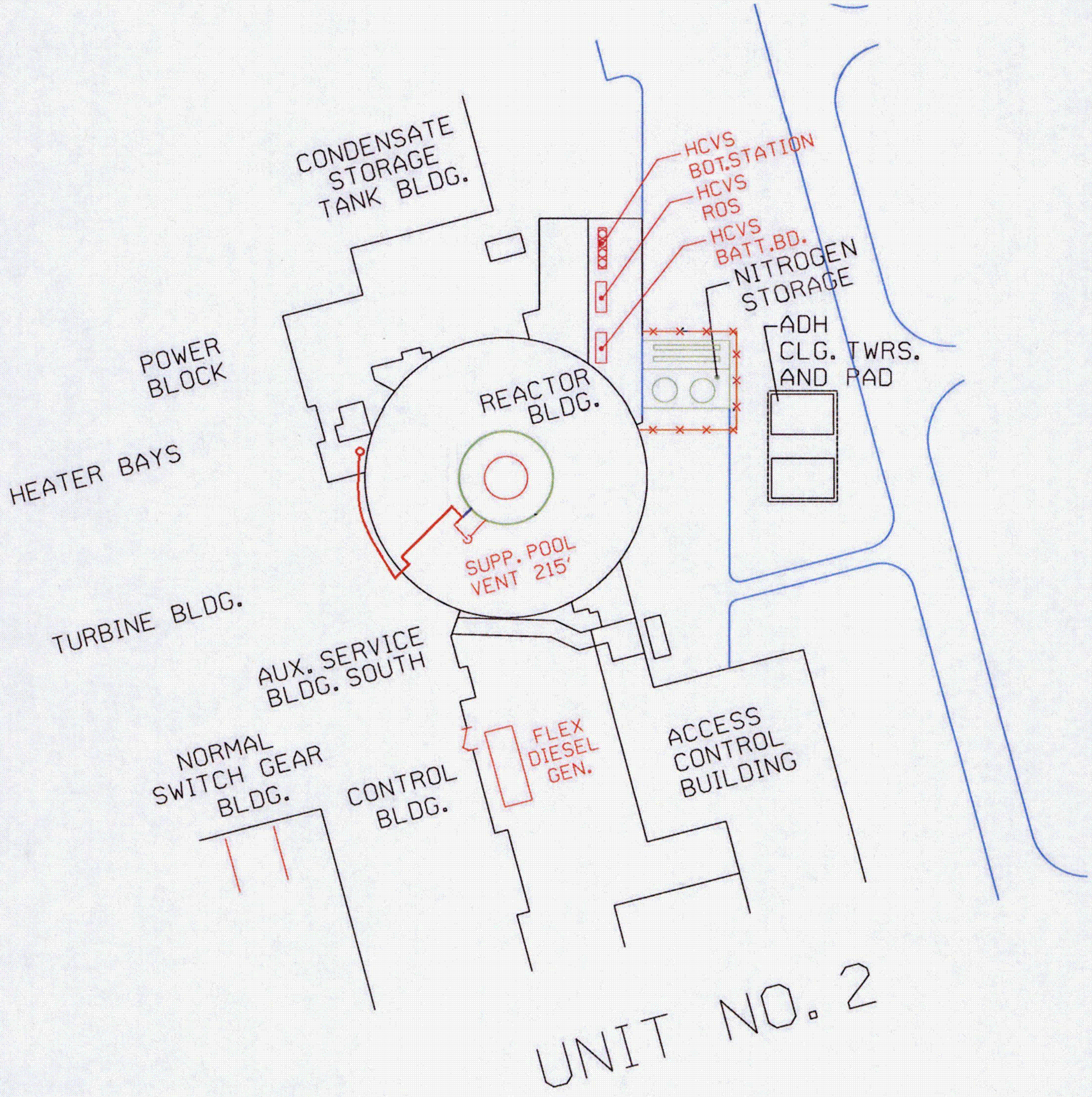
Sketch 2A: P&ID Layout of WW Vent



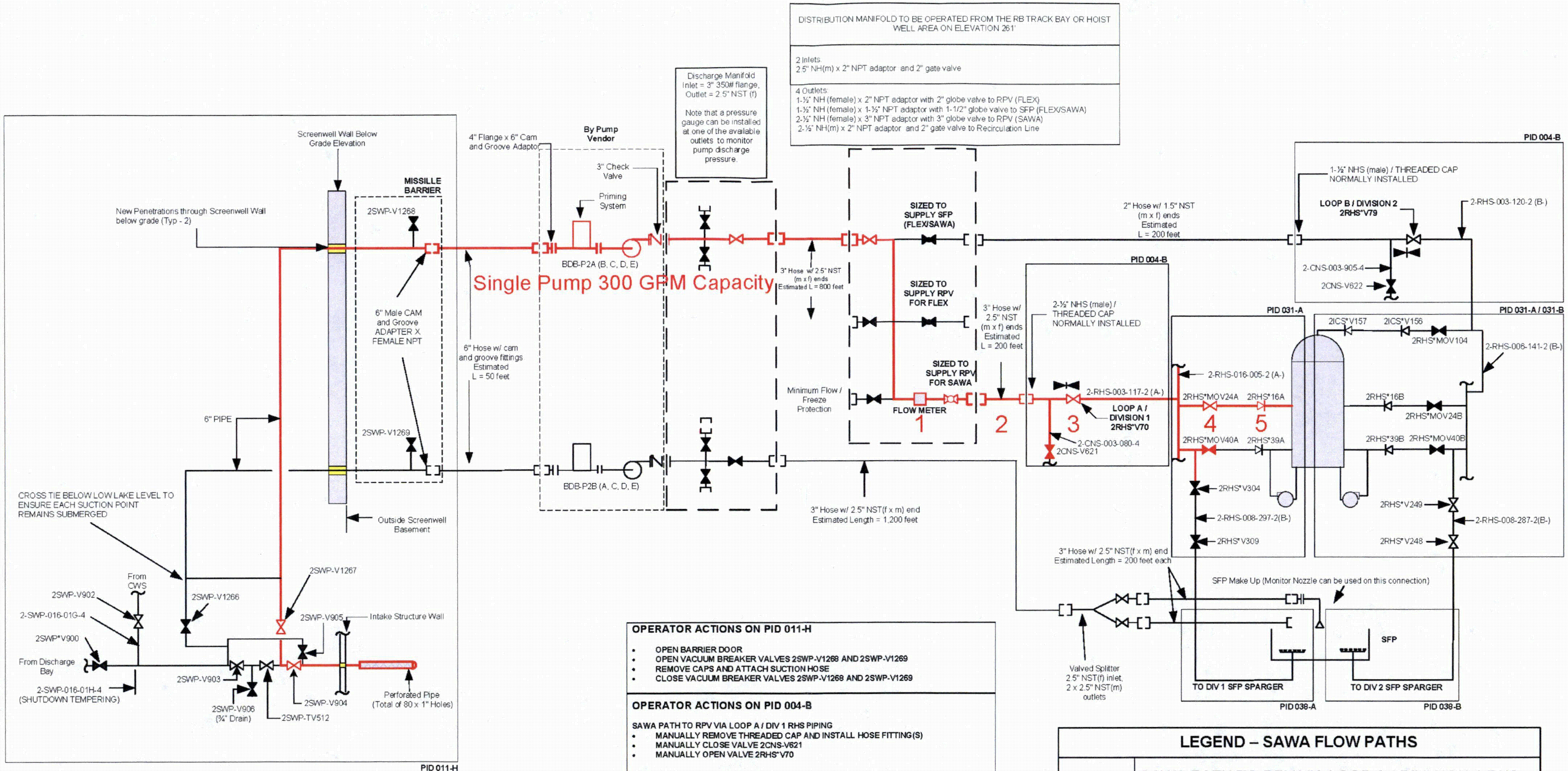
Sketch 2B: Remote Operating Station



Sketch 2C: HCVS Plan Overview



Sketch 3A: P&ID Layout of SAWA



OPERATOR ACTIONS ON PID 011-H

- OPEN BARRIER DOOR
- OPEN VACUUM BREAKER VALVES 2SWP-V1268 AND 2SWP-V1269
- REMOVE CAPS AND ATTACH SUCTION HOSE
- CLOSE VACUUM BREAKER VALVES 2SWP-V1268 AND 2SWP-V1269

OPERATOR ACTIONS ON PID 004-B

SAWA PATH TO RPV VIA LOOP A / DIV 1 RHS PIPING
- MANUALLY REMOVE THREADED CAP AND INSTALL HOSE FITTING(S)
- MANUALLY CLOSE VALVE 2CNS-V621
- MANUALLY OPEN VALVE 2RHS*V70

OPERATOR ACTIONS ON PID 031-A / 031-B

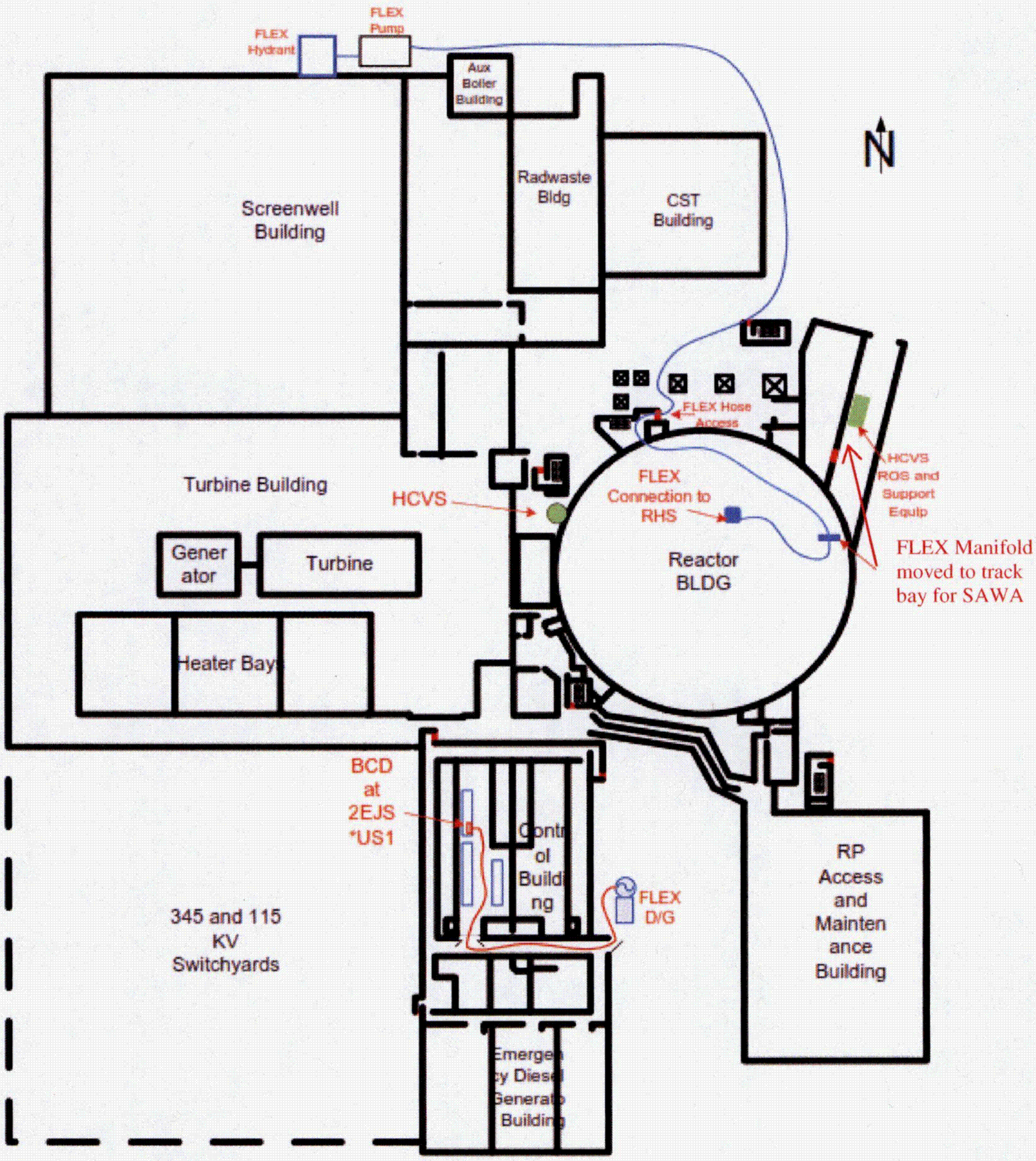
SAWA PATH TO RPV
- Remote Manual – Open 2RHS*MOV24A

LEGEND – SAWA FLOW PATHS	
(red line)	SAWA PATH TO RPV VIA LOOP A / DIVISION 1 RHS PIPING AND VALVE 2RHS*MOV24A

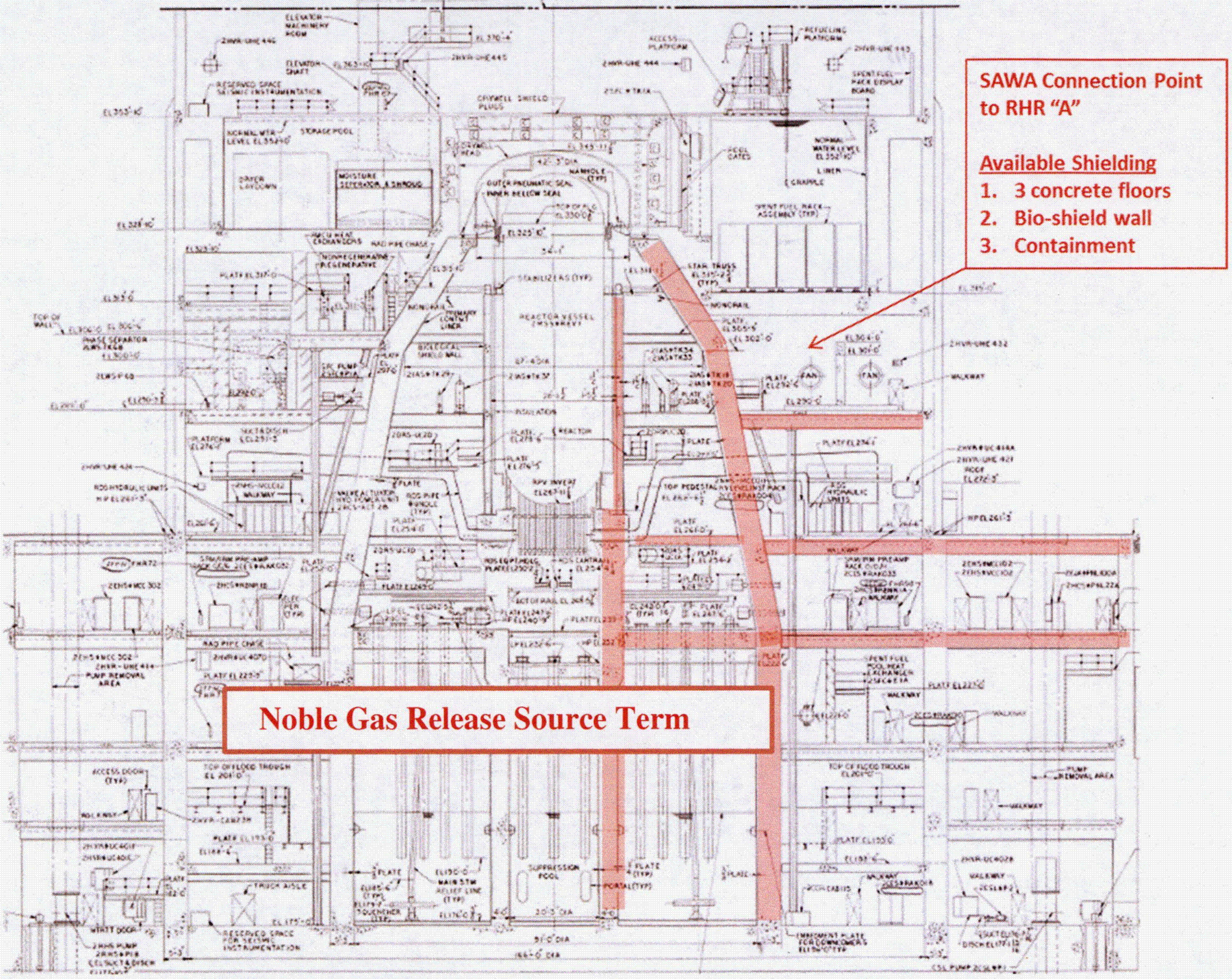
1. SAWA in-line flow meter
2. 200' of 3" hose
3. Local manual valve – Open
4. Power operated remote manual valve – Open
5. SAWA backflow prevention check valve - PCIV

NOTE ON FITTINGS
NH = NHS = Threaded fitting sealed with gasket.
Typical fire hose connection
NPT = Threaded fitting where threads do the sealing.
Storz = Latching hose fitting

Sketch 3B: Site Layout, Ingress and Egress Pathways (SAWA)



Sketch 3C: Nine Mile Point Unit 2 Reactor Building Elevation View



Attachment 4: Failure Evaluation Table

Table 4A: Wetwell HCVS Failure Evaluation Table

Functional Failure Mode	Failure Cause	Alternate Action	Failure with Alternate Action Prevents Containment Venting?
Fail to Vent (Open) on Demand	Valves fail to open/close due to loss of normal AC power/DC batteries.	None required – system SOVs utilize dedicated 24-hour power supply.	No
	Valves fail to open/close due to depletion of dedicated power supply.	Recharge system with FLEX provided portable generators.	No
	Valves fail to open/close due to complete loss of power supplies.	Manually operate backup pneumatic supply/vent lines at remote panel.	No
	Valves fail to open/close due to loss of normal pneumatic supply.	No action needed. Valves are provided with dedicated motive force capable of 24-hour operation.	No
	Valves fail to open/close due to loss of alternate pneumatic supply (long term).	Replace bottles as needed and/or recharge with portable air compressors.	No
	Valve fails to open/close due to SOV failure.	Manually operate backup pneumatic supply/vent lines at remote panel.	No
Fail to stop venting (Close) on demand	Not credible as there is not a common mode failure that would prevent the closure of at least 1 of the 3 valves needed for venting.	N/A	No
Spurious Opening	Not credible as key-locked switches prevent mispositioning of the HCVS PCIVs.	N/A	No
Spurious Closure	Valves fail to remain open due to depletion of dedicated power supply.	Recharge system with FLEX provided portable generators.	No
	Valves fail to remain open due to complete loss of power supplies.	Manually operate backup pneumatic supply/vent lines at remote panel.	No
	Valves fail to remain open due to loss of alternate pneumatic supply (long term).	Replace bottles as needed and/or recharge with portable air compressors.	No

Attachment 5: References

1. Overall Integrated Plan for Mitigation Strategies for Beyond-Design-Basis External Events, dated February 28, 2013 (ML13066A171) for Nine Mile Point Unit #2
2. Generic Letter 89-16, Installation of a Hardened Wetwell Vent, dated September 1, 1989
3. Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated March 12, 2012
4. Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated June 6, 2013
5. JLD-ISG-2012-01, Compliance with Order EA-12-049, Mitigation Strategies for Beyond-Design-Basis External Events, dated August 29, 2012
6. JLD-ISG-2013-02, Compliance with Order EA-13-109, Severe Accident Reliable Hardened Containment Vents, dated November 14, 2013
7. 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
8. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, dated August 2012
9. NEI 13-02, Industry Guidance for Compliance with Order EA–13–109, Revision 1, Dated April 2015
10. NEI 13-06, Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents and Events, Revision 0, dated March 2014
11. NEI 14-01, Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents, Revision 0, dated March 2014
12. NEI HCVS-FAQ-01, HCVS Primary Controls and Alternate Controls and Monitoring Locations
13. NEI HCVS-FAQ-02, HCVS Dedicated Equipment
14. NEI HCVS-FAQ-03, HCVS Alternate Control Operating Mechanisms
15. NEI HCVS-FAQ-04, HCVS Release Point
16. NEI HCVS-FAQ-05, HCVS Control and 'Boundary Valves'
17. NEI HCVS-FAQ-06, FLEX Assumptions/HCVS Generic Assumptions
18. NEI HCVS-FAQ-07, Consideration of Release from Spent Fuel Pool Anomalies
19. NEI HCVS-FAQ-08, HCVS Instrument Qualifications
20. NEI FHCVS-AQ-09, Use of Toolbox Actions for Personnel
21. NEI White Paper HCVS-WP-01, HCVS Dedicated Power and Motive Force
22. NEI White Paper HCVS-WP-02, HCVS Cyclic Operations Approach
23. NEI White Paper HCVS-WP-03, Hydrogen/CO Control Measures
24. 2015-01099, RCIC Equipment Survivability Review
25. NUREG/CR-7110, Rev. 1, State-of-the-Art Reactor Consequence Analysis Project, Volume 1: Peach Bottom Integrated Analysis
26. 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
27. NMP2 USAR, Rev. 20, Updated Safety Analysis Report
28. IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
29. FLEX MAAP Endorsement ML13190A201
30. N2-2014-003, MAAP 4.0.6 Analysis of Nine Mile Point Unit 2 Loss of All AC Power Scenario
31. JLD-ISG-2015-01, Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions, dated April 2015
32. NEI White Paper HCVS-WP-04, Missile Evaluation for HCVS Components 30 Feet Above Grade, Revision 0, dated August 17, 2015
33. NEI HCVS-FAQ-10, Severe Accident Multiple Unit Response
34. NEI HCVS-FAQ-11, Plant Response During a Severe Accident
35. NEI HCVS-FAQ-12, Radiological Evaluations on Plant Actions Prior to HCVS Initial Use
36. NEI HCVS-FAQ-13, Severe Accident Venting Actions Validation
37. N2-MISC-003, MAAP Analysis to Support SAWA Strategy

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

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

Attachment 7: List of Overall Integrated Plan Open Items

Phase 1 Open Item	Action	Status
1	Perform final sizing evaluation for HCVS batteries and battery charger and include in FLEX DG loading calculation.	Deleted (closed to ISE open item number 8 below)
2	Perform final vent capacity calculation for the HCVS piping confirming 1% minimum capacity.	Deleted (closed to ISE open item number 3 below)
3	Perform final sizing evaluation for pneumatic Nitrogen (N2) supply.	Deleted (closed to ISE open item number 9 below)
4	Perform seismic evaluation of Reactor Building Track Bay.	Deleted (closed to ISE open item number 2 below)
5	State which approach or combination of approaches the plant determines is necessary to address the control of combustible gases downstream of the HCVS control valve.	Deleted (closed to ISE open item number 4 below)
6	Complete evaluation for environmental/seismic qualification of HCVS components.	Deleted (closed to ISE open item numbers 10 and 12 below)
7	Confirm evaluation for environmental conditions and confirm travel path accessibility.	Deleted (closed to ISE open item number 7 below)
8	Perform final environmental evaluation of ROS location.	Deleted (closed to ISE open item number 7 below)
9	Perform radiological evaluation for Phase 1vent line impact on ERO response actions.	Not Started
Phase 1 ISE Open Item	**Action**	**Status**
1	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Started. The HCVS external piping meets the reasonable protection requirements of HCVS-WP-04.
2	Make available for NRC staff review documentation of a determination of seismic adequacy for the ROS location in the Reactor Building Track Bay.	Complete. Per the NMP2 USAR Table 3.2-1 and Section 3.8.4.1.9, the Reactor Building Track Bay is a seismic, tornado protected structure. The C045 Series of calculations and EC-045 Series of drawings also indicate that the Track Bay/Standby Gas Treatment Building is a Safety Related, QA Cat I structure. In addition, the outer track bay doors are designed to withstand tornado missiles per door specification S208G.
3	Make available for NRC staff audit analyses demonstrating that	Started. Calculation A10.1-P-050 confirms the vent design has

	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.	the minimum required capacity. Reference 37 documents venting is not required before 3 hours.
4	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Complete. The December 2015 OIP update contains a more detailed description of how the design addresses hydrogen detonation and deflagration.
5	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.	Started.
6	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress in the reactor building or other buildings.	Complete. The December 2015 OIP update contains a more detailed description of the strategies for hydrogen control and migration.
7	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.	Started. The Design Consideration Summary of ECP-13-000087 contains an evaluation of the temperatures at the ROS. Calculation ES-289 evaluates the temperatures in the Reactor Building after an ELAP and is being revised for the inclusion of an operating HCVS vent line. Calculation H21C-114 is being revised to contain an evaluation of the radiological conditions at the ROS and diesel generator.
8	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Started. The battery sizing summary is contained within the Design Consideration Summary of ECP-13-00087 and is complete. An update to calculation EC-206 for impact of the HCVS batteries on the FLEX DG loading is working.
9	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	Complete. P&ID 061-D outlines the functional design of the pneumatic system. Calculation A10.1-P-051 determines the required amount of Nitrogen needed for the required number of vent cycles in a 24-hour period.
10	Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.	Started.
11	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to	Started. The December 2015 OIP update contains a more detailed description of I&C components, including qualification

	implement this order including qualification methods.	methods.
12	Make available for NRC staff audit the description 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.	Started.
13	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.	Started. The containment isolation valves are being replaced and designed to ensure they can open and shut against the Maximum Expected Differential Pressure (MEDP). Vendor calculations are complete. NMP calculations are working.

Phase 2 Open Item	**Action**	**Comment**
1	Perform radiological evaluation to determine feasibility of reactor building actions.	Not started
2		