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February 28, 2013
Serial: BSEP 13-0014

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

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Docket Nos. 50-325, 50-324
Overall Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Reliable Hardened Containment Vents (Order Number EA-12-050)

References:

1. NRC Order Number EA-12-050, *Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents*, dated March 12, 2012, ADAMS Accession Number ML12054A694
2. NRC Interim Staff Guidance JLD-ISG-2012-02, *Compliance with Order EA-12-050, Reliable Hardened Containment Vents*, Revision 0, dated August 29, 2012, ADAMS Accession Number ML12229A475
3. Letter from Michael J. Annacone (CP&L) to U.S. Nuclear Regulatory Commission, *Carolina Power & Light Company's Initial Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents (Order Number EA-12-050)*, dated October 29, 2012, ADAMS Accession Number ML12312A464

On March 12, 2012, the U.S. Nuclear Regulatory Commission issued Order EA-12-050 (Reference 1) to Carolina Power & Light Company (CP&L). Reference 1 was immediately effective and directs CP&L to have a reliable hardened containment vent to remove decay heat and maintain control of containment pressure within acceptable limits following events that result in loss of active containment heat removal capability or prolonged station blackout (SBO). Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 requires submission of a Hardened Containment Vent System (HCVS) Overall Integrated Plan by February 28, 2013. The interim staff guidance, which was issued August 29, 2012 (Reference 2), provides direction regarding the content of this Overall Integrated Plan. The purpose of this letter is to provide the Overall Integrated Plan for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2, in accordance with Section IV, Condition C.1, of Reference 1. This letter confirms CP&L has received Reference 2 and has an Overall Integrated Plan complying with the guidance for the purpose of ensuring the functionality of a reliable hardened vent to remove decay heat and control of containment pressure following events that result in loss of active containment heat removal capability or prolonged SBO, as described in Attachment 2 of Reference 1.

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Reference 2, Section 4.0 contains the specific reporting requirements for the Overall Integrated Plan. The information in the enclosure provides CP&L's Overall Integrated Plan in accordance with Section 4.0 of Reference 2.

For the purposes of compliance with Order EA-12-050, CP&L plans to use a wetwell vent. Independent of the requirements of Order EA-12-050, CP&L plans to install a drywell vent.

This document contains no regulatory commitments.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager – Regulatory Affairs, at (910) 457-2487.

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on February 28, 2013.

Sincerely,

Michael J. Annacone

Enclosure: Hardened Containment Vent System (HCVS) Overall Integrated Implementation Plan for the Brunswick Steam Electric Plant cc (with enclosure):

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Hardened Containment Vent System (HCVS) Overall Integrated Plan for the Brunswick Steam Electric Plant (BSEP)

BSEP HCVS Overall Integrated Plan

Table of Contents:

References:

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

2. NRC Order EA-12-049, *Order Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012

3. NRC Order EA-12-050, *Order Modifying Licenses With Regard to Reliable Hardened Containment Vents*, dated March 12, 2012

4. NRC Interim Staff Guidance (ISG) JLD-ISG-2012-02, *Compliance with Order EA-12-050, Reliable Hardened Containment Vents*, dated August 29, 2012

5. NRC Responses to Public Comments, Japan Lessons-Learned Project Directorate Interim Staff Guidance JLD-ISG-2012-02: Compliance with Order EA-12-050, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents, dated August 29, 2012, ADAMS Accession No. ML12229A477

6. NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, dated August 2012.

Section 1: System Description

ISG Criteria:

Licensees shall provide a complete description of the system, including important operational characteristics. The level of detail generally considered adequate is consistent with the level of detail contained in the licensee's Final Safety Analysis Report.

Response:

System Overview:

The Hardened Containment Vent System (HCVS) will be designed to mitigate loss-of-decay-heat removal by providing sufficient containment venting capability to limit containment pressurization and maintain core cooling capability. The vent is designed with sufficient capacity to accommodate decay heat input equivalent to 1 percent of the current licensed thermal power (CLTP) of 2923 MWt. Thus, the hardened vent capacity will be adequate to relieve decay heat for a prolonged station blackout (SBO) event. The HCVS is intended for use as one element of core damage prevention strategies

The HCVS flow path from the containment to an elevated release point is shown in the simplified diagram below. No ductwork will be used in the flow path.

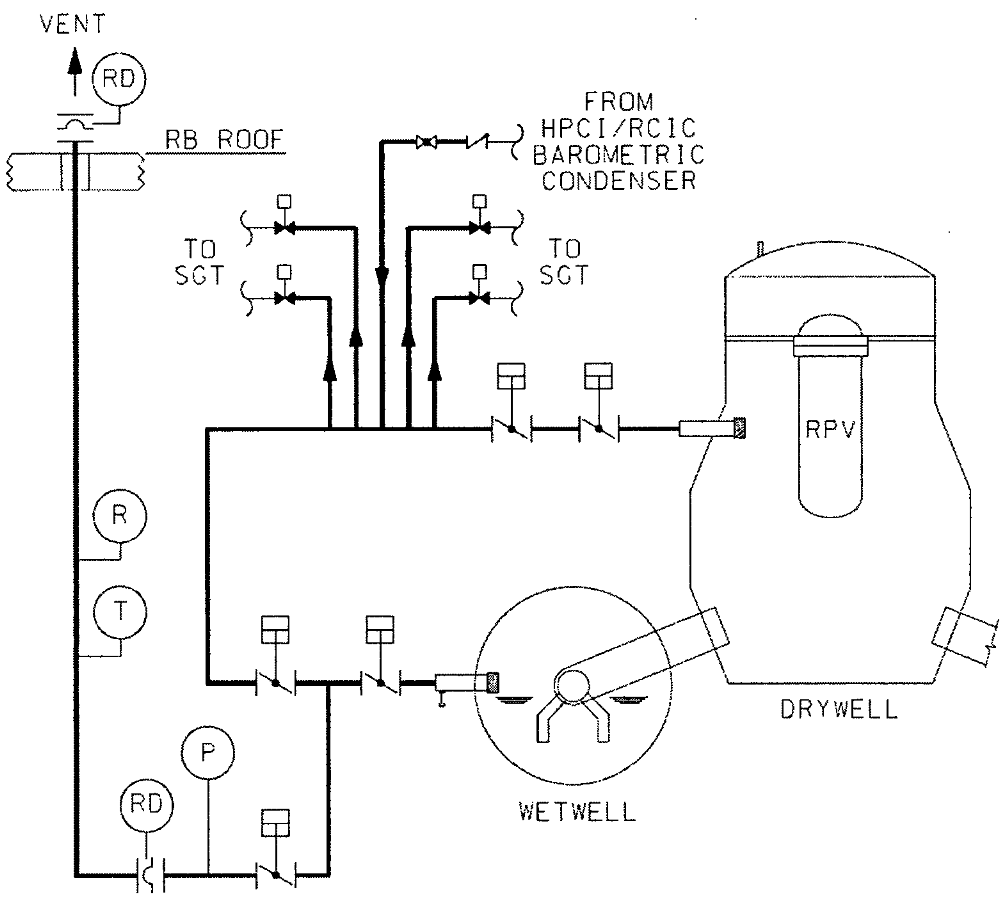


Figure 1.
Simplified Vent Line Connections to Wetwell and Other Systems

Equipment and components:

The following equipment and components will be provided:

i. HCVS Mechanical Components –
   a) Containment isolation piping, valves and, controls - The HCVS vent piping and supports up to and including the second containment isolation are designed in accordance with existing design bases. Containment Isolation Valves (CIVs) are provided consistent with the plant's containment isolation valve design basis. The valves are air-operated valves (AOVs), which are operated by an AC-powered solenoid valve (SOV), and will be able to be operated from switches in the Main Control Room (MCR).
   b) Other system valves and piping - The HCVS piping and supports downstream of the second containment isolation valve, including valve actuator pneumatic supply components, will be designed/analyzed to conform to the requirements consistent with the applicable design codes for the plant and to ensure functionality following a design basis seismic event.
   c) Interface valves provide positive isolation to the interconnected systems. The HCVS shares part of its drywell flow path with the Containment Atmospheric Control (CAC) and Standby Gas Treatment (SGT) Systems. Prior to initiating the HCVS drywell flow path, four valves to the SGT and one High Pressure Coolant Injection (HPCI) line from the HPCI/Reactor Core Isolation Cooling (RCIC) barometric condensers must be isolated. However, since no power will be available, local manual operator action will be required to close/confirm closed these valves/line prior to drywell venting.
   d) Rupture disks of 55 psig and 5 psig capability are provided in the vent line downstream of the CIVs to prevent inadvertent opening of the vent line during a design basis loss-of-coolant accident (DBLOCA). The 55 psig disk was selected to burst at a pressure higher than the worst case DBLOCA containment pressure. The 5 psig disk is located at the discharge end of the vent and was installed to prevent intrusion of precipitation/debris into the vent line. The rupture disks will be able to be intentionally breached from the MCR as directed by applicable procedures.

ii. Instrumentation to monitor the status of the HCVS –
   a) Instrumentation indications for vent path pressure, temperature, and radiation will be available in the MCR.
   b) The effluent radiation monitor is located adjacent to the vent line.
   c) HCVS vent flow path valves position indication, temperature, and pressure instrumentation will monitor the status of the HCVS to enable the operator verification of proper venting operation. A failure of the position indication instrumentation will not prevent opening and closing the valve. Bus voltage and Backup Nitrogen System pressure status will be provided in the MCR.

iii. Support systems –
   a) Normal power for the HCVS valve solenoids is provided from the Emergency Bus (E-bus) AC power system.
   b) Back-up power will be provided from a permanently installed uninterruptible power supply (UPS) power source for at least 24 hours.
   c) Motive air/gas supply for HCVS operation will be provided from the Backup Nitrogen system and will be adequate for at least the initial 24 hours during operation under prolonged SBO conditions.

d) FLEX equipment will provide back-up support equipment (electrical and pneumatic) for reliable HCVS operation after the initial 24 hours.

System control:

i. Active: The HCVS valves will be operated in accordance with site procedures to control containment pressure. The HCVS will be designed for a minimum of five open/close cycles for the initial 24 hours of the event. Separate key lock control switches will control the bypass of containment isolation signals to allow operation of the HCVS. It is anticipated that controlled venting at lower than containment design pressures will be permitted in the revised Boiling Water Reactor Owners' Group (BWROG) Emergency Procedure and Severe Accident Guidelines Revision 3. A rupture disk will be provided in the vent line downstream of the outboard CIV. The rupture disk will be able to be intentionally breached from the MCR, as directed by applicable procedures, to initiate venting at lower than containment design pressures.

ii. Passive: Inadvertent actuation protection will be provided by multiple and diverse barriers. A rupture disk will be provided in the vent line downstream of the outboard CIV. The rupture disk setpoint was selected to be greater than the highest DBLOCA containment pressure. A key lock control switch will be utilized on the solenoid valve controlling the breaching of the rupture disk to prevent inadvertent actuation. The CIVs must be open to permit vent flow. Separate key lock control switches will be utilized to control the bypass of containment isolation signals to allow operation of these valves as part of the HCVS.

Section 2: Design Objectives

Order EA-12-050 Requirement 1.1.1:

The HCVS shall be designed to minimize the reliance on operator actions.

ISG 1.1.1 Criteria:

During events that significantly challenge plant operations, individual operators are more prone to human error. In addition, the plant operations staff may be required to implement strategies and/or take many concurrent actions that further places a burden on its personnel. During the prolonged SBO condition at the Fukushima Dai-ichi units, operators faced many significant challenges while attempting to restore numerous plant systems that were necessary to cool the reactor core, including the containment venting systems. The difficulties faced by the operators related to the location of the HCVS valves, ambient temperatures and radiological conditions, loss of all alternating current electrical power, loss of motive force to open the vent valves, and exhausting dc battery power. The NRC staff recognizes that operator actions will be needed to operate the HCVS valves; however, the licensees shall consider design features for the system that will minimize the need and reliance on operator actions to the extent possible during a variety of plant conditions, as further discussed in this ISG.

The HCVS shall be designed to be operated from a control panel located in the main control room or a remote but readily accessible location. The HCVS shall be designed to be fully functional and self sufficient with permanently installed equipment in the plant, without the need for portable equipment or connecting thereto, until such time that additional on-site or off-site personnel and portable equipment become available. The HCVS shall be capable of operating in this mode (i.e., relying on permanently installed equipment) for at least 24 hours during the prolonged SBO, unless a shorter period is justified by the licensee. The HCVS operation in this mode depends on a variety of conditions, such as the cause for the SBO (e.g., seismic event, flood, tornado, high winds), severity of the event, and time required for additional help to reach the plant, move portable equipment into place, and make connections to the HCVS.

When evaluating licensee justification for periods less than 24 hours, the NRC staff will consider the number of actions and the cumulative demand on personnel resources that are needed to maintain HCVS functionality (e.g., installation of portable equipment during the first 24 hours to restore power to the HCVS controls and/or instrumentation) as a result of design limitations. For example, the use of supplemental portable power sources may be acceptable if the supplemental power was readily available, could be quickly and easily moved into place, and installed through the use of pre-engineered quick disconnects, and the necessary human actions were identified along with the time needed to complete those actions. Conversely, supplemental power sources located in an unattended warehouse that require a qualified electrician to temporarily wire into the panel would not be considered acceptable by the staff because its installation requires a series of complex, time-consuming actions in order to achieve a successful outcome. There are similar examples that could apply to mechanical systems, such as pneumatic/compressed air systems.

Response (ISG Item 1.1.1):

The operation of the HCVS will be designed to minimize the reliance on operator actions in response to hazards identified in NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*. Operator actions are required to isolate the HCVS boundary, as described in Section 1.i.c. This is a one-time operation and it is expected to be performed early in the event, before temperature and radiological conditions become adverse. All other operations will be controlled from the MCR. The operator actions required to open a vent path are:

Operator Actions Necessary to Vent the Containment during a Prolonged SBO	
These actions will align the system for venting the Wetwell.	
Vent containment with containment pressure **above** the rupture disc rupture pressure	Vent containment with containment pressure **below** the rupture disc rupture pressure
1. Transfer HCVS electrical loads to the backup UPS power source via transfer switch.	1. Transfer HCVS electrical loads to the backup UPS power source via transfer switch.
2. Locally close/verify closed the HCVS boundary valves.[1]	2. Locally close/verify closed the HCVS boundary valves.[1]
3. Open inboard wetwell purge exhaust CIV from MCR.	3. Open valve to pressurize area between rupture disc and closed valve from MCR.
4. Open hardened vent CIV from MCR.	4. Shut valve to pressurize area between rupture disc and closed valve from MCR.
	5. Open inboard wetwell purge exhaust Containment Isolation Valve from MCR.
	6. Open hardened vent CIV from MCR.

[1] These steps are not necessary for wetwell venting, but are actions taken early to support any needed transition to drywell venting.

Operator Actions Necessary to Vent the Containment during a Prolonged SBO	
These Actions will Transition from Wetwell to Drywell Venting.	
1. Close hardened vent CIV from MCR.	1. Close hardened vent CIV from MCR.
2. Close inboard wetwell purge exhaust CIV from MCR.	2. Close inboard wetwell purge exhaust CIV from MCR.
3. Open inboard drywell purge exhaust CIV from MCR.	3. Open inboard drywell purge exhaust CIV from MCR.
4. Open outboard drywell purge exhaust CIV from MCR.	4. Open outboard drywell purge exhaust CIV from MCR.
5. Open outboard wetwell purge exhaust CIV from MCR.	5. Open outboard wetwell purge exhaust CIV from MCR.
6. Open hardened vent CIV from MCR.	6. Open hardened vent CIV from MCR.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the MCR. This location minimizes plant operators' exposure to adverse temperature and radiological conditions and is protected from hazards assumed in NEI 12-06.

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

After 24 hours, available personnel will be able to connect supplemental electrical power and motive air/gas to the HCVS. Connections for supplementing electrical power and motive air/gas required for HCVS will be located in accessible areas with reasonable protection, per NEI 12-06, that minimize personnel exposure to adverse conditions following a prolonged SBO and venting. Connections will be pre-engineered quick disconnects to minimize manpower resources.

Order EA-12-050 Requirement 1.1.2:

The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system.

ISG 1.1.2 Criteria:

During a prolonged SBO, the drywell, wetwell (torus), and nearby areas in the plant where HCVS components are expected to be located will likely experience an excursion in temperatures due to inadequate containment cooling combined with loss of normal and emergency building ventilation systems. In addition, installed normal and emergency lighting in the plant may not be available. Licensees should take into consideration plant conditions expected to be experienced during applicable beyond design basis external events when locating valves, instrument air supplies, and other components that will be required to safely operate the HCVS system. Components required for manual operation should be placed in areas that are readily accessible to plant operators, and not require additional actions, such as the installation of ladders or temporary scaffolding, to operate the system.

When developing a design strategy, the NRC staff expects licensees to analyze potential plant conditions and use its acquired knowledge of these areas, in terms of how temperatures would react to extended SBO conditions and the lighting that would be available during beyond design basis external events. This *knowledge also provides an input to system operating procedures, training, the choice of protective clothing, required tools and equipment, and portable lighting.*

Response (ISG Item 1.1.2):

To transition from venting the wetwell to drywell venting, initial operator actions are required to isolate the HCVS flow path boundary, as described in Section 1.i.c, located on the west side of 50 foot elevation of the reactor building and in the south core spray room. This is a one-time operation and it is planned to be done early in the event, before temperature and radiological conditions become adverse. Other operations will be controlled from the MCR. In order to access these valve locations, permanent access platforms will be installed to permit access to these valves.

The HCVS design allows initiating, and then operating and monitoring, the HCVS from the MCR, which minimizes plant operators' exposure to adverse temperature and radiological conditions. The MCR is protected from hazards assumed in NEI 12-06.

In order to minimize operator exposure to temperature excursions due to the impact of the prolonged SBO (i.e., loss of normal and emergency building ventilation systems and/or containment temperature changes), once venting has been initiated, procedures will not require access to suppression pool (wetwell) or drywell purge exhaust penetration areas and exposure to extreme occupational hazards for normal and backup operation of electrical and pneumatic systems.

Connections for supplemental equipment needed for sustained operation will be located in accessible areas protected from severe natural phenomena and which will minimize exposure to occupational hazards. Tools required for sustained operation, such as portable headlamps or lighting alternatives like flashlights or portable lights, and connection specific tooling, will be pre-staged in the NEI 12-06 storage locations.

Neither temporary ladders nor scaffold are required to access these connections or storage locations.

Order EA-12-050 Requirement 1.1.3:

The HCVS shall also be designed to minimize radiological consequences that would impede personnel actions needed for event response.

ISG 1.1.3 Criteria:

The design of the HCVS should take into consideration the radiological consequences resulting from the event that could negatively impact event response. During the Fukushima event, personnel actions to manually operate the vent valves were impeded due to the location of the valves in the torus rooms. The HCVS shall be designed to be placed in operation by operator actions at a control panel, located in the main control room or in a remote location. The system shall be designed to function in this mode with permanently installed equipment providing electrical power (e.g., dc power batteries) and valve motive force (e.g., N2/air cylinders). The system shall be designed to function in this mode for a minimum duration of 24 hours with no operator actions required or credited, other than the system initiating actions at the control panel. Durations of less than 24 hours will be considered if justified by adequate supporting information from the licensee. To ensure continued operation of the HCVS beyond 24 hours, licensees may credit manual actions, such as moving portable equipment to supplement electrical power and valve motive power sources.

In response to Generic Letter (GL) 89-16, a number of facilities with Mark I containments installed vent valves in the torus room, near the drywell, or both. Licensees can continue to use these venting locations or *select new locations, provided the requirements of this guidance document are satisfied. The HCVS improves the chances of core cooling by removing heat from containment and lowering containment pressure, when core cooling is provided by other systems. If core cooling were to fail and result in the onset core damage, closure of the vent valves may become necessary if the system was not designed for severe accident service . In addition, leakage from the HCVS within the plant and the location of the external release from the HCVS could impact the event response from on-site operators and off-site help arriving at the plant. An adequate strategy to minimize radiological consequences that could impede personnel actions should include the following:*

1. Licensees shall provide permanent radiation shielding where necessary to facilitate personnel access to valves and allow manual operation of the valves locally. Licensee may use alternatives such as providing features to facilitate manual operation of valves from remote locations, as discussed further in this guidance under Requirement 1.2.2, or relocate the vent valves to areas that are significantly less challenging to operator access/actions.

2. In accordance with Requirement 1.2.8, the HCVS shall be designed for pressures that are consistent with the higher of the primary containment design pressure and the primary containment pressure limit (PCPL), as well as including dynamic loading resulting from system actuation. In addition, the system shall be leak-tight. As such, ventilation duct work (i.e., sheet metal) shall not be utilized in the design of the HCVS. Licensees should perform appropriate testing, such as hydrostatic or pneumatic testing, to establish the leak-tightness of the HCVS.

3. The HCVS release to outside atmosphere shall be at an elevation higher than adjacent plant structures. Release through existing plant stacks is considered acceptable, provided the guidance under Requirement 1.2.6 is satisfied. If the release from HCVS is through a vent stack different than the plant stack, the elevation of the stack should be higher than the nearest building or structure.

Response (ISG Item 1.1.3):

The HCVS will be designed for reliable remote-manual operation. Once venting has been initiated, operators will not be required to access the suppression pool area or the drywell purge exhaust penetration area. Local access to areas required to secure HCVS boundary valves, as described in Section 1.i.c above, will be done early in the event, before temperature and radiological conditions become adverse. The HCVS will be designed to minimize system cross flow, prevent steam flow into unintended areas, provide containment isolation, and provide reliable and rugged performance as discussed below for Order Requirements 1.2.6.

Dose rates will be evaluated consistent with the assumption that the HCVS is to be used for the prevention of core damage. Shielding or other alternatives to facilitate manual actions are not required for operation of the vent under these conditions since no core damage has occurred.

The HCVS release point is at the reactor building roof, an elevation higher than adjacent plant structures.

Section 3: Operational Characteristics

Order EA-12-050 Requirement 1.2.1:

The HCVS shall have the capacity to vent the steam/energy equivalent of 1 percent of licensed/rated thermal power (unless a lower value is justified by analyses), and be able to maintain containment pressure below the primary containment design pressure.

ISG 1.2.1 Criteria:

Beyond design basis external events such as a prolonged SBO could result in the loss of active containment heat removal capability. The primary design objective of the HCVS is to provide sufficient venting capacity to prevent a long-term overpressure failure of the containment by keeping the containment pressure below *the primary containment design pressure and the PCPL. The PCPL may be dictated by other factors, such as the maximum containment pressure at which the safety relief valves (SRVs) and the HCVS valves can be opened and closed.*

The NRC staff has determined that, for a vent sized under conditions of constant heat input at a rate equal to 1 percent of rated thermal power and containment pressure equal to the lower of the primary containment design pressure and the PCPL, the exhaust-flow through the vent would be sufficient to prevent the containment pressure from increasing. This determination is based on studies that have shown that the torus suppression capacity is typically sufficient to absorb the decay heat generated during at least the first three hours following the shutdown of the reactor with suppression pool as the source of injection, that decay heat is typically less than 1 percent of rated thermal power three hours following shutdown of the reactor, and that decay heat continues to decrease to well under 1 percent, thereafter. Licensees shall have an auditable engineering basis for the decay heat absorbing capacity of their suppression pools, selection of venting pressure such that the HCVS will have sufficient venting capacity under such conditions to maintain containment pressure at or below the primary containment design pressure and the PCPL. If required, venting capacity shall be increased to an appropriate level commensurate with the licensee's venting strategy. Licensees may also use a venting capacity sized under conditions of constant heat input at a rate lower than 1 percent of thermal power if it can be justified by analysis that primary containment design pressure and the PCPL would not be exceeded. In cases where plants were granted, have applied, or plan to apply for power uprates, the licensees shall use 1 percent thermal power corresponding to the uprated thermal power. The basis for the venting capacity shall give appropriate consideration of where venting is being performed from (i.e., wetwell or drywell) and the difference in pressure between the drywell and the suppression chamber. Vent sizing for multi-unit sites must take into consideration simultaneous venting from all the units, and ensure that venting on one unit does not negatively impact the ability to vent on the other units.

<u>Response (ISG Item 1.2.1)</u>:

The HCVS wetwell and drywell paths will be designed for venting steam/energy at a nominal capacity of 1 percent of 2923 MWt thermal power at pressure of 62 psig. This pressure is the lower of the containment design pressure and the PCPL value.

The 1 percent value assumes that the suppression pool pressure suppression capacity is sufficient to absorb the decay heat generated during the initial 3 hours. The vent would then be able to prevent containment pressure from increasing above the containment design pressure. As part of the detailed design, the duration of suppression pool decay heat absorption will be confirmed.

<u>Order EA-12-050 Requirement 1.2.2</u>:

The HCVS shall be accessible to plant operators and be capable of remote operation and control, or manual operation, during sustained operations.

<u>ISG 1.2.2 Criteria</u>:

The preferred location for remote operation and control of the HCVS is from the main control room. However, alternate locations to the control room are also acceptable, provided the licensees take into consideration the following:

1. *Sustained operations mean the ability to open/close the valves multiple times during the event. Licensees shall determine the number of open/close cycles necessary during the first 24 hours of operation and provide supporting basis consistent with the plant-specific containment venting strategy.*

2. *An assessment of temperature and radiological conditions that operating personnel may encounter both in transit and locally at the controls. Licensee may use alternatives such as providing features to facilitate manual operation of valves from remote locations or relocating/reorienting the valves.*

3. *All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during a prolonged SBO (electric power, N2/air) shall be located above the maximum design basis external flood level or protected from the design basis external flood.*

4. *During a prolonged SBO, manual operation/action may become necessary to operate the HCVS. As demonstrated during the Fukushima event, the valves lost motive force including electric power and pneumatic air supply to the valve operators, and control power to solenoid valves. If direct access and local operation of the valves is not feasible due to temperature or radiological hazards, licensees should include design features to facilitate remote manual operation of the HCVS valves by means such as reach rods, chain links, hand wheels, and portable equipment to provide motive force (e.g., air/N2 bottles, diesel powered compressors, and dc batteries). The connections between the valves and portable equipment should be designed for quick deployment. If a portable motive force (e.g., air or N2 bottles, dc power supplies) is used in the design strategy, licensees shall provide reasonable protection of that equipment consistent with the staff's guidance delineated in JLD-ISG-2012-01 for Order EA-12-049.*

5. *The design shall preclude the need for operators to move temporary ladders or operate from atop scaffolding to access the HCVS valves or remote operating locations.*

<u>Response (ISG Item 1.2.2)</u>:

The HCVS design allows initiating and then operating and monitoring the HCVS from the MCR following the local closure of the HCVS Drywell flow path boundary valves as described in response to Section 1.1.2. This location is also protected from adverse natural phenomena.

1. Following closure of boundary valves to establish the HCVS Drywell vent path, the HCVS flow path will be established using air-operated valves (AOV) with air-to-open and spring-to-shut. Opening the valves will require energizing an AC powered solenoid operated valve and providing motive air/gas. The detailed design will provide a permanently installed power source for the SOVs from the station 24/48 volt batteries via new inverters, and motive air/gas supply to the air-operated valves from the backup nitrogen system. The DC power supply to the AOVs will be adequate for the first 24 hours and will credit FLEX. BSEP compliance with NRC Order EA-12-049 (FLEX) will provide this capability. The initial stored motive air/gas will allow for at least five valve operating cycles. BSEP's evaluation for response to a prolonged SBO determined that only one HCVS actuation will be required in the first 24-hours, reference NRC Order EA-12-049 (FLEX). Once the vent is opened, it will remain open. Each of the valves that must be opened will be provided with one SOV that will be energized by back-up AC power through inverters connected to the station 24/48 volt battery power supply. The SOVs are the only electrical components required for valve operability that are located inside the area considered not-accessible following a prolonged SBO. The AOVs do not require torque switches or limit switches for operation.

2. An assessment of temperature and radiological conditions that operating personnel may encounter both in transit and locally at the controls will be performed.

3. Permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during a prolonged SBO (electric power, air/gas), will be located in areas reasonably protected from defined hazards from NEI 12-06.

4. Valves required to open the flow path will be designed for remote manual operation following a prolonged SBO, with the exception of the SGT and HPCI valves discussed in Section Item 1.i.c., which will be manually closed early in the event and remain closed. No HCVS valves will require operation by handwheel, reach–rod or similar means that requires close proximity to the valve. Any supplemental connections will be pre-

engineered to minimize man-power resources and any needed portable equipment will be reasonably protected from defined hazards from NEI 12-06.

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

Order EA-12-050 Requirement 1.2.3:

The HCVS shall include a means to prevent inadvertent actuation.

ISG 1.2.3 Criteria:

The design of the HCVS shall incorporate features, such as control panel key-locked switches, locking systems, rupture discs, or administrative controls to prevent the inadvertent use of the vent valves. The system shall be designed to preclude inadvertent actuation of the HCVS due to any single active failure. The design should consider general guidelines such as single point vulnerability and spurious operations of any plant installed equipment associated with HCVS.

The objective of the HCVS is to provide sufficient venting of containment and prevent long-term overpressure failure of containment following the loss of active containment heat removal capability or prolonged SBO. However, inadvertent actuation of HCVS due to a design error, equipment malfunction, or operator error during a design basis loss-of-coolant accident (DBLOCA) could have an undesirable effect on the containment accident pressure (CAP) to provide adequate net positive suction head to the emergency core cooling system (ECCS) pumps. Therefore, prevention of inadvertent actuation, while important for all plants, is essential for plants relying on CAP. The licensee submittals on HCVS shall specifically include details on how this issue will be addressed on their individual plants for all situations when CAP credit is required.

Response (ISG Item 1.2.3):

The features that prevent inadvertent actuation will be provided by multiple and diverse barriers. A rupture disk will be provided in the vent line downstream of the outboard CIV. The rupture disk setpoint was selected to be greater than the highest DBLOCA containment pressure. The rupture disk will be able to be intentionally breached from the MCR, as directed by applicable procedures to initiate venting. A key lock control switch will be utilized on the solenoid valve controlling the breaching of the rupture disk to prevent inadvertent actuation. The CIVs must be open to permit vent flow. In addition, separate key lock control switches will be utilized to control the bypass of containment isolation signals to allow operation of these valves as part of the HCVS.

Operating procedures will 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, as described above, such that any credited CAP that would provide net positive suction head to the ECCS pumps will be available (i.e., inclusive of a DBLOCA).

Order EA-12-050 Requirement 1.2.4:

The HCVS shall include a means to monitor the status of the vent system (e.g., valve position indication) from the control room or other location(s). The monitoring system shall be designed for sustained operation during a prolonged SBO.

ISG 1.2.4 Criteria:

Plant operators must be able to readily monitor the status of the HCVS at all times, including being able to understand whether or not containment pressure/energy is being vented through the HCVS, and whether or not containment integrity has been restored following venting operations. Licensees shall provide a means to allow plant operators to readily determine, or have knowledge of, the following system parameters:

(1) HCVS vent valves' position (open or closed),

(2) system pressure, and

(3) effluent temperature.

Other important information includes the status of supporting systems, such as availability of electrical power and pneumatic supply pressure. Monitoring by means of permanently installed gauges that are at, or nearby, the HCVS control panel is acceptable. The staff will consider alternative approaches for system status instrumentation; however, licensees must provide sufficient information and justification for alternative approaches.

The means to monitor system status shall support sustained operations during a prolonged SBO, and be designed to operate under potentially harsh environmental conditions that would be expected following a loss of containment heat removal capability and SBO. Power supplies to all instruments, controls, and indications shall be from the same power sources supporting the HCVS operation. "Sustained operations" may include the use of portable equipment to provide an alternate source of power to components used to monitor HCVS status. Licensees shall demonstrate instrument reliability via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- *radiological conditions that the instruments may encounter under normal plant conditions, and during and after a prolonged SBO event.*
- *temperatures and pressure conditions as described under requirement 1.2.8, including dynamic loading from system operation.*
- *humidity based on instrument location and effluent conditions in the HCVS.*

Response (ISG Item 1.2.4):

The design of the HCVS will have temperature and pressure monitoring downstream of the last isolation valve. HCVS valves will have open and closed position indication. These HCVS indications will be at or near the same location as the valve control switches, which is the MCR. Motive air/gas pressure and power source voltage will be monitored.

Power for the instrumentation will be from the same source used for valve manipulations. Refer to the response to ISG Item 1.2.2 for discussion on the power.

The approximate range for the temperature indication will be 50°F to 600°F. The approximate range for the pressure indication will be 0 psig to 120 psig. The upper limits are approximately twice the required design containment temperature and pressure. The ranges will be finalized when the detailed design and equipment specifications are prepared.

The detailed design will address the radiological, temperature, pressure, flow-induced vibration (i.e., if applicable) and internal piping dynamic forces, humidity/condensation, and seismic qualification requirements. Assumed radiological conditions are those expected after a prolonged SBO (i.e., without fuel failure), which will bound normal plant conditions.

Order EA-12-050 Requirement 1.2.5:

The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication in the control room or other location(s), and shall be designed for sustained operation during a prolonged SBO.

ISG 1.2.5 Criteria:

Licensees shall provide an independent means to monitor overall radioactivity that may be released from the HCVS discharge. The radiation monitor does not need to meet the requirements of NUREG 0737 for monitored releases, nor does it need to be able monitor releases quantitatively to ensure compliance with Title 10 of the Code of Federal Regulations (10 CFR) Part 100 or 10 CFR Section 50.67. A wide-range monitoring system to monitor the overall activity in the release providing indication that effluent from the containment environment that is passing by the monitor is acceptable. The use of other existing radiation monitoring capability in lieu of an independent HCVS radiation monitor is not acceptable because plant operators need accurate information about releases coming from the containment via the HCVS in order to make informed decisions on operation of the reliable hardened venting system.

The monitoring system shall provide indication in the control room or a remote location (i.e., HCVS control panel) for the first 24 hours of an extended SBO with electric power provided by permanent DC battery sources, and supplemented by portable power sources for sustained operations. Monitoring radiation levels is required only during the events that necessitate operation of the HCVS. The reliability of the effluent monitoring system under the applicable environmental conditions shall be demonstrated by methods described under Requirement 1.2.4.

Response (ref. ISG Item 1.2.5):

The HCVS Radiation Monitoring System (RMS) will be dedicated to the HCVS. The approximate range of the RMS will be 10^{-4} to 10^{5}µCi/cc.

The detector will be physically mounted adjacent to the outside of the piping, accounting for the pipe wall thickness shielding in order to provide a measurement of the radiation level on the inside of the HCVS piping. The radiation level will be indicated at the MCR. The RMS will be powered from the same source as other powered HCVS components. Refer to response Section 1.0 (i.e., Item 1.iii.d) and the response to Section 2.0 (i.e., ISG 1.1.1 Criteria) for discussion on sustainability of the power.

Order EA-12-050 Requirement 1.2.6:

The HCVS shall include design features to minimize unintended cross flow of vented fluids within a unit and between units on the site.

ISG 1.2.6 Criteria:

At Fukushima, an explosion occurred in Unit 4, which was in a maintenance outage at the time of the event. Although the facts have not been fully established, a likely cause of the explosion in Unit 4 is that hydrogen leaked from Unit 3 to Unit 4 through a common venting system. System cross-connections present a potential for steam, hydrogen, and airborne radioactivity leakage to other areas of the plant and to adjacent units at multi-unit sites if the units are equipped with common vent piping. In this context, a design that is free of physical and control interfaces with other systems eliminates the potential for any cross-flow and is one way to satisfy this requirement. Regardless, system design shall provide design features to prevent the cross flow of vented fluids and migration to other areas within the plant or to adjacent units at multi-unit sites.

The current design of the hardened vent at several plants in the U.S. includes cross connections with the standby gas treatment system, which contains sheet metal ducts and filter and fan housings that are not as leak tight as hard pipes. In addition, dual unit plant sites are often equipped with a common plant stack. Examples of acceptable means for prevention of cross flow is by valves, leak-tight dampers, and check *valves, which shall be designed to automatically close upon the initiation of the HCVS and shall remain closed for as long as the HCVS is in operation. Licensee's shall evaluate the environmental conditions (e.g. pressure, temperature) at the damper locations during venting operations to ensure that the dampers will remain functional and sufficiently leak-tight, and if necessary, replace the dampers with other suitable equipment such as valves. If power is required for the interfacing valves to move to isolation position, it shall be from the same power sources as the vent valves. Leak tightness of any such barriers shall be periodically verified by testing as described under Requirement 1.2.7.*

Response (ISG Item 1.2.6):

The HCVS for Units 1 and 2 will be fully independent of each other. Therefore, the capacity at each unit will be independent of the status of the other unit.

The HCVS shares part of its flow path with the CAC and SGT Systems. Prior to initiating the HCVS, four valves to the SGT and one HPCI line from the HPCI/RCIC barometric condensers must be isolated. However, since no power will be available, local manual operator action will be required to close/confirm closed these valves. The detailed design will review the valves to determine if the inter-system valves can meet the required leakage criteria under the limiting HCVS design conditions. If required, the valves will be replaced or upgraded.

Order EA-12-050 Requirement 1.2.7:

The HCVS shall include features and provision for the operation, testing, inspection and maintenance adequate to ensure that reliable function and capability are maintained.

ISG 1.2.7 Criteria:

The HCVS piping run shall be designed to eliminate the potential for condensation accumulation, as subsequent water hammer could complicate system operation during intermittent venting or to withstand the potential for water hammer without compromising the functionality of the system. Licensees shall provide a means (e.g., drain valves, pressure and temperature gauge connections) to periodically test system components, including exercising (opening and closing) the vent valve(s). In situations where total elimination of condensation is not feasible, HCVS shall be designed to accommodate condensation, including applicable water hammer loads.

The HCVS outboard of the containment boundary shall be tested to ensure that vent flow is released to the outside with minimal leakage, if any, through the interfacing boundaries with other systems or units. Licensees have the option of individually leak testing interfacing valves or testing the overall leakage of the HCVS volume by conventional leak rate testing methods. The test volume shall envelope the HCVS between the outer primary containment isolation barrier and the vent exiting the plant buildings, including the volume up to the interfacing valves. The test pressure shall be based on the HCVS design pressure. Permissible leakage rates for the interfacing valves shall be within the requirements of American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code (ASME OM) – 2009, Subsection ISTC – 3630 (e) (2), or later edition of the ASME OM Code. When testing the HCVS volume, allowed leakage shall not exceed the sum of the interfacing valve leakages as determined from the ASME OM Code. The NRC staff will consider a higher leakage acceptance values if licensees provide acceptable justification. When reviewing such requests, the NRC staff will consider the impact of the leakage on the habitability of the rooms and areas within the building and operability of equipment in these areas during the event response and subsequent recovery periods. Licensees shall implement the following operation, testing and inspection requirements for the HCVS to ensure reliable operation of the system.

Testing and Inspection Requirements

Description	*Frequency*
Cycle the HCVS valves and the interfacing system valves not used to maintain containment integrity during operations.	*Once per year*
Perform visual inspections and a walkdown of HCVS components	*Once per operating cycle*
Test and calibrate the HCVS radiation monitors.	*Once per operating cycle*
Leak test the HCVS.	*(1) Prior to first declaring the system functional;* *(2) Once every five years 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 logic from its control panel and ensuring that all interfacing system valves move to their proper (intended) positions.	*Once per every other operating cycle*

Response (ISG Item 1.2.7):

The detailed design for the HCVS will address condensation accumulation resulting from intermittent venting. In situations where total elimination of condensation is not feasible, the HCVS will be designed to accommodate condensation, including allowance for applicable water hammer loads.

The HCVS Containment Isolation Valves will be tested in accordance with the licensing and design basis for the plant. The HCVS past the outboard CIV will be tested in conformance to one of the ISG methods. The test pressure shall be based on the HCVS design pressure, 70 psig. Permissible leakage rates for the interfacing valves will be within the requirements of American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code (ASME OM) – 2009, Subsection ISTC – 3630 (e) (2), or later edition of the ASME OM Code. When testing the HCVS volume, the allowed leakage will not exceed the sum of the interfacing valve leakages as determined from the ASME OM Code, unless a higher leakage acceptance value is justified to the NRC.

The test types and frequencies will conform to the ISG 1.2.7 Table "Testing and Inspection Requirements." Rupture disks will be replaced at manufacturer's recommendations, not to exceed 10 years, per the NRC Responses to Public Comments document.

Order EA-12-050 Requirement 1.2.8:

The HCVS shall be designed for pressures that are consistent with maximum containment design pressures, as well as, dynamic loading resulting from system actuation.

ISG 1.2.8 Criteria:

The vent system shall be designed for the higher of the primary containment design pressure or PCPL, and a saturation temperature corresponding to the HCVS design pressure. However, if the venting location is from the drywell, an additional margin of 50 °F shall be added to the design temperature because of the potential for superheated conditions in the drywell. The piping, valves, and the valve actuators shall be designed to withstand the dynamic loading resulting from the actuation of the system, including piping reaction loads from valve opening, concurrent hydrodynamic loads from SRV discharges to the suppression pool, and potential for water hammer from accumulation of steam condensation during multiple venting cycles.

Response (ISG Item 1.2.8):

The HCVS design pressure will be 70 psig and the design temperature will be 366°F. The HCVS design pressure is the higher of the containment design pressure and the PCPL value. The HCVS design temperature is the saturation temperature corresponding to the design pressure.

The piping, valves, and valve actuators will be designed to withstand the dynamic loading resulting from the actuation of the HCVS, including piping reaction loads from valve opening, concurrent hydrodynamic loads from SRV discharges to the suppression pool, and potential for water hammer from accumulation of condensation during multiple venting cycles.

Order EA-12-050 Requirement 1.2.9:

The HCVS shall discharge the effluent to a release point above main plant structures.

ISG 1.2.9 Criteria:

The HCVS release to outside atmosphere shall be at an elevation higher than adjacent plant structures. Release through existing plant stacks is considered acceptable, provided the guidance under Requirement 1.2.6 is satisfied. If the release from HCVS is through a stack different than the plant stack, the elevation of the stack should be higher than the nearest building or structure. The release point should be situated away from ventilation system intake and exhaust openings, and emergency response facilities. The release stack or structure exposed to outside shall be designed or protected to withstand missiles that could be generated by the external events causing the prolonged SBO (e.g., tornadoes, high winds).

Response (ISG Item 1.2.9):

The HCVS discharge path will be routed to a point above any adjacent structure. This discharge point will be just above that unit's reactor building roof such that the release point will vent away from ventilation system intake and exhaust openings, MCR location, location of FLEX, access routes required following a prolonged SBO, and emergency response facilities; however, these must be considered in conjunction with other design criteria (e.g., flow capacity) and pipe routing limitations, to the degree practical.

The detailed design will address missile protection from external events as defined by NEI 12-06 for the outside portions of the selected release structure.

Section 4: Applicable Quality Requirements

Order EA-12-050 Requirement 2.1:

The HCVS system design shall not preclude the containment isolation valves, including the vent valve from performing their intended containment isolation function consistent with the design basis for the plant.

These items include piping, piping supports, containment isolation valves, containment isolation valve actuators and containment isolation valve position indication components.

ISG 2.1 Criteria:

The HCVS vent path up to and including the second containment isolation barrier shall be designed consistent with the design basis of the plant. These items include piping, piping supports, containment isolation valves, containment isolation valve actuators and containment isolation valve position indication components. The HCVS design, out to and including the second containment isolation barrier, shall meet safety-related requirements consistent with the design basis of the plant. The staff notes that in response to GL 89-16, in many cases, the HCVS vent line connections were made to existing systems. In some cases, the connection was made in between two existing containment isolation valves and in others to the vacuum breaker line. The HCVS system design shall not preclude the containment isolation valves, including the vent valve from performing their intended containment isolation function consistent with the design basis for the plant. The design shall include all necessary overrides of containment isolation signals and other interface system signals to enable the vent valves to open upon initiation of the HCVS from its control panel

Response (ISG Item 2.1):

The HCVS vent path up to and including the second containment isolation piping and supports will be designed in accordance with existing design basis. The HCVS system design will not preclude the CIVs, including the vent valve from performing their intended containment isolation function consistent with the design basis for the plant. Associated actuators, position indication, and power supplies will be designed consistent with the design basis of the plant, in order to maintain their design basis function of maintaining the valves closed. The control circuit will allow operation of the HCVS from its control panel, regardless of containment isolation signals.

Order EA-12-050 Requirement 2.2:

All other HCVS components shall be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. These items include electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) components.

ISG 2.2 Criteria:

All components of the HCVS beyond the second containment isolation barrier shall be designed to ensure HCVS functionality following the plant's design basis seismic event. These components include, in addition to the hardened vent pipe, electric power supply, pneumatic supply and instrumentation. The design of power and pneumatic supply lines between the HCVS valves and remote locations (if portable sources were to be employed) shall also be designed to ensure HCVS functionality. Licensees shall ensure that the HCVS will not impact other safety-related structures and components and that the HCVS will not be impacted by non-seismic components. The staff prefers that the HCVS components, including the piping run, be located in seismically qualified structures. However, short runs of HCVS piping in non-seismic structures are acceptable if the licensee provides adequate justification on the seismic ruggedness of these structures. The hardened vent shall be designed to conform to the requirements consistent with the applicable design codes for the plant, such as the American Society of Mechanical Engineers Boiler and Pressure Vessel Code and the applicable Specifications, Codes and Standards of the American Institute of Steel Construction.

To ensure the functionality of instruments following a seismic event, the NRC staff considers any of the following as acceptable methods:

- *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.*

Response (ISG Item 2.2):

The HCVS components downstream of the outboard containment isolation valve and components that interface with the HCVS will be routed in seismically qualified structures or supported from seismically qualified structure.

The HCVS downstream of the outboard CIV, including piping and supports, electrical power supply, valve actuator pneumatic supply, and instrumentation (local and remote) components, will be designed/analyzed to conform to the requirements consistent with the applicable design codes for the plant and to ensure functionality following a design basis seismic event.

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

1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO9001) where the procurement specifications include the applicable seismic requirements, design requirements, and applicable testing.

2. Demonstration of seismic reliability via methods that predict performance described in IEEE 344-2004

3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

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

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

Section 5: Procedures and Training

Order EA-12-050 Requirement 3.1:

Licensees shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during SBO conditions.

ISG 3.1 Criteria:

Procedures shall be developed describing when and how to place the HCVS in operation, the location of system components, instrumentation available, normal and backup power supplies, directions for sustained operation, including the storage location of portable equipment, training on operating the portable equipment, and testing of equipment. The procedures shall identify appropriate conditions and criteria for use of the HCVS. The procedures shall clearly state the nexus between CAP and ECCS pumps during a DBLOCA and how an inadvertent opening of the vent valve could have an adverse impact on this nexus. The HCVS procedures shall be developed and implemented in the same manner as other plant procedures necessary to support the execution of the Emergency Operating Procedures (EOPs).

Licensees shall establish provisions for out-of-service requirements of the HCVS and compensatory measures. These provisions shall be documented in the Technical Requirements Manual (TRM) or similar document. The allowed unavailability time for the HCVS shall not exceed 30 days during modes 1, 2, and 3. If the unavailability time exceeds 30 days, the TRM shall direct licensees to perform a cause assessment and take the necessary actions to restore HCVS availability in a timely manner, consistent with plant procedures and prevent future unavailability for similar causes.

Response (ISG Item 3.1):

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

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

- appropriate conditions and criteria for use of the HCVS
- when and how to place the HCVS in operation,
- the location of system components,
- instrumentation available,
- normal and backup power supplies,
- directions for sustained operation, reference NEI 12-06, including the storage location of portable equipment,
- training on operating the portable equipment, and
- testing of portable equipment

The procedures will state the impact on the ECCS pumps net positive suction head (i.e., loss of CAP) during a DBLOCA due to an inadvertent opening of the vent.

Provisions will be established for out-of-service requirements of the HCVS and compensatory measures. The following provisions will be documented in the Technical Requirements Manual (TRM) or other controlled document.

- The allowed unavailability time for the HCVS shall not exceed 30 days during Modes 1, 2, and 3.
- If the unavailability time exceeds 30 days

- The condition will be entered into the Corrective Action Program and
- The HCVS availability will be restored in a manner consistent with plant procedures.

Order EA-12-050 Requirement 3.2:

Licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during SBO conditions.

ISG 3.2 Criteria:

All personnel expected to operate the HCVS shall receive training in the use of plant procedures developed for system operations when normal and backup power is available, and during SBO conditions consistent with the plants systematic approach to training. The training shall be refreshed on a periodic basis and as any changes occur to the HCVS.

Response (ISG Item 3.2):

Personnel expected to perform direct execution of the HCVS will receive necessary training in the use of plant procedures for system operations when normal and backup power is available and during prolonged SBO conditions. The training will be refreshed on a periodic basis, and as any changes occur to the HCVS. The training will utilize the Systems Approach to Training (SAT).

In addition, per NEI 12-06, any non-trained personnel on-site will be available to supplement trained personnel.

Section 6: Implementation Schedule Milestones

The following milestone schedule is provided. The dates are planning dates only, and are 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.

Original Target Date	Activity	Status
October 2012	Hold preliminary/conceptual design meeting	Complete
October 2012	Submit 60 Day Status Report	Complete
February 2013	Submit Overall Integrated Implementation Plan	Complete
August 2013	Submit 6 Month Status Report	
February 2014	Submit 6 Month Status Report	
June 2014	Unit 2 Design Change Package Issued from Design	

Original Target Date	Activity	Status
August 2014	Submit 6 Month Status Report	
August 2014	Unit 2 Design Major Material On-site[2]	
September 2014	Procedure Changes Training Material Complete	
February 2015	Submit 6 Month Status Report	
April 2015	Procedure Changes Active	
April 2015	Unit 2 Design Change Implemented	
April 2015	Unit 2 Demonstration/Functional Test	
June 2015	Unit 1 Design Change Package Issued from Design	
August 2015	Unit 1 Design Major Material On-site [2]	
August 2015	Submit 6 Month Status Report	
April 2016	Unit 1 Design Change Implemented	
April 2016	Unit 1 Demonstration/Functional Test	
April 2016	Submit Completion Report	

Section 7: Changes/Updates to this Overall Integrated Plan

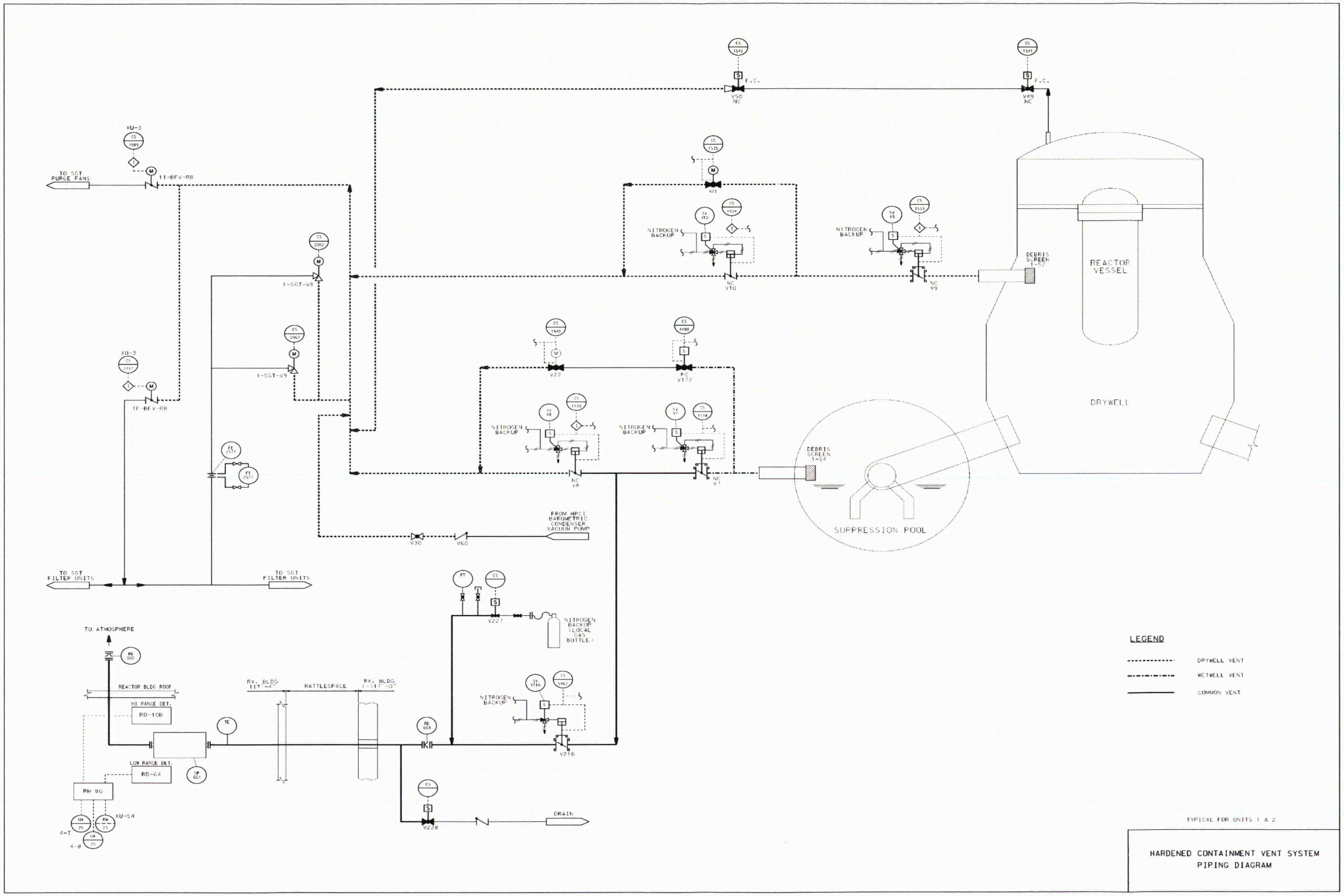
Any significant changes to this plan will be communicated to the NRC staff in the 6 month status reports.

Section 8: Figures/Diagrams

ISG IV.C. 1. Reporting Requirements:

A piping and instrumentation diagram or a similar diagram that shows system components and interfaces with plant systems and structures is acceptable.

[2] Major Equipment - Piping, valves and components greater than 3 inches, Instrumentation pick-ups and indicators.


TO SGT PURGE FANS
1T-BFV-RB
1F-BFV-RB
1-SGT-V8
1-SGT-V9
TO SGT FILTER UNITS
TO SGT FILTER UNITS
V50
NC
F.C.
V49
NC
F.C.
V21
NITROGEN BACKUP
NC
V10
NC
V9
DEBRIS SCREEN
REACTOR VESSEL
DRYWELL
V22
FC
V172
NC
V8
NC
V7
DEBRIS SCREEN
SUPPRESSION POOL
FROM HPCI BAROMETRIC CONDENSER VACUUM PUMP
V30
V60
TO ATMOSPHERE
REACTOR BLDG ROOF
HI RANGE DET.
RD-10B
LOW RANGE DET.
RD-64
RM 80
XU-54
RX. BLDG
BATTLESPACE
RX. BLDG
V227
NITROGEN BACKUP (LOCAL GAS BOTTLE)
V216
V228
DRAIN
LEGEND
DRYWELL VENT
WETWELL VENT
COMMON VENT
TYPICAL FOR UNITS 1 & 2
HARDENED CONTAINMENT VENT SYSTEM
PIPING DIAGRAM

BSEP HCVS Overall Integrated Plan