



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

February 12, 2015

Vice President, Operations  
Entergy Nuclear Operations, Inc.  
James A. FitzPatrick Nuclear Power Plant  
P.O. Box 110  
Lycoming, NY 13093

**SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT - 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. MF4464)**

Dear Sir or Madam:

By letter dated June 6, 2013, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-13-109, "Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A334). By letter dated June 30, 2014 (ADAMS Accession No. ML14181B117), Entergy Nuclear Operations, Inc. (Entergy), submitted its Overall Integrated Plan (OIP) for James A. Fitzpatrick Nuclear Power Plant (JAF) in response to Phase 1 of Order EA-13-109. By letter dated December 19, 2014 (ADAMS Accession No. ML14353A359), Entergy submitted its first 6-month status report for JAF in response to Order EA-13-109. Any changes to the compliance method described in the OIP dated June 30, 2014, will be reviewed as part of the ongoing Order EA-13-109 audit process for JAF.

Entergy's OIP appears consistent with the guidance found in Nuclear Energy Institute (NEI) 13-02, Revision 0 as endorsed, in part, by the NRC's Japan Lessons-Learned Project Directorate (JLD) Interim Staff Guidance (ISG) JLD-ISG-2013-02, as an acceptable means for implementing the requirements of Phase 1 of Order EA-13-109. This conclusion is based on satisfactory resolution of the open items detailed in the enclosed Interim Staff Evaluation. Any plant modifications will need to be conducted in accordance with the plant engineering change process and be consistent with the plant's licensing basis.

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If you have any questions, please contact Charles Norton, Project Manager, at 301-415-7818 or at Charles.Norton@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Mandy K. Halter". The signature is written in a cursive style with a large, prominent "M" and "H".

Mandy K. Halter, Acting Chief  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosure:  
Interim Staff Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES  
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INTERIM STAFF EVALUATION  
BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO ORDER EA-13-109 PHASE 1, MODIFYING LICENSES  
WITH REGARD TO RELIABLE HARDENED  
CONTAINMENT VENTS CAPABLE OF OPERATION UNDER  
SEVERE ACCIDENT CONDITIONS  
ENTERGY NUCLEAR OPERATIONS, INC.  
JAMES A. FITZPATRICK NUCLEAR POWER PLANT  
DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated June 6, 2013, the U.S. Nuclear Regulatory Commission (NRC, or Commission) issued Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions" [Reference 1]. The Order requires licensees to implement its requirements in two phases. In Phase 1, licensees of boiling-water reactors (BWRs) with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the wetwell during severe accident conditions. In Phase 2, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the drywell under severe accident conditions, or, alternatively, those licensees shall develop and implement a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions.<sup>1</sup>

The purpose of the NRC staff's review, as documented in this interim staff evaluation (ISE) is to provide an interim evaluation of the Overall Integrated Plan (OIP) for Phase 1 of Order EA-13-109. Phase 1 of Order EA-13-109 requires that BWRs with Mark I and Mark II containments shall design and install a severe accident capable hardened containment vent system (HCVS)

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<sup>1</sup> This ISE only addresses the licensee's plans for implementing Phase 1 of Order EA-13-109. While the licensee's OIP makes reference to Phase 2 issues, those issues are not being considered in this evaluation. Issues related to Phase 2 of Order EA-13-109 will be considered in a separate interim staff evaluation at a later date.

Enclosure

that provides venting capability from the wetwell during severe accident conditions, using a vent path from the containment wetwell to remove decay heat, vent the containment atmosphere (including steam, hydrogen, carbon monoxide, non-condensable gases, aerosols, and fission products), and control containment pressure within acceptable limits. The HCVS shall be designed for those accident conditions (before and after core damage) for which containment venting is relied upon to reduce the probability of containment failure, including accident sequences that result in the loss of active containment heat removal capability or extended loss of alternating current (ac) power (ELAP).

By letter dated June 30, 2014 [Reference 2], Entergy Nuclear Operations, Inc. (Entergy, the licensee) provided the OIP for James A. Fitzpatrick Nuclear Power Plant (JAF) for compliance with Phase 1 of Order EA-13-109. The OIP describes the licensee's currently proposed modifications to systems, structures, and components, new and revised guidance, and strategies that it intends to implement in order to comply with the requirements of Order EA-13-109.

## 2.0 REGULATORY EVALUATION

Following the events at the Fukushima Dai-ichi nuclear power plant on March 11, 2011, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF was tasked with conducting a systematic and methodical review of the NRC regulations and processes and determining if the agency should make improvements to these programs in light of the events at Fukushima Dai-ichi. As a result of this review, the NTTF developed a set of recommendations, documented in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 [Reference 3]. These recommendations were enhanced by the NRC staff following interactions with stakeholders. Documentation of the NRC staff's efforts is contained in the Commission's Staff Requirements Memorandum (SRM) SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011 [Reference 4] and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 [Reference 5].

As directed by the Commission's SRM for SECY-11-0093 [Reference 6], the NRC staff reviewed the NTTF recommendations within the context of the NRC's existing regulatory framework and considered the various regulatory vehicles available to the NRC to implement the recommendations. SECY-11-0124 and SECY-11-0137 established the NRC staff's prioritization of the recommendations based upon the potential safety enhancements.

On February 17, 2012, the NRC staff provided SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami" [Reference 7], to the Commission, including the proposed order to implement the installation of a reliable HCVS for Mark I and Mark II containments. As directed by SRM-SECY-12-0025 [Reference 8], the NRC staff issued Order EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents" [Reference 9], which requires licensees to install a reliable HCVS for Mark I and Mark II containments.

While developing the requirements for Order EA-12-050, the NRC acknowledged that questions remained about maintaining containment integrity and limiting the release of radioactive

materials if the venting systems were used during severe accident conditions. The NRC staff presented options to address these issues for Commission consideration in SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments" [Reference 10]. In the SRM for SECY-12-0157 [Reference 11], the Commission directed the staff to issue a modification to Order EA-12-050, requiring 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." The NRC staff held a series of public meetings following issuance of SRM SECY-12-0157 to engage stakeholders on revising the order. Accordingly, by letter dated June 6, 2013, the NRC issued Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Performing under Severe Accident Conditions."

Order EA-13-109, Attachment 2 requires that BWRs with Mark I and Mark II containments shall have a reliable, severe accident capable HCVS. This requirement shall be implemented in two phases. In Phase 1, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the wetwell during severe accident conditions. Severe accident conditions include the elevated temperatures, pressures, radiation levels, and combustible gas concentrations, such as hydrogen and carbon monoxide, associated with accidents involving extensive core damage, including accidents involving a breach of the reactor vessel by molten core debris. In Phase 2, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the drywell under severe accident conditions, or, alternatively, those licensees shall develop and implement a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions.

On November 12, 2013, the Nuclear Energy Institute (NEI) issued NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0 [Reference 12] to provide guidance to assist nuclear power reactor licensees with the identification of measures needed to comply with the requirements of Phase 1 of the HCVS order. On November 14, 2013, the NRC staff issued Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2013-02, "Compliance with Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Performing under Severe Accident Conditions" [Reference 13], endorsing, in part, NEI 13-02, Revision 0, as an acceptable means of meeting the requirements of Phase 1 of Order EA-13-109, and published a notice of its availability in the *Federal Register* (FR) [78 FR 70356]. Licensees are free to propose alternate methods for complying with the requirements of Phase 1 of Order EA-13-109.

By letter dated May, 27, 2014 [Reference 14], the NRC notified all BWR Mark I and Mark II licensees that the staff will be conducting audits of the implementation of Order EA-13-109. This letter described the audit process to be used by the staff in its review of the information contained in licensee's submittals in response to Phase 1 of Order EA-13-109.

### 3.0 TECHNICAL EVALUATION

JAF is a single unit General Electric BWR with a Mark I containment system. To implement Phase 1 (HCVS) of Order EA-13-109, Entergy plans to use existing containment isolation valves and piping from the suppression chamber. Existing valves will isolate the HCVS from other systems and new piping will route the HCVS through the reactor building roof. As part of its review of the submitted OIP, the NRC staff held clarifying discussions with Entergy in evaluating the licensee's plans for addressing wetwell venting during beyond-design-basis external events (BDBEEs) and severe accidents.

#### 3.1 GENERAL INTEGRATED PLAN ELEMENTS AND ASSUMPTIONS

##### 3.1.1 Evaluation of Extreme External Hazards

Extreme external hazards for JAF were evaluated in the JAF OIP in response to Order EA-12-049 (Mitigation Strategies) [Reference 15]. The NRC staff documented an analysis of Entergy's extreme external hazards evaluation in the JAF ISE relating to the Mitigation Strategies OIP [Reference 16]. The following extreme external hazards screened in: Seismic, Extreme Cold Temperature (including snow and ice), High Wind, and Extreme High Temperature. Consistent with the "dry site" classification discussed in the JAF Mitigation Strategies ISE, external flooding screened out. Based on JAF not excluding any external hazard from consideration, the NRC staff determined that Entergy appears to have considered the appropriate external hazards in the HCVS design.

##### 3.1.2 Assumptions

On page 4 of the JAF OIP, Entergy adopted a set of generic assumptions associated with Order EA-13-109 Phase 1 actions. The staff determined that the set of generic assumptions appear to establish a baseline for the HCVS evaluation consistent with the guidance found NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02.

JAF reported no plant specific assumptions. The NRC staff determined that as JAF appears to be implementing HCVS with no deviations from the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02, that no plant specific assumptions are required.

##### 3.1.3 Compliance Timeline and Deviations

Page 4 of the OIP states the following:

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

- Phase 1 (wetwell): by the startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first. Implementation of the Phase 1 Wetwell Vent is currently scheduled for the fall of 2016.

- Phase 2: Later; no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first. Implementation of the Phase 2 Drywell Vent is currently scheduled for fall of 2018.

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

JAF's implementation schedule appears to be in compliance with Order EA-13-109 requirements. Entergy reports that JAF will implement Order EA-13-109 with no known deviations from the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02.

### Summary, Section 3.1:

The licensee's approach to General Integrated Plan Elements and Assumptions, if implemented as described in Section 3.1 above, and assuming acceptable resolution of any open items identified here or as a result of licensee alterations to their proposed plans, appears to be consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02.

## 3.2 BOUNDARY CONDITIONS FOR WETWELL VENT

### 3.2.1 Sequence of Events

Order EA-13-109, Sections 1.1.1, 1.1.2, and 1.1.3, state that:

- 1.1.1 The HCVS shall be designed to minimize the reliance on operator actions.
- 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.
- 1.1.3 The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response.

Page 7 of the OIP states the following:

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

The NRC staff reviewed the remote manual actions (Table 2-1 of the OIP) and concluded that these actions appear to consider minimizing the reliance on operator actions. The actions appear consistent with the types of actions described in the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02. The NRC staff reviewed the Wetwell HCVS Failure Evaluation Table (Attachment 4 of the OIP) and determined the actions described appear to adequately address all the failure modes listed in the guidance provided by NEI 13-02, which include: loss of normal ac power, long term loss of batteries, loss of normal pneumatic supply, loss of alternate pneumatic supply, and solenoid operated valve failure.

The staff reviewed the three cases contained in the sequence of events timeline [Attachment 2 of the OIP] and determined that the three cases appropriately bound the conditions for which the HCVS is required. These cases include: successful FLEX implementation with no failure of reactor core isolation cooling (RCIC); late failure of RCIC leading to core damage; and failure of RCIC to inject at the start of the event. The timelines accurately reflect the progression of events as described in the JAF FLEX OIP [Reference 17], SECY-12-0157 [Reference 10], and State-of-the-Art Reactor Consequence Analyses (SOARCA) [Reference 18].

The NRC staff reviewed the licensee discussion of time constraints on page 8 of the OIP. The time constraints establish when the HCVS must be initiated and when supplemental compressed gas for motive power and supplemental electrical power (FLEX) must be supplied. The staff confirmed that the time constraints identified appear to be appropriately derived from the time lines developed in Attachment 2 of the OIP, and therefore are consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02.

The NRC staff reviewed the discussion of radiological and temperature constraints on page 9 of the OIP and determined that Entergy addressed radiological and temperature considerations at the locations where manual actions are required to operate the HCVS. The licensee identified that severe accident radiological evaluations are necessary at all locations where manual actions are required outside the control room.

Open Item: 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.

### 3.2.2 Vent Characteristics

#### 3.2.2.1 Vent Size and Basis

Order EA-13-109, Section 1.2.1, states that:

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

Page 11 of the OIP states the following:

The HCVS wetwell path will be designed for venting the steam / energy equivalent of 1% or greater of the Current Licensed Thermal Power (CLTP) of 2,536 MWt [megawatt thermal] at a pressure of 56 psig. This pressure is the lower of the containment design pressure and the PCPL [primary containment pressure limit] value. The wetwell portion of the HCVS piping will be sized to provide adequate capacity to meet or exceed the Order criteria. Evaluations for an extended power uprate were previously performed at JAF. However, there are no future plans to move forward with the uprate.

The JAF OIP describes installation of a new vent sized to meet or exceed 1 percent or greater CLTP. This appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific design details that have not been provided at this time include: an analysis that demonstrates sufficient HCVS capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and an analysis that demonstrates 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; therefore, the staff has not completed its review.

Open Item: 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 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.

### 3.2.2.2 Vent Capacity

Order EA-13-109, Section 1.2.1, states that:

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

Page 11 of the OIP states the following:

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

The JAF OIP acknowledges that until decay heat is less than 1 percent, the suppression pool must absorb the decay heat generated and prevent containment pressure from increasing above the containment design pressure until the 1 percent containment vent is able to restore

and maintain primary containment pressure below the primary containment design pressure and the primary containment pressure limit. An analysis that demonstrates sufficient HCVS 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 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 is not available at this time; therefore, the staff has not completed its review.

Open Item: 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 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.

### 3.2.2.3 Vent Path and Discharge

Order EA-13-109, Section 1.1.4 states that:

1.1.4 The HCVS controls and indications shall be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of AC power, and inadequate containment cooling.

Order EA-13-109, Section 1.2.2 states that:

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

Page 12 of the OIP states the following:

The HCVS vent path at JAF utilizes the existing Containment Air Dilution System piping from the suppression chamber and drywell up to a new isolation valve just upstream of the Standby Gas Treatment System isolation valves (27MOV-120 and 27MOV-121). The suppression chamber 20" diameter piping exits the primary containment into the Reactor Building and increases in diameter to 30". The 24" drywell vent piping ties into the 30" suppression chamber pipe. The combined 30" Drywell/Wetwell vent piping will be isolated by a new 20" boundary valve 27AOV-SGT that will be installed between two 20" x 30" reducers (See Attachment 3, [of the OIP] Sketch 2.A). New 8" piping will tie into this header upstream of the 20" isolation valve and will contain a new air-operated control valve, 27AOV-HCV, to serve as secondary containment isolation.

JAF will have a single and independent release vent pipe. The discharge piping will exit through the Reactor Building roof with a minimum discharge point of 3' above the highest point of the roof. The distance between the vent release point and any surrounding structure will be at least 25' (horizontal distance; See

HCVS-FAQ[frequently asked question]-04). This value is based on the ability of the effluent stream to overcome wind effects above the roof (and appurtenances) elevation and agrees with accepted industry practice for roof vents. However, this must be considered as part of the final design in conjunction with other design criteria (e.g., flow capacity) and pipe routing limitations, to the degree practical. Vent line and new AOV [Air-Operated Valves] sizes will be confirmed during final design of the HCVS system.

The Reactor Building's parapet is at an elevation of approximately 434' (Reference 32). The HCVS pipe will exit seismic class I structures at an elevation well over 30' from the nominal ground elevation of 272'. However, sections of the vent piping will be located within a seismic class I structure which is not of substantial construction with regard to protection from tornado missiles (i.e., those sections of the piping located above the elevation of the refuel floor). These piping sections will be evaluated for reasonable protection from missiles and protected as required (Reference 17 [of the OIP]). The piping and supports will be seismically rugged.

The JAF OIP describes the routing and discharge point of the HCVS that appear consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02. Design details not available at this time include: the seismic and tornado missile final design criteria for the HCVS stack, evaluations of the environmental and radiological effects on HCVS controls and indications, and documentation of an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.

Open Item: 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.

Open Item: 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.

#### 3.2.2.4 Power and Pneumatic Supply Sources

Order EA-13-109, Sections 1.2.5 and 1.2.6, state that:

1.2.5 The HCVS shall, in addition to meeting the requirements of 1.2.4, be capable of manual operation (e.g., reach-rod with hand wheel or manual operation of pneumatic supply valves from a shielded location), which is accessible to plant operators during sustained operations.

- 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of AC power

Page 12 of the OIP states the following:

All electrical power required for operation of HCVS components will be routed through three inverters: one inverter for each of the two electrical divisions and one inverter for non-divisional loads. These inverters will be sized to convert DC [direct current] power from installed batteries into AC power for the end users (e.g. solenoid valves, indicating lights, etc.). In addition, a converter will provide 24 VDC power for instruments. Battery power will be provided by dedicated HCVS batteries that will supply power for at least 24 hours. After that time, it is expected that a temporary power source will be in service to recharge the HCVS batteries.

Pneumatic power is normally provided by the station's instrument air system. Following an ELAP event, the normal station instrument air that supplies motive force to the HCVS AOVs is lost. Therefore, for the first 24 hours, pneumatic force will be supplied from a newly installed dedicated backup nitrogen bottle station. The nitrogen bottles will supply the required motive force to those HCVS valves needed to maintain flow through the HCVS effluent piping.

1. The HCVS flow path valves are air-operated valves (AOVs) with air-to-open and spring-to-close pneumatic cylinders. Opening the valves requires energizing AC powered solenoid operated valves (SOVs) and providing motive gas. The detailed design will provide a permanently installed power source and motive gas supply adequate for the first 24 hours. After 24 hours, FLEX can be credited to sustain electrical power. The detailed design will finalize whether FLEX will be used for sustained power. The capability under the FLEX effort to maintain the electrical source is still applicable under the EA-13-109 Order Elements. The initial stored motive gas will allow for a minimum of 12 valve operating cycles for the HCVS valves for the first 24-hours of operation.
2. An assessment of temperature and significant radiological conditions will be performed to ensure that operating personnel can safely access and operate controls at the ROS [remote operating station] based on the time constraints listed in Attachment 2 of the OIP.
3. All permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (i.e., HCVS battery station and nitrogen bottle station), will be located in areas reasonably protected from defined hazards listed in Part 1 of this report.
4. All valves required to open the flow path 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 that requires close proximity to the valve (Reference 16). Motive force for the AOVs will be provided from nitrogen bottles located in the Administration Building hallway between the Reactor Building and the Turbine Building on Elevation 272'. This area is accessible to operators and will not be exposed to high temperature or significant radiological conditions from a resulting severe accident (SA) event. Any supplemental connections will be pre-engineered to minimize man-power resources and address environmental concerns. Required portable equipment will be reasonably protected from screened in hazards listed in Part 1 of this OIP.

5. Access to the locations described above will not require temporary ladders or scaffolding.
6. Following the initial 24 hour period, additional motive force will be supplied from nitrogen bottles that will be staged at a gas cylinder rack located such that radiological impacts are not an issue. Additional bottles can be brought in as needed.

The JAF OIP contains system feature descriptions that appear to make the system reliable consistent with the guidance found in NEI 13-02, as endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final nitrogen pneumatic system design including sizing and location, the final sizing for HCVS battery/battery charger including documentation of incorporating HCVS electrical sources into the FLEX DG [diesel generator] loading calculations, and documentation of an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: 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.

### 3.2.2.5 Location of Control Panels

Order EA-13-109, Sections 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.2.4, and 1.2.5, state that:

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

- 1.1.3 The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response
- 1.1.4 The HCVS controls and indications shall be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of AC power, and inadequate containment cooling.
- 1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.
- 1.2.5 The HCVS shall, in addition to meeting the requirements of 1.2.4, be capable of manual operation (e.g., reach-rod with hand wheel or manual operation of pneumatic supply valves from a shielded location), which is accessible to plant operators during sustained operations.

Page 13 of the OIP states the following:

The HCVS design allows initiating and then operating and monitoring the HCVS from the Relay Room and the ROS located in the Administration Building hallway between the Reactor Building and Turbine Building. Adequate shielding provided by the adjacent Reactor Building wall will minimize dose rates at the ROS located in the Administration Building. The Relay Room is a normal control point for Plant Emergency Response actions. Both of these locations are protected from adverse natural phenomena and the ROS is free from any harsh thermal and significant radiological conditions.

The JAF OIP describes HCVS control locations that appear to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific design details not available at this time include: documentation that demonstrates adequate communication between remote HCVS operation locations and HCVS operational decision makers, evaluations of the environmental and radiological effects on HCVS controls and indications, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

- Open Item: 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.
- Open Item: 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.

Open Item: 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.

### 3.2.2.6 Hydrogen

Order EA-13-109, Sections 1.2.10, 1.2.11, and 1.2.12, state that:

- 1.2.10 The HCVS shall be designed to withstand and remain functional during severe accident conditions, including containment pressure, temperature, and radiation while venting steam, hydrogen, and other non-condensable gases and aerosols. The design is not required to exceed the current capability of the limiting containment components.
- 1.2.11 The HCVS shall be designed and operated to ensure the flammability limits of gases passing through the system are not reached; otherwise, the system shall be designed to withstand dynamic loading resulting from hydrogen deflagration and detonation.
- 1.2.12 The HCVS shall be designed to minimize the potential for hydrogen gas migration and ingress into the reactor building or other buildings.

Page 13 of the OIP states the following:

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

These and other possible solutions are being studied for effectiveness and potential use at JAF.

The final determination of the method to be used to address the control of flammable gases will be determined during final design.

A description of the final design for hydrogen control is not available at this time, including a description of the final design of the HCVS to address hydrogen detonation and deflagration (licensee identified) and 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; therefore, the staff has not completed its review.

Open Item: Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.

Open Item: 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.

### 3.2.2.7 Unintended Cross Flow of Vented Fluids

Order EA-13-109, Section 1.2.3 and 1.2.12 state:

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

1.2.12 The HCVS shall be designed to minimize the potential for hydrogen gas migration and ingress into the reactor building or other buildings.

Page 14 of the OIP states the following:

The HCVS uses the Primary Containment Purge (PCP) System containment isolation valves for primary containment isolation. These containment isolation valves are AOVs and they are air-to-open and spring-to-close. An SOV must be energized to allow the motive air to open the valve. Although these valves are shared between the Containment Purge System and the HCVS, separate control circuits are provided to each valve for each function. Specifically:

- The PCP System control circuit will be used during all “design basis” operating modes including all design basis transients and accidents.
- Cross flow could exist between the HCVS and the Standby Gas Treatment System (SGTS). Isolation between the proposed vent path and SGTS is provided by two separate (parallel) AC powered motor operated valves (i.e., MOVs [Motor-Operated Valves] 27MOV-120 and 27MOV-121). These valves would fail-as-is during loss of AC events and as such, could not be credited as a leak tight boundary. To address this, a new boundary valve, 27AOV-SGT, will be installed on the common vent line upstream of the SGTS MOVs. The testing criteria for this new valve will be based on JAF’s Appendix J test criteria for the HCVS PCIVs [primary containment isolation valve] (27AOV-117 and 27AOV-118). The allowable leakage will be set equal to the allowable leakage for the HCVS PCIV which exhibits the highest accepted leakage rate during the current Appendix J testing cycle. The valve will be tested at the frequency specified in NEI 13-02, Section 6.2.4 and the testing criteria suggested in HCVS-FAQ-05 (Ref. 18 of the JAF OIP).

The JAF OIP describes design features to minimize unintended cross flow of vented fluids that appear consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

### 3.2.2.8 Prevention of Inadvertent Actuation

Order EA-13-109, Section 1.2.7 states that:

1.2.7 The HCVS shall include means to prevent inadvertent actuation.

Page 14 of the OIP states the following:

EOP/ERG [emergency operating procedure/emergency response guideline] operating procedures provide clear guidance that the HCVS is not to be used to defeat containment integrity during any design basis transients and accidents. In addition, the HCVS will be designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error such that any credited containment accident pressure (CAP) that would provide net positive suction head [NPSH] to the emergency core cooling system (ECCS) pumps will be available (inclusive of a design basis loss-of-coolant accident (DBLOCA)). However the ECCS pumps will not have normal power available because of the starting boundary conditions of an ELAP. Note that JAF does not rely on CAP to maintain NPSH for ECCS pumps, but does credit 2 psig for both the core spray and residual heat removal systems.

- The features that prevent inadvertent actuation at all times are two PCIV's in series powered from different divisions and automatic isolation of the valves upon a containment isolation signal. Procedures also provide clear guidance to not circumvent containment integrity by simultaneously opening torus and drywell vent valves during any design basis transient or accident. In addition, the HCVS will be designed to provide features to prevent inadvertent actuation due to a design error, equipment malfunction, or operator error.

The JAF OIP provides a description of methods to prevent inadvertent HCVS initiation that includes: key lock switches, valves in series powered from separate power supplies and procedural guidance. This appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

### 3.2.2.9 Component Qualifications

Order EA-13-109, Section 2.1, states that:

- 2.1 The HCVS vent path up to and including the second containment isolation barrier shall be designed consistent with the design basis of the plant. Items in this path include piping, piping supports, containment isolation valves, containment isolation valve actuators and containment isolation valve position indication components.

Page 14 of the OIP states the following:

The HCVS components downstream of the second containment isolation valve and components that interface with the HCVS are routed in seismically designed structures.

HCVS components that directly interface with the primary containment pressure boundary will be considered safety related, as the existing system is safety related. The containment system limits the leakage or release of radioactive materials to the environment to prevent offsite exposures from exceeding the guidelines of 10 CFR 100. During normal or design basis operations, this means serving as a pressure boundary to prevent release of radioactive material.

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

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

The HCVS instruments, including valve position indication, process instrumentation, radiation monitoring, and support system monitoring, will be qualified by using one or more of the three methods described in the ISG [JLD-ISG-2013-02], 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 [Institute of Electrical and Electronic Engineers] 344-2004
3. Demonstration that instrumentation is substantially similar to the design of instrumentation previously qualified.

<b>Instrument</b>	<b>Qualification Method*</b>
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(s) used for each required HCVS instrument will be reported in future 6 month status reports.

The JAF OIP describes component qualification methods that appear to be consistent with the design-basis of the plant and the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific design details not available at this time include an evaluation for seismic and environmental qualifications of HCVS components, and documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under ELAP and severe accident conditions; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.

Open Item: 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.

Open Item: 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.

### 3.2.2.10 Monitoring of HCVS

Order EA-13-109, Sections 1.1.4, 1.2.8, and 1.2.9 state that:

- 1.1.4 The HCVS controls and indications shall be accessible and functional under a range of plant conditions, including severe accident conditions, extended loss of AC power, and inadequate containment cooling.
- 1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power.
- 1.2.9 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 from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of AC power.

Page 16 of the OIP states the following:

The JAF wetwell HCVS will be capable of being manually operated during sustained operations from a control panel located in the Relay Room and will meet the requirements of Order element 1.2.4. The Relay Room is a readily accessible location that will be evaluated for sustained habitability in accordance with HCVS-FAQ-01 (Reference 14 of the JAF OIP). Additionally, to meet the intent for a secondary control location of Section 1.2.5 of the Order, a readily accessible Remote Operating Station (ROS) will also be incorporated into the HCVS design as described in NEI 13-02 Section 4.2.2.1.2.1. The controls and indications at the ROS location will be accessible and functional under a range of plant conditions, including severe accident conditions with due consideration to source term and dose impact on operator exposure, extended loss of AC power (ELAP), and inadequate containment cooling. An evaluation will be performed to determine accessibility to the location, habitability, staffing sufficiency, and communication capability with Vent-use decision makers.

The wetwell HCVS will include means to monitor the status of the vent system in both the Relay Room and the ROS. Included in the current design of the HCVS are control switches in the Relay Room with valve position indication. The existing HCVS controls currently meet the environmental and seismic requirements of the Order for the plant severe accident and will be upgraded to address ELAP. The ability to cycle these valves multiple times during the event's first 24 hours will be provided by backup nitrogen bottles and dedicated HCVS batteries, supplemented by installed backup battery power sources. Beyond the first 24 hours, the ability to cycle these valves will be provided with replaceable nitrogen bottles and a temporary power source.

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

The JAF OIP provides a description of HCVS monitoring and control that appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: descriptions of all instrumentation and controls (existing and planned) including qualification methods, evaluations of the environmental and radiological effects on HCVS controls and indications, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

- Open Item: Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.
- Open Item: 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.
- Open Item: 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.

### 3.2.2.11 Component Reliable and Rugged Performance

Order EA-13-109, Section 2.2, states that:

- 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.

Page 16 of the OIP states the following:

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

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

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

If the instruments are purchased as commercial-grade equipment, they will be qualified to operate under severe accident environment as required by NRC Order EA-13-109 and the guidance of NEI 13-02.

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

- demonstration of seismic motion will be consistent with that of existing design basis loads at the installed location;
- substantial history of operational reliability in environments with significant vibration with a design envelope inclusive of the effects of seismic motion imparted to the instruments proposed at the location;
- adequacy of seismic design and installation is demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations, (Reference 27 of the JAF OIP) or a substantially similar industrial standard;
- demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or
- Seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

The JAF OIP provides descriptions for component reliable and rugged performance that appear to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

### 3.2.3 Beyond-Design-Basis External Event Venting

#### 3.2.3.1 First 24-Hour Coping

Order EA-13-109, Section 1.2.6, states that:

- 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of AC power.

Page 18 of the OIP states the following:

The operation of the HCVS will be designed to minimize reliance on operator actions for response to an ELAP and BDBEE hazards identified in part 1 of this OIP. Immediate operator actions can be completed by Operators from the HCVS control station and includes remote-manual initiation. The operator actions required to open a vent path are as described in Table 2-1 [of the OIP].

Remote-manual is defined in this report as a non-automatic power operation of a component and does not require the operator to be at or in close proximity to the component. No other operator actions are required to initiate venting under the guiding procedural protocol.

The HCVS will be designed to allow initiation, control, and monitoring of venting from the Relay Room. This location minimizes plant operators' exposure to adverse temperature and significant radiological conditions and is protected from hazards assumed in Part 1 of this report [the JAF OIP].

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

System control:

- i. Active: HCVS control valves and PCIVs are operated in accordance with EOPs/SOPs and SAOGs [severe accident operating guidelines] to control containment pressure. The HCVS will be designed for a minimum of 12 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 EPGs and associated implementing 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 both the HCVS power supply actuation and valve operation. The normal state of the system is de-energized and closed. Provisions will be provided so that the N2 backup supply into the SOV vent ports does not cause inadvertent actuation of the valves.

The JAF OIP describes a first 24 hour BDBEE coping strategy that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation and the final nitrogen pneumatic system design including sizing and location; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.

### 3.2.3.2 Greater Than 24-Hour Coping

Order EA-13-109, Section 1.2.4, states that:

1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.

Page 19 of the OIP states the following:

After 24 hours, available personnel will be able to connect supplemental motive gas to the HCVS. Connections for supplementing electrical power and motive gas required for HCVS will be located in accessible areas with reasonable protection per NEI 12-06 that minimize personnel exposure to adverse conditions for HCVS initiation and operation. Connections will be pre-engineered quick disconnects to minimize manpower resources. These actions provide long term support for HCVS operation for the period beyond 24 hours following an ELAP event. On-site and off-site personnel and resources will have access to the unit to provide needed action and supplies.

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 JAF to provide needed action and supplies.

The JAF OIP describes a greater than 24 hour BDBEE coping strategy, that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Design details are not available at this time. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, and the final nitrogen pneumatic system design including sizing and location; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.

### 3.2.4 Severe Accident Event Venting

#### 3.2.4.1 First 24 Hour Coping

Order EA-13-109, Section 1.2.6, states that:

- 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of AC power.

Page 22 of the OIP states the following:

The operation of the HCVS will be designed to minimize the reliance on operator actions for response to an ELAP and severe accident events. Severe accident event assumes that specific core cooling actions from the FLEX strategies identified in the response to Order EA-12-049 were not successfully initiated. Access to the reactor building will be restricted as determined by the RPV [reactor pressure vessel] water level and core damage conditions. Immediate operator actions will be completed by Operators in the Relay Room or at the HCVS Remote Operating Station (ROS) and will include remote-manual actions from a backup nitrogen cylinder. The operator actions required to open a vent path were previously listed in the BDBEE Venting Part 2 of this report (Table 2-1[of the OIP]).

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

System control:

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

The JAF OIP describes greater than 24 hour severe accident coping strategy that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.

Open Item: 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.

### 3.2.4.2 Greater Than 24 Hour Coping

Order EA-13-109, Sections 1.2.4 and 1.2.8, states that:

- 1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.
- 1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power.

Page 22 of the OIP states the following:

Specifics are the same as for BDBEE Venting Part 2 except the location and refueling actions for the temporary power source and replacement nitrogen bottles will be evaluated for SA environmental conditions resulting from the proposed damaged Reactor Core and resultant HCVS vent pathway.

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 JAF to provide needed action and supplies.

The pneumatic supply station will be located outside of the secondary containment and the HCVS batteries / battery charger will be located in the secondary containment equipment access lock. The HCVS piping will exit the Reactor Building on the southwest side of the Reactor Building. An evaluation will be completed to address radiological and temperature concerns when the locations of the batteries, battery charger and ROS are finalized.

The JAF OIP describes greater than 24 hour severe accident coping strategy that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified); therefore, the staff has not completed its review.

- Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.
- Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.
- Open Item: 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.

### 3.2.5 Support Equipment Functions

#### 3.2.5.1 BDBEE

Order EA-13-109, Sections 1.2.8 and 1.2.9, state that:

- 1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power.
- 1.2.9 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 from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of AC power.

Page 24 of the OIP states the following:

Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the Relay Room or ROS located in the Administration Building.

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

The location of the pneumatic supply station in the Administration Building will be evaluated for reasonable protection per Part 1 of this OIP. Actions to replenish the pneumatic supplies may include replacement of nitrogen bottles. Sufficient replacement HCVS nitrogen bottles will be staged in a location to support operations for beyond 24 hours following the ELAP event.

The HCVS batteries and battery charger will be sufficient for a minimum of 24 hour operation. The normal power source for the battery charger is a dedicated

600 VAC to 120/240 VAC transformer, which will be powered from a 600 VAC bus that may be re-powered by temporary power source.

These actions provide long term support for HCVS operation for the period beyond 24 hrs. On-site and off-site personnel and resources will have access to the unit to provide needed action and supplies.

The JAF OIP describes BDBEE supporting equipment functions that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation and the final nitrogen pneumatic system design including sizing and location; therefore, the staff has not completed its review.

Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.

Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.

### 3.2.5.2 Severe Accident Venting

Order EA-13-109, Sections 1.2.8 and 1.2.9, state that:

1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g., valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power.

1.2.9 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 from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of AC power.

Page 24 of the OIP states the following:

The same support functions that are used in the BDBEE scenario would be used for severe accident venting. To ensure power for venting during the first 24 hours, a set of dedicated HCVS batteries will be available to feed HCVS loads via control power transfer switches. Beyond 24 hours, power can be backed up by a temporary power source.

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

The JAF OIP describes support equipment functions for severe accident venting that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified); therefore, the staff has not completed its review.

- Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.
- Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.
- Open Item: 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.

### 3.2.6 Venting Portable Equipment Deployment

Order EA-13-109, Section 3.1, states that:

- 3.1 The licensee 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 an extended loss of AC power.

Page 26 of the OIP states the following:

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

The JAF OIP describes venting portable equipment deployment functions that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. Specific details not available at this time include: the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation, the final nitrogen pneumatic system design including sizing and location, and an evaluation of environmental and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the staff has not completed its review.

- Open Item: Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.
- Open Item: Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.
- Open Item: Provide documentation of an assessment of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

Summary, Section 3.2:

The licensee's approach to Boundary Conditions for Wetwell Vent, if implemented as described in Section 3.2, and assuming acceptable resolution of any open items identified here or as a result of licensee alterations to their proposed plans, appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02, as an acceptable means for implementing applicable requirements of Order EA-13-109.

3.3 BOUNDARY CONDITIONS FOR DRYWELL VENT

Summary, Section 3.3:

The Drywell Vent will be evaluated during Phase 2 of Order EA-13-109. The ISG for Phase 2 will be provided by April 30, 2015. Licensees will submit an updated OIP to address Phase 2 of Order EA-13-109 by December 31, 2015.

3.4 PROGRAMMATIC CONTROLS, TRAINING, DRILLS AND MAINTENANCE

3.4.1 Programmatic Controls

Order EA-13-109, Sections 3.1 and 3.2, state that:

- 3.1 The licensee 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 an extended loss of AC power.
- 3.2 The 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 an extended loss of AC power.

Page 29 of the OIP states the following:

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 during all modes of operation and during Severe Accidents.

Procedures:

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

The HCVS procedures will be developed and implemented following JAF's process for initiation or revising procedures and contain the following details:

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

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

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

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

- A cause assessment will be performed to prevent future loss of function for similar causes.
- Initiate action to implement appropriate compensatory actions

The JAF OIP describes programmatic controls that appear to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. NRC staff determined that procedure development appears to be in accordance with existing industry protocols. The provisions for out-of-service requirements appear to reflect consideration of the probability of an ELAP requiring severe accident venting and the consequences of a failure to vent under such conditions.

### 3.4.2 Training

Order EA-13-109, Section 3.2, states that:

- 3.2 The 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 an extended loss of AC power.

Page 30 of the OIP states the following:

Personnel expected to perform direct execution of the HVCS 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. Training content and frequency will be established using the Systematic Approach to Training (SAT) process.

In addition, (Reference 10 [of the OIP]) all personnel on-site will be available to supplement trained personnel [applies only to FLEX].

The JAF OIP describes HCVS training requirements that appear to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. The systematic approach to training process has been accepted by the NRC as appropriate for developing training for nuclear plant personnel.

### 3.4.3 Drills

Order EA-13-109, Section 3.1, states that:

- 3.1 The licensee 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 an extended loss of AC power.

Page 30 of the OIP states the following:

The site will utilize the guidance provided in NEI 13-06 and 14-01 for guidance

related to drills, tabletops, or exercises for HCVS operation. In addition, the site will integrate these requirements with compliance to any rulemaking resulting from the NTF Recommendations 8 and 9.

The JAF OIP describes an approach to drills that appears to be in accordance with NEI 13-06, "Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents" and Events and NEI 14-01, "Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents." This approach appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

### 3.4.4 Maintenance

Order EA-13-109, Section 1.2.13, states that:

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

Page 31 of the OIP states the following:

The site will utilize the standard EPRI [Electric Power Research Institute] industry PM process (similar to the Preventive Maintenance Basis Database) for establishing the maintenance calibration and testing actions for HCVS 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.

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

Table 4-1 [of the OIP]: 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 operating cycle
Perform visual inspections and a walk down 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 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 logic from its control panel and ensuring that all interfacing system valves move to their proper (intended) positions.	Once per every other operating cycle
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The JAF OIP describes an approach to maintenance that appears to be in accordance with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02.

Summary, Section 3.4:

The licensee’s approach to Programmatic Controls Training, Drills and Maintenance, if implemented as described in Section 3.4, and assuming acceptable resolution of any open items identified here or as a result of licensee alterations to their proposed plans, appears to be consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109.

4.0 OPEN ITEMS

This section contains a summary of the open items identified to date as part of the technical evaluation. Open items, whether NRC or licensee identified, are topics for which there is insufficient information to fully resolve the issue, for which the NRC staff requires clarification to ensure the issue is on a path to resolution, or for which the actions to resolve the issue are not yet complete. The intent behind designating an issue as an open item is to highlight items that the staff intends to review further. The NRC staff has reviewed the licensee OIP for consistency with NRC policy and technical accuracy. NRC and licensee identified open items have been identified in Section 3.0 and are listed in the table below.

List of Open items

Open Item	Action	Comment
1.	Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one (1) percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.	Section 3.2.2.1 Section 3.2.2.2
2.	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Section 3.2.2.3

3.	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6
4.	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2 Section 3.2.6
5.	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Section 3.2.2.6
6.	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	Section 3.2.2.6
7.	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Section 3.2.2.10
8.	Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.	Section 3.2.2.9
9.	Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Section 3.2.2.3 Section 3.2.2.5 Section 3.2.2.9 Section 3.2.2.10
10.	Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.	Section 3.2.2.9
11.	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	Section 3.2.2.5

12.	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Section 3.2.1 Section 3.2.2.3 Section 3.2.2.4 Section 3.2.2.5 Section 3.2.2.10 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.2 Section 3.2.6
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5.0 SUMMARY

As required by Order EA-13-109, the licensee has provided an OIP for designing and installing Phase 1 of a severe accident capable HCVS that provides venting capability from the wetwell during severe accident conditions, using a vent path from the containment wetwell to remove decay heat, vent the containment atmosphere (including steam, hydrogen, carbon monoxide, non-condensable gases, aerosols, and fission products), and control containment pressure within acceptable limits. The OIP describes a HCVS wetwell vent designed for those accident conditions (before and after core damage) for which containment venting is relied upon to reduce the probability of containment failure, including accident sequences that result in the loss of active containment heat removal capability or ELAP.

The NRC staff finds that the licensee's OIP for Phase 1 of Order EA-13-109 describes: plan elements and assumptions; boundary conditions; provisions for programmatic controls, training, drills and maintenance; and an implementation schedule that appear consistent with the guidance found in NEI 13-02 endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing phase 1 requirements of Order EA-13-109, subject to acceptable closure of the above open items.

## 6.0 REFERENCES

1. Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," June 6, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A321).
2. Letter from Entergy to NRC, Entergy's Overall Integrated Plan for James A. Fitzpatrick Nuclear Power Plant in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions Phase 1 (Order EA-13-109)," dated June 30, 2014 (ADAMS Accession No. ML14181B117).
3. SECY-11-0093, "The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident." (ADAMS Accession No. ML111861807).
4. SRM-SECY-11-0124, "Recommended Actions to be taken Without Delay From The Near-Term Task Force Report", (ADAMS Accession No. ML112911571).
5. SRM-SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned", (ADAMS Accession No. ML113490055).
6. SRM-SECY-11-0093, "Staff Requirements – SECY-11-0093 – Near-Term Report and Recommendations for Agency Actions following the Events in Japan," August 19, 2011 (ADAMS Accession No. ML112310021)
7. SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," February 17, 2012 (ADAMS Accession No. ML12039A103)
8. SRM-SECY-12-0025, "Staff Requirements – SECY-12-0025 - Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," March 9, 2012 (ADAMS Accession No. ML120690347)
9. Order EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents," March 9, 2012 (ADAMS Accession No. ML12054A694)
10. SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments," November 26, 2012 (ADAMS Accession No. ML12325A704)
11. SRM-SECY-12-0157, "Staff Requirements - SECY-12-0157, "Consideration Of Additional Requirements For Containment Venting Systems For Boiling Water Reactors With Mark I And Mark II Containments", March 19, 2013 (ADAMS Accession No. ML13078A017).

12. NEI-13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0, November 12, 2013 (ADAMS Accession No. ML13316A853)
13. JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," November 14, 2013 (ADAMS Accession No. ML13304B836)
14. Nuclear Regulatory Commission Audits Of Licensee Responses To Phase 1 of Order EA-13-109 to Modify Licenses With Regard To Reliable Hardened Containment Vents Capable Of Operation Under Severe Accident Conditions (ADAMS Accession No. ML14126A545)
15. Order EA-12-049, "Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (ADAMS Accession No. ML12054A735).
16. James A. FitzPatrick Nuclear Power Plant Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (ADAMS Accession No. ML14007A681).
17. Letter from Entergy to NRC, Entergy Overall Integrated Plan for the James A. FitzPatrick in Response to 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 February 28, 2013 (ADAMS Accession No. ML13063A287).
18. NUREG-1935, State-of-the-Art Reactor Consequence Analyses (SOARCA) Report (ADAMS Accession No. ML12332A058).

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Date: February 12, 2015

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Sincerely,

*/RA/*

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Docket No. 50-333

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