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

April 1, 2015

Mr. Paul Fessler, Senior VP
and Chief Nuclear Officer
DTE Energy Company
Fermi 2 – 210 NOC
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI, UNIT 2 - INTERIM STAFF EVALUATION RELATING TO OVERALL INTEGRATED PLAN IN RESPONSE TO PHASE 1 OF ORDER EA-13-109 (SEVERE ACCIDENT CAPABLE HARDENED VENTS) (TAC NO. MF4362)

Dear Mr. Fessler:

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. ML14182A203), DTE Electric Company (DTE), submitted its Overall Integrated Plan (OIP) for Fermi, Unit 2 (Fermi) in response to Phase 1 of Order EA-13-109. By letter dated December 18, 2014 (ADAMS Accession No. ML14352A174), DTE submitted its first six-month status report for Fermi in response to Order EA-13-109. By letter dated March 19, 2015 (ADAMS Accession No. ML15079A044), DTE resubmitted its OIP for Fermi to include page 40 of 44 inadvertently omitted from the June 30, 2014, OIP submittal. Any changes to the compliance method will be reviewed as part of the ongoing audit process.

DTE's OIP for Fermi appears consistent with the guidance found in Nuclear Energy Institute (NEI) 13-02, Revision 0, 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. This evaluation only addressed consistency with the guidance. Any plant modifications will need to be conducted in accordance with plant engineering change processes and consistent with the licensing basis.

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

Sincerely,

Mandy K. Halter

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

Docket No. 50-341

Enclosure:
Interim Staff Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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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

DTE ELECTRIC COMPANY

FERMI, UNIT 2

DOCKET NO. 50-341

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.[1]

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

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[1] 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 ISE at a later date.

system (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 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], DTE Electric Company (DTE, the licensee) provided the OIP for Fermi, Unit 2 (Fermi) for compliance with Phase 1 of Order EA-13-109. By letter dated March 19, 2015 [Reference 3], DTE resubmitted its OIP for Fermi to include page 40 of 44 inadvertently omitted from the June 30, 2014, OIP submittal. 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 Phase 1 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 4]. 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) for SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011 [Reference 5], and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 [Reference 6].

As directed by the Commission's SRM for SECY-11-0093 [Reference 7], 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 8], 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 9], the NRC staff issued Order EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents" [Reference 10], which required 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 11]. In the SRM for SECY-12-0157 [Reference 12], the Commission directed the NRC 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 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 13] 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 14], 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 15], the NRC notified all BWR Mark I and Mark II licensees that the NRC staff will be conducting audits of the implementation of Order EA-13-109. This letter described the audit process to be used by the NRC 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

Fermi is a single unit BWR with a Mark I primary containment system. DTE is upgrading an existing HCVS at Fermi to meet the severe accident capable HCVS requirements of Phase 1 of Order EA-13-109. The existing system consists of a wetwell vent and a drywell vent that combine in a common header that is routed to an effluent release point above the reactor building roof. Modifications are planned to supplement the HCVS batteries and HCVS motive air. The elevation of the effluent release point will be extended to discharge 3 feet above the reactor building roof parapet. The OIP describes plant modifications, strategies and guidance under development for HCVS implementation.

3.1 GENERAL INTEGRATED PLAN ELEMENTS AND ASSUMPTIONS

3.1.1 Evaluation of Extreme External Hazards

Extreme external hazards for Fermi were evaluated in the Fermi OIP in response to Order EA-12-049 (Mitigation Strategies) [Reference 16]. In the Fermi ISE relating to Mitigation Strategies [Reference 17], NRC staff documented an analysis of DTE's extreme external hazards evaluation. The following extreme external hazards screened in: Seismic, External Flooding, Extreme Cold, High Wind, and Extreme High Temperature. Hurricane screened out. Based on DTE not excluding any external hazard from consideration, the NRC Staff determined that DTE appears to have identified the appropriate external hazards for consideration in the design of HVCS.

3.1.2 Assumptions

On page 6 of the Fermi OIP, DTE adopted a set of generic assumptions associated with Order EA-13-109 Phase 1 actions. The NRC staff determined that the set of generic assumptions appear to establish a baseline for HCVS evaluation consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable method to implement the requirements of Order EA-13-109.

The NRC staff reviewed the Fermi plant-specific HCVS related assumptions:

F2-1 The current Torus Hardened Vent stack on the Auxiliary Building (AB) roof can handle the HCVS flow.

F2-2 All load stripping is accomplished within one hour and fifteen minutes of event initiation and will occur at locations not impacted by a radiological event.

Concerning assumption F2-1, in section 3.2.2.1 and 3.2.2.2 of this ISE, open items address the HCVS stack capacity. Concerning assumption F2-2, confirmation that load stripping can be accomplished within one hour and fifteen minutes is not available at this time; therefore, the NRC staff has not completed its review.

Open Item: Make available for NRC staff audit documentation confirming that all load stripping will be accomplished within one hour and fifteen minutes of event initiation and will occur at locations not impacted by a radiological event.

3.1.3 Compliance Timeline and Deviations

Page 4 of the OIP states the following:

> Compliance will be attained for Fermi 2 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. Currently scheduled for RF-18 planned for second quarter 2017.
>
> - Phase 2: by the startup no later than startup from RF-19. Currently scheduled for Fourth Quarter 2018.
>
> If deviations are identified at a later date, then the deviations will be communicated in a future 6 month update following identification.

DTE's schedule appears to comply with the Order EA-13-109 requirements. Regarding other deviations, DTE did not identify any. However, the NRC staff has identified one deviation from the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable method to implement the requirements of Order EA-13-109. The deviation pertains to the Institute of Electrical and Electronic Engineers (IEEE) standard used by DTE for instrumentation seismic qualification and is discussed further in section 3.2.2.9, "Component Qualification," of this ISE.

<u>Summary, Section 3.1</u>:

The licensee's described approach to General Integrated Plan Elements and Assumptions if implemented, as described in Section 3.1, 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.

3.2 BOUNDARY CONDITIONS FOR WETWELL VENT

3.2.1 Sequence of Events (SOE)

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 Power (ELAP) Failure Evaluation table, which shows alternate actions that can be performed, is included in Attachment 4 [of the OIP].

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, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109. 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 (SOV) failure.

The NRC staff reviewed the three cases contained in the SOE 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) (note: Torus feed and bleed, not HCVS initiation, is the primary FLEX response method); 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 Fermi Mitigation Strategies OIP [Reference 18], SECY-12-0157 [Reference 11], and State-of-the-Art Reactor Consequence Analyses (SOARCA) [Reference 19].

The NRC staff reviewed the licensee discussion of time constraints on page 9 of the OIP and confirmed that the time constraints identified appear to be appropriately derived from the time lines developed in Attachment 2 of the OIP, consistent with the guidance found in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02. 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 NRC staff reviewed the discussion of radiological and temperature constraints on page 12 of the OIP. The licensee identified that accessibility evaluations are required for specific HCVS locations outside the main control room. Until these locations are finalized, the licensee cannot complete evaluations of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment; therefore, the NRC staff has not completed its review.

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 12 of the OIP states the following:

> The HCVS wetwell path is designed to vent steam/energy at a nominal capacity of greater than 1% of the current licensed power of 3486 MWt [Megawatt thermal] at a pressure of 53.9 psig. The pressure of 53.9 psig is lower than the containment design pressure (56 psig) and the PCPL [primary containment pressure limit] value (58.8 psig). The size of the wetwell portion of the HCVS is 20 and 24 inches in diameter until it reduces to a HCVS dedicated 10 inch pipe on RB [Reactor Building] 5, which provides adequate capacity to meet or exceed the Order criteria.

The Fermi OIP describes a vent sized to meet or exceed one percent or greater current licensed thermal power. Specific details not available at this time include: 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 NRC 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 12 of the OIP states the following:

> The 1% of 3486 MWt value at Fermi 2 assumes that the suppression pool pressure suppression capacity is sufficient to absorb the decay heat generated during the first 3 hours. HCVS venting 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 Fermi OIP assumes that until decay heat is less than the one percent capacity of the proposed HCVS, the suppression pool must absorb the decay heat generated until the HCVS is able to restore and maintain primary containment pressure below the primary containment design pressure and the PCPL. An analysis confirming 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 is not available at this time; therefore, the NRC 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, Sections 1.1.4 and 1.2.2 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.
>
> 1.2.2 The HCVS shall discharge the effluent to a release point above main plant structures.

Page 12 of the OIP states the following:

> The existing HCVS vent path at Fermi 2 consists of a wetwell and drywell vent. The wetwell vent rises using Standby Gas Treatment System [SGTS] piping from the torus, joins the drywell vent on RB 3rd floor, connects to the SGTS system inlet piping on RB 5th floor then exhausts through a dedicated 10 inch vent stack.
>
> HCVS has its own discharge path. The HCVS discharge path is routed to a point above the Reactor Building roof. The cooling towers have a higher elevation than HCVS discharge point but they are not adjacent to the Reactor Building. The Reactor Building ventilation system vent stack is at a higher elevation and is 67 feet south of HCVS stack. The vent stack will be extended to discharge 3 feet above the RB roof parapet. The HCVS discharge will vent away from emergency ventilation system intake and exhaust openings, main control room location, location of HCVS portable equipment, access routes required following an ELAP and BDBEE, and emergency response facilities.
>
> The detailed design will provide appropriate missile protection on RB 5th floor in accordance with NEI guidance.

The Fermi OIP describes the routing and discharge point of the HCVS that, pending resolution of open items, appear 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. A 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 is not available at this time; therefore, the NRC staff has not completed its review.

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.

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:

> For the first 24 hours following the ELAP event, power for the HCVS is provided from either the station battery or a dedicated HCVS battery for operation from HCVS Control Panel H21P101 (primary controls location). After 24 hours, power is available from FLEX sources through existing MPU #1, MPU #2, and the station battery chargers for HCVS operation from the Control Room and Relay Room (alternate controls location). Battery power will be provided from the station batteries during the coping period and from the dedicated HCVS battery for the remaining period until the use of FLEX power sources. After 24 hours, power is available and credited from a FLEX Phase 2 480V generator for both the station batteries and 120VAC distribution equipment, to allow HCVS operation from the either the HCVS Control Panel or Control Room.
>
> Pneumatic power is provided by the local Nitrogen bottles for the first 24 hours. Alternate method of operation used the non-interruptible air system with backup air provided from the FLEX Compressor. Following an ELAP event, station air system is lost. The Primary pneumatic power is supplied by the local Nitrogen bottles until NIAS [non-interruptible air supply]is restored via FLEX. The alternate method is expected to be in service based on FLEX actions conducted prior to 6 hours post event but is not credited until > 24 hours post event.
>
> 1. The existing HCVS flow path valves are either air-operated valves (AOV) with air-to-open and spring-to- shut (i.e., the wet well containment isolation valves and the torus hardened vent isolation valves) or AOV air-to-shut and spring-to-open (RBHVAC isolation from RB 3rd and RB 5th floor). Operating the valves to their required positions for HCVS requires energizing an AC or DC [direct current] powered solenoid operated valve (SOV) and providing motive air/gas. The initial stored motive air/gas will allow for a minimum of 12 valve operating cycles for the HCVS control valve for the first 24-hours. After the first 24 hours, FLEX generators and compressor will be available to maintain electric power and pneumatic supply for HCVS components.

2. An assessment of temperature and radiological conditions will be confirmed acceptable to ensure that operating personnel can safely access and operate controls at the HCVS Control Panel based on time constraints listed in Attachment 2.

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

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 hand wheel, reach–rod or similar means that requires close proximity to the valve (reference FAQ [frequently asked question] HCVS-03). The operating mechanisms are routed to the HCVS Control Panel located in the Division 2 Switchgear room (AB 3rd Floor). This location is outside the heat influence zone for the HCVS discharge pipe (located in the Reactor Building) and ventilation is supplemented by the FLEX Battery Exhaust fans. This location is also east of the concrete shield wall between the Reactor Building and the Auxiliary Building for adequate shielding from the expected HCVS pipe source term. DC power supplemental system is located at the HCVS Control Panel and will be designed to minimize man-power resources. Required portable equipment for the alternate HCVS operation is all required FLEX mitigating strategies support equipment and is protected to the standards in NEI-12-06 (Attachment 1). Based on this, 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, alternate motive force will be supplied from the FLEX Compressor to the NIAS header for operation of the HCVS valves via their normally designed operators from the Control Room. The FLEX compressor can be started prior to 6 hours following the event but will not be credited for < 24 hours following the event. Vital 120 VAC power for HCVS Valve and Radiation Monitor operation from the Control Room (alternate operation) will be supplied via the FLEX Generators 2 hours after event initiation. This alternate AC power will not be credited 24 hours following the event.

The Fermi OIP describes system features, such as a dedicated HCVS battery and local nitrogen bottles, to support HCVS system operation for the first 24 hours. Beyond 24 hours system operation will be supported by a FLEX generator and a FLEX air compressor. Design details not available at this time include: an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified), documentation of the HCVS nitrogen pneumatic system design including sizing and location (licensee identified), and 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.

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.

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 HCVS Control Panel located in the Division 2 Switchgear Room (Primary controls location) and the Main Control Room (MCR) (alternate controls location). Both the HCVS Control Panel and the MCR location are protected from adverse natural phenomena and will be evaluated as a normal control point

for Plant Emergency Response actions. The HCVS Control Panel location is outside the heat influence zone for the HCVS discharge pipe (located in the Reactor Building). This location is also east of the concrete shield wall between the Reactor Building and the Auxiliary Building for adequate shielding from the expected HCVS pipe source term.

The Fermi OIP describes two HCVS control locations, a primary controls location in the Division 2 switchgear room and an alternate controls location in the control room. Design details not available at this time include: an assessment of communication capability between remote operation locations and HCVS operational decision makers, an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment (licensee identified), and 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; therefore, the NRC 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 an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.

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.

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 14 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. Fermi 2 is considering a discharge check valve in combination with a purge system as required installed after the last HCVS Isolation Valve. The evaluation of the purge system and operation of the purge valve connecting to the HCVS piping will be described in the detailed 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 NRC 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, Sections 1.2.3 and 1.2.12 state that:

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

- The Containment Purge System control circuit will be used during all "design basis" operating modes including all design basis transients and accidents.

- Cross flow potential exists between the HCVS and the Standby Gas Treatment System (SGTS). Resolution involves evaluation of SGTS boundary valve leakage. Testing and maintenance will be performed to ensure that the valves remain leak tight with established leakage criteria.

The Fermi OIP describes methods to minimize unintended cross flow within the unit that include AOVs that are air-to-open spring-to-shut and containment isolation valves with separate control circuits for non-HCVS functions. Design details of features to prevent actuation of the interfacing valves between SGTS and HCVS during HCVS operation are not available at this time; therefore, the NRC staff has not completed its review.

Open Item: Make available for NRC staff review design details to ensure the potential for cross flow between HCVS and SGTS is minimized.

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/EPG [emergency operating procedure/emergency procedure guideline] operating procedures will 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.
>
> The features that prevent inadvertent actuation are:
>
> - Key lock switches will be provided to prevent inadvertent operation of the HCVS control valves.
>
> - The HCVS Control Panel override capability of Containment isolation function is not powered to allow this override without operator action.
>
> - Energizing the HCVS Control Panel will be annunciated in the MCR per the IEEE-279 standards.
>
> - Procedures will also provide clear guidance to not circumvent containment integrity by simultaneously opening torus and drywell vent valves during any design basis transient or accident.

The Fermi OIP describes methods to prevent inadvertent operation that include: procedure controls, annunciators, override capability and key lock switches. This appears to be in accordance 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.

3.2.2.9 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 qualified structures. HCVS components that directly interface with the pressure boundary will be designed in accordance with existing safety system boundaries. The containment system limits the leakage or release of radioactive materials to the environment to prevent offsite exposures from exceeding the guidelines of 10CFR100. During normal or design basis operations, this means serving as a pressure boundary to prevent release of radioactive material. Newly installed components will be seismically qualified back to their isolation boundaries.
>
> Any electrical or controls component that 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 installed components will be considered Augmented Quality. Electrical and controls components will be seismically qualified and will include the ability to handle harsh environmental conditions (although they will not be considered part of the site Environmental Qualification (EQ) program).
>
> HCVS instrumentation performance (e.g., accuracy and precision) need not exceed that of similar plant installed equipment. Additionally, radiation monitoring instrumentation accuracy and range will be sufficient to confirm flow of radionuclides through the HCVS. The HCVS instruments, including valve position indication, process instrumentation, radiation monitoring, and support system monitoring, will be qualified by using one or more of the three methods described in the ISG, which includes:
>
> 1. Purchase of instruments and supporting components with known operating principles from manufacturers with commercial quality assurance programs (e.g., ISO9001) where the procurement

specifications include the applicable seismic requirements, design requirements, and applicable testing.

2. Demonstration of seismic reliability via methods that predict performance described in IEEE 344-1975

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

Instrument	**Qualification Method***
HCVS Process Temperature	ISO9001 / IEEE 344-1975 / Demonstration
HCVS Process Radiation Monitor	ISO9001 / IEEE 344-1975 / Demonstration
HCVS Process Valve Position	ISO9001 / IEEE 344-1975 / Demonstration
HCVS Electrical Power Supply Availability	ISO9001 / IEEE 344-1975 / Demonstration

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

In its description of component qualifications, the Fermi OIP deviates from the industry provided template that provides essential OIP information, as described in section 7.2.2.2 of NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109 by substituting IEEE 344-1975 for IEEE 344-2004 as the seismic qualification standard. Specific details not available at this time include: information regarding the pre-qualification methods of existing instrumentation, which will be used by operators to make containment venting decisions, HCVS component qualification details that take into account local conditions (temperature, radiation and humidity) confirming that HCVS components are capable of performing their functions, and confirmation that the containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting; therefore, the NRC staff has not completed its review.

Open Item: Provide a justification for deviating from the instrumentation seismic qualification guidance specified 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.

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, and 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 15 of the OIP states the following:

The Fermi 2 wetwell HCVS will be capable of being manually operated during sustained operations from an HCVS Control panel located in the Division 2 Switchgear Room. The Division 2 Switchgear Room location is in the Auxiliary Building and is in a separate ventilation zone from the Reactor Building area and is not directly impacted by the HCVS piping heat load. On loss of power, the Division 2 Switchgear Room ventilation is isolated from the Reactor Building ventilation. A 4.3' thick concrete shield wall separates the HCVS piping from the HCVS Control Panel, providing protection equivalent to GDC 19/Alternate Source Term (AST). This operating location meets the requirements of Order element 1.2.4. The controls and indications at the HCVS 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. The Fermi 2 wetwell HCVS will also be capable of being manually operated during sustained operations from a control panel located in the MCR (alternate controls location). The MCR is a readily accessible location with no further evaluation required. Control Room dose associated with HCVS operation conforms to GDC 19/Alternate Source Term (AST). This location meets the intent for an alternate control location of section 1.2.5 of the Order as described in NEI 13-02 section

4.2.2.1.2.1. The controls and indications at the MCR 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 confirm 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 at both the HCVS Control panel and the MCR. The HCVS Control panel includes valve position indications for the seven (7) operating valves and the two SGTS Isolation valves. HCVS pneumatic capability is provided by bottle sizing for 7 days in addition to pneumatic capability from the NIAS system after first 24 hours.

The wetwell HCVS operation will be indicated by valve position and gas flow (indicated by temperature). HCVS effluent radiation level will be indicated by the radiation monitor. Indication of HCVS electrical capability will be provided by Division II station battery voltage and HCVS battery voltage. These indicators will provide compliance with Requirement 1.2.4 and will be designed for sustained operation during an ELAP event.

The Fermi OIP provides a description of HCVS monitoring and control that, pending resolution of open items, 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. Descriptions 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 are not available at this time; therefore, the NRC staff has not completed its review.

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 for the vent pipe effluent.
>
> Torus vent design temperature and pressure will be increased from 300°F and 62 psig to 340°F and 80 psig. Containment and isolation valves T4600F400, T4600F401 and T4600F412 are currently qualified for 340°F. NEI 13-02 guidance section 2.4.3 and 5.1.1 recommends 350°F and 80 psig. The Fermi 2 hardened vent will be opened to protect the PCPL of 58.8 psig and containment design pressure of 56 psig, which equates to a saturation temperature of 303°F. 340°F provides adequate margin to ensure the torus vent containment isolation valves will perform their hardened vent and isolation functions.
>
> Conduit will be installed to Seismic Class 1 criteria. Both existing and new barriers will be used to provide a level of protection from missiles when equipment is located outside of seismically qualified structures. Augmented quality requirements will be applied to the components installed in response to this Order.
>
> If the instruments are purchased as commercial-grade equipment, they will be qualified to operate under severe accident environment as required by NRC Order EA-13-109 and the guidance of NEI 13-02. The equipment will be qualified seismically (IEEE 344), environmentally (IEEE 323), and for electro-magnetic compatibility (per RG 1.180). These qualifications will be bounding conditions for Fermi 2.
>
> 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 IEEE Standard 344-1975, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations, (Reference 27 [of the 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 Fermi OIP deviates from the industry provided template that provides essential OIP information as described in section 7.2.2.2 of NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109 by substituting IEEE 344-1975 for IEEE 344-2004 as the seismic qualification standard. This was discussed in Section 3.2.2.9. Other descriptions for component reliable and rugged performance that appear to be in accordance 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.

3.2.3 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 in the FLEX Contingency mode will be designed to minimize the reliance on operator actions for response to a ELAP and BDBEE hazards identified in part 1 of this OIP. Immediate operator actions can be completed by Operators from the HCVS control station and include 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 HCVS Control Panel. This location minimizes plant operators' exposure to adverse temperature and radiological conditions and is protected from hazards assumed in Part 1 of this report [the OIP].

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

System control:

i. Active: Control valves and/or PCIVs [Primary Containment Isolation Valves] are operated in accordance with EOPs/SOPs [standard operating procedures] to control containment pressure. The HCVS is designed for 12 open/close cycles under ELAP conditions over the first 24 hours following an ELAP. Controlled venting as a contingency action under FLEX will be permitted in the revised EPGs and associated implementing EOPs.

ii. Passive: Inadvertent actuation protection is provided by a normally de-energized HCVS Control Panel with energization annunciated in the MCR. A key-lock is provided to prevent inadvertent operation at the HCVS Control Panel.

The Fermi OIP describes a first 24 hour BDBEE coping strategy that, pending resolution of open items, appears to be in accordance 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. 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 are not available at this time; therefore, the NRC 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 18 of the OIP states the following:

> After 24 hours, available personnel will be able to power 120 VAC and NIAS air supplies to allow operation of the HCVS Valves from the Control Room. FLEX Generators are credited for re-energizing MPU #1 and MPU #2 electrical supplies to restore normal HCVS valve operations. FLEX actions will bypass the required Containment Isolation logic to allow HCVS Valve positioning. As stated previously, operation of the HCVS system after 24 hours is only a contingency if the credited FLEX method of Feed and Bleed of the Torus fails to maintain Torus Temperature below 220 F.
>
> These actions provide long term support for HCVS operation for the period beyond 24 hours to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the unit to provide needed action and supplies.

The Fermi OIP describes a greater than 24 hour BDBEE coping strategy that, pending resolution of open items, appears to be in accordance 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. 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 are not available at this time; therefore, the NRC 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 21 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. Actions will be completed by Operators at the HCVS Control Panel and will include remote-manual actions to operate HCVS valves using the locally installed operating bottles and DC solenoids. The operator actions required to open a vent path were previously listed in the BDBEE Venting Part 2 section of this report [the OIP] (Table 2-1 [of the OIP]). Operator actions required are limited to DC load shedding (Relay Room), energizing the HCVS Control Panel, and operation of the HCVS Control Panel.
>
> Permanently installed power and motive air/gas capable will be available to support operation and monitoring of the HCVS for 24 hours. Specifics are the same as for BDBEE Venting Part 2.

System control:

I. Active: Primary method: Control valves and/or PCIVs are operated in accordance with EOPs/SOPs to control containment pressure. The HCVS will be designed for 12 open/close cycles under ELAP conditions over the first 24 hours following an ELAP. Controlled venting will be permitted in the revised EPGs and associated implementing EOPs.

II. Passive: Same as for BDBEE Venting Part 2.

The Fermi OIP describes a first 24 hour severe accident coping strategy that, pending resolution of open items, appears to be in accordance 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. 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 are not available at this time; therefore, the NRC 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.

3.2.4.2 Greater Than 24 Hour Coping

Order EA-13-109, Sections 1.2.4 and 1.2.8 state 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 21 of the OIP states the following:

> Specifics are the same as for BDBEE Venting Part 2.
>
> These actions provide long term support for HCVS operation for the period beyond 24 hours to 7 days (sustained operation time period) because on-site and off-site personnel and resources will have access to the unit to provide needed action and supplies.

The Fermi OIP describes a greater than 24 hour severe accident coping strategy that, pending resolution of open items, appears to be in accordance 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. 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 are not available at this time; therefore, the NRC 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 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 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 23 of the OIP states the following:

> Containment integrity is initially maintained by permanently installed equipment. All containment venting functions will be performed from the HCVS Control Panel or MCR.
>
> Venting will require support from DC power and pneumatic supplies from permanently installed local bottles (Primary operating mechanism for the first 24 hours). Existing safety related station batteries will provide sufficient electrical power for HCVS operation for greater than 14 hours. Before station batteries are depleted, installed HCVS dedicated batteries will be placed in service using a throw over switch located at the HCVS Control panel to attain > 24 hours capacity for HCVS Operation with DC Load Shedding accomplished via the FLEX actions.

The Fermi OIP describes BDBEE supporting equipment functions that, pending resolution of open items, appear to be in accordance 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. 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 are not available at this time; therefore, the NRC 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 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 23 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 the 12 to 24 hours, dedicated HCVS batteries will be available to feed HCVS loads via a manual transfer switch to attain > 24 hours capacity for HCVS Operation with DC Load Shedding accomplished via the FLEX actions.
>
> At 24 hours, power will be available at the station service batteries which, at that point, will be backed up by FLEX generators evaluated for SA capability. FLEX generators supplying the DC Battery chargers are located outside the Reactor Building in a FLEX rated structure so issues of thermal or radiological impacts are minimized. This allows them to be used under Severe Accident conditions based on available distance and shielding provide by the Reactor Building exterior walls.
>
> Multiple sources of compressed air will be available (FLEX compressor, FLEX generator supplied NIAS compressors) to tie-in supplemental pneumatic sources to the NIAS system for HCVS valve operation.

The Fermi OIP describes severe accident venting supporting equipment functions that, pending resolution of open items, appear to be in accordance 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. 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 are not available at this time; therefore, the NRC 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.

3.2.6 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 25 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. At Fermi 2, no deployment is required in the areas around the Reactor Building or in the vicinity of the HCVS piping for access, operation and replenishment of consumables related to HCVS operation.

The Fermi 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 as an acceptable means for implementing applicable requirements of Order EA-13-109.

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 DRY WELL VENT

Summary, Section 3.3:

Dry Well 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.

On page 28 of the Integrated Plan, the licensee stated:

Program Controls:

The HCVS venting actions will include:

- Site procedures and programs are being developed in accordance with NEI 13-02 to address: operation of HCVS System in both standby and operating conditions, maintenance of HCVS permanent equipment, interface with NRC Order EA-12-049 equipment, connection points and timing for alternate HCVS control equipment being used, protection of HCVS 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.

Procedures:

Procedures will be established for system operations when normal and backup power is available, and during ELAP conditions. The HCVS procedures will be developed and implemented following the plant process for initiating or revising procedures and will 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
- testing of portable equipment,
- performance or surveillance testing

Provisions for out-of-service requirements of the HCVS and compensatory measures will be documented in the Beyond-Design-Bases Event Coping Strategies Program Document (pending MOP25):

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

- If for up to 90 consecutive days, the primary or alternate means of HCVS operation are non-functional, no compensatory actions are necessary.

- If for up to 30 days, the primary and alternate means of HCVS operation are 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
    - The appropriate compensatory actions will be implemented

The Fermi 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. 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 29 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, personnel on-site will be available to supplement trained personnel (reference NEI 12-06).

The Fermi 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 as an acceptable means for implementing applicable requirements of Order EA-13-109. 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 29 of the OIP states:

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

The Fermi OIP describes an approach to drills that appear 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 as an acceptable means for implementing applicable requirements of Order EA-13-109.

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 30 of the OIP stated 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.
>
> Fermi 2 will implement the following operation, testing and inspection requirements for the HCVS to ensure reliable operation of the system.

Table 4-1: Testing and Inspection Requirements

Description	Frequency
Cycle the HCVS 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

The Fermi 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 as an acceptable means for implementing applicable requirements of Order EA-13-109.

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 NRC staff intends to review further. The NRC staff has reviewed the licensee's 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 documentation confirming that all load stripping will be accomplished within one hour and fifteen minutes of event initiation and will occur at locations not impacted by a radiological event.	Section 3.1.2
2.	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Section 3.2.1 Section 3.2.2.4 Section 3.2.2.5 Section 3.2.2.10
3.	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.	Section 3.2.2.1 Section 3.2.2.2
4.	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
5.	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
6.	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Section 3.2.2.4 Section 3.2.3.1 Section 3.2.3.2 Section 3.2.4.1 Section 3.2.4.2 Section 3.2.5.1 Section 3.2.5.2
7.	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

8.	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Section 3.2.2.6
9.	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
10.	Make available for NRC staff review design details to ensure the potential for cross flow between HCVS and SGTS is minimized.	Section 3.2.2.7
11.	Provide a justification for deviating from the instrumentation seismic qualification guidance specified 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.	Section 3.2.2.9
12.	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Section 3.2.2.9
13.	Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.	Section 3.2.2.9

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 DTE to NRC, "DTE Electric Company's Phase 1 Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses With Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions (Order Number EA-13-109)" dated June 30, 2014 (ADAMS Accession No. ML14182A203).

3. Letter from DTE to NRC, "Fermi 2 - Resubmittal of Phase 1 Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses With Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions (Order Number EA-13-109" dated March 19, 2015 (ADAMS Accession No. ML15079A044).

4. SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan" (ADAMS Accession No. ML111861807).

5. SRM-SECY-11-0124, "Recommended Actions to be taken Without Delay from the Near-Term Task Force Report" (ADAMS Accession No. ML112911571).

6. SRM-SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned" (ADAMS Accession No. ML113490055).

7. 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).

8. 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).

9. 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).

10. Order EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents," March 9, 2012 (ADAMS Accession No. ML12054A694).

11. 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).

12. 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).

13. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 0, November 12, 2013 (ADAMS Accession No. ML13316A853).

14. Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, 'Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Performing under Severe Accident Conditions,'" Rev. 0, November 14, 2013 (ADAMS Accession No. ML13304B836).

15. 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).

16. Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events", March 12, 2012 (ADAMS Accession No. ML12054A735).

17. Fermi Unit 2 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (ADAMS Accession No. ML13220A133).

18. Letter from DTE to NRC, Fermi Unit 2, DTE Electric Overall Integrated Plan 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. ML13063A262).

19. NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report" (ADAMS Accession No. ML12332A058).

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Date: April 1, 2015

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Sincerely,

/RA/

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

Docket No. 50-341

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Interim Staff Evaluation

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