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NRC-18-0037

10 CFR 50.54(f)

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

Fermi 2 Power Plant
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: DTE Electric Company's Eighth Six-Month Status Report for
Implementation of Order EA-13-109, Order Modifying Licenses with
Regard to Reliable Hardened Containment Vents Capable of Operation
Under Severe Accident Conditions

- References:
- 1) NRC Order EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013 (Accession No. ML13130A067)
 - 2) NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," Revision 0, dated April 2015 (Accession No. ML15104A118)
 - 3) NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109, BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 1, dated April 2015 (Accession No. ML15113B318)
 - 4) DTE Electric Company Letter, NRC-14-0043, "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 (Accession No. ML14182A203)

- 5) DTE Electric Company Letter, NRC-15-0105, “DTE Electric Company’s Phase 1 and Phase 2 Overall Integrated Plan for Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated December 23, 2015 (Accession No. ML15357A289)
- 6) NRC Letter to DTE Electric Company, “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),” dated April 1, 2015 (Accession No. ML15077A574)
- 7) NRC Letter to DTE Electric Company, “Fermi Unit 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents),” dated August 30, 2016 (Accession No. ML16231A443)

On June 6, 2013, the U.S. Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to DTE Electric Company (DTE). Reference 2 was immediately effective and directed DTE to take certain actions to ensure that Fermi 2 Nuclear Power Plant has a Hardened Containment Venting System (HCVS) to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in loss of active containment heat removal capability while maintaining the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP). Specific requirements were outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an Overall Integrated Plan (OIP) by June 30, 2014 for Phase 1 of the Order, and an OIP by December 31, 2015 for Phase 2 of the Order. The interim staff guidance (Reference 2) provided direction regarding the content of the OIP for Phase 1 and Phase 2. Reference 2 endorsed industry guidance document NEI 13-02, Revision 1 (Reference 3), with certain clarifications and exceptions. References 4 and 5 provided the Phase 1 and Phase 2 OIPs. In References 6 and 7, NRC provided the Phase 1 and Phase 2 Interim Staff Evaluations for Fermi 2.

The Enclosure to this letter provides the eighth six-month update for Phase 1 and Phase 2 of the Order.

This letter contains no new regulatory commitments.

Should you have any questions or require additional information, please contact Mr. Scott A. Maglio, Manager – Nuclear Licensing, at (734) 586-5076.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 26, 2018



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Enclosure: DTE Electric Company's Eighth Six-Month Status Report

cc: Director, Office of Nuclear Reactor Regulation
NRC Project Manager
NRC Resident Office
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Regional Administrator, Region III
Michigan Public Service Commission,
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**Enclosure to
NRC-18-0037**

**Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43**

DTE Electric Company's Eighth Six-Month Status Report

DTE Electric Company's Eighth Six-Month Status Report for the Implementation of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

1 Introduction

DTE Electric Company (DTE) developed an Overall Integrated Plan (OIP) (Reference 8.1), documenting the installation of a Hardened Containment Venting System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to NRC Order Number EA-13-109 (Reference 8.2). Updates of milestone accomplishments will be based on the combined Phase 1 and 2 OIP, dated December 23, 2015 (Reference 8.3).

This Enclosure provides an update of milestone accomplishments since submittal of the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any, in accordance with Nuclear Energy Institute (NEI) 13-02, Revision 1, "Industry Guidance for Compliance with Order EA-13-109, BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" (Reference 8.4).

2 Milestone Accomplishments

The following milestone(s) have been completed since December 14, 2017, the previous completion date given in the Seventh Six-Month Status Report (Reference 8.9), and are current as of June 1, 2018, for this status report.

- Eighth Six-Month Status Report (this submittal)

3 Milestone Schedule Status

The following provides an update to Part 5 of the combined Phase 1 and 2 OIP (Reference 8.3). It provides the activity status of each item. No target completion dates have changes in this report. The dates are planning dates subject to change as design and implementation details are developed.

| Milestone | Target Completion Date | Activity Status | Comments {Include date changes in this column} |
|---|------------------------|-----------------|--|
| Phase 1 and 2 HCVS Milestone Table | | | |
| Submit Overall Integrated Plan | Jun 2014 | Complete | |
| Submit 6 Month Updates | | | |
| Update 1 | Dec 2014 | Complete | |
| Update 2 | Jun 2015 | Complete | |
| Update 3 [with Phase 2 OIP] | Dec 2015 | Complete | |
| Update 4 | Jun 2016 | Complete | |
| Update 5 | Dec 2016 | Complete | |
| Update 6 | Jun 2017 | Complete | |
| Update 7 | Dec 2017 | Complete | |
| Update 8 | Jun 2018 | This Submittal | |
| Update 9 | Dec 2018 | Not Started | |
| Phase 1 Specific Milestones | | | |
| Phase 1 Modifications | | | |
| Hold Preliminary/Conceptual Design Meeting | Jun 2014 | Complete | |
| Modifications Evaluation | Jul 2014 | Complete | |
| Design Engineering On-site/Complete | Apr 2017 | Complete | |
| Implementation Outage | Apr 2017 | Complete | |
| Walk Through Demonstration/Functional Test | Apr 2017 | Complete | |
| Phase 1 Procedure Changes Active | | | |
| Operations Procedure Changes Developed | Apr 2017 | Complete | |
| Site Specific Maintenance Procedure Developed | Apr 2017 | Complete | |
| Procedure Changes Active | Apr 2017 | Complete | |
| Phase 1 Training | | | |
| Training Complete | Apr 2017 | Complete | |
| Phase 1 Completion | | | |
| Submit Completion Report [60 days after full site compliance] | Jun 2017 | Not Required | Not required for Phase 1. |
| Phase 2 Specific Milestones | | | |
| Phase 2 Modifications | | | |
| Hold Preliminary/Conceptual Design Meeting | Sept 2016 | Complete | |
| Modifications Evaluation | Sept 2016 | Complete | |

| Milestone | Target Completion Date | Activity Status | Comments {Include date changes in this column} |
|---|-------------------------------|------------------------|---|
| Phase 2 Specific Milestones (cont.) | | | |
| Design Engineering On-site/Complete | Oct 2018 | Started | Calculation updates are required for Phase 2. |
| Implementation Outage | Oct 2018 | Not Required | No modifications required for Phase 2. |
| Walk Through Demonstration/Functional Test | Oct 2018 | Started | |
| Phase 2 Procedure Changes Active | | | |
| Operations Procedure Changes Developed | Oct 2018 | Started | |
| Site Specific Maintenance Procedure Developed | Oct 2018 | Started | |
| Procedure Changes Active | Oct 2018 | Started | |
| Phase 2 Training | | | |
| Training Complete | Oct 2018 | Started | |
| Phase 2 Completion | | | |
| Submit Completion Report [60 days after full site compliance] | Dec 2018 | Not Started | |

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the combined Phase 1 and 2 OIP (Reference 8.3).

5 Need and Basis for Relief/Relaxation

DTE expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Combined Phase 1 and 2 Overall Integrated Plan and Interim Staff Evaluations

The following tables provide a summary of the open items documented in the combined Phase 1 and 2 OIP and the Interim Staff Evaluations (ISEs) (References 8.5 and 8.6) and the status of each item. All Phase 1 open items have been completed.

| Combined Phase 1 and 2 OIP Open Items | | Status |
|---------------------------------------|--|---|
| Phase 1 OIP Open Items | | |
| OIP Open Item | Action | Comment |
| 1 | Confirm thermal environment for actions using GOTHIC. | Complete. Conducted under Design Calculation DC-6639, Loss of HVAC-Room Environmental Analysis in Support of Hardened Vent. |
| 2 | Confirm radiological environment. | Complete. Conducted under Design Calculation DC-6645, HCVS Radiological Assessment. |
| 3 | Confirm suppression pool heat capacity. | Complete. Conducted under Design Calculation DC-6668, Torus Capacity to Absorb Decay Heat Generated During First Three Hours After Shutdown. |
| 4 | Define tornado missile protection for RB 5 th floor components. | Complete. Missile protection for HCVS components on the RB 5 th floor was provided by following the guidance of NRC endorsed white paper HCVS-WP-04, Missile Evaluation for HCVS Components 30 Feet Above Grade. Fermi 2 also conducted an evaluation of actions and timeframes for actions in the event of a tornado and have placed steps in 29.400.01 for FLEX Venting and 29.400.03 for HCVS Venting to ensure proper checks for HCVS function after a tornado. |
| Phase 2 OIP Open Items | | |
| OIP Open Item | Action | Comment |
| 1 | Confirm that the thermal environment supports feasibility of staff actions. | Thermal evaluation of SAWA actions is in progress. |
| 2 | Confirm that the radiological environment supports feasibility of staff actions. | Radiological evaluation of SAWA actions is in progress. |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|---------------------------------------|---|---|
| Phase 1 ISE Open Items | | |
| 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. | Complete. Validation of times needed for load stripping is contained in the FLEX Validation Program results that are documented in TMII-15-0008 which was posted on the e-portal. |
| 2 | Make available for NRC staff audit an evaluation of Section 3.2.1 temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment. | Complete for Phase 1 actions. The evaluation of temperature conditions is contained in DC-6639 and the evaluation of radiological conditions is contained in DC-6645. These design calculations were posted on the e-portal. |
| 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. | Complete. HCVS vent capacity evaluation is contained in DC-6646, Torus Hardened Vent Sizing Analysis and Dynamic Analysis. Suppression pool heat capacity is contained in DC-6668. These design calculations were posted on the e-portal. |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|--|--|---|
| Phase 1 ISE Open Items (cont.) | | |
| 4 | Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during extended loss of alternating current (AC) power (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. | <p>Complete.</p> <p>The evaluation of HCVS components capability during ELAP and severe accident conditions was performed by review of vendor test reports and plant design basis environmental qualification material in comparison to local conditions determined by the design calculations discussed in the response to Phase 1 ISE Item 2 above. Results of these comparisons are documented in DC-6639 and DC-6645 for areas containing new components.</p> <p>DC-6639 and DC-6645 were posted on the e-portal.</p> |
| 5 | Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location. | <p>Complete.</p> <p>The HCVS pneumatic design and location is included in Engineering Design Package (EDP) 37115, Reliable Severe Accident Capable Containment Wetwell Venting System Modification for NRC Order EA-13-109, for all the pneumatic tubing runs to the valves and for T46P410/P411. The sizing is included in DC-6636, Hardened Containment Vent System Bottle Sizing.</p> <p>The requested information was provided on the e-portal.</p> |
| 6 | Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX diesel generator (DG) loading calculation. | <p>Complete.</p> <p>The sizing evaluation for the HCVS battery is included in DC-6584 Rev A, FLEX DC Calculations.</p> <p>The requested information was provided on the e-portal.</p> |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|--|--|---|
| Phase 1 ISE Open Items (cont.) | | |
| 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. | <p>Complete.</p> <p>The primary method of communications will be via satellite phone per 29.FSG.06. Adequate communication is provided by face to face communication for commencement of venting per 29.FSG.13 (HCVS prior to 24 hours) and by face to face continuous communication for HCVS Operation from the Main Control Room (MCR) after 24 hours.</p> <p>The requested information was provided on the e-portal.</p> |
| 8 | Provide a description of the final design of HCVS to address hydrogen detonation and deflagration. | <p>Complete.</p> <p>The plant used the guidance from NEI 13-02 and white paper HCVS-WP-03, Hydrogen/Carbon Monoxide Control Measures, Rev 1. Fermi 2 used the check valve option. Check Valve testing and design is per EDP 37115 with evaluation of leakage in EDP 37115.B103.</p> <p>The requested information was provided on the e-portal.</p> |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|--|--|--|
| Phase 1 ISE Open Items (cont.) | | |
| 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. | <p>Complete.</p> <p>By use of the HCVS in conjunction with the EPG/SAGs, the containment will be maintained below pressure limits (with the exception that short excursions may occur and are acceptable). Maintaining containment within failure limits will minimize containment leakage to secondary containment; therefore, minimizing the potential for hydrogen gas migration and ingress outside of containment and the HCVS piping. Valves that directly connect to the Reactor Building air space (T4600F407/ F410) have been leak tested per 47.000.94, Local Leakage Rate Testing for Hardened Vent.</p> <p>In addition, cross flow is addressed in Phase 1 ISE Item 10 for leakage between HCVS and Standby Gas Treatment System.</p> <p>Fermi 2 utilizes leak tight valves as a strategy for hydrogen control to minimize hydrogen gas migration and ingress into the Reactor Building per NEI 13-02 Sections 4.1.4.1.2, 4.1.4.1.5, 4.1.4.1.8 (testing). All applicable valves have been tested per 10 CFR 50 Appendix J or new procedure 47.000.94 to ensure proper leak tight integrity.</p> <p>Test results were posted on the e-portal.</p> |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|--|--|---|
| Phase 1 ISE Open Items (cont.) | | |
| 10 | Make available for NRC staff review design details to ensure the potential for cross flow between HCVS and Standby Gas Treatment System (SGTS) is minimized. | <p>Complete.</p> <p>The expected differential pressure is within the scope of containment design for compliance with GL 89-16.</p> <p>HCVS and SGTS cross flow is minimized by use of the auto close on loss of Non-Interruptible Air Supply (NIAS)/ 120 VAC to T4600F408/ F409 valves between HCVS pipe and SGTS. Additionally, both the T4600F408/ F409 valves were tested under 47.000.94 procedure for leak tight integrity.</p> <p>Test results were posted on the e-portal.</p> |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|--|---|--|
| Phase 1 ISE Open Items (cont.) | | |
| 11 | <p>Provide a justification for deviating from the instrumentation seismic qualification guidance specified in Nuclear Energy Institute (NEI) 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109.</p> | <p>Complete.</p> <p>The Fermi 2 existing design basis instrument seismic qualification standard is IEEE 344-1975.</p> <p>Fermi 2 Design Basis for Containment Isolation Valves (CIVs) (T4600F400, T4600F401, T4803F602, T4600F402, T4600F411) is IEEE 344-1975 based on original design. Upgrading to IEEE 344-2004 for these components (valves, AC solenoids, limit switches) is not required by Order EA-13-109 as design basis for CIVs is exempted.</p> <p>Non CIV valves using existing hardware for operation (T4600F407, T4600F408, T4600F409, T4600F410, T4600F420, T4600F421) that are design basis valves (QA-1) installed prior to 2004 would similarly not require upgrade to IEEE 344-2004.</p> <p>Design basis instruments (Drywell Pressure, Torus Pressure, Torus Level) were also installed prior to 2004 and thus would not require upgrade to IEEE 344-2004.</p> <p>New DC solenoids for HCVS (for T4600F407, T4600F410, T4600F420, T4600F421) were upgraded to IEEE 344-2004 as were new instrumentation (HCVS Radiation Monitor, HCVS Thermal monitor).</p> <p>New operating shuttles for T4600F400/T4600F401 have no electrical parts and thus IEEE 344 does not apply.</p> |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|--|---|---|
| Phase 1 ISE Open Items (cont.) | | |
| 12 | Make available for NRC staff audit description of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods. | <p>Complete.</p> <p>The instrumentation planned and existing is listed in the OIP (Reference 8.3). The selected qualification methods for the instruments is defined in EDP 37115 Index Item 004 Section 5.14 (I & C Scope) and 5.32 where EQ Program impact was defined.</p> <p>The requested information was posted on the e-portal.</p> |
| 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 beyond design basis external events (BDBEE) and severe accident wetwell venting. | <p>Complete.</p> <p>The expected differential pressure is within the scope of containment design for compliance with GL 89-16. This evaluation is contained in EDP 37115 Index Item 004 Section 5.12 (Valves) and evaluated under DC-5938 Vol I, DC-5951 Vol I, DC-6170 Vol I, DC-5937 Vol I, DC-5989 Vol I, DC-6292, and Thrust Torque Calculations 2206C, 2406C, 2744C, 3612C, 3613C, 3590C.</p> <p>The requested Design Calculations and Thrust Torque Calculations were posted on the e-portal.</p> |

| Combined Phase 1 and 2 ISE Open Items | | Status |
|---------------------------------------|--|--|
| Phase 2 ISE Open Items | | |
| 1 | Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions. | Evaluation in progress to demonstrate adequacy of the Fermi 2 strategy. |
| 2 | Licensee to provide the site-specific MAAP evaluation that demonstrates Severe Accident Water Addition (SAWA) / Severe Accident Water Management (SAWM) can be maintained for greater than 7 days. | Evaluation in progress to demonstrate adequacy of the Fermi 2 strategy. |
| 3 | Licensee to demonstrate that there is adequate communication between Main Control Room and the SAWM control location during severe accident conditions. | Validation of HCVS actions is in progress to demonstrate adequate communication channels exist. |
| 4 | Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions. | Radiological analysis is in progress to demonstrate the SAWM flow instrumentation qualification. |

7 Interim Staff Evaluation Impacts

Items identified in the Phase 1 ISE (Reference 8.5) and Phase 2 ISE (Reference 8.6) are addressed in Section 6 above. There are no other impacts to the ISE identified at this time.

8 References

The following references support the updates to the combined Phase 1 and 2 OIP described in this Enclosure.

- 8.1 DTE Electric Company Letter, NRC-14-0043, “DTE Electric Company’s Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109),” dated June 30, 2014 (ML14182A203)
- 8.2 NRC Order Number EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated June 6, 2013 (ML13130A067)
- 8.3 DTE Electric Company Letter, NRC-15-0105, “DTE Electric Company’s Combined Phase 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109),” dated December 23, 2015 (ML15357A289)
- 8.4 NEI 13-02, “Industry Guidance for Compliance with Order EA-13-109, BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” Revision 1, dated April 2015 (ML15113B318)
- 8.5 NRC Letter to DTE Electric Company, “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),” dated April 1, 2015 (ML15077A574)
- 8.6 NRC Letter to DTE Electric Company, “Fermi Unit 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents),” dated August 30, 2016 (ML16231A443)
- 8.7 DTE Electric Company Letter, NRC-16-0069, “DTE Electric Company’s Fifth Six-Month Status Report for Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated December 9, 2016 (ML16344A252)
- 8.8 DTE Electric Company Letter, NRC-17-0043, “DTE Electric Company’s Sixth Six-Month Status Report for Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated June 27, 2017 (ML17178A343)
- 8.9 DTE Electric Company Letter, NRC-17-0079, “DTE Electric Company’s Seventh Six-Month Status Report for Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions,” dated December 14, 2017 (ML17348A784)