Exelon Generation.

Order No. EA-13-109

RS-16-236

December 14, 2016

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

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

Subject: Fifth Six-Month Status Report For Phases 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)

References:

1. NRC Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013
2. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions", Revision 0, dated November 14, 2013
3. 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
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
5. Exelon Generation Company, LLC's Answer to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 26, 2013
6. Exelon Generation Company, LLC Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 27, 2014
7. Exelon Generation Company, LLC First Six-Month Status Report Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 17, 2014 (FLL-14-035)
8. Exelon Generation Company, LLC Second Six-Month Status Report Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 30, 2015 (RS-15-153)

9. Exelon Generation Company, LLC Phase 1 (Updated) and Phase 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 15, 2015 (RS-15-302)
10. Exelon Generation Company, LLC Fourth Six-Month Status Report For Phases 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 June 30, 2016 (RS-16-111)
11. NRC letter to Exelon Generation Company, LLC, Nine Mile Point Nuclear Station, Unit 1 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC No. MF4481), dated March 26, 2015
12. NRC letter to Exelon Generation Company, LLC, Nine Mile Point Nuclear Station, Unit 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC No. MF4482), dated February 11, 2015
13. NRC letter to Exelon Generation Company, LLC, Nine Mile Point Nuclear Station, Unit 1 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC No. MF4481), dated August 30, 2016
14. NRC letter to Exelon Generation Company, LLC, Nine Mile Point Nuclear Station, Unit 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC No. MF4482), dated August 25, 2016

On June 6, 2013, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an Order (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to require their BWRs with Mark I and Mark II containments to take certain actions to ensure that these facilities have a hardened containment vent system (HCVS) to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in loss of active containment heat removal capability while maintaining the capability to operate under severe accident (SA) conditions resulting from an Extended Loss of AC Power (ELAP). Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 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 (References 2 and 3) provide direction regarding the content of the OIP for Phase 1 and Phase 2. Reference 3 endorses industry guidance document NEI 13-02, Revision 1 (Reference 4) with clarifications and exceptions identified in References 2 and 3. Reference 5 provided the EGC initial response regarding reliable hardened containment vents capable of operation under severe accident conditions. Reference 6 provided the Nine Mile Point Nuclear Station, Units 1 and 2, Phase 1 OIP pursuant to Section IV, Condition D.1 of Reference 1. References 7 and 8 provided the first and second six-month status reports pursuant to Section IV, Condition D.3 of Reference 1 for Nine Mile Point Nuclear Station. Reference 9 provided the Nine Mile Point Nuclear Station, Units 1 and 2, Phase 1 updated and Phase 2 OIP pursuant to Section

IV, Conditions D.2 and D.3 of Reference 1. Reference 10 provided the fourth six-month status reports pursuant to Section IV, Condition D.3 of Reference 1 for Nine Mile Point Nuclear Station.

The purpose of this letter is to provide the fifth six-month update reports for Phases 1 and 2, pursuant to Section IV, Condition D.3 of Reference 1, that delineates progress made in implementing the requirements of Reference 1 for Nine Mile Point Nuclear Station, Units 1 and 2. The enclosed reports provide an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any. The enclosed reports also address the NRC Interim Staff Evaluation open items contained in References 11, 12, 13, and 14.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 14th day of December 2016.

Respectfully submitted,

D. P. Helker

David P. Helker
Manager - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosures:

1. Nine Mile Point Nuclear Station, Unit 1 Fifth Six-Month Status Report for Phases 1 and 2 Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

2. Nine Mile Point Nuclear Station, Unit 2 Fifth Six-Month Status Report for Phases 1 and 2 Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region I
NRC Senior Resident Inspector - Nine Mile Point Nuclear Station
NRC Project Manager, NRR - Nine Mile Point Nuclear Station
Mr. Raj Auluck, NRR/JLD/TSD/JCBB, NRC
Mr. Brian E. Lee, NRR/JLD/JCBB, NRC
Mr. Jason C. Paige, NRR/JLD/JOMB, NRC

Enclosure 1

Nine Mile Point Nuclear Station, Unit 1

Fifth Six-Month Status Report for Phases 1 and 2 Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

(19 pages)

Enclosure 1

Nine Mile Point Nuclear Station, Unit 1
Fifth Six-Month Status Report for Phases 1 and 2 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

Nine Mile Point Unit 1 developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the installation of a Hardened Containment Vent 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 Reference 2. This six month status report updates the milestone accomplishments based on the combined Phases 1 and 2 Overall Integrated Plan dated December 15, 2015 (Reference 7) and last updated on June 30, 2016 (Reference 9).

Nine Mile Point Unit 1 developed an updated and combined Phases 1 and 2 Overall Integrated Plan (Reference 7 in Section 8), documenting:

1. The installation of a Hardened Containment Vent 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 Reference 2.
2. An alternative venting strategy that makes it unlikely that a drywell vent is needed to protect the containment from overpressure related failure under severe accident conditions, including those that involve a breach of the reactor vessel by molten core debris, in response to Reference 2

This enclosure provides an update of milestone accomplishments since submittal of the combined Phases 1 and 2 Overall Integrated Plan and the last six month update, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since the last six-month update was submitted under Reference 9, and are current as of December 2, 2016.

- Fifth Six-Month Update (complete with this submittal)

3 Milestone Schedule Status

The following provides an update to the Part 5 Milestone Schedule of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed. The revised Design Engineering Complete date shown below does not impact the order implementation date.

NMP1 - Phase 1 Specific Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Hold preliminary/conceptual design meeting	November 2013	Complete	
Submit Overall Integrated Implementation Plan	June 2014	Complete	
Submit 6 Month Status Report	December 2014	Complete	
Submit 6 Month Status Report	June 2015	Complete	
Submit 6 Month Status Report	December 2015	Complete	Simultaneous with Phase 2 OIP
Submit Combined Phase 1 & 2 Six-Month Status Report	June 2016	Complete	
Design Engineering Complete	~~July 2016~~ January 2017	Started	Design Package issued February 2016 and revised pkg. issued June 2016 to capture lessons learned from NMP2. Additional Design Package changes in progress.
Submit Combined Phase 1 & 2 Six-Month Status Report	December 2016	Complete with this submittal	
Maintenance and Operation Procedure Changes Developed, Training Complete	February 2017	Started	
Implementation Outage	April 2017	Not Started	
Procedure Changes Active, Walk-Through Demonstration/Functional Test	April 2017	Not Started	
Submit Completion Report	June 2019	Not Started	

NMP1 - Phase 2 Specific Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Submit Overall Integrated Implementation Plan	December 2015	Complete	Simultaneous with Phase 1 Updated OIP
Hold preliminary/conceptual design meeting	June 2015	Complete	
Submit 6 Month Status Report	June 2016	Complete	
Submit 6 Month Status Report	December 2016	Complete with this submittal	
Submit 6 Month Status Report	June 2017	Not Started	
Submit 6 Month Status Report	December 2017	Not Started	
Submit 6 Month Status Report	June 2018	Not Started	
Submit 6 Month Status Report	December 2018	Not Started	
Design Engineering Complete	April 2018	Not Started	
Maintenance and Operation Procedure Changes Developed, Training Complete	February 2019	Not Started	
Implementation Outage	April 2019	Not Started	
Procedure Changes Active, Walk-Through Demonstration/Functional Test	April 2019	Not Started	
Submit Completion Report	June 2019	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the combined Phases 1 and 2 Overall Integrated Plan (Reference 7).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

Nine Mile Point Unit 1 expects to comply with the order implementation date and no relief/relaxation is required at this time.

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

The following tables provide a summary of the open items documented in Attachment 7 of the combined Phases 1 and 2 Overall Integrated Plan, the Reference 6 Interim Staff Evaluation (ISE) for Phase 1 and the Reference 10 ISE for Phase 2, and the status of each item.

Open Item	Phase 1 Open Items from OIP	Status
1.	Perform final sizing evaluation for HCVS batteries and battery charger and include in FLEX DG loading calculation.	Deleted (closed to ISE open item number 7 below)
2.	Perform final vent capacity calculation for the Torus HCVS piping confirming 1 % minimum capacity.	Deleted (closed to ISE open item number 2 below)
3.	Perform final sizing evaluation for pneumatic Nitrogen (N2) supply.	Deleted (closed to ISE open item number 8 below)
4.	Perform confirmatory environmental condition evaluation for the Turbine Building in the vicinity of the Remote Operating Station (ROS) and HCVS dedicated pneumatic supply and batteries.	Deleted (closed to ISE open item numbers 6 and 11 below)
5.	State which approach or combination of approaches the plant determines is necessary to address the control of combustible gases downstream of the HCVS control valve.	Deleted (closed to ISE open item number 3 below)
6.	Complete evaluation for environmental/seismic qualification of HCVS components.	Deleted (closed to ISE open item numbers 9 and 11 below)
7.	Complete evaluation for environmental conditions and confirm the travel path accessibility.	Deleted (closed to ISE open item number 6 below)
8.	Perform radiological evaluation for Phase 1 vent line impact on ERO response actions.	Started

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
1	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	Seismic Design of HCVS stack The HCVS vent piping system has been evaluated to Seismic Category I requirements in pipe stress calculations S22.4-201.1P002 and S22.4-201.13P003 consistent with the plant's seismic design basis to comply with NEI 13-02, Section 5.2 seismic design guidance. Per NRC Letter, May 9, 2014 "Subject: Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Re-Evaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", the NRC concluded that NMP1 "screened out" of performing the seismic risk evaluation as part of the HCVS seismic analysis. Therefore, use of current licensing basis and design basis seismic information (i.e., response spectra) is considered acceptable for the BDB analysis of the HCVS piping system at NMP1. The above referenced pipe stress calculations are available for NRC review in the ePortal. Missile Protection of the HCVS stack NEI 13-02, Section 5.1.1.6 requires that missile impacts are to be considered for portions of the HCVS. The Nuclear Energy Institute (NEI) issued a white paper HCVS-WP-04, endorsed by the NRC, which provides a risk-informed approach to evaluate the threat posed to exposed portions of the HCVS by wind-borne missiles. The white paper concludes that the HCVS is unlikely to be damaged in a manner that prevents containment venting by wind-generated missiles coincident with an ELAP or LUHS, for plants that are enveloped by the assumptions in the white paper.	Complete

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		A NMP1 specific missile evaluation is documented in the Engineering Change Package (ECP) consistent with HCVS-WP-04. The conclusion of the evaluation is that NMP1 meets all of the tornado missile assumptions identified in HCVS-WP-004 and as such, supplementary protection is not required for the HCVS piping and components. The ECP missile evaluation is available in the ePortal for NRC review.	
2	Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject 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	The HCVS is sized to provide sufficient venting capacity to prevent a long-term overpressure failure of the containment by keeping the containment pressure below the containment design pressure and the primary containment pressure limit. The HCVS has been demonstrated by calculation S22.4-201.13F004 to have the capacity to vent the steam/energy equivalent of 1 percent of licensed/rated thermal power. The calculation indicates that a vent capacity of approximately 68,300 lb_m/hour of saturated steam at the primary containment design pressure is required. The results of this calculation show that the capacity of the HCVS exceeds this value. The suppression pool thermal capacity must be sufficient to absorb the decay heat generated during at least the first 3 hours following reactor shutdown. The total decay heat available to the suppression pool for the first 3 hours following reactor shutdown, when starting at 102% reactor thermal power, is 2.910E8 BTU; and the suppression pool thermal capacity, i.e., its capacity to absorb energy, is 6.299E8 BTU. Therefore, there is sufficient suppression pool capacity to absorb the decay heat during the first 3 hours following reactor shutdown, and the EA-13-109, Attachment 2, Requirement 1.21 and NEI 13-02, Section 4.1.1 are satisfied. The calculations supporting the above	Complete

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
	containment pressure limit.	response are available for NRC review in the ePortal.	
3	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	As discussed in the December 2015 OIP submittal, the NMP1 design will use an Argon purge system to prevent the possibility of hydrogen detonation and deflagration. The argon purge system design is illustrated on Piping and Instrumentation Drawing C-18014-C, Sht. 7, and is available for NRC review in the ePortal. The argon purge system was sized in calculation S22.4-201.13F001 which is on the ePortal.	Complete
4	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	At NMP1, the primary operating station for HCVS operation is located in the Auxiliary Control Room. A HCVS remote operating station (ROS) is located in the turbine building. The location was evaluated for habitability and accessibility during a severe accident. Onsite communications will be performed using either the installed sound powered headset system or the 450 MHz radios in the talk around mode, or a combination thereof. A sound powered phone jack is available near the ROS to communicate with the rest of the plant. Offsite communications will utilize fixed satellite phones in the Control Room and Technical Support Center (TSC). Both locations also have portable satellite phones staged. Communications protocol for beyond design basis events are documented in CC-NM-118 and procedure N1-OP-51 and are available for NRC review in the ePortal. These communication methods are consistent with FLEX communication practices at NMP1 and have been previously reviewed by the staff as documented in a communications safety assessment regarding NTTF Rec 9.3 Communications for	Complete

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		NMP (ML13100A236).	
5	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	P&IDs C18014C, Sheets 1 and 7 are available to the NRC for review on the ePortal. The P&IDs combined with the following system description provides a summary of the system design intended to minimize the potential for hydrogen gas migration and ingress into the reactor building or other buildings: The new HCVS wetwell pipe has a dedicated HCVS flowpath from the wetwell penetration PCIVs to the outside with no interconnected downstream piping. The HCVS discharges the effluent to a release point above main plant structures. The new HCVS vent interfaces with lines 201.1-20-LT (upstream of PCIVs IV-201-16 and IV-201-17) and 201.1-3-LT (upstream of PCIV IV-201.2-33 and IV-201.2-06) of the Containment System. Line 201.1-20-LT is utilized for supplying nitrogen to the torus through isolation valves IV-201-16 and IV-201-17 during primary containment inerting. Similarly, the containment purge fan takes suction through this flow path when de-inerting containment. IV-201-16 and IV-201-17 are normally closed and automatically close upon receipt of a containment isolation signal from the Reactor Protection System or a high radiation signal from the Off-Gas System monitors. Line 201.1-3-LT provides nitrogen makeup to the torus through isolation valves IV-201.2-33 and IV-201.2-06 during normal operation. IV-201.2-33 and IV-201.2-06 are normally closed and automatically close upon receipt of a containment isolation signal from the Reactor Protection System or a loss of motive air supply. The new HCVS vent will be normally isolated from the Containment System by two new normally closed PCIVs (IV-201.13-74 and IV-	Complete

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		201.13-71) and will not impact the operation of these interfacing systems. The new HCVS piping is designed as an independent, isolable branch off of Line 201.1-20-LT. There are no branch lines downstream of the HCVS vent piping PCIVs (IV-201.13-71 and IV-201.13-74), which interface with existing plant systems and there is no potential for cross flow from the HCVS, thereby meeting the requirements of NEI 13-02, Section 1.2.3. Therefore, valves IV-201.2-33, IV-201.2-06, IV-201-16 and IV-201-17 are not considered boundary valves. These valves are exposed to the containment atmosphere, as a result of the original plant design, independent of the addition of HCVS.	
6	Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	An assessment of Operator access to HCVS equipment was performed and documented in the Design Consideration Section (DCS) of Engineering Change Package ECP-13-000086 which has been loaded on the ePortal. The assessment evaluated the temperature and radiological conditions of all areas that will be needed to be accessed by plant Operators in order to initiate and operate the HCVS during a beyond design basis event. The assessment provides the expected temperature and radiological conditions in each area documented in tabular form in the DCS. The assessment concludes that during the 7 days of sustained operation during a beyond design basis event the predicted environmental and radiological conditions will be acceptable for the operators to gain access to areas required for HCVS operation in the primary and remote operating stations.	Complete
7	Make available for NRC staff audit the final sizing evaluation for HCVS	The new battery selected is a sixty (60) cell GNB battery with the battery cells connected in series to create 125VDC nominal voltage. The battery is a Valve Regulated Lead Acid (VRLA) type rated for 104 ampere-hours.	Complete

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
	batteries/battery charger including incorporation into FLEX DG loading calculation.	The battery is selected in accordance with IEEE-485. The Battery Sizing Requirements indicates that based on 1.5 ampere loading requirements for 24 hours duty period, a minimum of a sixty (60) cell, 55 ampere-hours battery is required to bound the required battery duty cycle and end-of-cycle battery terminal voltage requirements. The selected battery capacity of 104 ampere-hours is more than the minimum required 55 ampere-hours battery capacity. Therefore, the selected battery is adequate. The battery charger is rated for 130 volts nominal DC output voltage, 10 amperes nominal DC output current, 120 volts AC input voltage and a current limit adjustment range of 50% - 120%. The HCVS loads may also be powered via 125 VDC battery board 12 which is downstream of the station battery charger 12 (DC side). The FLEX DG sizing calc. 600VACDGES-FLEX-BDB was already sized to accommodate the station battery charger 12 full load rating (AC side). Additionally, the HCVS loads will be powered by FLEX portable power sources at T≥ 24 hours when the station battery would have been fully charged and load shedding would have been completed during ELAP. Therefore, there will be no impact on the FLEX DG loading calculation 600VACDGES-FLEX-BDB. A minor revision to the FLEX portable battery charger equipment sizing calculation 125VDCSCES-FLEX-BDB was completed to address the addition of the HCVS loads. The calculation concluded that the HCVS panel load addition of 1.5 amperes DC is negligible and still within the 400 ampere rating of the portable battery charger BC-BDB. The battery/battery charger sizing requirements evaluation and the minor revision to calculation 125VDCSCES-FLEX-	

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		BDB are in the ePortal for NRC review.	
8	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	As discussed in the December 2015 OIP submittal, the NMP1 design will use a nitrogen bottle station to supply motive force to the HCVS isolation valves. The bottle station will be located in a readily accessible protected area in the turbine building. The nitrogen supply system design is illustrated on Piping and Instrumentation Drawing C-18014-C, Sht. 7, and is available for NRC review in the ePortal. A calculation was completed to determine the required pneumatic supply storage volume and supply pressure required to operate the HCVS isolation valves (IV-201.13-71 and IV-201.13-74) for 24 hours following a loss of normal pneumatic supplies during an ELAP. Calculation S22.4-201.13M002 is available for NRC review in the ePortal.	Complete
9	Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.		Started
10	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Description of Existing Instrumentation: In the Phases 1 and 2 combined HCVS OIP, Part 2: Key Venting Parameters section, both drywell pressure, torus pressure and torus level are listed as key parameters. Other Part 2 OIP sections only list drywell pressure and torus pool level as key parameters. In Part 3 of the OIP, drywell pressure and suppression pool level are stated as the key parameters for SAWM operations. The following discussion has been revised since the June 2016 six-month update to clarify what key parameters are used for HCVS initiation and	Complete

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		cycling for Phases 1 and 2. Existing control room indications for wetwell (suppression chamber) pressure and suppression pool (primary containment) water level are used for HCVS venting operation. Operation of the HCVS will be based on guidance in the EOPs and SAPs and will follow the primary containment pressure limit (PCPL) curves contained in these procedures. The PCPL curves use suppression chamber pressure vs. primary containment water level parameters to determine when to vent containment. Therefore, containment wetwell pressure indication is preferred to determine the need, timing and effectiveness of the venting operation following a BDBEE, in order to ensure that containment pressure does not exceed the PCPL. Existing control room indication for wetwell pressure, shown on PI-201.2-595A (Channel 12) and PI-201.2-594A (Channel 11), will be used for this purpose. These indicators receive pressure signals from pressure transmitters PT-201.2-595 and PT-201.2-594, respectively. These pressure transmitters sense the torus pressure from a penetration at the top of the torus and therefore will not be impacted by high water levels. Drywell pressure instrumentation may also be referenced during the event. Containment pressure is displayed on indicator PI-201.2-483A (Channel 12) and PI-201.2-484A (Channel 11). These indicators receive pressure signals from pressure transmitters PT-201.2-483 and PT-201.2-484, respectively. Wetwell level indication is needed to determine that the wetwell vent path is preserved. Wetwell level is displayed on indicator LI-201.2-595D (Channel 12) and LI-201.2-594C (Channel 11). LI-201.2-595D	

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		receives signals from PT-201.2-595 and PT-201.2-596 while LI-201.2-594C receives signals from PT-201.2-594 and PT-201.2-680. As indicated in the OIP, LI 58-05A (LT 58-05) can also be used to monitor torus level and PI 201.2-106A (PT 201.2-106) can also be used to monitor drywell pressure. The pressure and level indicators and related transmitters are all Safety Related, Regulatory Guide 1.97 compliant components. Channel 12 is the FLEX diesel power backed loop, and Channel 11 can be powered as an alternate strategy. Description of New Instrumentation: The I&C scope for the HCVS is to display the following and to control the SOVs associated with the new primary containment isolation valves. • HCVS Isolation Valve Position Indication (POS) • Temperature and Radiation of the HCVS Pipe (POS) • Radiation of the HCVS Pipe (ROS) • HCVS Purge System Supply Pressure (POS and ROS) • HCVS Battery Voltage (ROS) The ROS panel serves as the main power distribution for all I&C components and will contain local indicators to display HCVS battery voltage, radiation, and purge gas supply pressure. The POS panel provides all other indication except HCVS battery voltage and allows for the control of the HCVS SOVs via key lock switches. A detailed description of new I &C components including qualification methods is included in the Engineering Change Package and is available on the ePortal for	

Open Item	Phase 1 Interim Staff Evaluation (ISE) Open Items	Description	Status
		NRC review.	
11	Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.		Started

Phase 2 OIP and ISE Open Items

Open Item	Phase 2 OIP Open Item Description	Status
1	Perform radiological evaluation to determine the SAWA flow control point location.	Started
Open Item	**Phase 2 Interim Staff Evaluation (ISE) Open Item Description**	**Status**
1	Licensee to confirm through analysis the temperature and radiological conditions to ensure that operating personnel can	Started

	safely access and operate controls and support equipment (ISE Section 3.3.2.1)	
2	Licensee to evaluate the SAWA equipment and controls, as well as ingress and egress paths for the expected severe accident conditions (temperature, humidity, radiation) for the sustained operating period (ISE Section 3.3.2.3).	Not Started
3	Licensee to demonstrate how instrumentation and equipment being used for SAWA and supporting equipment is capable to perform for the sustained operating period under the expected temperature and radiological conditions (ISE Section 3.3.2.3).	Not Started
4	Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions (ISE Section 3.3.3).	Not Started
5	Licensee to demonstrate how the plant is bounded by the reference plant analysis that shows the SAWM strategy is successful in making it unlikely that a drywell vent is needed (ISE Section 3.3.3.1).	Not Started
6	Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX manual valve during severe accident conditions (ISE Section 3.3.3.4).	Not Started
7	Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions (ISE Section 3.3.3.4).	Not Started

7 Interim Staff Evaluation (ISE) Impacts

As described above in the response to the ISE Open Item 10, the existing containment instrumentation credited has been changed to credit torus pressure indication in lieu of drywell pressure indication, although drywell pressure indication will also be available.

Secondly, in the Reference 10 HCVS Phase 2 ISE, sections 3.1.2 and 3.3.2.1, the NRC staff makes reference to HCVS power supplies based on information provided in the Reference 7 combined Phases 1 and 2 OIP. Changes to the HCVS power supply design described in the OIP have been made in the final design that necessitates a revision to the OIP discussion. Below is a revision to each OIP section impacted which shows the changes made to the HCVS power supply summaries.

<u>OIP Page 11 of 64, third bullet under the time constraint discussion:</u>

24 hours, connect back-up power. The HCVS battery is calculated to last a minimum of 24 hours. The HCVS components will be able to be re-powered directly from the 125V DC Battery Board #12 which will be re-powered from a portable diesel generator (DG) put in place for FLEX. The DG will be staged and placed in service within 8 hours (Reference 1) and therefore will be available prior to being required. In the event that the DG is not available, a local 120 VAC connection will allow a small portable generator staged outside of the turbine building to be connected to the HCVS battery charger to provide power.

<u>OIP Page 14 of 64, under "Power and Pneumatic Supply Sources":</u>

All electrical power required for operation of HCVS components will be provided by a dedicated HCVS battery charger and battery. The HCVS battery has a minimum capacity capable of providing power to the HCVS loads for 24 hours without recharging. A final confirmatory evaluation has been completed as part of the detailed design process. The HCVS battery charger provided requires a 120 V AC supply. This will be fed by a 120/240 V AC rated lighting panel during normal plant operation. After the initial 24-hour period, the system can be aligned to 125 V DC Battery Board 12, which will be re-powered by a diesel generator as part of the FLEX response. In addition, a connection point that utilizes standard 120 VAC electrical connections will be provided for a portable generator for sustained operation of the HCVS.

<u>OIP Page 21 of 64, 4th paragraph under Greater than 24 Hour Coping Detail:</u>

The HCVS battery and battery charger will also be installed in the Turbine Building ROS area. The HCVS battery has a capacity sufficient for 24-hour operation. The normal power supply to the HCVS controls and instruments will be provided by a 120/240 V AC rated lighting panel via the HCVS battery charger. The #12 Station Battery Bus, which in turn is re-powered by a 600 VAC portable diesel generator connected to the # 12 Station Battery Charger as part of the FLEX response, can be aligned to the HCVS loads after the dedicated HCVS battery has completely discharged. A design change to install the portable diesel generator external connection points to this bus has been completed in support of EA-12-049 (Reference 1). In the event that power is not restored to the bus, a local 120 V AC connection to the HCVS battery charger will allow the HCVS battery charger to receive power from a small portable generator. Actions to replenish the electrical supply include refueling the DG or connecting and refueling a small portable generator.

OIP Page 26 of 64, 3rd bullet under general description of venting actions using portable equipment:

Establishing temporary power to repower the battery charger. Option 1 is to connect the FLEX DG to Station Battery Charger #12, which provides power to Station Battery Bus #12 that in turn powers the HCVS components. Option 1 would be completed as part of the FLEX response strategy and occurs to the south and inside the NMP Turbine Building. Option 2, to be taken if the FLEX DG cannot be connected to the Station Battery Charger #12, is to connect a small portable generator to the HCVS battery charger. Option 2 would be taken locally at the HCVS ROS Area. Either of these actions will also require the generators to be refueled. A one line diagram of the electrical system to be installed is included in sketch 1A.

OIP Sketch 1A: This sketch is out-of-date. The attached ECP-13-000086-MU-039 F45940C-002 provides an updated electrical layout of the HCVS.

8 References

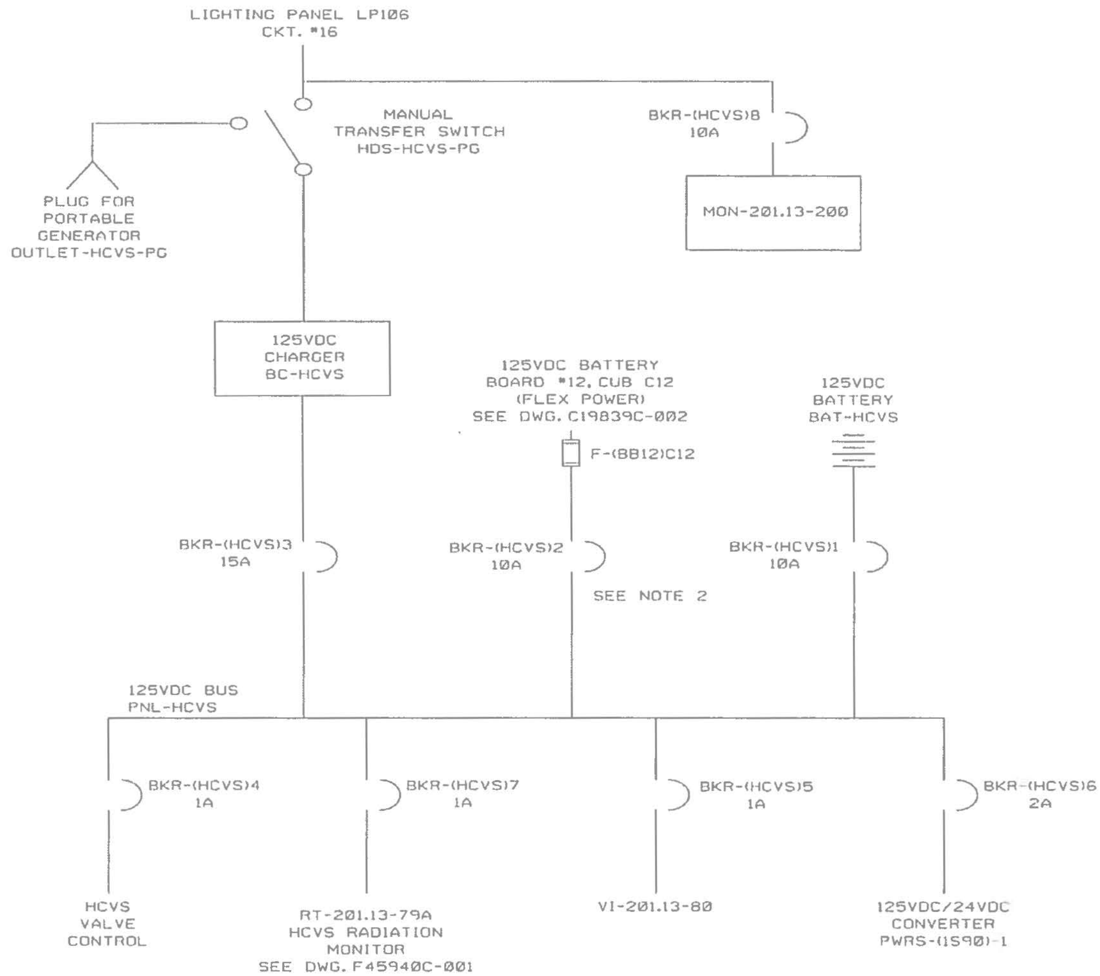
The following references support the updates to the combined Phases 1 and 2 Overall Integrated Plan described in this enclosure.

1. Nine Mile Point Unit 1'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 27, 2014.
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.
3. NEI 13-02, "Industry Guidance for Compliance with NRC Order EA-13-109, 'To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 1, dated April 2015.
4. NRC 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 Operation Under Severe Accident Conditions," Revision 0, dated November 2013 (Accession No. ML13304B836).
5. NRC Endorsement of industry "Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109) Rev 0" (Accession No. ML14128A219).
6. NRC Interim Staff Evaluation "Nine Mile Point Nuclear Station, Unit 1 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of the Order EA-13-109 (Severe Accident Capable Hardened Vents (TAC NO. MF4481)", dated March 26, 2015.
7. Nine Mile Point Unit 1's Combined Phases 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 15, 2015.

8. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated April 2015 (Accession No. ML15104A118).
9. Nine Mile Point's Fourth Six-Month Status Report Update for Phases 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 June 30, 2016.
10. NRC Interim Staff Evaluation "Nine Mile Point Nuclear Station, Unit 1 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of the Order EA-13-109 (Severe Accident Capable Hardened Vents (TAC NO. MF4481)", dated August 30, 2016.

Sketch 1A: Electrical Layout of System – HCVS



NOTES:
1. NOT USED.
2. BREAKER IS KEPT OPEN DURING PLANT NORMAL OPERATION AND CLOSED ONLY IF REQUIRED DURING A BEYOND DESIGN BASIS EXTERNAL EVENT(BDBEE).

Enclosure 2

Nine Mile Point Nuclear Station, Unit 2

Fifth Six-Month Status Report for Phases 1 and 2 Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions

(24 pages)

Enclosure 2

Nine Mile Point Nuclear Station, Unit 2
Fifth Six-Month Status Report for Phases 1 and 2 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

Nine Mile Point Unit 2 developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the installation of a Hardened Containment Vent 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 Reference 2. This six month status report updates the milestone accomplishments based on the combined Phases 1 and 2 Overall Integrated Plan dated December 15, 2015 (Reference 7) and last updated on June 30, 2016 (Reference 10).

Nine Mile Point Unit 2 developed an updated and combined Phases 1 and 2 Overall Integrated Plan (Reference 7 in Section 8), documenting:

1. The installation of a Hardened Containment Vent 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 Reference 2.
2. An alternative venting strategy that makes it unlikely that a drywell vent is needed to protect the containment from overpressure related failure under severe accident conditions, including those that involve a breach of the reactor vessel by molten core debris, in response to Reference 2

This enclosure provides an update of milestone accomplishments since submittal of the combined Phases 1 and 2 Overall Integrated Plan and the last six month update, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since the last six-month update was submitted under Reference 10, and are current as of December 2, 2016.

- Fifth Six-Month Update (complete with this submittal)

3 Milestone Schedule Status

The following provides an update to the Part 5 Milestone Schedule of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

NMP2 - Phase 1 Specific Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Hold preliminary/conceptual design meeting	November 2013	Complete	
Submit Overall Integrated Implementation Plan	June 2014	Complete	
Submit 6 Month Status Report	December 2014	Complete	
Design Engineering Complete	March 2015	Complete	
Submit 6 Month Status Report	June 2015	Complete	
Operations Procedure Changes Developed	December 2015	Complete	
Submit 6 Month Status Report	December 2015	Complete	Simultaneous with Phase 2 OIP
Training Complete	February 2016	Complete	
NMP2 Implementation Outage	April 2016	Complete	
Procedure Changes Active	April 2016	Complete	
Walk Through Demonstration/Functional Test	April 2016	Complete	
Submit Fourth 6-Month Status Report	June 2016	Complete	
Submit Completion Report	June 2018	Not Started	

NMP2 - Phase 2 Specific Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments
Submit Overall Integrated Implementation Plan	December 2015	Complete	
Hold preliminary/conceptual design meeting	January 2016	Complete	
Submit 6 Month Status Report	June 2016	Complete	
Submit 6 Month Status Report	December 2016	Complete with this submittal	
Design Engineering On-site/Complete	August 2017	Not Started	Changed from March 2017
Submit 6 Month Status Report	June 2017	Not Started	
Operations Procedure Changes Developed	December 2017	Not Started	
Site Specific Maintenance Procedure Developed	December 2017	Not Started	
Submit 6 Month Status Report	December 2017	Not Started	
Training Complete	February 2018	Not Started	
Implementation Outage	April 2018	Not Started	
Procedure Changes Active	April 2018	Not Started	
Walk Through Demonstration/Functional Test	April 2018	Not Started	
Submit Completion Report	June 2018	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the combined Phases 1 and 2 Overall Integrated Plan (Reference 7).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

Nine Mile Point Unit 2 complied with the Phase 1 order implementation date and expects to comply with the Phase 2 order implementation date and no relief/relaxation is required at this time.

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

The following tables provide a summary of the open items documented in the combined Phases 1 and 2 Overall Integrated Plan, the Reference 6 Interim Staff Evaluation (ISE) for Phase 1, and the Reference 11 ISE for Phase 2 and the status of each item.

Phase 1 Open Items from OIP	Status
OIP Phase 1 Open Item No. 1	Deleted (closed to ISE open item number 8 below)
OIP Phase 1 Open Item No. 2	Deleted (closed to ISE open item number 3 below)
OIP Phase 1 Open Item No. 3	Deleted (closed to ISE open item number 9 below)
OIP Phase 1 Open Item No. 4	Deleted (closed to ISE open item number 2 below)
OIP Phase 1 Open Item No. 5	Deleted (closed to ISE open item number 4 below)
OIP Phase 1 Open Item No. 6	Deleted (closed to ISE open item numbers 10 and 12 below)
OIP Phase 1 Open Item No. 7	Deleted (closed to ISE open item number 7 below)
OIP Phase 1 Open Item No. 8	Deleted (closed to ISE open item number 7 below)
OIP Phase 1 Open Item No. 9	Submitted for closure in Reference 10
ISE Phase 1 Open Items	**Status**
ISE Phase 1 Open Item No. 1	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 2	Submitted for Closure in Reference 7

ISE Phase 1 Open Item No. 3	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 4	Submitted for Closure in Reference 7
ISE Phase 1 Open Item No. 5	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 6	Submitted for Closure in Reference 7
ISE Phase 1 Open Item No. 7	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 8	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 9	Submitted for Closure in Reference 7
ISE Phase 1 Open Item No. 10	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 11	Submitted for closure in Reference 10 and updated with this update as provided in table below.
ISE Phase 1 Open Item No. 12	Submitted for closure in Reference 10
ISE Phase 1 Open Item No. 13	Submitted for closure in Reference 10
OIP Phase 2 Open Items	**Status**
OIP Phase 2 Open Item No. 1	Started
ISE Phase 2 Open Items	**Status**
ISE Phase 2 Open Item No. 1	Started
ISE Phase 2 Open Item No. 2	Not Started
ISE Phase 2 Open Item No. 3	Not Started
ISE Phase 2 Open Item No. 4	Not Started

The table below documents the completion of the final remaining open items as listed above. As stated above, EGC provides the response for the following items and considers them to be complete for Nine Mile Point Nuclear Station, Unit 2.

Phase 1 Open Items

Item	Description	Status
OIP Phase 1 Open Item No. 9 Perform radiological evaluation for Phase 1 vent line impact on ERO response actions.	Radiological Calculation H21C-114 has been completed to provide assurance that personnel can safely operate the NMP2 HCVS and respond to required ERO response actions during severe accident conditions. Calculation was performed using NRC endorsed HCVS-WP-02 and HCVS-FAQ-12 methodologies. Calculation H21C-114 has been posted in ePortal for NRC's review.	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 1 Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack.	<u>Seismic Design of the outdoor HCVS stack</u> The HCVS piping contains ASME Class 2, 3 and ANSI B31.1 piping. The entire HCVS system has been evaluated to Seismic Category I requirements in pipe stress calculation AX-515B consistent with the plants seismic design basis to comply with NEI 13-02, Section 5.2 seismic design guidance. Per NRC Letter, May 9, 2014 "Subject: Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Re-Evaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", the NRC concluded that NMP2 "screened out" of performing the seismic risk evaluation as part of the Containment Purge System (CPS) / HCVS seismic analysis. Therefore, the more severe seismic load case (2xSSE) is not required as part of the BDB analysis of the CPS/HCVS system. Pipe stress calculation AX-515B is available in the ePortal for NRC review. <u>Missile Protection of the outdoor HCVS stack</u> NEI 13-02, Section 5.1.1.6 requires that missile impacts are to be considered for portions of the HCVS. The Nuclear Energy Institute (NEI) issued a white paper HCVS-WP-04, endorsed by the NRC, which provides a risk-informed approach to evaluate the threat posed to exposed portions of the HCVS by wind-borne missiles. The white paper concludes that the HCVS is unlikely to be damaged in a manner that prevents containment venting by wind-generated missiles coincident with an ELAP or LUHS, for plants that are enveloped by the assumptions in the white paper. A NMP2 specific missile evaluation is documented in the Engineering Change Package (ECP) consistent with HCVS-WP-04. The conclusion of the evaluation is that NMP2 meets all of the tornado missile assumptions identified in HCVS-WP-04 and as such, supplementary protection is not required for the HCVS piping and components. The ECP missile	Complete

Item	Description	Status
	evaluation is available in the eportal for NRC review.	
ISE Phase 1 Open Item No. 2 Make available for NRC staff review documentation of a determination of seismic adequacy for the ROS location in the Reactor Building Track Bay.	The December 2015 OIP update contains a more detailed description of the seismic adequacy of the ROS location.	Complete
ISE Phase 1 Open Item No. 3 Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one (1) percent of licensed/rated thermal power (unless a lower value is justified) and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary	The HCVS was designed to have the capacity to vent the steam equivalent of a decay heat rate of 1% of the rated thermal power at a pressure equivalent to the lessor of containment design pressure or the PCPL consistent with NEI 13-02 Section 4.1.1.1 guidance. The design pressure was used which is 45 psig at NMP2. This is equivalent to a flow rate of approximately 148,600 lbm/hr. The current design has been evaluated considering pipe diameter, length, and geometry as well as vendor provided valve Cv's, and the losses associated with a burst rupture disc. Calculation A10.1-A-050 concludes that the design provides margin to the minimum required flow rate. Calculation A10.1-A-050 is available for NRC review in the ePortal. Additionally, MAAP 4.0.6 analyses in Calculation N2-2014-004 were performed to investigate the response of the NMP2 containment venting using the new HCVS vent parameters and the use of RPV alternate injection with assumed RCIC failure at 240 °F in the suppression pool. The objective of the analysis was to understand the overall accident response signature and key containment (wetwell and drywell) thermal-hydraulic behavior. The MAAP analyses demonstrate 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	Complete

Item	Description	Status
containment design pressure and the primary containment pressure limit.	design pressure and the primary containment pressure limit. Calculation N2-2014-004 is available for NRC review in the ePortal.	

Item	Description	Status
ISE Phase 1 Open Item No. 4 Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	As required by EA-13-109, Section 1.2.11, the HCVS design will include an Argon purge system that will be connected just downstream of the HCVS isolation valve. It will be designed to prevent hydrogen detonation downstream of that valve. However, the Argon purge system is required to be used only if the ELAP progresses to severe accident conditions which result in the creation of hydrogen. The Argon purge system will have a switch for the control valve in the MCR to allow opening the purge for the designated time, but it will also allow for local operation in the ROS in case of a DC power or control circuit failure. The installed capacity for the Argon purge system will be sized for 6 purges within the first 24 hours of the ELAP. Evaluation N2-MISC-003, "MAAP Analysis to Support SAWA Strategy" shows that in a severe accident, NMP2 would not be expected to exceed 6 vent cycles in the first 24-hour period. The design allows for Argon bottle replacement for continued operation past 24 hours. The argon system was sized in calculation A10.1-P-053 which has been loaded on the ePortal. The Argon purge system can also be used to breach the rupture disc. The MCR panel will include an indication of vent line pressure upstream of the disc to show when the disc has burst due to the increased Argon pressure.	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 5 Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	At NMP2, the primary operating station for HCVS operation is located in the MCR. A HCVS remote operating station (ROS) is located in the RB Track Bay. The location was evaluated for habitability and accessibility during a severe accident. Onsite communications will be performed using either the installed sound powered headset system or the 450 MHz radios in the talk around mode, or a combination thereof. A sound powered phone jack is available near the ROS to communicate with the rest of the plant. Offsite communications will utilize fixed satellite phones in the Control Room and Technical Support Center (TSC). Both locations also have portable satellite phones staged. Communications protocol for beyond design basis events are documented in CC-NM-118 and procedure N2-OP-76 which are available for NRC review in the ePortal. These communication methods are consistent with FLEX communication practices at NMP2 and have been previously reviewed by the staff as documented in a communications safety assessment regarding NTTF Rec 9.3 Communications for NMP (ML13100A236).	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 6 Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	The December 2015 OIP update contains a more detailed description of how the design addresses hydrogen detonation and deflagration. Refer to the discussion subtitled "Unintended Cross Flow of Vented Fluids" on page 16 of 66 in the December 2015 OIP for details as to how hydrogen gas migration and ingress into the reactor building or other buildings is minimized.	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 7 Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Temperature Evaluation: Accessing HCVS equipment, following an external event that results in an ELAP, will subject the operator to prevailing area temperatures. The majority of the operator travel path from the MCR to the ROS is outdoors. Therefore, the travel path does not pose any habitability concerns, with respect to temperature. The MCR and ROS are expected to remain habitable, with respect to temperature, during the event. During the ELAP, as with the station blackout, normal ventilation systems are inoperable and non-vital equipment is not contributing to the area heat load. Therefore, area temperatures in the MCR will be higher than that for normal operation and likely more in line with that for station blackout. The expected peak area temperature for the MCR is 100 °F. This is based on Calculation ES-198 which predicts the control room heat-up following a station blackout. The calculation assumes doors to the control room will be open. Procedural directions is provided in Station Blackout/ELAP procedure N2-SOP-01 to block open control room doors for additional cooling when normal ventilation is lost. The area temperature for the ROS in the Track Bay is not expected to undergo any appreciable change as a result of the event. There is no vital equipment in the area that would be operating, adding to the heat load, and the space has a 20' vertical height, which will moderate the area temperature. Additionally, the Track Bay door to the outside can be opened to moderate the temperature, if needed. Radiological Evaluation: The radiological dose Calculation H21C-114 is described in detail under the response to OIP Phase 1, Open Item No. 9 above. In accordance with the definition of sustained operations in NEI 13-02, the integrated radiation dose due to HCVS operation over a 7-day period	Complete

Item	Description	Status
	was determined in Calculation H21C-114. The 7-day dose determined in the calculation due to HCVS operation is a conservative maximum integrated radiation dose over a 7-day period with ELAP and fuel failure starting at reactor shutdown. For the sources considered and the methodology used in the calculation, the timing of HCVS vent operation or cycling of the vent will not create higher doses at personnel habitability and equipment locations (i.e., maximum doses determined in the calculation bound operational considerations for HCVS vent operation). The operator travel path is designed to minimize the dose to the operator from shine off of the HCVS vent pipe on the west side of the Reactor Building. The dose rates along the majority of the path are heavily shielded from the HCVS vent pipe and would not be significant (< 1 mR/hr). The dose rate between the Control Building and the Maintenance Building could be significant (several R/hr). However, the exposure to this dose rate would be for a few seconds and the accumulated dose would not be significant. Peak maximum dose rates and 7-day total integrated dose have been calculated for the POS and the ROS in Calculation H21C-114. The radiation dose to personnel occupying defined habitability locations, resulting from HCVS operation are below the 5 rem acceptance criteria as shown below: MCR: 7-day Total Integrated Dose = 4.1 rem ROS: 7-day Total Integrated Dose < 1 rem Therefore, during the 7 days of sustained operation for BDBEE, the predicted environmental and radiological conditions will be acceptable for the operators to gain access to areas required for HCVS operation in the MCR and ROS. The above referenced calculations are available in the ePortal for NRC review.	

Item	Description	Status
ISE Phase 1 Open Item No. 8 Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Batteries/Battery Charger Sizing: The new battery selected is a sixty (60) cell GNB battery, with the battery cells connected in series to create 125VDC nominal voltage. The battery is a Valve Regulated Lead Acid (VRLA) type rated for 104 ampere-hours. The battery is selected in accordance to IEEE-485. The Battery Sizing Requirements indicates that based on 2.3 ampere loading requirements for 24 hours duty period, a minimum of a sixty (60) cell, 90.3 ampere-hours battery is required to bound the required battery duty cycle and end-of-cycle battery terminal voltage requirements. The selected battery capacity of 104 ampere-hours is more than the minimum required 90.3 ampere-hours battery capacity. Therefore, the selected battery is adequate. The battery charger is rated for 130 volts nominal DC output voltage, 10 amperes nominal DC output current, 120 volts AC input voltage and a current limit adjustment range of 50% - 120%. The battery/battery charger sizing requirements evaluation is available in the ePortal for NRC review. Incorporation into FLEX DG Loading Calculation: Following a BDBE, the battery charger is expected to draw a maximum load of 2.9 kVA. This load will be credited in the NMP2 FLEX Portable Diesel Generator Calculation EC-206 which was revised to reflect the load addition of the battery charger. The additional load added is still within the capability of the NMP2 FLEX Diesel Generator and therefore, this change is acceptable. Calculation EC-206 is available in the ePortal for NRC review.	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 9 Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	P&ID 061-D outlines the functional design of the pneumatic system. Calculation A10.1-P-051 determines the required amount of Nitrogen needed for the required number of vent cycles in a 24-hour period. The P&ID and calculation are loaded on the ePortal.	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 10 Make available for NRC staff audit documentation of a seismic qualification evaluation of HCVS components.	New components related to HCVS operation are required to be designed to operate following a seismic event. Most equipment came qualified or evaluated by the vendor. However, some equipment was purchased as commercial grade (non-safety related) and was shake tested in order to prove the components' ability to withstand a bounding seismic event. Qualification/evaluation documentation provided by the vendor, or test results from shake tests were compiled into a single report for HCVS dedicated equipment (Ref. VENRPT-15-000013) with the exception of separate seismic design reports for the PCIVs and HCVS pressure control valve 2CPS-AOV134. These reports are available in the ePortal for NRC review.	Complete
ISE Phase 1 Open Item No. 11 Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Existing Instrumentation: In the Phases 1 and 2 combined HCVS OIP, Part 2: Key Venting Parameters section, both drywell pressure and suppression chamber pressure and suppression pool level are listed as key parameters. Other Part 2 OIP sections only list drywell pressure and suppression pool level as key parameters. In Part 3 of the OIP, drywell pressure and suppression pool level are stated as the key parameters for SAWM operations. The following discussion has been revised since the June 2016 six-month update to clarify what key parameters are used for HCVS initiation and cycling for Phases 1 and 2. Existing control room indications for wetwell (suppression chamber) pressure and suppression pool (primary containment) water level are used for HCVS venting operation. Operation of the HCVS will be based on guidance in the EOPs and SAPs and will follow the primary containment pressure limit (PCPL) curves contained in these procedures. The PCPL curves use suppression chamber pressure vs. primary containment water level parameters to determine when to vent containment. Therefore, containment wetwell pressure indication is preferred	Complete and Revised in this December 2016 Update

Item	Description	Status
	to determine the need, timing and effectiveness of the venting operation following a BDBEE, in order to ensure that containment pressure does not exceed the PCPL. Existing control room indication for wetwell pressure, shown on 2CMS*PI7A (Division 1) and 2CMS*PR7B (Division 2), will be used for this purpose. These indicators receive pressure signals from pressure transmitters 2CMS*PT7A and 2CMS*PT7B, respectively. These pressure transmitters sense the wetwell pressure from penetrations Z-337-1 and Z-338-1, both located at elevation 224'-0". Drywell pressure instrumentation may also be referenced during the event. Existing control room indication for drywell pressure, shown on 2CMS*PI2A (Division 1) and 2CMS*PR2B (Division 2), will be used for this purpose. These indicators receive pressure signals from pressure transmitters 2CMS*PT2A and 2CMS*PT2B, respectively. Wetwell level indication is needed to determine that the wetwell vent path is preserved. Wetwell level is displayed on indicator 2CMS*LI9A (Division 1) and 2CMS*LR9B (Division 2). These indicators receive level signals from level transmitters 2CMS*LT9A and 2CMS*LT9B, respectively. Both of the instruments interface with the suppression pool at low and high elevation of 192' and 217' and can therefore monitor between those elevations. The inlet to the HCVS vent pipe is at elevation 227'. Therefore, water level will have to be maintained below 217' in order to ensure that the vent inlet does not get covered with water. The pressure and level indicators and related transmitters are all Safety Related, Regulatory Guide 1.97 compliant components (Ref. NMP2-RG197-01). They are also environmentally qualified for accident conditions (Ref. 2EQDP-XMTR001). Division 1 is the FLEX diesel power backed loop, and Division 2 can be powered as an alternate strategy. Additionally, containment pressure and/or wetwell level can be obtained from a Transmation 1045 (or	

Item	Description	Status
	similar loop calibrator) at the associated transmitter or Relay Room panel. NMP2 procedure N2-SOP-78A, EOP Key Parameter – Alternate Instrumentation, provides direction on how to obtain readings from transmitters using this hand-held test equipment. The FLEX Phase 2 primary strategy is to provide power using a FLEX generator to Division 1 600 VAC unit substation to maintain instrumentation power supply and the back-up is Division 2. Depending on availability, either loop may be used for containment pressure and wetwell level determination. New HCVS Instrumentation and Controls: The I&C scope for the HCVS is to display the following and to control the SOVs associated with the new primary containment isolation valves from new control room panel 2CEC-PNL801 located in the Main Control Room. The SOVs are controlled via key-lock control switches. • HCVS Isolation Valve Position Indication • Temperature, Pressure and Radiation of the HCVS Pipe • HCVS Purge System Supply Pressure (Local indication only) • HCVS Battery Voltage New track bay control panel 2CPS-PNL100 serves as the main power distribution for all I&C components. A detailed description of existing and new I &C components including qualification methods is included in the Engineering Change Package and is available on the ePortal for NRC review.	

Item	Description	Status
ISE Phase 1 Open Item No. 12 Make available for NRC staff audit the description of local conditions (temperature, radiation, and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	The HCVS is located in Primary Containment, Secondary Containment, the Reactor Building Track Bay, the Control Room, and outside the Reactor Building. Environmental conditions and impacts are evaluated in detail in the Engineering Change Package (ECP). The ECP includes a listing of the components in each area along with the corresponding environmental conditions including temperature, radiation and humidity. The ECP also includes a detailed listing of environmental qualification requirements. The complete listing and information from the ECP is available on the ePortal for NRC review. On November 17, 2016 a teleconference between Exelon and the NRC was held to review NMP2 Phase 1 closure of open items. In this call NMP clarified that consistent with NEI 13-02 Appendix C section C.8.1, no further environmental qualification of existing containment parameter monitoring instrumentation is required if the instrumentation is already RG 1.97 qualified.	Complete

Item	Description	Status
ISE Phase 1 Open Item No. 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.	The existing containment isolation valves 2CPS*AOV109 and 2CPS*AOV111 were replaced with new valves. Additionally, an HCVS containment pressure control valve (2CPS-AOV134) located downstream of the containment isolation valves was added to control vent flow after the containment isolation valves are opened during a BDBEE. Actuator capability and margin calculations were performed using the Sargent & Lundy AirBase software program for the three AOVs. The calculations are intended to confirm that the AOVs can open under the maximum expected differential pressure (MEDP) during BDBEE and severe accident wetwell venting. Under an ELAP or for severe accident wetwell venting the subject valves are closed and without their normal supply of air power. Prior to exceeding the primary containment pressure limit (PCPL), Operators open the valves remotely using the dedicated HCVS batteries and nitrogen bottles. The MEDP is determined based on assuming the maximum upstream pressure is equal to the PCPL of 45 psig and by conservatively using a downstream pressure equal to vacuum pressure (-14.7 psig) since exhausting steam may condense in the HCVS line, creating a negative pressure. Thus the MEDP used in the calculations is 59.7 psid. Calculation A10.1-P-047 for 2CPS*AOV109/111 shows actuator torque required vs. actuator torque available margins for the closed to full open stroke in the range of 49% to 189%. Calculation A10.1-P-052 for 2CPS-AOV134 shows margins from the closed to full open stroke in the range of 78% to 233%. The calculations demonstrate positive margin in the opening direction. The calculations are available in the ePortal for NRC review.	Complete

Phase 2 OIP Open Items

Item	Description	Status
OIP Phase 2 Open Item No. 1	Perform radiological evaluation to determine feasibility of reactor building actions.	Started
ISE Phase 2 Open Item No. 1	Licensee to provide the site-specific MAAP evaluation that establishes the initial SAWA flow rate (ISE Section 3.3.2.2)	Started
ISE Phase 2 Open Item No. 2	Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions (ISE Section 3.3.3).	Not Started
ISE Phase 2 Open Item No. 3	Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX manual valve during severe accident conditions (ISE Section 3.3.3.4).	Not Started
ISE Phase 2 Open Item No. 4	Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions (ISE Section 3.3.3.4).	Not Started

7 Interim Staff Evaluation Impacts

There are no potential impacts to the Interim Staff Evaluation(s) identified at this time. However, as revised in the response to ISI Open Item 11 above the existing containment instrumentation credited has been changed. Additionally, clarifications to various electrical discussions in the Reference 7 combined OIP are provided as follows:

Page 11 of 66, fourth bullet under the time constraint discussion

24 Hours, Connect back-up power to HCVS battery charger. The HCVS battery is calculated to last a minimum of 24 hours (ISE Open Item #8). The HCVS battery charger will be able to be re-powered either from the 600V AC bus permanently connected to the HCVS battery charger (via a 600 – 120/240 VAC step-down distribution transformer) that will be re-powered from a portable diesel generator (DG) put in place for FLEX or locally (Reactor Building Track Bay) from a small portable generator. The DG will be staged and placed in service within 8 hours (Reference 1) and therefore will be available prior to being required. In the event that the DG is not available, a local connection will allow a small portable generator to be connected to the HCVS battery charger to provide power. Connection of a small portable generator is achievable within 24 hours.

Page 14 of 66, under "Power and Pneumatic Supply Sources"

All electrical power required for operation of HCVS components will be provided by a dedicated HCVS battery charger and battery. The HCVS battery has a minimum capacity capable of providing power to the HCVS loads for 24 hours without recharging. An evaluation has been completed as part of the detailed design process (ISE Open Item #8). The HCVS battery charger provided requires a 120 VAC supply. This will be supplied by a 600 VAC bus (via a 600 – 120/240 VAC step-down distribution transformer) that will be re-powered by a portable diesel generator as part of the FLEX response. In addition, a connection point that utilizes standard 120 VAC electrical connections will be provided locally for a portable generator for sustained operation of the HCVS.

<u>Page 21 of 66, 4th paragraph under Greater than 24 Hour Coping Detail</u>

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

<u>Page 26 of 66, 5th paragraph under general description of venting actions support functions</u>

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

8 References

The following references support the updates to the combined Phases 1 and 2 Overall Integrated Plan described in this enclosure.

1. Nine Mile Point Unit 2'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 27, 2014.

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.

3. NEI 13-02, “Industry Guidance for Compliance with NRC Order EA-13-109, ‘To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 1, dated April 2015.

4. NRC 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 Operation Under Severe Accident Conditions," Revision 0, dated November 2013 (Accession No. ML13304B836).

5. NRC Endorsement of industry “Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109) Rev 0” (Accession No. ML14128A219).

6. NRC Interim Staff Evaluation "Nine Mile Point Nuclear Station, Unit 2 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of the Order EA-13-109 (Severe Accident Capable Hardened Vents (TAC NO. MF4482)", dated February 11, 2015.

7. Nine Mile Point Unit 1’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 15, 2015.

8. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated April 2015 (Accession No. ML15104A118).

9. Letter from M.G. Korsnick (CENG) to Document Control Desk (NRC), Overall Integrated Plan for Mitigation Strategies for Beyond-Design-Basis External Events, dated February 28, 2013.

10. Nine Mile Point’s Fourth Six-Month Status Report Update for Phases 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 June 30, 2016.

11. NRC Interim Staff Evaluation "Nine Mile Point Nuclear Station, Unit 2 - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of the Order EA-13-109 (Severe Accident Capable Hardened Vents (TAC NO. MF4482)", dated August 25, 2016.