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

October 17, 2017

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 2 - REPORT FOR THE AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATION OPEN ITEMS RELATED TO NRC ORDER EA-13-109 TO MODIFY LICENSES WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE OF OPERATION UNDER SEVERE ACCIDENT CONDITIONS (CAC NO. MF4482; EPID L-2014-JLD-004)

Dear Mr. Hanson:

On June 6, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A334), the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-13-109, "Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Condition," to all Boiling Water Reactor licenses with Mark I and Mark II primary containments. The order requirements are provided in Attachment 2 to the order and are divided into two parts to allow for a phased approach to implementation. The order required licensees to submit for review overall integrated plans (OIPs) that describe how compliance with the requirements for both phases of Order EA-13-109 will be achieved.

By letter dated June 27, 2014 (ADAMS Accession No. ML14184B340), Exelon Generation Company, Inc. (the licensee) submitted its Phase 1 OIP for Nine Mile Point Nuclear Station, Unit 2 (NMP2). By letters dated December 16, 2014, June 30, 2015, December 15, 2015 (which included the combined Phase 1 and Phase 2 OIP), June 30, 2016, December 14, 2016, and June 30, 2017 (ADAMS Accession Nos. ML14356A192, ML15181A017, ML15364A075, ML16182A013, ML16349A033, and ML17181A033, respectively), the licensee submitted its 6-month updates to the OIP. The staff reviewed the information provided by the licensee and issued interim staff evaluations (ISEs) for Phase 1 and Phase 2 of Order EA-13-109 for NMP2 by letters dated February 11, 2015 (ADAMS Accession No. ML15028A149), and August 25, 2016 (ADAMS Accession No. ML16223A853), respectively. When developing the ISEs, the staff identified open items where the staff needed additional information to determine whether the licensee's plans would adequately meet the requirements of Order EA-13-109.

The NRC staff is using the audit process described in the letters dated May 27, 2014 (ADAMS Accession No. ML14126A545), and August 10, 2017 (ADAMS Accession No. ML17220A328), to gain a better understanding of licensee activities as they come into compliance with the order.

As part of the audit process, the staff reviewed the licensee's closeout of the ISE open items. The NRC staff conducted teleconferences with the licensee on November 17, 2016, and September 28, 2017. The enclosed audit report provides a summary of that aspect of the audit.

If you have any questions, please contact me at 301-415-1025 or by e-mail at Rajender.Auluck@nrc.gov.

Sincerely,

Rajender Auluck, Senior Project Manager
Beyond-Design-Basis Engineering Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No.: 50-410

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATION OPEN ITEMS

RELATED TO ORDER EA-13-109 MODIFYING LICENSES

WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE OF

OPERATION UNDER SEVERE ACCIDENT CONDITIONS

EXELON GENERATION COMPANY, INC.

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

BACKGROUND

On June 6, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13143A334), the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-13-109, "Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Condition," to all Boiling Water Reactor (BWR) licenses with Mark I and Mark II primary containments. The order requirements are divided into two parts to allow for a phased approach to implementation.

Phase 1 of Order EA-13-109 requires license holders of BWRs with Mark I and Mark II primary containments to design and install a Hardened Containment Vent System (HCVS), using a vent path from the containment wetwell to remove decay heat, vent the containment atmosphere (including steam, hydrogen, carbon monoxide, non-condensable gases, aerosols, and fission products), and control containment pressure within acceptable limits. The HCVS shall be designed for those accident conditions (before and after core damage) for which containment venting is relied upon to reduce the probability of containment failure, including accident sequences that result in the loss of active containment heat removal capability or extended loss of alternating current power (ELAP). The order required all applicable licensees, by June 30, 2014, to submit to the Commission for review an overall integrated plan (OIP) that describes how compliance with the Phase 1 requirements described in Order EA-13-109 Attachment 2 will be achieved.

Phase 2 of Order EA-13-109 requires license holders of BWRs with Mark I and Mark II primary containments to design and install a system that provides venting capability from the containment drywell under severe accident conditions, or, alternatively, to develop and implement a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell during severe accident conditions. The order required all applicable licensees, by December 31, 2015, to submit to the Commission for

review an OIP that describes how compliance with the Phase 2 requirements described in Order EA-13-109 Attachment 2 will be achieved.

By letter dated June 27, 2014 (ADAMS Accession No. ML14184B340), Exelon Generation Company, Inc. (Exelon, the licensee) submitted its Phase 1 OIP for Nine Mile Point Nuclear Station, Unit 2 (NMP2). By letters dated December 16, 2014, June 30, 2015, December 15, 2015 (which included the combined Phase 1 and Phase 2 OIP), June 30, 2016, December 14, 2016, and June 30, 2017 (ADAMS Accession Nos. ML14356A192, ML15181A017, ML15364A075, ML16182A013, ML16349A033, and ML17181A033, respectively), the licensee submitted its 6-month updates to the OIP, as required by the order.

The staff reviewed the information provided by the licensee and issued interim staff evaluations (ISEs) for Phase 1 and Phase 2 for NMP2 by letters dated February 11, 2015 (ADAMS Accession No. ML15028A149), and August 25, 2016 (ADAMS Accession No. ML16223A853), respectively. When developing the ISEs, the staff identified open items where the staff needed additional information to determine whether the licensee's plans would adequately meet the requirements of Order EA-13-109.

The NRC staff is using the audit process in accordance with the letters dated May 27, 2014 (ADAMS Accession No. ML14126A545), and August 10, 2017 (ADAMS Accession No. ML17220A328), to gain a better understanding of licensee activities as they come into compliance with the order. The staff reviews submitted information, licensee documents (via ePortals), and preliminary Overall Program Documents (OPDs)/OIPs, while identifying areas where additional information is needed. As part of this process, the staff reviewed the licensee closeout of the ISE open items.

AUDIT SUMMARY

As part of the audit, the NRC staff conducted teleconferences with the licensee on November 17, 2016, and September 28, 2017. The purpose of the audit teleconferences was to continue the audit review and provide the NRC staff the opportunity to engage with the licensee regarding the closure of open items from the ISEs. As part of the preparation for these audit calls, the staff reviewed the information and/or references noted in the OIP updates to ensure that closure of ISE open items and the HCVS design are consistent with the guidance provided in Nuclear Energy Institute (NEI) 13-02, Rev. 1 and related documents (e.g. white papers (ADAMS Accession Nos. ML14126A374, ML14358A040, ML15040A038 and ML15240A072) and frequently asked questions (FAQs, ADAMS Accession No. ML15271A148)) that were developed and reviewed as part of overall guidance development. The NRC staff audit members are listed in Table 1. Table 2 is a list of documents reviewed by the staff. Table 3 provides the status of the ISE open item closeout for NMP2. The open items are taken from the Phase 1 and Phase 2 ISEs issued on February 11, 2015, and August 25, 2016, respectively.

FOLLOW UP ACTIVITY

The staff continues to audit the licensee's information as it becomes available. The staff will issue further audit reports for NMP2, as appropriate.

Following the licensee's declarations of order compliance, the licensee will provide a final integrated plan (FIP) that describes how the order requirements are met. The NRC staff will evaluate the FIPs, the resulting site-specific OPDs, as appropriate, and other licensee documents, prior to making a safety determination regarding order compliance.

CONCLUSION

This audit report documents the staff's understanding of the licensee's closeout of the ISE open items, based on the documents discussed above. The staff notes that several of these documents are still preliminary, and all documents are subject to change in accordance with the licensee's design process. In summary, the staff has no further questions on how the licensee has addressed the ISE open items, based on the preliminary information. The status of the NRC staff 's review of these open items may change if the licensee changes its plans as part of final implementation. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:
1. Table 1 – NRC Staff Audit and Teleconference Participants
2. Table 2 – Audit Documents Reviewed
3. Table 3 – ISE Open Item Status Table

Table 1 - NRC Staff Audit and Teleconference Participants

Title	Team Member	Organization
Team Lead/Project Manager	Rajender Auluck	NRR/DLP
Project Manager Support/Technical Support – Containment / Ventilation	Brian Lee	NRR/DLP
Technical Support – Containment / Ventilation	Bruce Heida	NRR/DLP
Technical Support – Electrical	Kerby Scales	NRR/DLP
Technical Support – Balance of Plant	Kevin Roche	NRR/DLP
Technical Support – I&C	Steve Wyman	NRR/DLP
Technical Support – Dose	John Parillo	NRR/DRA

Table 2 – Audit Documents Reviewed

ECP 13-000087 – Missile Evaluation
N2-2014-004, "MAAP 4.0.6 Analysis of Nine Mile Point Unit 2 Loss of All AC Power Scenario with Succesful FLEX Short Term – Cases 1F19a, 1F20a, and 1F23a"
A10.1-P-050 Revision. 0, "Hardened Contaniment Vent Capacity"
AX-515B, "Pipe Stress Calculation For Vent'N R.B. Air Cool & Purge Piping Lines From Penetration Z-48 To Penetration Z-51"
A10.1-P-053, Revision 0, Hardened Containment Vent Purge System Design Calculation"
Procedure N2-OP-76, Revision 00300 – Plant Communications
Calculation-ES-198-01-1.0, "Control Building Station Blackout Analysis"
H21C-114, "NMP2 Hardened Containment Vent System Dose Assessment"
EC-206, "600VAC FLEX Phase II Portable 450kW Diesel Generator Sizing Calculation"
Document No. 301-10001434-12 – Design/Sesmic Report Weak Link Analysis Maximum Torque Calculation
VENRPT-15-000013 – Seismic Qualifiaction Summary for Hardened Containment Vent Components
ECP 13-000087 – Instrumentation & Controls
N2-MISC-003, Revision 2, "MAAP Analysis to Support SAWA Strategy"
ECP-17-000280-CN-001 - H21C-114, "Hardened Containment Vent System (HCVS) Radiological Dose Analysis"
BWROG-TP-008, "Severe Accident Water Addition Timing"
BWROG-TP-011, "Severe Accident Water Management Supporting Evaluations"

Nine Mile Point Nuclear Station, Unit 2
Vent Order Interim Staff Evaluation Open Items:

Table 3 - ISE Open Item Status Table

ISE Open Item Number Requested Action	Licensee Response – Information provided in 6- month updates and on the ePortal	NRC Staff Close-out notes	Safety Evaluation (SE) status Closed; Pending; Open (need additional information from licensee)
Phase 1 ISE OI 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 [American Society of Mechanical Engineers] Class 2, 3 and ANSI [American National Standards Institute] 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 dated May 9, 2014 [ADAMS Accession No. ML14111A147], "Subject: Seismic 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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation AX-515B addresses the HCVS seismic qualification. The licensee evaluated the entire HCVS system to Seismic Category I, which is consistent with the plants seismic design-basis. The Engineering Change Package (ECP) addresses the HCVS Tornado Missile Protection. The licensee's design is consistent with the endorsed white paper and meets all of the tornado missile assumptions identified in HCVS-WP-04. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.2.2]

	seismic load case (2 times theSSE) is not required as part of the BDB [beyond-design-basis] analysis of the CPS/HCVS system. Pipe stress calculation AX-515B is available on the ePortal for NRC review. Missile Protection of the outdoor 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 [extended loss of alternating current power (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 evaluation is available on the eportal for NRC review.		
Phase 1 ISE OI 2	Per the NMP2 Updated Final Safety Analysis Report Table 3.2-1 and Section	The NRC staff reviewed the information provided in the 6-	Closed

Make available for NRC staff review documentation of a determination of seismic adequacy for the remote operating station (ROS) location in the Reactor Building Track Bay.	3.8.4.1.9, the Reactor Building Track Bay is a seismic, tornado protected structure. The EC-045 Series of calculations and EC-045 Series of drawings also indicate that the Track Bay/Standby Gas Treatment Building is a Safety-Related, QA Cat I structure. In addition, the outer track bay doors are designed to withstand tornado missiles per door specification S208G.	month updates and on the ePortal. The ROS is in a location that is readily accessible and seismically adequate, and appears to support operation of the HCVS. No follow-up questions.	[Staff evaluation to be included in SE Section 3.2.2]
Phase 1 ISE OI 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.	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 [per square inch gauge] 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 on the ePortal. Additionally, MAAP [Modular Accident Analysis Program] 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 [reactor pressure vessel] alternate injection with assumed RCIC [reactor core isolation cooling] failure at 240°F in the	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. In response to the staff's question regarding HCVS capacity, the licensee provided Calculation A10.1-A-050. This document confirmed that the size of the wetwell portion of the HCVS ($\geq$ 12 inches in diameter) provides adequate capacity to meet or exceed the order criteria. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.1]

	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 design pressure and the primary containment pressure limit. Calculation N2-2014-004 is available for NRC review on the ePortal.		
Phase 1 ISE OI 4 Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	As required by Order 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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee's design is consistent with option 3 of the endorsed white paper HCVS-WP-03. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.11]

	Argon bottle replacement for continued operation past 24 hours. 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.		
Phase 1 ISE OI 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 on 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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The communication methods are the same as accepted in Order EA-12-049. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.1.1]

	assessment regarding NTTF Rec 9.3 Communications for NMP ([ADAMS Accession No. ML13100A236)].		
Phase 1 ISE OI 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. Same response as Open Item #4.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee's design appears to maintain hydrogen below flammability limits. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.12]
Phase 1 ISE OI 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 area temperature for the ROS in the Track Bay is not expected to undergo any	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee stated that expected peak area temperature for the MCR is 100°F, which is based on Calculation ES-198. The licensee stated that the ROS location has no vital equipment in the area that would be operating, which would add to the heat load, and the ROS location 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. Temperatures do not exceed 110 degrees Fahrenheit (F°), which is acceptable for long-term personnel habitability.	Closed [Staff evaluation to be included in SE Sections 3.1.1.2 and 3.1.1.3]

	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: 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 on the ePortal for NRC's review. 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 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	The total integrated radiological dose in the MCR and ROS during the sustained operating period results in low operator dose, which is based on Calculation H21C-114. The calculated mission doses associated with actions taken to protect the public under severe accident conditions will not subject plant personnel to an undue risk from radiation exposure. No follow-up questions.	

	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 [beyond-design-basis-external events], 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 on the ePortal for NRC review.		
Phase 1 ISE OI 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 (VALA) type rated for 104 ampere hours. The battery is selected in accordance to IEEE [Institute of Electrical and Electronics Engineers] 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 on 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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee stated that all electrical power required for operation of HCVS components is provided by a dedicated HCVS battery charger and batteries. The battery sizing requirements confirmed that the HCVS batteries have a minimum capacity capable of providing power for 24 hours without recharging, and therefore is adequate. The licensee revised the FLEX Diesel Generator Calculation (EC-206) to add the loads for the HCVS (including the new battery charger). The NRC staff reviewed the revised calculation and confirmed that with the additional load added, it's still within the capacity and capability of the NMP2 FLEX diesel generator. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]

	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 on the ePortal for NRC review.		
Phase 1 ISE OI 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.	Reviewed Calculation A10.1-P-051, Rev 0, "Nitrogen Requirement for Operation of the HCVS Valves." Calculation determined that if the N2 bottles are maintained above 1993 psig, they will have sufficient capacity to operate the HCVS for 24 hours.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]
Phase 1 ISE OI 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 on the ePortal for NRC review.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee provided several reports which demonstrate the seismic adequacy of the HCVS components. The staff reviewed these reports and confirmed that the components required for HCVS venting remain functional following a design basis earthquake. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.2.2]
Phase 1 ISE OI 11	Existing Instrumentation:	The NRC staff reviewed the information provided in the 6-	Closed

Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Existing control room indications for drywell pressure and wetwell level are used for HCVS venting operation. Containment pressure indication is needed 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 containment design pressure and/or the primary containment pressure limit (PCPL). Containment pressure is displayed on indicator 2CMS*PI2A (Division 1), which receives a pressure signal from pressure transmitter 2CMS*PT2A; and recorder 2CMS*PR2B (Division 2), which receives a pressure signal from pressure transmitter 2CMS*PT2B. Wetwell level indication is needed to determine that the wetwell vent path is preserved. Wetwell level is displayed on indicator 2CMS*LI9A (Division 1), which receives a level signal from level transmitter 2CMS*LT9A; and recorder 2CMS*LR9B (Division 2), which receives a level signal from level transmitter 2CMS*LT9B. 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. Additionally, containment pressure and/or wetwell level can be obtained from a Transmation 1045 (or similar loop calibrator) at the associated transmitter or in the relay room panel.	month updates and on the ePortal. ECP-13-000087-102-02 Rev 6 discusses the environmental conditions during an accident at the locations containing I&C components. The staff concluded that the environmental qualification met the order requirements. No follow-up questions.	[Staff evaluation to be included in SE Section 3.1.2.8]

	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. • Isolation Valve Position Indication • Temperature, Pressure and Radiation of the HCVS Pipe • HCVS Purge System Supply Pressure (Local indication only) • Battery Voltage New track bay control panel 2CPS-PNL 100 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.		
Phase 1 ISE OI 12 Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation	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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. ECP-13-000087-102-02 Rev 6 discusses the environmental conditions during an accident at the locations containing I&C components. The staff concluded that the environmental qualification met the order requirements.	Closed [Staff evaluation to be included in SE Section 3.1.1.4]

that the components are capable of performing their functions during ELAP and severe accident conditions.	listing and information from the ECP is available on the ePortal for NRC review.	No follow-up questions.	
Phase 1 ISE OI 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.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee provided calculations A10.1-P-047 and A10.1-P-052, which determined actuator capability and margin calculation. Based on these calculations, the new air operated valves (AOVs) can open under the maximum expected differential pressure during a BDBEE and severe accident wetwell venting. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.2.1]

	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 A 10.1-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 on the ePortal for NRC review.		
Phase 2 ISE OI 1 Licensee to provide the site-specific MAAP evaluation that establishes the initial SAWA flow rate.	Reference Plant: Torus freeboard Volume is 525,000 gallons; SAWA flow is 500 GPM at 8 hours followed by 100 GPM from 12 hours to 168 hours Nine Mile point U2: Total freeboard volume is 782,00 gallons; SAWA flow is 300 GPM at 8 hours followed by 100 GPM from 14 hours to 168 hours NMP2 has performed a plant specific MAAP analysis to establish an initial SAWA flow rate using the above parameters of 300 GPM at 8 hours followed by 100 GPM from 14 hours to 168 hours. The MAAP analysis demonstrates that the plant is bounded by the reference plant analysis and that the SAWM strategy is successful in making it unlikely that a drywell vent is needed to prevent containment failure (N2-MISC-003 Rev 2). The MAAP analysis is loaded on the ePortal for NRC review.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation N2-MISC-003. Cases 2 through Case 2d address SAWA and the ability to maintain containment integrity. All Cases assume wetwell venting at 45 psig. Cases 2, 2a, and 2d assume 300 gallons per minute (gpm) water addition at 8 hours followed by a reduction to 100 gpm 6 hours later. Case 2b assumed 500 gpm water addition at 8 hours followed by a reduction to 100 gpm 4 hours later. All Cases run show that sufficient water is added to maintain or increase the water level in the suppression pool. All Cases run demonstrate a successful SAWA strategy. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.2.1.1]
Phase 2 ISE OI 2	The wetwell vent has been designed and installed to meet NEI 13-02 Rev 1	The NRC staff reviewed the information provided in the 6-	Closed

Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions.	guidance, which will ensure that it is adequately sized to prevent containment overpressure under severe accident conditions. The SAWM strategy will ensure that the wetwell vent remains functional for the period of sustained operation. Nine Mile Point Unit 2 will follow the guidance (flow rate and timing) for SAWA/SAWM described in BWROG-TP-15-008 and BWROG-TP-15-011. The wetwell vent will be opened prior to exceeding the PCPL value of 45 PSIG. Therefore, containment over pressurization is prevented without the need for a drywell vent.	month updates and on the ePortal. Calculation N2-MISC-003 Rev 2 demonstrates a successful SAWA strategy will maintain containment within design limits. The SAWM strategy will ensure that the wetwell vent remains functional for the period of sustained operation. No follow-up questions.	[Staff evaluation to be included in SE Sections 4.1 and 4.2]
Phase 2 ISE OI 3 Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX manual valve during severe accident conditions.	NMP2 utilizes the installed sound powered headset system and/or the 450 MHz radios in the talk around mode to communicate between the MCA and the SAWA flow control location. This communication method is the same as accepted in Order EA-12-049. These items will be powered and remain powered using the same methods as evaluated under EA-12-049 for the period of sustained operation, which may be longer than identified for EA-12-049.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The communication methods are the same as accepted in Order EA-12-049. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.1]
Phase 2 ISE OI 4 Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions.	The SAWA flow instrument will be mounted on the FLEX valve manifold cart and stored in the reactor building just outside of the inner door to the reactor building track bay. During FLEX/SAWA flow injection to the RPV the cart will be moved into the RB track bay adjacent to the HCVS Remote Operating Station (ROS). A quantitative evaluation of expected dose rates has been performed per HCVS-WP-02 and found the dose rates at the ROS including ingress/egress	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. ECP-17-000280-CN-001-H21C114 Rev 0 discusses the SAWM flow instrumentation qualification. The NRC staff found through engineering judgement that the accuracy of the flow meter and the	Closed [Staff evaluation to be included in SE Sections 4.1.1.3 and 4.2.1.3]

	paths are acceptable (Ref. Calculation H21C-114 as amended by ECP-17-00280-CN-001 H21C-114). The dose rate at the operating location of the flow meter cart is <5E-3 rem/hr. The total dose over the 7-day period is less than 1 rem, which is well below the generally accepted maximum for digital equipment, 1000 rem. The flow meter is commercial equipment and does not have a published radiation dose limit. ECP-17-00280-CN-001 H21C-114 is loaded in the NRC ePortal. The selected instrument is designed for the expected flow rate, temperature, and pressure for SAWA over the period of sustained operation.	environmental qualifications related to the performance of the flow meter meet the intent of Order EA-13-109. No follow-up questions.	

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 2 - REPORT FOR THE AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATION OPEN ITEMS RELATED TO NRC ORDER EA-13-109 TO MODIFY LICENSES WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE OF OPERATION UNDER SEVERE ACCIDENT CONDITIONS DATED October 17, 2017

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