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

October 30, 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 1 - REPORT FOR THE AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATIONS 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. MF4481; EPID L-2014-JLD-0043)

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 licensees 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, LLC. (the licensee) submitted its Phase 1 OIP for Nine Mile Point Nuclear Station, Unit 1 (NMP1). 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 NRC 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 NMP1 by letters dated March 26, 2015 (ADAMS Accession No. ML15069A671), and August 30, 2016 (ADAMS Accession No. ML16231A452), 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 a teleconference with the licensee on October 12, 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,

R Auluck

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

Docket No.: 50-220

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 EVALUATIONS 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, LLC.

NINE MILE POINT NUCLEAR STATION, UNIT 1

DOCKET NO. 50-220

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) licensees 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, LLC. (Exelon, the licensee) submitted its Phase 1 OIP for Nine Mile Point Nuclear Station, Unit 1 (NMP1). 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 March 26, 2015 (ADAMS Accession No. ML15069A671), and August 30, 2016 (ADAMS Accession No. ML16231A452), 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 a teleconference with the licensee on October 12, 2017. The purpose of the audit teleconference 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, respectively) 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 NMP1. The open items are taken from the Phase 1 and Phase 2 ISEs issued on March 26, 2015, and August 30, 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 NMP1, 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/Sr. 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 13-000086-103 – Missile Evaluation
ECP 13-000086 – DCS Electrical Section, Battery and Charger
S10-HVAC-HV11, "TB Building Maximum & Minimum Temperatures"
HCVS-OGP-09 – HCVS Hose Radiological Evaluation
S22.4-201.1P002, "HCVS Piping Analysis for Non-Torus Attached Piping"
S22.4-201.13F004, Revision 0, "Hardened Contaniment Vent Capacity"
ECP 13-000086-103 – Suppresion Pool Thermal Capacity
S22.4-201.13F001, Revision 0, "Hardened Containment Vent Purge System Design Calculation"
Procedure N1-OP-51, Revision 01300 – Plant Communications
H21C-115, "NMP1 Hardened Containment Vent System Dose Analysis"
Calculation 125VDCSCES-FLEX-BDB, Revision 0, "Fukushima/NFPA-805 125VDC Portable Battery Charger Equipment Sizing"
S22.4-201.13M002, Revision 0, "HCVS Valve Motive Gas Supply Sizing"
VENRPT-15-000013 – Seismic Qualifiaction Summary for Hardened Containment Vent Components
ECP 13-000086-103 – Instrumentation & Controls Section 4.1.36
ECP 13-000086-103 – Environmental Conditions and Impacts Section 4.1.14
ECP 13-000086-103 – Assessment of Operator Access to HCVS Equipment Section 4.1.19
N2-MISC-004, Revision 0, "MAAP Analysis to Support SAWA Strategy"
ECP-17-000279-CN-001 - H21C-115, "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 1
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 HCVS stack</u> 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 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 10of the *Code of Federal Regulations* 50.54(f) Regarding Seismic Hazard Reevaluations 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 [beyond-design-basis] analysis of the HCVS piping system at NMP1. The above referenced pipe stress calculations are available for NRC review in the ePortal.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculations S22.4-201.1P002 and S22.4-201.13P003 address the HCVS seismic qualification. The licensee evaluated the entire HCVS system to Seismic Category I, which is consistent with the plant's seismic design-basis. The Engineering Change Package (ECP) -13-000086-103 addresses the HCVS Tornado Missile Protection. The licensee credits NEI 13-02, Section 5.1.1.6 risk informed approach to wind-borne missiles. The licensee indicated they have contingency actions available in the event a wind-borne missile blocks vent gas flow. The licensee's design is consistent with the endorsed white paper and meets all of the tornado missile assumptions identified in HCVS-WP-04.	Closed [Staff evaluation to be included in SE Section 3.2.2]

	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 ELAP or LUHS [loss of ultimate heat sink], for plants that are enveloped by the assumptions in the white paper. 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-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.	No follow-up questions.	
Phase 1 ISE OI 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	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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. ECP-13-000086-103, Attachment B determined the energy released for 3 hours is 2.9E8 BTUs. The	Closed [Staff evaluation to be included in SE Section 3.1.2.1]

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.	equivalent of 1 percent of licensed/rated thermal power. The calculation indicates that a vent capacity of approximately 68,300 lbm/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 2.91 OE8 BTU [British Thermal Unit]; 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 response are available for NRC review in the ePortal.	capacity of the suppression pool is 6.299E8 BTUs. Analysis ECP-13-000086-MU-008 used the RELAP5 computer program. The 1% venting capacity required is 68,303 lbm/hr. The vent capacity is 63,259 lbm/hr at 25 per square inch gauge (psig) and 71,658 lbm/hr at 30 psig. The vent capacity at 35 psig is 79,859 lbm/hr. Updated Final Safety Analysis Report Section VI.B.2.1 design limits the Drywell and 35 psig and 25°F for the Suppression Pool (Torus). This document confirmed that the size of the wetwell portion of the HCVS provides adequate capacity to meet or exceed the order criteria. No follow-up questions.	
Phase 1 ISE OI 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	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.	Closed [Staff evaluation to be included in SE Section 3.1.2.11]

	sized in calculation S22.4-201.13F001 which is on the ePortal.	Calculation S33.4-201.13F001, "HCVS Purge System Design," determined the quantity of Argon required to inert the hydrogen in the vent system to preclude the potential for a hydrogen deflagration. The calculation assumed 8 argon purges in the first 24 hours with a minimum of 1 hour between purges. No follow-up questions.	
Phase 1 ISE OI 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 [mega hertz] 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.	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]

	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 NMP ([ADAMS Accession No.] ML13100A236).		
Phase 1 ISE OI 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 [primary containment isolation valve] 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-L T 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-inserting containment. IV-201-16 and IV-201-17 are normally closed and automatically	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The licensee has installed a new HCVS wetwell pipe which provides a dedicated HCVS flowpath from the wetwell penetration PCIVs to the outside with no interconnected downstream piping. The staff's review of the proposed system indicates that 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]

	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-L T 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 nitrogen to the valve actuator. The new HCVS vent will be normally isolated from the Containment System by two new normally closed PCIVs (IV-201.13-74 and IV-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-L T. 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.		
Phase 1 ISE OI 6 Make available for NRC staff audit an evaluation of	An assessment of Operator access to HCVS equipment was performed and documented in the Design Consideration Section (DCS) of Engineering Change	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal.	Closed

temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	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.	ECP-13-000086-103 documents that temperature and radiological conditions should not inhibit operator actions needed to initiate and operate the HCVS during an ELAP with severe accident conditions. Temperatures do not exceed 110 degrees Fahrenheit (F°), which is acceptable for long-term personnel habitability. Radiological conditions result in low operator dose. No follow-up questions.	[Staff evaluation to be included in SE Sections 3.1.1.2 and 3.1.1.3]
Phase 1 ISE OI 7 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 [Institute of Electrical and Electronics Engineers] 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-	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.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]

	hours battery capacity. Therefore, the selected battery is adequate. The battery charger is rated for 130 volts nominal DC [direct current] output voltage, 10 amperes nominal DC output current, 120 volts AC [alternating current] input voltage and a current limit adjustment range of 50% - 120%. The HCVS loads may also be powered via 125 VDC [volts direct current] 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-	The licensee revised the FLEX portable battery charger equipment sizing calculation 125VDCSCES-FLEX-BDB to add the loads for the HCVS. 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 portable battery charger BC-BDB. No follow-up questions.	

	FLEX- BDB are in the ePortal for NRC review.		
Phase 1 ISE OI 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 C18014-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.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation S22.4-201.13M002, Revision 0 "HCVS Valve Motive Gas Supply Sizing" determined that if the N2 bottles are maintained above 1993 psig, they will have sufficient capacity to operate the HCVS for 24 hours. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]
Phase 1 ISE OI 9 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. 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 rupture	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]

	disc. These reports are available on the ePortal for NRC review.		
Phase 1 ISE OI 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, drywall pressure and suppression pool level are stated as the key parameters for SAWM [severe accident water management] 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 [emergency operating procedures] and SAPs [severea accident procedures] 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	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. ECP-13-000086-103 Revision 3, Section 4.1.36 discusses the environmental conditions during an accident at the locations containing I&C components. The staff's review indicated that the environmental qualification met the order requirements. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.8]

	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 .2-5950 (Channel 12) and LI-201.2-594C (Channel 11). LI-201.2-595D 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 (LT58-05) 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 [solenoid-operated valves] 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 NRC review.		
Phase 1 ISE OI 11	The HCVS is located in the Reactor Building, Turbine Building, Auxiliary Control Room, and outside the Reactor	The NRC staff reviewed the information provided in the 6-	Closed

Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	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.	month updates and on the ePortal. ECP-13-000086-103 Revision 3, Section 4.1.36 discusses the environmental conditions during an accident at the locations containing I&C components. The staff's review indicated that the environmental qualification met the order requirements. No follow-up questions.	[Staff evaluation to be included in SE Section 3.1.1.4]
Phase 2 ISE OI 1 Licensee to confirm through analysis the temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Refer to the closure summary for ISE Phase 2 Open Item No. 2.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation S10-HVAC-HV11, Revision 1, "TB Bldg. Max & Min Temperatures" along with ECP-13-000086-103, shows that temperature and radiological conditions should not inhibit operator actions needed to initiate and operate the HCVS during an ELAP with severe accident conditions. No follow-up questions.	Closed [Staff evaluation to be included in SE Sections 4.1.1.4 and 4.2.1.4]

Phase 2 ISE OI 2 Licensee to evaluate the SAWA [severe accident water addition] equipment and controls, as well as ingress and egress paths for the expected severe accident Conditions (temperature, humidity, radiation) for the sustained operating period.	Equipment and Controls: Plant instrumentation for SAWM that is qualified to RG 1.97 or equivalent is considered qualified for the sustained operating period without further evaluation. The following plant instruments are qualified to RG 1.97: PT-201.2-594, PT-201.2-680, PT-201.2-594C – Wetwell Water Level PT-201.2-595, PT-201.2-596, PT-201.2-595D – Wetwell Water Level PT-201.2-595, PT-201.2-595A – Wetwell Pressure PT-201.2-594 PT-201.2-594A – Wetwell Pressure Passive components that do not need to change state after initially establishing SAWA flow do not require evaluation beyond the first 8 hours, at which time they are expected to be installed and ready for use to support SAWA/SAWM. Also the fire hoses used are the "Big 10" model from Key hose. This hose is a heavy duty double jacketed hose using both polyurethane and EPDM rubber. Per HCVS-OGP-009 these materials will withstand the maximum doses that can be experienced during a sever accident and are therefore acceptable. The following additional equipment performing an active SAWA/SAWM function is considered:	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation S10-HVAC-HV11, Revision 1, "TB Bldg. Max & Min Temperatures," along with ECP-13-000086-103, shows that temperature and radiological conditions should not inhibit operator actions or SAWA equipment and controls needed to initiate and operate the HCVS during an ELAP with severe accident conditions. No follow-up questions.	Closed [Staff evaluation to be included in SE Sections 4.1.1.4 and 4.2.1.4]

	• SAWA/SAWM flow instrument • SAWA/SAWM pump • SAWA/SAWM generator • Active valves in SAWA flow path (Not applicable as there are no active valves in the SAWA flow path) The above listed additional SAWA/SAWM equipment performing an active function evaluated for radiation and temperature/humidity as described below: SAWA/SAWM flow instrument: The SAWA flow instrumentation will be mounted on a cart with a throttling valve and stored in the FLEX Storage Building. During FLEX/SAWA flow injection to the RPV, the cart will be moved into the turbine building near 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 flow instrument are acceptable. Refer to calculation H21C115 loaded in the ePortal. The dose rate at the operating location of the flow meter cart (just west of the ROS, between column rows G and H) is 2.25E-05 rem/hr. The area just east of the ROS may be acceptable as well as long as an operator does not stay at the flow meter for an extended period of time as the dose rate east of the ROS increases to 7.335E-01 rem/hr per H21C115 page C3. Using the higher dose rate, the total dose over the 7-day period is 123 rem. This dose 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. The selected instrument is designed for the expected flow rate, temperature and pressure for SAWA over the period of sustained operation.		
Phase 2 ISE OI 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	Refer to the closure summary for ISE Phase 2 Open Item No. 2.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation S10-HVAC-HV11, Revision 1, "TB Bldg. Max & Min Temperatures," along with ECP-13-000086-103, shows that temperature and radiological conditions should not inhibit operability for instrumentation and equipment being used for SAWA supporting equipment during an ELAP with severe accident conditions. No follow-up questions.	Closed [Staff evaluation to be included in SE Sections 4.1.1.4 and 4.2.1.4]
Phase 2 ISE OI 4 Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions.	The wetwell vent has been designed and installed to meet NEI 13-02 Rev 1 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 1 will follow the guidance (flow rate and timing) for SAWA/SAWM	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation N2-MISC-004, Revision 0 demonstrates the suppression pool will be provided with sufficient makeup to maintain a heat sink for reactor decay heat, which will maintain containment within design limits. The SAWM	Closed [Staff evaluation to be included in SE Sections 4.1 and 4.2]

	described in BWROG-TP-15-008 and BWROG-TP-15-011. The wetwell vent will be opened prior to exceeding the PCPL value of 43 PSIG. Therefore, containment over pressurization is prevented without the need for a drywell vent.	strategy will ensure that the wetwell vent remains functional for the period of sustained operation. No follow-up questions.	
Phase 2 ISE OI 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.	*Reference Plant* Torus freeboard volume is 525,000 gallons *NMP1* Total freeboard volume is 862,288 gallons *Reference Plant* SAWA flow is 500 GPM [gallons per minute] at 8 hours followed by 100 GPM from 12 hours to 168 hours *NMP1* SAWA flow is 263 GPM at 8 hours followed by 54 GPM* from 12 hours to 168 hours NMP1 has performed a plant specific MAAP [modular accident analysis program] analysis to establish an initial SAWA flow rate using the above parameters of 263 GPM at 8 hours followed by 54 GPM* from 12 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 (N1-MISC-004).	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation N2-MISC-004, Revision 0 addresses SAWA/SAWM and the ability to maintain containment integrity. The calculation shows that sufficient water is added to maintain or increase water level in the suppression pool and demonstrates a successful SAWA/SAWM strategy. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.2.1.1]

	(*Note that 53 GPM was quoted in the OIP but NMP1 will use 54 GPM in its procedures consistent with the flowrate used in MAAP)		
Phase 2 ISE OI 6 Licensee to demonstrate that there is adequate communication between the main control room (MCR) and the operator at the FLEX manual valve during severe accident conditions.	NMP1 utilizes the installed sound powered headset system and/or the 450 MHz radios in the talk around mode to communicate between the MCR 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 valuated 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 7 Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions.	Refer to the closure summary for ISE Phase 2 Open Item No. 2.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. ECP-17-000279-CN-001-H21C115, Rev 0 discusses the SAWM flow instrumentation qualification. The NRC staff found through engineering judgement that the accuracy of the flow meter and the environmental qualifications related to the performance of the flow meter meet the intent of Order EA-13-109. No follow-up questions.	Closed [Staff evaluation to be included in SE Sections 4.1.1.3 and 4.2.1.3]

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 1 - REPORT FOR THE AUDIT OF LICENSEE RESPONSES TO INTERIM STAFF EVALUATIONS 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 30, 2017

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