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

March 29, 2018

Mr. John Dent, Jr.
Vice President-Nuclear and CNO
Nebraska Public Power District
Cooper Nuclear Station
72676 648A Avenue
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - 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. MF4384; EPID L-2014-JLD-0046)

Dear Mr. Dent:

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 Conditions," 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 30, 2014 (ADAMS Accession No. ML14189A415), Nebraska Public Power District (NPPD, the licensee) submitted its Phase 1 OIP for Cooper Nuclear Station (CNS, Cooper). By letters dated December 19, 2014, June 30, 2015, December 21, 2015 (which included the combined Phase 1 and Phase 2 OIP), June 30, 2016, December 28, 2016, June 19, 2017, and December 21, 2017 (ADAMS Accession Nos. ML14364A154, ML15189A047, ML15364A011, ML16196A058, ML17006A005, ML17177A091, and ML17362A037, 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 Cooper by letters dated February 11, 2015 (ADAMS Accession No. ML15006A234), and September 29, 2016 (ADAMS Accession No. ML16266A066), 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 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 July 13, 2017 and March 8, 2018. 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. 50-298

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

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

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 Conditions," 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 (ac) 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 30, 2014 (ADAMS Accession No. ML14189A415), Nebraska Public Power District (NPPD, the licensee) submitted its Phase 1 OIP for Cooper Nuclear Station (CNS, Cooper). By letters dated December 19, 2014, June 30, 2015, December 21, 2015 (which included the combined Phase 1 and Phase 2 OIP), June 30, 2016, December 28, 2016, June 19, 2017, and December 21, 2017 (ADAMS Accession Nos. ML14364A154, ML15189A047, ML15364A011, ML16196A058, ML17006A005, ML17177A091, and ML17362A037, respectively), the licensee submitted its 6-month updates to the OIP, as required by the order.

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 Cooper by letters dated February 11, 2015 (ADAMS Accession No. ML15006A234), and September 29, 2016 (ADAMS Accession No. ML16266A066), 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 July 13, 2017 and March 8, 2018. The purpose of these 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, Revision 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 Cooper. The open items are taken from the Phase 1 and Phase 2 ISEs issued on February 11, 2015, and September 29, 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 Cooper, 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	Joshua Miller	NRR/DLP
Technical Support – I&C	Steve Wyman	NRR/DLP
Technical Support – Dose	John Parillo	NRR/DRA

Table 2 – Audit Documents Reviewed

Calculation NEDC 15-020, "HCVS Flow Rate and Vent Size," Revision 0
Calculation NEDC 14-026, "MAAP Analysis to Support Cooper FLEX Strategy," Revision 0
Calculation NEDC 15-028, "Analysis of the HCVS Piping," Revision 1
Calculation NEDC 96-025B, "Review of Advent LCA Calculation 96007TR-41B, Rev. 1 for PC-MOV-232MV and -233MV," Revision 1C1
Calculation NEDC 95-003, "Determination of Allowable Operating Parameters for CNS MOV Program MOVs," Revision 31C1
Calculation NEDC 00-110, "MOV Program Valve Margin Determination," Revision 10C1
Calculation NEDC 00-065, "Functional and MEDP Evaluation for PC-AOV-237AV," Revision 1C2
Calculation NEDC 05-013, "AOV Component Level Calculation for PC-AOV-237AV," Revision 1C1
Calculation NEDC 15-002, "Review of Tetra Portable Equipment Calculations in support of CNS FLEX Strategy," Revision 0
Calculation NEDC 15-024, "Radiological Conditions Resulting from the Operation of the HCVS," Revision 1
Calculation NEDC 15-047, "HCVS Radiological Source Term," Revision 0
Calculation NEDC 15-023, "Calculation of the Pressure Gradient Across the HCVS Line and HCVS Maximum Operational Temperature," Revision 0
Caclulation NEDC 15-030, "HCVS UPS Sizing Analysis," Revision 1
Calculation NEDC 15-033, "Review of Tetra Tech Calculation CALC-CNS001-194-4933-013 Rev 3," Revision 0
Calculation NEDC 15-025, "Mechanical ROS Civil/Structural Design," Revision 0
Calculation NEDC 15-026, "Mechanical ROS Nitrogen Calculation," Revision 0
Calculation NEDC 92-073, "Accumulator Sizing and Recharge Time for PC-237AV and PC-AO32," Revision 1
NLS2013028 – "CNS Communications Assessment," Revision 1

Cooper Nuclear Station
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 analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (i.e., unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.	Complete. 1% of RTP is demonstrated in NEDC 15-020,"Calculation of HCVS Flow Rate and Vent Size." The MAAP [modular accident analysis program] Analysis was documented in EC 14-027, "Acceptance of MAAP Analysis to Support Initial FLEX Strategy," which implements calculation NEDC 14-026, "MAAP Analysis to Support Cooper FLEX Strategy."	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation NEDC 15-020, "HCVS Flow Rate and Vent Size," Revision 0 calculates that the mass flow rate required to vent 1% of rated thermal power (RTP) of 2419 MWt is 7.55x104 lbm/hr. The calculation further demonstrates that a 12" diameter pipe will vent 1% RTP flow rate at 20.3 psig and will have 105,000 lbm/hr margin at 56 psig containment design pressure. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.1]
Phase 1 ISE OI 2 Make available for NRC staff audit seismic and tornado missile final design criteria for the HCVS stack.	Complete. NEDC 15-028, "Analysis of the HCVS Piping," performed the pipe stress analysis for the HCVS pipe, including the seismic and tornado wind design analysis. CED 6036742, Tab 6, Section 6.5.6 (E3 - External Hazard),"E3.4 - Tornado and Tornado-Generated Missile," evaluated	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation NEDC 15-028, "Owner Acceptance of TetraTech Calculation CNS001-194-4933-009 "Analysis of the HCVS	Closed [Staff evaluation to be included in SE Section 3.2.2]

	the tornado missile for the HCVS pipe. The evaluation was written in the CED (and not in a calculation), since the vast majority of the pipe is inside a Class I structure	Piping" for the Hardened Containment Vent System Project, Revision 0" classified HCVS as Seismic Class II/I and analyzed to safe shutdown earthquake forces and operating basis earthquake allowables. This calclulation uses the AutoPIPE computer program. Change Evaluation Document (CED) 6036742, "Reliable Hardened Containment Venting System", Tab 6 states that the HCVS is routed through the interior of the Reactor Building from the Torus Room and out through the roof. No follow up questions.	
Phase 1 ISE OI 3 Make available for NRC staff audit descriptions of all instrumentation and controls (i.e., existing and planned) necessary to implement this order including qualification methods.	Complete. CED 6036742, Section 6.5.14 (12 - Instrumentation & Control (I&C)) describes the instrumentation and controls (existing and planned) necessary to implement this Order. The majority of the equipment for the HCVS is non-essential. Environmental Qualification is limited to those components in the electrical system that interface with and provide isolation between Class 1E and non-Class 1E circuits.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. CED 6036742, TAB 6, including Sections 6.5.8 and 6.5.14 and Tables 6-10 and 6-10a shows that the radiation qualification appears to be in order for all the instruments. The temperature appears reasonable. Most temperatures are under 70 degrees Celsius. The licensee clarified the comment regarding elements that require qualification. They are referring specifically to isolation switches tied to 1E systems. They are referring to qualification for the	Closed [Staff evaluation to be included in SE Section 3.1.2.8]

		regular operating licensing basis because these impact 1E. They appear to be still in the process to address the necessary "meets environmental conditions" review for the remaining HCVS order related items. Critical channels of wetwell level and containment pressure are Regulatory Guide (RG) 1.97 variables and are accepted based on the existing RG 1.97 qualification. The staff's review indicates that the I&C components are consistent with the guidance in NEI 13-02 and its qualifications meet the order requirements. No follow-up questions.	
Phase 1 ISE OI 4 Make available for NRC staff audit a determination of the number of required valve cycles during the first 24 hours.	Complete. CED 6036742,Tab 4, Section 4.2.1.3 ("Control Valve PC-AOV-AO32, Accumulator IA-ACC-AO32, and new Pressure Switch IA-PSO4") determines 8 valve cycles during the first 24 hours, based on NEI White Paper HCVS-WP-O2 and the MAAP analysis results (EC 14-027,"Acceptance of MAAP Analysis to Support Initial FLEX Strategy" and NEDC 74-026, "MAPP Analysis to Support Cooper FLEX Strategy"). CED 6036742, Tab 6, Section 6.5.5 (82 - Environmental Features), states that NEDC 92-073, "Accumulator Sizing and Recharge Time for PC-237AV and PC-AO32," performs the calculation that sizes the accumulators, and accounts for leakage for 24 hours.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]

Phase 1 ISE OI 5 Make available for NRC audit the control document for HCVS out of service time criteria.	Complete. The out-of-service time criteria for HCVS will be maintained in the Technical Requirements Manual.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The Technical Requirements Manual contains the HCVS out of service time criteria, which is consistent with the guidance in NEI 13-02. No follow-up questions.	Closed [Staff evaluation to be included in SE)Section 3.1.2.13]
Phase 1 ISE OI 6 Make available for NRC staff to audit, an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during severe accident wetwell venting.	Complete. The HCVS operational temperature has been updated to 310°F per NEDC 15-023, "Owner Acceptance of TetraTech Calculation CNS001-194-4933-004 - Calculation of the Pressure Gradient Across the HCVS Line and HCVS Maximum Operation Temperature." Change Notice #28 to CED 6036742, "Reliable Hardened Containment Venting System, " authorized corresponding changes to the following air operated valve (AOV) and motor operated valve (MOV) related calculations to address HCVS flow rate and temperature increase: - NEDC 91-242, "Review of ERIN's System Level Design Basis Review for the Primary Containment System MOV's," Revision 2C1 - NEDC 96-0258, "Review of ADVENT LCA Calculation 96007TR-41 B, Rev. 1 for	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The NRC staff reviewed the various AOV and MOV calculations and verified in each case that the actuator can develop greater torque than Primary Containment Isolation Valves unseating torque. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 3.2.1]

	PCMOV-232MV and -233MV," Revision 1C1 - NEDC 95-003, "Determination of Allowable Operating Parameters for CNS MOV Program MOVs," Revision 31C1 - NEDC 00-110, "MOV Program Valve Margin Determination," Revision 10C1 - NEDC 00-065, "Functional and MEDP Evaluation for PC-AOY - 237 AV," Revision 1C2 NEDC 05-013, "AOV Component Level Calculation for PC-AOV -237 AV," Revision 1C1		
Phase 1 ISE OI 7 Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and the HCVS decision makers during ELAP and severe accident conditions.	Complete The Main Control Room (MCR) is the normal monitoring and operating location for HCVS. The Mechanical ROS has the capability to operate the HCVS if needed. Hand held radios will be used for communications between the MCR and ROS. The communications assessment performed in response to Near Term Task Force Recommendation 9.3 (NLS2013028) documented the acceptability of this communications channel.	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]
Phase 1 ISE OI 8 Make available for NRC staff audit an evaluation of temperature and radiological	Complete. CED 6036742,Tab 6, Section 6.5.5 (E2 - Environmental Features), discusses the temperature and radiological conditions,	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal.	Closed [Staff evaluation to be included in SE Sections 3.1.1.2 and 3.1.1.3]

conditions to ensure that operating personnel can safely access and operate controls and support equipment.	as well as CED 6036742,Tab 6, Section 6.5.7 (E4 - Emergency Preparedness, Planning and Response). NEDC 15-002, "Review of Tetra Tech Portable Equipment Calculations in support of CNS FLEX Strategy," calculates the 24 hour room heat-up temperature profile in the Reactor Building and Control Building during an ELAP. The site-specific radiological conditions for the HCVS are evaluated in NEDC 15-024, "Radiological Conditions Resulting from the Operation of the HCVS," based on the bounding CNS -specific in-containment source term during the first seven days following an ELAP (NEDC 15-047, "HCVS Radiological Source Term").	Main Control Room temperatures have been addressed as part of the FLEX order and were found to acceptable by the NRC staff. No calculations were identified related to evaluation of environmental conditions for the mechanical remote operating station (MROS). During the audit call, the licensee indicated that the MROS is open to the atmosphere. The temperature will be ambient conditions. The licensee does have cold weather gear available for operators, if needed. Calculation NEDC 15-024 evaluates the radiological conditions in areas where operators are needed for HCVS operation. Radiological conditions result in low operator dose. Based on the these evaluations, the 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.	
Phase 1 ISE OI 9 Make available for NRC staff audit the final sizing evaluation for HCVS batteries/Battery	Complete. CED 6036742, Tab 6, Section 6.5.4 (EI - Electrical Features), discusses the electrical power requirements and sizing.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal.	Closed [Staff evaluation to be included in SE Section 3.1.2.6]

charger including incorporation into FLEX DG loading calculation.	NEDC 15-030, "HCVS UPS Inverter, Battery, and Battery Charger Sizing Analysis," documents the load and sizing analysis for the Hardened Containment Venting System Uninterruptable Power Supply (HCVS UPS) and distribution panel. NEDC 15-033, "HCVS PC233MV UPS Sizing Analysis," documents the size of the UPS for PC-MOV-233MV, which is located near MCC-RA on RB elevation 958'-3". The FLEX diesel generator (DG) is discussed in: CED 6036742,Tab 4, Section 4.4.3.1 HCVS UPS; CED 6036742,Tab 6, Section 6.5.14 (I2 - Instrumentation & Control (I&C), 12.3 (System/Controls); and CED 6036142,Tab 6, Section 6.5.26 (S3 - System Interfaces). The hardened vent modification (CED 6036742) interfaces with CED 6037041, "FLEX Electrical Connections," with respect to the use of the FLEX DG (per Tab 11) to power the HCVS UPS after the first 24 hours of the event.	The licensee stated that all electrical power required for operation of HCVS components is provided by the HCVS batteries/battery chargers. The HCVS UPS inverter, battery, and battery charger sizing calculation (NEDC 15-030) confirmed that the HCVS batteries have a minimum capacity capable of providing power for 24 hours without recharging, and therefore is adequate. The licensee provided CED 6037041, which discusses re-powering of the HCVS UPS using a FLEX DG. No follow-up questions.	
Phase 1 ISE OI 10 Make available for NRC staff audit the final sizing evaluation for pneumatic N2 supply.	Complete. The nitrogen station is located in the mechanical ROS enclosure. NEDC 15-025, "Mechanical ROS Civil / Structural Design," documents the MROS design. The mechanical ROS enclosure is located in the yard adjacent to the south wall of the Reactor Building. NEDC 15-026, "Mechanical ROS Nitrogen Calculation," determines the amount of	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation NEDC 15-026 evaluates the pneumatic design and sizing to support the operation of HCVS following a beyond design basis external event (BDBEE). The evaluation discusses the required number of	Closed [Staff evaluation to be included in SE Section 3.1.2.6]

	nitrogen required to support operation of PC-AOV-237AV and PC-AOV-AO32 for operation between 24 hours and 7 days following a beyond design basis external event (BDBEE).	nitrogen cylinders needed for vent operation for sustained operation. The number of nitrogen cylinders installed and available is sufficient to operate the HCVS for the first 24 hours, as well as 7 days following a BDBEE. No follow-up questions.	
Phase 1 ISE OI 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, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Complete. CED 6036742, Tab 6, Section 6.5.5 (E2 - Environmental Features), provides a description of the local conditions (temperature, radiation, and humidity) for the HCVS components. NEDC 15-002, "Review of Tetra Tech Portable Equipment Calculations in support of CNS FLEX Strategy," calculates the 24 hour room heat-up temperature profile in the Reactor Building and Control Building during an ELAP. The site-specific radiological conditions for the HCVS are evaluated in NEDC 15-024, "Radiological Conditions Resulting from the Operation of the HCVS," based on the bounding CNS-specific in containment source term during the first seven days following an ELAP (NEDC 15-047, "HCVS Radiological Source Term"). NEDC 15-023, "Calculation of the Pressure Gradient Across the HCVS Line and HCVS Maximum Operational Temperature," determines the HCVS pressure and temperature conditions for the HCVS pipe.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. Calculation CED 6036742 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 3.1.1.4]

Phaes 2 ISE OI 1 Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions.	Complete. ER 1252, "NRC Order EA-13-109 Phase 2 Reliable Hardened Containment Vent Engineering Study," evaluated Phase 2 Order requirements. In this ER, CNS referred to the MAAP analysis that was performed for the reference Mark I plant (Peach Bottom). An evaluation of the plant parameters between CNS and Peach Bottom was performed to ensure that the MAAP analysis for Peach Bottom would be a bounding evaluation for CNS and confirms that the Severe Accident Water Addition/Severe Accident Water Management strategy endorsed by the nuclear industry (NRC, Nuclear Energy Institute and Boiling Water Reactor Owner's Group) would preserve the use of a wetwell vent path to ensure containment integrity. Calculation NEDC 15-020, "Owner Acceptance of TetraTech Calculation CNS00l -1 94-4933-001r - Calculation of HCVS Flow Rate and Vent Size," performs the analysis to ensure that the wetwell vent can achieve the required capacity to vent the steam/energy equivalent of 1% of the licensed/rated thermal power.	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The NRC staff reviewed Engineering Study ER-1252 Revision 1, "NRC Order EA-13-109 Phase 2 Reliable Hardened Containment Vent Engineering Study". SAWA provides cooling of core debris limiting the drywell temperature. SAWA permits venting containment through the wetwell vent without the necessity of having a drywell vent (see discussion for Phase 1 ISE 1 for wetwell vent capacity). SAWM manages the water addition into the wetwell such that the wetwell vent does not become blocked by the water level and remains operational. SAWA and SAWM related industry study was based on a reference plant which has the most limiting containment heat capacity in the U.S. fleet and therefore is conservative. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.2]
Phase 2 ISE OI 2 Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX pump during severe accident conditions.	Complete. The Main Control Room (MCR) is the normal monitoring and operating location for HCVS. Hand held radios will be used for communications between the MCR and the operator at the FLEX pump.	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.	Closed [Staff evaluation to be included in SE Section 4.1]

	Base station repeaters (Base 1 and Base 2) were upgraded to 24-hour battery life. Both bases are capable of being powered via FLEX generator and one base station will be powered from a FLEX generator after 24 hours. The communications assessment performed in response to Near Term Task Force Recommendation 9.3 (NLS2013028) documented the acceptability of this communications channel.	No follow-up questions.	
Phae 2 ISE OI 3 Licensee to demonstrate the SAWM flow instrumentation qualification for the expected environmental conditions.	Complete. Per CNS' Final Integrated Plan for Order EA-12-049, the following environmental conditions exist: • Snow, ice, and extreme cold (minus 5 degrees Fahrenheit) • Extreme heat (97 degrees Fahrenheit) The severe accident water management (SAWM) pump that will be used to provide make-up water for HCVS Phase 2 actions is rated for 925 gpm and 378 feet of discharge head. As such, the pump's maximum discharge pressure is approximately 165 psig. The selected flow meter is normally supplied with polyvinyl chloride (PVC) piping; however, for this application, CNS will use chlorinated polyvinyl chloride (CPVC) piping. CPCV material (4-inch diameter, schedule 80) has a pressure rating of approximately 320 psig. However, this pressure rating is reduced when accounting for elevated temperatures. An operating temperature of 100 degrees Fahrenheit has a derating factor of 0.82. Therefore, the selected CPVC material	The NRC staff reviewed the information provided in the 6-month updates and on the ePortal. The NRC staff reviewed and confirmed the site temperatures given in the Cooper FLEX FIP (-5 to 97 degrees Fahrenheit (°F)) and confirmed the flow meter performance in the certificate of conformance and calibration from Sure Flow Products, LLC, which stated accuracy of +/- 2 to 5% depending on the pressure. The manufacturer also stated that operation to -5 °will not impact accuracy. No follow-up questions.	Closed [Staff evaluation to be included in SE Section 4.4.1.3 and 4.5.1.2]

	has a pressure rating of approximately 260 psig which exceeds the maximum discharge pressure of the SAWM pump. The selected flow meter has a listed operating ambient temperature range of 0-150 degrees Fahrenheit, although the vendor confirmed that the meter will function and provide accurate readings at the required minus 5 degrees Fahrenheit. Additionally, the selected flow meter is listed for applications such as lake or river water, potable water, deionized water, etc. These types of fluids meet the applications that CNS may be pumping through the flow meter.		

SUBJECT: COOPER NUCLEAR STATION - 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 March 29, 2018

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