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June 30, 2016

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

Subject: Nebraska Public Power District's Fourth Six-Month Status Report in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:

1. NRC Order Number EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013

2. NPPD letter to NRC, "Nebraska Public Power District's Phase 1 Overall Integrated Plan in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 30, 2014 (NLS2014057)

3. NPPD letter to NRC, "Nebraska Public Power District's First Six-Month Status Report in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 19, 2014 (NLS2014101)

4. NPPD letter to NRC, "Nebraska Public Power District's Phase 1 and Phase 2 Overall Integrated Plan in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 21, 2015 (NLS2015137)

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued Order EA-13-109 (Reference 1) to Nebraska Public Power District (NPPD). Reference 1 was immediately effective and directs NPPD to take certain actions to ensure that Cooper Nuclear Station (CNS) has a Hardened Containment Vent System to remove decay heat from the containment, and maintain control of containment pressure within acceptable limits following events that result in loss of active containment heat removal capability while maintaining the capability to operate under severe accident conditions resulting from an Extended Loss of AC Power. Specific requirements are outlined in Attachment 2 of Reference 1.

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Reference 1 required submission of a Phase 1 overall integrated plan (OIP) pursuant to Section IV, Condition D, and status reports at six-month intervals thereafter. NPPD submitted an initial OIP for CNS by letter dated June 30, 2014 (Reference 2), Revision 1 to the OIP by letter dated December 19, 2014 (Reference 3), and Revision 2 which provided a combined Phase 1 and Phase 2) OIP (Reference 4).

The purpose of this letter is to provide the fourth six-month update for both Phase 1 and Phase 2 OIP implementation pursuant to Section IV, Condition D.3, of Reference 1.

This letter contains no new regulatory commitments. Should you have any questions concerning the content of this letter, please contact Jim Shaw, Licensing Manager, (402) 825-2788.

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

Executed on: 06/30/16

Sincerely,

Oscar A. Limpias
Vice President - Nuclear and
Chief Nuclear Officer

/bk

Attachment: Nebraska Public Power District's Fourth Six-Month Status Report for the Implementation of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

cc: Regional Administrator, w/attachment
USNRC - Region IV

Director, w/attachment
USNRC - Office of Nuclear Reactor Regulation

Cooper Project Manager, w/attachment
USNRC - NRR Plant Licensing Branch IV-2

Senior Resident Inspector, w/attachment
USNRC - CNS

NPG Distribution, w/o attachment

CNS Records, w/attachment

Attachment

Nebraska Public Power District's Fourth Six-Month Status Report for the Implementation of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

Introduction

Nebraska Public Power District (NPPD) developed an Overall Integrated Plan (OIP) for Cooper Nuclear Station (CNS) (Reference 1), documenting the installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2. Starting with this six-month status report, updates of milestone accomplishments will be based on the combined Phase 1 and 2 OIP (Reference 4).

NPPD developed an updated and combined Phase 1 and 2 OIP (Reference 4) in accordance with the guidance contained in Reference 3, documenting:

1. The installation of a HCVS that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2.

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

This attachment provides an update of milestone accomplishments since submittal of the combined Phase 1 and 2 OIP including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

Milestone Accomplishments

Operations procedure changes for Phase 1 have been developed.

Milestone Schedule Status

The following table provides an update to Attachment 2 of the combined Phase 1 and 2 OIP. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Milestone	Target Completion Date	Activity Status	Comments (Include date changes)
Phase 1 and 2 HCVS Milestone Table			
Submit Phase 1 OIP	June 2014	Complete	
Submit Six-Month Updates:			
Update 1	December 2014	Complete	
Update 2	June 2015	Complete	
Update 3 with Phase 2 OIP	December 2015	Complete	
Update 4	June 2016	Complete with this submittal	
Update 5	December 2016	Not Started	
Update 6	June 2017	Not Started	
Update 7	December 2017	Not Started	
Update 8	June 2018	Not Started	
Phase 1 Specific Milestones			
Phase 1 Modifications:			
Hold preliminary/conceptual design meeting	June 2014	Complete	
Design Engineering On-site/Complete	September 2015	Complete	
Operations Procedure Changes Developed	August 2016	Complete	
Site Specific Maintenance Procedure Developed	August 2016	In Progress	
Training Complete	September 2016	Not Started	
Procedure Changes Active	November 2016	Not Started	
Walk Through Demonstration/Functional Test	November 2016	Not Started	

Phase 2 Specific Milestones			
Hold preliminary/conceptual design meeting	December 2015	Complete	
Design Engineering On-site/Complete	October 2017	In Progress	
Operations Procedure Changes Developed	May 2018	In Progress	
Site Specific Maintenance Procedure Developed	May 2018	In Progress	
Training Complete	June 2018	In Progress	
Implementation Outage	October 2018	Not Started	
Walk Through Demonstration/Functional Test	October 2018	Not Started	
Procedure Changes Active	October 2018	Not Started	
Submit Completion Report (60 days after full site compliance)	January 2019	Not Started	

Changes to Compliance Method

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

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

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

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

The following tables provide a summary of the open items documented in the combined Phase 1 and 2 OIP, the Interim Staff Evaluation (ISE) (Reference 5), and the status of each item.

Combined Phase 1 and 2 OIP Open Item		
Phase 1 Open Items		
OIP Open Item #	**Action**	**Status/Comment**
1	Determine location of HCVS ROS.	Closed. The mechanical remote operating station (ROS) will be located along the Reactor Building South exterior wall.
2	Evaluate accessibility of the Mechanical ROS for radiological and environmental conditions. Address dose and temperature items for the Mechanical ROS and non-MCR locations. FAQ-HCVS-01 (Reference 14) will be used as guidance.	Closed. CED 6036742, Tab 6, Section 6.5.5 (E2 – Environmental Features), discusses the temperature and radiological conditions, 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 extended loss of AC power (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").
3	Determine the location of the Dedicated HCVS Battery transfer switch.	Closed. The dedicated HCVS battery transfer switch will be located at the 903' elevation in the Control Building along the west wall.
4	Determine the location of backup nitrogen bottles and evaluate the effects of radiological and temperature constraints on their	Closed. Nitrogen bottles will be installed and pre-connected in the mechanical ROS.

Combined Phase 1 and 2 OIP Open Item		
Phase 1 Open Items		
OIP Open Item #	**Action**	**Status/Comment**
	deployment.	These bottles are sufficient for operation for seven days. CED 6036742, Tab 6, Section 6.5.5 (E2 – Environmental Features), discusses the temperature and radiological conditions, 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").
5	Evaluate the location of the Portable DG for accessibility under Severe Accident HCVS use.	Closed. The portable diesel generator (DG) (FLEX 60KW DG) will be positioned North of the Reactor Building allowing the entire Reactor Building to act as shielding.
6	Confirm suppression pool heat capacity.	Closed. 1% of rated thermal power (RTP) is demonstrated in NEDC 15-020, "Calculation of HCVS Flow Rate and Vent Size." The MAAP Analysis was documented

Combined Phase 1 and 2 OIP Open Item		
Phase 1 Open Items		
OIP Open Item #	**Action**	**Status/Comment**
		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."
7	Determine which approach or combination of approaches Cooper Nuclear Station (CNS) will take to address the control of flammable gases, clearly demarcating the segments of vent system to which an approach applies.	Closed. Hydrogen control will be addressed using a check valve combined with limiting the run-up distance so a purging system is not required.
8	Identify qualification method used for HCVS instruments.	Closed. CED 6036742, Section 6.5.14 (I2 – Instrumentation & Control (I&C) describes 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.
9	Evaluate HCVS monitoring location for accessibility, habitability, staffing sufficiency, and communication capability with vent-use decision makers.	Closed. 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.
10	Determine the number of required valve cycles during the first 24 hours. Size the electrical and pneumatic supplies accordingly.	Closed. CED 6036742, Tab 4, Section 4.2.1.3 ("Control Valve PC-AOV-AO32, Accumulator IA-ACC-AO32, and new Pressure Switch IA-PS04") determines 8 valve cycles during the first 24 hours, based

Combined Phase 1 and 2 OIP Open Item		
Phase 1 Open Items		
OIP Open Item #	**Action**	**Status/Comment**
		on NEI White Paper HCVS-WP-02 and the MAAP analysis results (EC 14-027, "Acceptance of MAAP Analysis to Support Initial FLEX Strategy" and NEDC 14-026, "MAAP Analysis to Support Cooper FLEX Strategy"). CED 6036742, Tab 6, Section 6.5.5 (E2 – 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.
11	Evaluate the impact of SA environmental conditions for post-24 hour actions supporting the implementation of power and pneumatic supplies.	Closed. The mechanical ROS has the capability to operate the HCVS for 24 hours independent of power and has its own pneumatics. 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").
12	Determine the control document for HCVS out of service time criteria.	In progress.
Phase 2 Open Items		
None.		

Phase 1 Interim Staff Evaluation Open Item		
ISE Open Item #	**Action / ISE Section Reference**	**Status**
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 (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. Sections 3.2.2.1, 3.2.2.2	Complete. 1% of RTP is demonstrated in NEDC 15-020, "Calculation of HCVS Flow Rate and Vent Size." The MAAP 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."
2	Make available for NRC staff audit the seismic and tornado missile final design criteria for the HCVS stack. Section 3.2.2.3	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 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.
3	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods. Section 3.2.2.10	Complete. CED 6036742, Section 6.5.14 (I2 – 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

Phase 1 Interim Staff Evaluation Open Item		
ISE Open Item #	**Action / ISE Section Reference**	**Status**
		components in the electrical system that interface with and provide isolation between Class 1E and non-Class 1E circuits.
4	Make available for NRC staff audit a determination of the number of required valve cycles during the first 24 hours. Section 3.2.3.1	Complete. CED 6036742, Tab 4, Section 4.2.1.3 ("Control Valve PC-AOV-AO32, Accumulator IA-ACC-AO32, and new Pressure Switch IA-PS04") determines 8 valve cycles during the first 24 hours, based on NEI White Paper HCVS-WP-02 and the MAAP analysis results (EC 14-027, "Acceptance of MAAP Analysis to Support Initial FLEX Strategy" and NEDC 14-026, "MAAP Analysis to Support Cooper FLEX Strategy"). CED 6036742, Tab 6, Section 6.5.5 (E2 – 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.
5	Make available for NRC audit the control document for HCVS out of service time criteria. Section 3.4.1	In Progress.
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. Section 3.2.2.9	In Progress.
7	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations	Complete. The Main Control Room (MCR) is the normal monitoring and operating location

Phase 1 Interim Staff Evaluation Open Item		
ISE Open Item #	**Action / ISE Section Reference**	**Status**
	and HCVS decision makers during ELAP and severe accident conditions. Section 3.2.2.5	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.
8	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. Sections 3.2.1, 3.2.2.3, 3.2.2.4, 3.2.2.5, 3.2.2.10, 3.2.4.1, 3.2.4.2, 3.2.5.2, 3.2.6	Complete. CED 6036742, Tab 6, Section 6.5.5 (E2 – Environmental Features), discusses the temperature and radiological conditions, 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").
9	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger and incorporate into FLEX DG loading calculation. Sections 3.2.2.4, 3.2.3.1, 3.2.3.2,	Complete. CED 6036742, Tab 6, Section 6.5.4 (E1 – Electrical Features), discusses the electrical power requirements and sizing.

Phase 1 Interim Staff Evaluation Open Item		
ISE Open Item #	**Action / ISE Section Reference**	**Status**
	3.2.4.1, 3.2.4.2, 3.2.5.1, 3.2.5.2, 3.2.6	NEDC 15-030, "HCVS UPS Inverter, Battery, and Battery Charger Sizing Analysis," documents the load and sizing analysis for the HCVS UPS (EE-UPS-HCVS) 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 (Hardened Containment Venting System Uninterruptable Power Supply (HCVS UPS)); CED 6036742, Tab 6, Section 6.5.14 (I2 – Instrumentation & Control (I&C)), I2.3 (System/Controls); and CED 6036742, 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.
10	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location. Sections 3.2.1, 3.2.2.4, 3.2.3.1, 3.2.3.2, 3.2.4.1, 3.2.4.2, 3.2.5.1, 3.2.5.2, 3.2.6	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 nitrogen required to support operation of PC-AOV-237AV and PC-AOV-AO32 for

Phase 1 Interim Staff Evaluation Open Item		
ISE Open Item #	**Action / ISE Section Reference**	**Status**
		operation between 24 hours and 7 days following a beyond design basis external event (BDBEE).
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. Sections 3.2.2.3, 3.2.2.5, 3.2.2.9, 3.2.2.10	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.
Phase 2 Interim Staff Evaluation Open Item		
None identified at the time of this submittal.		

Interim Staff Evaluation Impacts

There are no potential impacts to the ISEs identified at this time.

References

1. NPPD letter to NRC, "Nebraska Public Power District's Phase 1 Overall Integrated Plan in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 30, 2014

2. NRC Order Number EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" dated June 6, 2013

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

4. Nebraska Public Power District's Phase 1 and Phase 2 Overall Integrated Plan in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 21, 2015

5. NRC letter to NPPD, "Cooper Nuclear Station - Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC NO. MF4384)," dated February 11, 2015