



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

October 19, 2021

Mr. John Dent, Jr., Vice President
and Chief Nuclear Officer
Nebraska Public Power District
72676 648A Avenue
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION – TEMPORARY INSTRUCTION 2515/194
REPORT 05000298/2021011

Dear Mr. Dent:

On September 16, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Cooper Nuclear Station. On September 16, 2021, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Nicholas H. Taylor, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 05000298
License No. DPR-46

Enclosure:
As stated

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 REPORT 05000298/2021011 – DATED OCTOBER 19, 2021

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NAME	<i>J. Drake</i>	<i>R. Deese</i>	<i>J. Kozal</i>	<i>N. Taylor</i>	
DATE	10/15/2021	10/18/2021	10/18/2021	10/18/2021	

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Number: 05000298

License Number: DPR-46

Report Number: 05000298/2021011

Enterprise Identifier: I-2021-011-0030

Licensee: Nebraska Public Power District

Facility: Cooper Nuclear Station

Location: Brownville, NE

Inspection Dates: April 26, 2021 to April 30, 2021

Inspectors: J. Drake, Senior Reactor Inspector
R. Deese, Senior Reactor Analyst

Approved By: Nicholas H. Taylor, Chief
Engineering Branch 2
Division of Reactor Safety

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a Temporary Instruction 2515/194 at Cooper Nuclear Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the Temporary Instruction (TI) in effect at the beginning of the inspection unless otherwise noted. Currently approved Temporary Instructions with their attached revision histories are located on the public website at <https://www.nrc.gov/reading-rm/doc-collections/insp-manual/temp-instructions/index.html>.

Samples were declared complete when the TI requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), inspectors were directed to begin teleworking. In addition, regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the TI could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable TI. In some cases, portions of a TI were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the TI.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

2515/194 - Inspection of the Licensee's Implementation of Industry Initiative Associated With The Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01)

The inspectors reviewed the licensee's implementation of Revision 3 to the "Nuclear Energy Institute Voluntary Industry Initiative," (ADAMS Accession No. ML19163A176) dated June 6, 2019. This review included the licensee's application of risk screening techniques to determine that the risk associated with an open phase condition (OPC) event is significantly reduced through the implementation of detection circuits and the use of operator manual actions in lieu of automatic trip functions.

Sections 03.01.a, "Detection, Alarms and General Criteria," and 03.01.b, "Protective Actions," were previously inspected and documented in Inspection Report 05000298/2019013 with noted exceptions. Because the licensee has chosen to demonstrate compliance with Revision 3 of the Open Phase Condition Initiative using the Risk Informed Evaluation Method in lieu of the designs automatic protective functions, section 03.01.c, "Use of Risk-Informed Evaluation Method" is inspected in this report.

Inspection of the Licensee's Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01) (1 Sample)

- (1) Inspection of the Licensee's Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01) (1 Sample)

Nebraska Public Power District, LLC. selected the open phase detection system designed and manufactured by Power System Sentinel Technologies, LLC (PSSTech) as the design vendor for Cooper Nuclear Station. Nebraska Public Power District has chosen to rely on

risk-informed operator manual actions to isolate a power supply affected by an OPC in lieu of enabling the open phase isolation systems (OPIS) automatic functions. At the end of this inspection the OPIS system was monitoring and would initiate audible and visual alarms in the control room if a loss of phase condition is detected.

Cooper Nuclear Station has two independent offsite sources (345 kV and 161 kV) which provide power via the Startup Station Service Transformer (SSST) or Emergency Station Service Transformer, depending on the plant operating status. The T-2 and T-5 transformers function to interconnect the 345 kV and 161 kV distribution systems in the CNS switchyard, and to supply the 12.5 kV system from either distribution system. During normal plant operation the Engineered Safety Feature (ESF) buses, 4160 Volt Bus 1F (Division 1) and 4160 Volt Bus 1G (Division 2), are normally powered from the Normal Station Service Transformer (NSST) via 4160 Volt Bus 1A for ESF Bus 1F and 4160 Volt Bus 1B for ESF Bus 1G. The NSST is powered from the main generator. The NSST supplies power to ESF buses during normal at power operation. During startup and shutdown or whenever the NSST becomes unavailable, the Startup Station Service Transformer (SSST) provides power to the ESF buses. Additionally, the Emergency Station Service Transformer (ESST) provides a second source of offsite power to the ESF buses in the event both the NSST and SSST are unavailable. The SSST and ESST are the credited offsite power sources.

The licensee installed and tested redundant open phase detection systems on the SSST and ESST in the monitoring mode of operations (tripping function disabled). Currently, all function switches are in the “Alarm Only” position with an approved risk evaluation in place.

Based on discussions with Nebraska Public Power District staff, review of design and testing documentation, and walkdowns of installed equipment, the inspectors had reasonable assurance that Nebraska Public Power District is appropriately implementing the voluntary industry initiative at Cooper Nuclear Station.

INSPECTION RESULTS

Observation: Temporary Instruction 2515/194-03.01 - Voluntary Industry Initiative	2515/194
Based on discussions with Cooper Nuclear Station (CNS) staff, review of design and testing documentation, and walkdowns of installed equipment, the inspectors had reasonable assurance that Nebraska Public Power District (NPPD) is appropriately implementing the voluntary industry initiative at CNS. The inspectors verified the following criteria:	
<u>Detection, Alarms and General Criteria</u>	
<ol style="list-style-type: none"> 1. [03.01(a)(1)] Open phase conditions are detected and alarmed in the control room. 2. [03.01(a)(2)] In scenarios where automatic detection may not be possible due to very low or no-load conditions, or when transformers are in a standby mode, automatic detection will occur as soon as loads are transferred to the standby source. Additionally, where automatic detection is not reliable, NPPD has established monitoring requirements on a per shift basis, to look for evidence of an open phase condition. 3. [03.01(a)(4)] No Class 1E circuits were being replaced with non-Class 1E circuits in this design. 	

4. [03.01(a)(5)] The Final Safety Analysis Report was updated to discuss the design features and analyses related to the effects of any open phase condition design vulnerability.
5. [03.01(a)(6)] The open phase condition detection and alarm components are maintained in accordance with NPPD procedures or maintenance program, and periodic tests, calibrations setpoint verifications or inspections (as applicable) have been established.

Use of Risk-Informed Evaluation Method

1. [03.01(c)(1)] The plant configuration matched the changes made to the probabilistic risk assessment model to address an open phase condition, and the logic of the probabilistic risk assessment model changes is sound.
2. [03.01(c)(2)] The procedures which validate that the open phase condition alarm would identify the proper indication to validate the open phase conditions at all possible locations.
3. [03.01(c)(3)] Observations associated with procedure(s) and operator actions required to respond to an open phase condition alarm and potential equipment trip match the Human Reliability Analysis.
4. [03.01(c)(4)] Assumptions listed in the NEI 19-02 Appendix A evaluation and the sensitivity analyses listed in Section 5 of the evaluation were verified.
5. [03.01(c)(5)] Assumptions, procedures, operator actions, and NPPE analyses specified above are consistent with the plant-specific design and licensing basis, including:
 - a. Initiating events considered in the analysis
 - b. Boundary conditions specified in Attachment 1 of the NEI Voluntary Industry Initiative, Revision 3
 - c. Operating procedures for steps taken to recover equipment from the effects of open phase conditions (or use of alternate equipment) was appropriate.
 - d. Where recovery was assumed in the probabilistic risk assessment analysis for tripped electric equipment, restoration of the equipment was based on analyses that demonstrate that automatic isolation trips did not result in equipment damage

No findings or exceptions were identified.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

On September 16, 2021, the inspectors presented the Temporary Instruction 2515/194 results to Mr. John Dent, Jr., Vice President and Chief Nuclear Officer, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Corrective Action Documents		CR-CNS-2019-05776, CR-CNS-2020-05889, CR-CNS-2020-05898	
	Drawings	3001 454003876_DRW_000_AL SINGLE LINE	Cooper Nuclear Station Main One Line Diagram	33
		3129 SH 1 454004005_DRW_000_AG CNS CONTROL ROOM	Cooper Nuclear Station Control Building Cable and Control Rooms Conduit Tray and Grounding Plans	39
		NC29546 492029546_DRW_000	Cooper Transmission Line Routes	2
	Miscellaneous		Cooper Nuclear Station Open Phase Protection	1
		LO-2020-0198-008	Additional Training is Required for Control Room Operators to Take Action for an Open Phase Condition when Indicated by Control Room Annunciators	02/10/2021
		OTH015-06-21	RE 29 Outage Modification Training	0
		UCR 2018-010	Update Safety Analysis Report	12/04/2019
	Procedures	2.3 C-2	PANEL C - ANNUNCIATOR C-2	62
		CONDUCT OF OPERATIONS PROCEDURE 2.0.1.3	TIME CRITICAL OPERATOR ACTION CONTROL AND MAINTENANCE	7
		GENERAL OPERATING PROCEDURE 2.1.12	CONTROL ROOM DATA	126
		OPERATIONS INSTRUCTION 7	OPERATIONS EXPECTATIONS	62
	Self-Assessments	2019-0099	TI 2515/194 Pre-Inspection Focused Self-Assessment	07/02/2019
		2020-0198	TI 2515/194 Pre-Inspection Focused Self-Assessment	01/20/2021
		PSA-ES130	Cooper Nuclear Station Open Phase Condition Evaluation	1