



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
1600 EAST LAMAR BOULEVARD  
ARLINGTON, TEXAS 76011-4511

July 25, 2018

Mr. John Dent, Jr.  
Vice President-Nuclear and CNO  
Nebraska Public Power District  
Cooper Nuclear Station  
72676 648A Avenue  
P.O. Box 98  
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION – NRC INTEGRATED INSPECTION REPORT  
05000298/2018002

Dear Mr. Dent:

On June 30, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Cooper Nuclear Station. On July 12, 2018, the NRC inspectors discussed the results of this inspection with Mr. K. Dia, Acting Vice President-Nuclear and CNO, and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented three findings of very low safety significance (Green) in this report. All of these findings involved violations of NRC requirements. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement; and the NRC resident inspector at the Cooper Nuclear Station.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; and the NRC resident inspector at the Cooper Nuclear Station.

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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

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Jason W. Kozal, Chief  
Project Branch C  
Division of Reactor Projects

Docket No. 50-298  
License No. DPR-46

Enclosure:  
Inspection Report 05000298/2018002  
w/ Attachment:  
1. Documents Reviewed  
2. NRC Request for Information

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

Docket Number: 05000298

License Number: DPR-46

Report Number: 05000298/2018002

Enterprise Identifier: I-2018-002-0003

Licensee: Nebraska Public Power District

Facility: Cooper Nuclear Station

Location: Brownville, Nebraska

Inspection Dates: April 1, 2018 to June 30, 2018

Inspectors: M. Tobin, Acting Senior Resident Inspector  
R. Kumana, Acting Senior Resident Inspector  
R. Deese, Senior Reactor Analyst  
J. Mateychick, Senior Reactor Inspector  
W. Sifre, Senior Reactor Inspector  
C. Young, Senior Project Engineer  
M. Stafford, Resident Inspector

Approved By: J. Kozal, Chief, Project Branch C  
Division of Reactor Projects

## SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated inspection 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. NRC and self-revealed violations and additional items are summarized in the tables below.

### List of Findings and Violations

Failure to Set Performance Monitoring Action Levels to Ensure that the Assumptions in the Engineering Analysis Remain Valid			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000298/2018002-01 Closed	[H.3] – Human Performance, Change Management	71111.05XT – Fire Protection – NFPA 805 (Triennial)
The inspectors identified a Green non-cited violation of License Condition 2.C.(4), “Fire Protection,” for the failure to establish an appropriate monitoring program in accordance with Section 2.6 of the National Fire Protection Association (NFPA) Standard 805, “Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants.” Specifically, the licensee failed to set the action level for the availability of some plant components to ensure that the assumptions in the engineering analysis remained valid.			

Failure to Maintain Alarm Procedure for Service Water Booster Pump Ventilation Manual Actions			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000298/2018002-02 Closed	[H.3] – Human Performance, Change Management	71111.18 – Plant Modifications
The inspectors identified a Green non-cited violation of Technical Specification 5.4, “Procedures,” when the licensee failed to maintain Procedure 2.3_R-1 with the bounding time restrictions for required manual ventilation actions identified in Engineering Evaluation NEDC 92-064, “Transient Temperature Rise in SWBP Room After Loss of Cooling,” Revision 3C2. As a result, the licensee relied on procedure guidance that contained an incorrect, less restrictive allowance of 13 hours for completion of manual actions rather than the bounding 5.8-hour allowance described in NEDC 92-064.			

Failure to Maintain Adequate Work Instructions for Traversing In-Core Probe System Limit Switches			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000298/2018002-03 Closed	None	71153 – Follow-up of Events and Notices of Enforcement Discretion
A self-revealed, Green non-cited violation of Technical Specification 5.4, "Procedures," was identified when the licensee failed to maintain Procedure 14.2.14, "TIP Chamber Shield Maintenance," with adequate instructions for reinstalling the traversing in-core probe system in-shield limit switches. As a result, the licensee experienced multiple failures of the shield limit switches resulting in inoperable primary containment isolation valves.			

### Additional Tracking Items

Type	Issue number	Title	Report Section	Status
URI	05000298/2016008-01	Possible Failure to Ensure that the Assumptions in the Engineering Analysis Remain Valid	71111.05XT	Closed
LER	05000298/2017-005-00	Traversing In-core Probe In-shield Limit Switch Mounting Failure Results in Common Cause Inoperability of Independent Trains or Channels and Condition Prohibited by Technical Specifications	71153	Closed

## PLANT STATUS

The unit began the inspection period at rated thermal power. On May 30, 2018, the unit was shut down for repairs to the drywell fan coil units. The unit was returned to rated thermal power on June 11, 2018, and remained at or near rated thermal power for the remainder of the inspection period.

## INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP 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 performed plant status activities described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." 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.

## REACTOR SAFETY

### 71111.01—Adverse Weather Protection

#### Summer Readiness (1 Sample)

The inspectors evaluated summer readiness of offsite and alternate alternating current (AC) power systems on May 11, 2018.

#### External Flooding (1 Sample)

The inspectors evaluated readiness to cope with external flooding on May 17, 2018.

### 71111.04—Equipment Alignment

#### Partial Walkdown (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Reactor core isolation cooling during high pressure coolant injection work window on April 18, 2018
- (2) Shutdown cooling A while B in service on June 1, 2018
- (3) Control building ventilation for service water booster system on May 11, 2018

#### Complete Walkdown (1 Sample)

The inspectors evaluated system configurations during a complete walkdown of the high pressure coolant injection full system alignment on June 28, 2018.

### 71111.05Q—Fire Protection

#### Quarterly Inspection (5 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Intake building and service water pump room on April 5, 2018
- (2) Reactor core isolation cooling and core spray A area on April 18, 2018
- (3) 125/250 Vdc battery and switchgear room on May 23, 2018
- (4) Supplemental diesel generator on May 29, 2018
- (5) Cable spreading room on June 28, 2018

### 71111.05XT—Fire Protection – NFPA 805 (Triennial)

The inspectors reviewed the licensee's actions to address the issue identified in Unresolved Item (URI) 05000298/2016008-01 from May 7, 2018, to June 5, 2018. This URI is now closed.

### 71111.06—Flood Protection Measures

#### Internal Flooding (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the high pressure coolant injection room on June 26, 2018.

### 71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

#### Operator Requalification (1 Sample)

The inspectors observed and evaluated operator training during a licensed operator requalification simulator scenario focusing on an anticipated transient without a scram on May 18, 2018.

#### Operator Performance (1 Sample)

The inspectors observed and evaluated operator performance during a downpower for a forced outage associated with fan coil unit maintenance on May 29, 2018.

### 71111.12—Maintenance Effectiveness

#### Routine Maintenance Effectiveness (2 Samples)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) Service water booster system room cooler on May 11, 2018
- (2) Traversing in-core probe on May 11, 2018

71111.13—Maintenance Risk Assessments and Emergent Work Control (5 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) High pressure coolant injection maintenance window on April 19, 2018
- (2) Service water booster system room cooler risk evaluation on May 11, 2018
- (3) Service water pump D work week on May 17, 2018
- (4) Emergent drywell fan coil unit D work on May 18, 2018
- (5) Emergent downpower due to drywell fan coil unit A on May 26, 2018

71111.15—Operability Determinations and Functionality Assessments (4 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Emergency diesel generator 2 jacket water temperature issue on April 25, 2018
- (2) Service water booster system pipe below minimum wall thickness on May 1, 2018
- (3) Fan coil unit functionality on June 22, 2018
- (4) High pressure coolant injection operability with room floor drains clogged, extending limiting condition for operation time on June 25, 2018

71111.18—Plant Modifications (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Service water booster system room fan coil unit manual actions on May 11, 2018
- (2) Service water booster pump oil reservoirs on May 11, 2018

71111.19—Post Maintenance Testing (4 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) HPCI-MO-15 following packing replacement on March 15, 2018
- (2) High pressure coolant injection pump test following maintenance window on April 20 2018
- (3) Service water pump C on May 3, 2018
- (4) Reactor recirculation pump B relay replacement on June 21, 2018

71111.20—Refueling and Other Outage Activities (1 Sample)

The inspectors evaluated fan coil D forced outage activities from May 30, 2018 to June 11, 2018.



### 71111.22—Surveillance Testing

The inspectors evaluated the following surveillance tests:

#### Routine (3 Samples)

- (1) Service water pump D surveillance test on May 29, 2018
- (2) Division 1 reactor recirculation flow unit channel calibration on June 7, 2018
- (3) Operator rounds on June 15, 2018

#### In-service (1 Sample)

- (1) Core spray subsystem A quarterly inservice surveillance test on May 1, 2018

### 71114.06—Drill Evaluation

#### Emergency Planning Drill (1 Sample)

The inspectors evaluated a full team drill on May 22, 2018.

## **OTHER ACTIVITIES – BASELINE**

### 71151—Performance Indicator Verification (3 Samples)

The inspectors verified licensee performance indicators submittals listed below:

- (1) MS05: Safety System Functional Failures (SSFFs) (April 1, 2017 – March 31, 2018)  
(1 Sample)
- (2) BI01: Reactor Coolant System (RCS) Specific Activity (April 1, 2017 – March 31, 2018)  
(1 Sample)
- (3) BI02: RCS Leak Rate (April 1, 2017 – March 31, 2018) (1 Sample)

### 71152—Problem Identification and Resolution

#### Semiannual Trend Review (1 Sample)

The inspectors reviewed the licensee's corrective action program for trends that might be indicative of a more significant safety issue.

#### Annual Follow-up of Selected Issues (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

- (1) Emergency diesel generator damper failures on May 11, 2018

71153—Follow-up of Events and Notices of Enforcement Discretion

Licensee Event Reports (1 Sample)

The inspectors evaluated the following licensee event reports which can be accessed at <https://lersearch.inl.gov/LERSearchCriteria.aspx>:

- (1) Licensee Event Report (LER) 05000298/2017-005-00, Traversing In-core Probe In-shield Limit Switch Mounting Failure Results in Common Cause Inoperability of Independent Trains or Channels and Condition Prohibited by Technical Specifications (ADAMS Accession No. ML17236A166), on May 11, 2018.

**INSPECTION RESULTS**

Observation	71152 – Problem Identification and Resolution
<p>The inspectors identified a potential adverse trend involving the sizing of bolts associated with emergency diesel generator components. The inspectors determined that the licensee documented multiple instances where they discovered incorrect bolting on various components of the emergency diesel generators. The inspectors determined that in all cases reviewed, the licensee had determined that the bolts used in the plant were greater than the length required by design, had adequate thread engagement to ensure they maintained their safety function, and did not adversely impact the ability of the emergency diesel generators to perform their function. The inspectors determined that the licensee had identified these issues through focused observation of the system design requirements and had implemented appropriate corrective actions.</p>	

Failure to Set Performance Monitoring Action Levels to Ensure that the Assumptions in the Engineering Analysis Remain Valid			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000298/2018002-01 Closed	[H.3] – Human Performance, Change Management	71111.05XT – Fire Protection – NFPA 805 (Triennial)
<p>The inspectors identified a Green non-cited violation of License Condition 2.C.(4), “Fire Protection,” for the failure to establish an appropriate monitoring program in accordance with Section 2.6 of the National Fire Protection Association (NFPA) Standard 805, “Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants.” Specifically, the licensee failed to set the action level for the availability of some plant components to ensure that the assumptions in the engineering analysis remained valid.</p>			
<p><u>Description:</u> During the NRC triennial fire protection inspection in 2016 (see NRC Inspection Report 05000298/2016008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16270A561)), the inspectors reviewed the licensee’s implementation of the monitoring program required in Section 2.6 of NFPA Standard 805, “Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants.” NFPA 805 requires the following in Section 2.6:</p>			

**Monitoring.** A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained, and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid.

The inspectors reviewed selected samples of equipment monitored by the licensee using Procedure 3-CNS-DC-357, "National Fire Protection Association (NFPA) 805 Monitoring Program," Revision 0, to ensure that the licensee's program properly implemented the requirements of NFPA 805, Section 2.6. The inspectors also reviewed Engineering Report ER-2015-002, "National Fire Protection Association (NFPA) 805 Fire Protection Monitoring Program," Revision 2. The inspectors observed that for components used in the fire probabilistic risk assessment, the unavailability time for those components was monitored using the existing maintenance rule (10 CFR 50.65) monitoring program. These components included the:

- Control rod drive pumps
- Core spray pumps
- Emergency diesel generators
- Emergency station service transformer
- Startup station service transformer
- High pressure core spray pump
- Instrument air compressors
- Residual heat removal pumps
- Standby liquid control pumps
- Service water pumps

The inspectors noted that the action levels for availability in the maintenance rule monitoring program were greater than the assumptions in the fire probabilistic risk assessment and questioned whether this met the requirement in NFPA 805 to maintain the assumptions in the engineering analysis.

Clarifications of the monitoring program requirements were being discussed between the industry and the NRC's Office of Nuclear Reactor Regulation during periodic public meetings which discussed Frequently Asked Question 10-0059, "National Fire Protection Association (NFPA) 805 Monitoring." With the further clarification pending, the inspectors documented the issue as Unresolved Item 05000298/2016008-01, "Possible Failure to Ensure that the Assumptions in the Engineering Analysis Remain Valid." The discussions failed to provide any additional guidance; therefore, the inspectors are addressing this issue based on the information contained in Frequently Asked Question 10-0059, "National Fire Protection Association (NFPA) 805 Monitoring," Revision 5.

Corrective Action(s): The inspectors concluded that the issue did not present an immediate safety concern based on the licensee performing a sensitivity analysis to determine the significance of monitoring at a higher level of unavailability via the maintenance rule. This analysis determined an increase in core damage frequency for the additional unavailability time that could be accrued above the assumption for availability in the fire probabilistic risk assessment and up to the maintenance rule monitoring value for unavailability. The increase in core damage frequency was determined to not exceed 1.0E-6/year.

Corrective Action Reference(s): Condition Report CR-CNS-2016-05109

Performance Assessment:

Performance Deficiency: The failure to adequately monitor unavailability of the plant components to ensure that the assumptions in the engineering analysis remained valid was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, the performance deficiency could adversely affect the acceptable level of availability of the components which are used to respond to fire initiating events, in that the action levels for availability in the monitoring program were greater than the assumptions in the fire probabilistic risk assessment. This finding affects the Mitigating Systems Cornerstone.

Significance: The inspectors assessed the significance of the finding using NRC Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," dated October 7, 2016, as requiring significance determination per Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated May 2, 2018, because the finding affected the ability to reach and maintain safe shutdown conditions in case of a fire. The inspectors categorized the finding as a post-fire safe shutdown finding with a high degradation rating. The high degradation rating was made using Manual Chapter 0609, Appendix F, Attachment 2, "Degradation Rating Guidance," dated May 2, 2018, because the finding was not a minor procedural deficiency that was able to be compensated by operators. Using step 1.4.7 of Attachment 1 of Appendix F, the finding was screened as a Green finding of very low safety significance in Question 1.4.7-C because the fire finding did not adversely affect the ability to reach and maintain hot shutdown/hot standby, or safe and stable conditions using the credited safe shutdown success path.

Cross-cutting Aspect: This finding had a cross-cutting aspect associated with change management within the human performance area since the leaders failed to use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. Specifically, the inspectors determined that the licensee did not use the process that was in place to ensure that the appropriate fire risk assessment monitoring action levels were incorporated into the maintenance rule program and monitored [H.3].

Enforcement:

Violation: License Condition 2.C.(4), "Fire Protection," states, in part, "Nebraska Public Power District shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the license amendment request, dated April 24, 2012, (and supplements dated July 12, 2012, January 14, 2013, February 12, 2013, March 13, 2013, June 13, 2013, December 12, 2013, January 17, 2014, February 18, 2014, and April 11, 2014), and as approved in the safety evaluation dated April 29, 2014."

The approved fire protection program is a risk-informed performance-based program in accordance with NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition," which is incorporated by reference into 10 CFR 50.48(c). NFPA 805, Section 2.6, "Monitoring," states that, "Monitoring shall ensure that the assumptions in the engineering analysis remain valid."

Contrary to the above, from April 29, 2014, to June 5, 2018, the licensee failed to appropriately monitor plant equipment to ensure that the assumptions in the NFPA 805 engineering analysis remained valid. Specifically, the licensee’s monitoring program did not monitor the availability of the control rod drive pumps, core spray pumps, emergency diesel generators, emergency station service transformer, startup station service transformer, high pressure core spray pump, instrument air compressors, residual heat removal pumps, standby liquid control pumps, and service water pumps to ensure that it was no lower than the fire probabilistic risk assessment assumptions.

Disposition: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

The disposition of this finding and associated violation closes Unresolved Item 05000298/2016008-01.

**Failure to Maintain Alarm Procedure for Service Water Booster Pump Ventilation Manual Actions**

Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000298/2018002-02 Closed	[H.3] – Human Performance, Change Management	71111.18 – Plant Modifications

The inspectors identified a Green non-cited violation of Technical Specification 5.4, “Procedures,” when the licensee failed to maintain Procedure 2.3\_R-1 with the bounding time restrictions for required manual ventilation actions identified in Engineering Evaluation NEDC 92-064, “Transient Temperature Rise in SWBP Room After Loss of Cooling,” Revision 3C2. As a result, the licensee relied on procedure guidance that contained an incorrect, less restrictive allowance of 13 hours for completion of manual actions rather than the bounding 5.8-hour allowance described in NEDC 92-064.

Description: On October 13, 2017, during routine maintenance activities for the service water booster pump (SWBP) fan coil unit (FCU), FC-C-1A, the licensee discovered a 5-10 gallon per minute (gpm) leak in the cooling coil. The licensee was using high pressure demineralized water to flush the FCU when the leak initiated, and operations personnel took action to isolate the coil. The fan coil unit is used to cool the SWBP room, which contains all four SWBPs, when power is lost to the site and nonessential ventilation is automatically isolated from the room. The SWBPs provide service water to the residual heat removal (RHR) heat exchangers during accident and shutdown cooling conditions. The operations crew determined that the SWBPs remained operable because Updated Safety Analysis Report (USAR), Section X-10.3.5.4, states that although the fan coil unit can be used to keep the room cool during an accident, “acceptable room temperatures can be maintained for a single RHR service water booster pump without forced ventilation through operator action to reduce the room heat load and establishment of a natural ventilation flowpath.” The operations crew also determined that these manual actions, which included rigging and removing three equipment hatches and opening three control building doors, were directed by Alarm Procedure 2.3\_R-1, “Panel R – Annunciator R-1,” Revision 18.

The inspectors reviewed Calculation NEDC 92-064, “Transient Temperature Rise in SWBP Room After Loss of Cooling,” Revision 3C2, and Calculation NEDC 92-063, “Maximum SWBP Room Temperatures w/ No Cooling From Control Bldg HVAC,” Revision 1. These heat-up

calculations served as the basis for acceptability of the manual ventilation actions described in Alarm Procedure 2.3\_R-1. NEDC 92-064 concluded that the required maximum design temperature for the SWBP room was 131 degrees Fahrenheit (F). The calculation also concluded that with the FCU unavailable, once the SWBP room high temperature alarm was triggered at 120 degrees F, the control room staff would enter Alarm Procedure 2.3\_R-1, and station personnel would have a limited amount of time to establish a natural ventilation path and secure excess heat loads in the room before operability of all four SWBPs was lost. The calculation determined that if two SWBPs were in service, station personnel would have 5.8 hours to establish a ventilation path, secure all lighting, de-energize all instrument air compressors, secure all instrument air dryers, and secure all but one SWBP. The calculation also determined that station personnel would have 13 hours to perform the same actions if only one SWBP was in service during an accident scenario. The inspectors also noted that emergency operating procedures directed control room staff to “operate all available suppression pool cooling” during accident conditions, which made operation of two SWBPs a very likely scenario during an accident.

The inspectors also reviewed Alarm Procedure 2.3\_R-1, Revision 17, and 50.59 Evaluation 2013-04, “RHR SWBP FCU 50.59 Inadequate for USAR Change LCR 93-10,” Revision 0. Evaluation 2013-04 sought to prove through simulation that the associated manual actions could be completed within the limiting 5.8 hours that would be available during an event. This evaluation concluded that the activities could be completed in less than 5 hours, and deemed the actions acceptable. Upon review of Alarm Procedure 2.3\_R-1, the inspectors discovered that step 1.3 of the procedure provided directions to secure heat loads in the room and establish natural ventilation through manual actions. However, prior to step 1.3, a procedure note stated, “NEDC 92-064 assumes that step 1.3 is complete within 13 hours of receiving RHR SWBP ROOM high temperature alarm.” The inspectors determined that this procedure should have included the bounding timeline of 5.8 hours, as described by NEDC 92-064, rather than the timeline of 13 hours that was based on the nonconservative assumption that only one SWBP would be in service. The inspectors challenged the licensee on the procedure timelines, and the licensee initiated Condition Report CR-CNS-2017-07601 and performed the associated procedure changes to make the correction on December 21, 2017.

The inspectors concluded that, prior to December 21, 2017, the licensee failed to maintain Procedure 2.3\_R-1 with the bounding time restrictions for required manual ventilation actions identified in Engineering Evaluation NEDC 92-064. In addition, prior to 2015, the procedure failed to contain any timeline restrictions, despite NEDC 92-064 concluding that time critical manual ventilation actions were required to ensure operability of all four service water booster pumps. The inspectors found that a May 2015 procedure change introduced the nonconservative 13-hour timeline into Alarm Procedure 2.3\_R-1.

Corrective Action(s): The licensee implemented a revision to Alarm Procedure 2.3\_R-1 to include the correct manual action required timelines.

Corrective Action Reference(s): Condition Report CR-CNS-2017-07601

Performance Assessment:

Performance Deficiency: The licensee’s failure to provide adequate guidance for restoring room cooling in Alarm Procedure 2.3\_R-1 was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the procedure quality attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage).

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," the finding was screened as having very low safety significance (Green) because the finding was not a design deficiency; did not represent a loss of system and/or function; did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time; and did not result in the loss of a high safety-significant nontechnical specification train.

Cross-cutting Aspect: The inspectors determined that the finding had a cross-cutting aspect in the area of human performance associated with change management, because the licensee failed to use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. Specifically, the licensee failed to ensure that the appropriate and correct changes were made when updating the procedure. [H.3]

Enforcement:

Violation: Technical Specification 5.4.1.a, requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2. Section 5 of Appendix A to Regulatory Guide 1.33, Revision 2, requires, "Procedures for Abnormal, Offnormal, or Alarm Conditions." The licensee established Alarm Procedure 2.3\_R-1, "Panel R – Annunciator R-1," Revision 17, to meet the Regulatory Guide 1.33 requirement.

Contrary to the above, prior to December 21, 2017, the licensee failed to maintain adequate written procedures for abnormal, offnormal, or alarm conditions. Specifically, the licensee failed to maintain Alarm Procedure 2.3\_R-1 with the bounding time restrictions for required manual ventilation actions identified in Engineering Evaluation NEDC 92-064, "Transient Temperature Rise in SWBP Room After Loss of Cooling," Revision 3C2.

Disposition: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Maintain Adequate Work Instructions for Traversing In-Core Probe System Limit Switches			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000298/2018002-03 Closed	None	71153 – Follow-up of Events and Notices of Enforcement Discretion
<p>A self-revealed, Green, non-cited violation of Technical Specification 5.4, “Procedures,” was identified when the licensee failed to maintain Procedure 14.2.14, “TIP Chamber Shield Maintenance,” with adequate instructions for reinstalling the traversing in-core probe system in-shield limit switches. As a result, the licensee experienced multiple failures of the shield limit switches resulting in inoperable primary containment isolation valves.</p>			
<p><u>Description:</u> On June 21, 2017, during operation of the traversing in-core probe (TIP) system, the C probe failed to stop at the correct “in-shield” position during withdrawal of the probe from the core. The probe is designed to stop when the limit switch is activated. While the limit switch is not activated, the associated containment isolation ball valve is blocked from automatic and manual operation. The licensee declared the valve inoperable. Subsequently, on June 22, 2017, the D probe failed to stop at the “in-shield” position during withdrawal. The licensee declared the D containment isolation ball valve inoperable. The licensee determined that the cause of the failures was that the limit switches had become loose due to inadequate mounting of the switches to the chamber shields. The design drawing for the system indicated that the switches were to be mounted using bolts and washers, but the licensee identified that some mounting bolts did not have washers installed.</p> <p>The switches had been removed and reinstalled during performance of Procedure 14.2.14, “TIP Chamber Shield Maintenance,” Revision 12, as part of the maintenance of the system. The procedures did not specify the method for reinstalling the switches. The licensee found that the vendor drawing specified the use of washers.</p> <p>Corrective Action(s): The licensee implemented a revision to Procedure 14.2.14 to include a description of the vendor specified mounting configuration and a requirement to apply a minimum torque to the bolts.</p> <p>Corrective Action Reference(s): Condition Report CR-CNS-2017-00039</p>			
<p><u>Performance Assessment:</u></p> <p>Performance Deficiency: The licensee’s failure to provide adequate guidance for maintenance on the TIP system was a performance deficiency.</p> <p>Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the procedure quality attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events.</p> <p>Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, “The Significance Determination Process for Findings</p>			



At-Power.” Using Exhibit 3, “Barrier Integrity Screening Questions,” the finding was screened as having very low safety significance (Green) because the finding did not represent an actual open pathway in the physical integrity of reactor containment (valves, airlocks, etc.), containment isolation system (logic and instrumentation), and heat removal components, and did not involve hydrogen igniters.

Cross-cutting Aspect: No cross-cutting aspect was assigned to this finding because the inspectors determined that since the last revision of the procedure was more than three years ago, the finding did not reflect present licensee performance.

Enforcement:

Violation: Technical Specification 5.4.1.a, requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2. Appendix A to Regulatory Guide 1.33, Revision 2, Section 9, “Procedures for Performing Maintenance,” requires, in part, that maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. The licensee established Procedure 14.2.14, “TIP Chamber Shield Maintenance,” Revision 12, to meet the Regulatory Guide 1.33 requirement.

Contrary to the above, prior to July 5, 2017, the licensee failed to establish adequate written procedures appropriate to the circumstances for performing maintenance that can affect the performance of safety related equipment. Specifically, the licensee failed to provide instructions appropriate to the circumstances for Procedure 14.2.4, “TIP Chamber Shield Maintenance.”

Disposition: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

The disposition of this finding and associated violation closes Licensee Event Report (LER) 05000298/2017-005-00, Traversing In-core Probe In-shield Limit Switch Mounting Failure Results in Common Cause Inoperability of Independent Trains or Channels and Condition Prohibited by Technical Specifications (ADAMS Accession No. ML17236A166).

## **EXIT MEETINGS AND DEBRIEFS**

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

On July 12, 2018, the inspector presented the quarterly resident inspector inspection results to Mr. K. Dia, Acting Vice President-Nuclear and CNO, and other members of the licensee staff.

## DOCUMENTS REVIEWED

### 71111.01—Adverse Weather Protection

#### Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Interface Operating Agreement between Nebraska Public Power District Operations Business Unit and Nebraska Public Power District Nuclear Power Group Business Unit	9
NC43456	Cooper 161 kV Substation One-Line Switching Diagram	13
NC66688	Cooper 345 kV Substation One-Line Switching Diagram	23

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
0-CNS-52	Control of Switchyard and Transformer Yard Activities at CNS	32

#### Work Orders

5196728

### 71111.04—Equipment Alignment

#### Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2040	Flow Diagram Residual Heat Removal System	N82
2043	Flow Diagram Reactor Core Isolation Coolant and Reactor Feed Systems	56
2044	Flow Diagram High Pressure Coolant Injection and Reactor Feed Systems	75

#### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2.2.33A	High Pressure Coolant Injection System Component Checklist	30
2.2.33B	High Pressure Coolant Injection System Instrument Valve Checklist	8
2.2.67A	Reactor Core Isolation Cooling System Component Checklist	22

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2.2A.RHR.DIV1	Residual Heat Removal System Component Checklist (Div 1)	9
2.2A.RHR.DIVSDC	Residual Heat Removal System Component Checklist (Div SDC)	3

Condition Reports (CR-CNS-)

2018-03339

71111.05—Fire Protection Quarterly

Drawings

CNS-FP-211      CNS-FP-227      CNS-FP-256      CNS-FP-379

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
0-BARRIER-CONTROL	Control Building	7
0-BARRIER-MAPS	Barrier Maps	9
0-BARRIER-MISC	Miscellaneous Buildings	5
0-BARRIER-REACTOR	Reactor Building	13
6.FP.305	Halon 1301 Service Water Pump Room Fire Suppression Surveillance Checks	15

Condition Reports (CR-CNS-)

2018-02059                      2018-02067

71111.06 - Flood Protection Measures

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
6.HPCI.103	HPCI IS and 92 Day Test Mode	55
0-Barrier	Flooding Barriers	24

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2.2.33A	High Pressure Coolant Injection System Component Checklist	30

Condition Reports (CR-CNS-)

2018-02403

71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
SKL05151245	CRD Pump Trip, Drifting Rods, ATWS, Loss of Level Indication, EOP 7B RPV Flooding	3

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2.1.4	Normal Shutdown	160
2.2.28.1	Feedwater System Operation	95

Condition Reports (CR-CNS-)

2018-03326

71111.12—Maintenance Effectiveness

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Maintenance Rule Function HV-F02 Performance Criteria Basis	4
11414213	Notification	

Condition Reports (CR-CNS-)

2016-02434                      2016-08539                      2017-00039                      2017-06120

Work Orders

5166424                      5214101

## 71111.13—Maintenance Risk Assessments and Emergent Work Control

### Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	D Drywell Fan Coil Unit Operational Decision Making Issue	0
	Drywell Fan Coil Unit D Failure, Week 1819 Protected Equipment Program Tracking Form	May 11, 2018
	HPCI Remain in Service List	
	HPCI Window, Week 1816 Protected Equipment Program Tracking Form	April 16, 2018
Calc NEDC 89-1234	Review of EAS Calculation	4
Calc NEDC 91-253G	Limiting Conditions Analysis for 18" Tricentric Valves	0

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
0-CNS-WM-104A	On-Line Fire Risk Management Actions	4
2.1.4	Normal Shutdown	160
2.2.71	Service Water System	123
6.2EE.602	Div 2 125V/250V Station Battery 92 Day Check	6
6.2SW.101	Service Water Surveillance Operation (Div 2) (IST)	53

### Condition Reports (CR-CNS-)

2018-02373	2018-02375	2018-02377	2018-02378
2018-02380	2012-06509		

### Work Orders

5134630

## 71111.15—Operability Determinations and Functionality Assessments

### Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2.1.11.1	Turbine Building Data	167
2.2.20	Standby AC Power System (Diesel Generator)	99

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
14.17.4	DG-2 System Instrument Calibration	25
6.HPCI.103	HPCI IS and 92 Day Test Mode	55
0-Barrier	Flooding Barriers	24
2.2.33A	High Pressure Coolant Injection System Component Checklist	30

Condition Reports (CR-CNS-)

2018-02364	2018-02413	2018-02426	2018-02427
2018-02492	2018-03294	2018-03341	2018-03365
2018-03388	2018-2403		

Work Orders

5169626	5244135
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71111.18—Plant Modifications

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EC 6040480	SWBP Oil Sight Glasses and Reservoir – and ECNs 1- 5	0
ER 2017-036	Seismic Test Report for Oil-Rite Constant Level Oiler	0

Condition Reports (CR-CNS-)

2018-02091	2018-02148	2018-02412	2018-02565
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71111.19—Post Maintenance Testing

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
NEDC 10-027	Drywell MOV Backseat Limits	1
NEDC 95-003	Determination of Allowable Operating Parameters for CNS MOV Program MOVs	32
730E197BB Sheet 3	Elementary Diagram Variable Speed Recirc Pump and MG Set	19
730E197BB Sheet 8	Elementary Diagram Variable Speed Recirc Pump and MG Set	28

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
6.HPCI.201	HPCI Valve Operability Test (IST)	26
6.1SW.101	Service Water Surveillance Operation (Div 1)(IST)	52

Work Orders

5077619	5122033	5233022	5249662
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71111.22—Surveillance Testing

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
Calc NEDC 89-1234	Review of EAS Calculation	4
Calc NEDC 91-253G	Limiting Conditions Analysis for 18” Tricentric Valves	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2.1.11.2	Reactor Building Data	68
2.2.71	Service Water System	123
6.1CS.101	Core Spray Test Mode Surveillance Operation (IST) (Div 1)	30
6.1RR.302	Reactor Recirculation Flow Unit Channel Calibration (Div 1)	38
6.2SW.101	Service Water Surveillance Operation (IST) (Div 2)	53

Condition Reports (CR-CNS-)

2018-03674

Work Orders

5134630	5147404
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71151—Performance Indicator Verification

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	Operations Instruction 17, Daily Report	47

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
	RCS Activity PI Data	January 2017 – March 2018
	RCS Leakage PI Data	January 2017 – March 2018
NEI 99-02	Regulatory Assessment Performance Indicator Guideline	7

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
6.LOG.601	Daily Surveillance Log – Modes 1, 2, and 3	132

Condition Reports (CR-CNS-)

2018-02134	2018-02571	2018-02592	2018-02657
2018-02679	2018-02700	2018-02860	

71153—Follow-up of Events and Notices of Enforcement Discretion

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
846D931	Chamber Shield	February 4, 1966

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
14.2.14	TIP Chamber Shield Maintenance	12

Condition Reports (CR-CNS-)

2017-00039	2017-03764	2017-03790	2017-03982
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Work Orders

5175552



## **NRC Request for Information**

**System:** High Pressure Coolant Injection

**CD Date Requested by:** April 2, 2018

**Date Range of Document Request:** March 31, 2016 - Current

### **Please provide the following documents:**

1. Copies of all root and apparent cause evaluations performed on this system.
2. Summary list of all condition reports written on this system, sorted by CR classification
3. List of all surveillances performed on this system, sortable by component if possible.
4. Provide copies of the three most recently completed quarterly surveillances
5. List of all corrective maintenance work orders, with description of work, performed on this system
6. Provide a list of control room deficiencies associated with this system
7. Copies of ODMI's, OWA/OWB's, prompt operability evaluations, and standing orders associated with this system
8. Summarized list of all Maintenance Rule equipment issues evaluated for the system (including their conclusions and their CR number); copies of each MRule evaluation for the system (MRFF and a(1) evaluations – regardless of their result); and any MRule Basis Document(s) for the system
9. List of all work orders, with description of work, planned for this system within the next year
10. Provide a list and description of overdue PM's, deferred PM's, and PM change requests for this system
11. System design calculations
12. Provide fire impairments associated with this system
13. Provide copies of any QA audits or self-assessments associated with this system
14. Copies of vendor manuals, drawings (P&ID's), and system training manuals
15. System health reports and system engineering logs for this system

16. List and description of temporary modifications; completed ECs (within the requested date range); and planned ECs (within the next year) associated with this system
17. Schedule of activities (Fragnet) for the planned AOT for HPCI scheduled for the work week of 1816.

COOPER NUCLEAR STATION – NRC INTEGRATED INSPECTION REPORT  
05000298/2018002 – JULY 25, 2018

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