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

May 10, 2019

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 – NRC INTEGRATED INSPECTION REPORT 05000298/2019001

Dear Mr. Dent:

On March 31, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Cooper Nuclear Station and 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.

NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements.

If you contest the violation or significance of the violation documented in this inspection report, 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 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 Cooper.

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,

/RA/

Jason W. Kozal, Chief
Reactor Projects Branch C

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

Enclosure:
Inspection Report 05000298/2019001
w/attachment: Detailed Risk Evaluation

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000298
License Numbers:	DPR-46
Report Numbers:	05000298/2019001
Enterprise Identifier:	I-2019-001-0003
Licensee:	Nebraska Public Power District
Facility:	Cooper Nuclear Station
Location:	Brownville, NE 68321
Inspection Dates:	January 01, 2019, to March 31, 2019
Inspectors:	M. Stafford, Resident Inspector (BWR) P. Vossmar, Senior Resident Inspector (BWR/TL)
Approved By:	Jason W. Kozal Chief, Reactor Projects Branch C Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a quarterly 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. Violations being considered in the NRC's assessment and additional items are summarized in the tables below.

List of Findings and Violations

Failure to Maintain Configuration Control of a Fire Zone Boundary Barrier Resulting in a Fire			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Initiating Events	Green NCV 05000298/2019001-01 Open/Closed	[H.11] - Challenge the Unknown	71152
The inspectors reviewed a self-revealed, non-cited violation of License Condition 2.C(4), "Fire Protection," for the failure to implement in effect all provisions of the approved fire protection program. Specifically, on September 19, 2018, the licensee failed to implement configuration control requirements for an FP2 fire zone boundary barrier during work activities associated with Maintenance Procedure 7.2.78.2, "Pipe Penetration Seal Installation Using Gasket Placement," Revision 1. Contrary to procedure requirements, during work on a pipe penetration between the radwaste and augmented radwaste buildings, maintenance personnel injected a combustible foam sealant (Avanti-248) on piping that exceeded 150 degrees Fahrenheit. On December 29, 2018, the sealant caught fire, resulting in emission of toxic smoke and declaration of a Notification of Unusual Event.			

Additional Tracking Items

Type	Issue Number	Title	Inspection Procedure	Status
LER	05000298/2018-001-00	Inadequate Packing on Motor Operated Valve Results in Unplanned High Pressure Coolant Injection Inoperability and a Loss of Safety Function	71153 – Follow-up of Events and Notices of Enforcement Discretion	Closed
LER	05000298/2018-003-00	Safety Valve Failure Results in Loss of Safety Function	71153 – Follow-up of Events and Notices of Enforcement Discretion	Closed

PLANT STATUS

Cooper Nuclear Station began the inspection period at rated thermal power. On February 22, 2019, the licensee reduced power to 70 percent for a control rod sequence exchange. The plant was returned to rated thermal power on February 23, 2019 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

External Flooding Sample (IP Section 03.04) (1 Sample)

On March 11, 2019, the inspectors evaluated readiness to cope with external flooding for the following areas:

- Intake structure;
- Reactor building basement areas;
- Turbine building basement areas;
- External plant levees.

Impending Severe Weather Sample (IP Section 03.03) (1 Sample)

The inspectors evaluated readiness for impending adverse weather conditions for a winter weather advisory on January 18, 2019.

71111.04 - Equipment Alignment

Partial Walkdown (IP Section 02.01) (3 Samples)

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

(1) Standby liquid control B with standby liquid control A out of service for maintenance on January 14, 2019;

(2) Emergency diesel generator 2 starting air during emergency diesel generator 1 maintenance on February 5, 2019;

(3) Reactor equipment cooling subsystem B with reactor equipment cooling A out of service for maintenance on March 11, 2019.

71111.04S - Equipment Alignment

Complete Walkdown (IP Section 02.02) (1 Sample)

The inspectors evaluated system configurations during a complete walkdown of the high pressure coolant injection system on March 8, 2019.

71111.05A - Fire Protection (Annual)

Annual Inspection (IP Section 03.02) (1 Sample)

The inspectors evaluated fire brigade performance on January 18, 2019.

71111.05Q - Fire Protection (Quarterly)

Quarterly Inspection (IP Section 03.01) (5 Samples)

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

(1) Waste collector drain tank room on January 10, 2019;

(2) Torus basement area on February 11, 2019;

(3) Fire pump building on February 12, 2019;

(4) Intake structure and service water pump room on March 4, 2019;

(5) Southwest quad 859 feet elevation, Division 2 residual heat removal and high pressure coolant injection room on March 5, 2019.

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

The inspectors observed and evaluated licensed operator performance in the control room during the first quarter downpower on February 23, 2019.

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

The inspectors observed and evaluated a simulator scenario on March 26, 2019.

71111.12 - Maintenance Effectiveness

Routine Maintenance Effectiveness Inspection (IP Section 02.01) (2 Samples)

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

(1) MS-AO-738 and MS-AO-739 reactor vessel head vent valves on March 29, 2019;
(2) Primary containment pressure monitoring and relief on March 29, 2019.

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (6 Samples)

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

(1) Residual heat removal D and service water booster pump D maintenance windows on January 16, 2019;

(2) Residual heat removal loop B maintenance window on January 25, 2019;

(3) Reactor feed pump A discharge valve, RF-MOV-29MV, packing torque adjustment on January 30, 2019;

(4) Emergency diesel generator 1 maintenance window on February 7, 2019;

(5) Reactor equipment cooling heat exchanger cleaning and reactor core isolation cooling maintenance windows on March 6, 2019;

(6) Emergent flooding preparations on March 14, 2019.

71111.15 - Operability Determinations and Functionality Assessments

Sample Selection (IP Section 02.01) (4 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

(1) Elevated release point sump discharge check valve functionality on February 1, 2019;

(2) Emergency diesel generator 1 turbo bearing wear on February 19, 2019;

(3) High pressure coolant injection minimum flow valve closure signal failed to actuate on March 25, 2019;

(4) Emergency diesel generator 2 jacket water heat exchanger flange leak on March 25, 2019.

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

(1) High pressure coolant injection steam isolation valve, HPCI-MO-16, backseating due to packing leakage on February 6, 2019;

(2) Reactor feed pump A discharge valve, RF-MOV-29MV, sealant injection modification on February 23, 2019.

71111.19 - Post Maintenance Testing

Post Maintenance Test Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the following post maintenance tests:

(1) Standby liquid control post work test on January 11, 2019;

(2) Residual heat removal B subsystem testing following system maintenance on January 25, 2019;

(3) Reactor feed pump A discharge valve, RF-MOV-29MV, backseat and packing adjustment post work testing on January 28, 2019;

(4) Reactor equipment cooling pump A testing following pump replacement on January 31, 2019;

(5) Diesel fire pump D testing following hose, belt, and oil change on March 27, 2019.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Inservice Testing (IST) (IP Section 03.01) (2 Samples)

(1) High pressure coolant injection pump and valve quarterly inservice test on January 18, 2019;

(2) Emergency diesel generator fuel oil transfer pump inservice test on March 6, 2019.

Surveillance Testing (IP Section 03.01) (3 Samples)

(1) Standby liquid control chemistry sample on January 9, 2019;
(2) Northwest quad fan coil unit flow test on February 11, 2019;
(3) 4160 V critical switchgear undervoltage relay testing on March 1, 2019.

71114.06 - Drill Evaluation

Emergency Preparedness (EP) Drill (IP Section 02.01) (1 Sample)

Emergency preparedness drill on February 26, 2019.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (1 Sample)

January 1, 2018 - December 31, 2018

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (1 Sample)

January 1, 2018 - December 31, 2018

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (3 Samples)

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

(1) Operator challenge assessment on February 7, 2019;

(2) Declaration of a Notification of Unusual Event due to fire resulting in toxic gas on March 28, 2019;

(3) Unplanned shutdown due to high pressure coolant injection packing leakage on March 29, 2019.

Semiannual Trend Review (IP Section 02.02) (1 Sample)

The inspectors reviewed the licensee's corrective action program for potential adverse trends in emergency preparedness and training performance that might be indicative of a more significant safety issue.

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

Event Follow-up (IP Section 03.01) (2 Samples)

(1) The inspectors evaluated when elevated release point sumps were nonfunctional which challenged standby gas treatment operability, and the licensee's response, on January 30, 2019;

(2) The inspectors evaluated the March 2019 Missouri river flooding and the licensee's response on March 25, 2019.

Event Report (IP Section 03.02) (2 Samples)

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

(1) • LER 05000298/2018-001-00, Inadequate Packing on Motor Operated Valve Results in Unplanned High Pressure Coolant Injection Inoperability and a Loss of Safety Function, (ADAMS Accession: ML18136A539):

The inspectors concluded that no violation of NRC requirements occurred.

(2) • LER 05000298/2018-003-00, Safety Valve Failure Results in Loss of Safety Function, (ADAMS Accession: ML18353A279):

Based on information at the time of inspection, the inspectors did not identify a violation of NRC requirements. The inspectors are awaiting Revision 1 to the LER, which will include the licensee's causal determination.

INSPECTION RESULTS

Failure to Maintain Configuration Control of a Fire Zone Boundary Barrier Resulting in a Fire			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Initiating Events	Green NCV 05000298/2019001-01 Closed	[H.11] - Challenge the Unknown	71152
The inspectors reviewed a self-revealed, non-cited violation of License Condition 2.C(4), "Fire Protection," for the failure to implement in effect all provisions of the approved fire protection program. Specifically, on September 19, 2018, the licensee failed to implement configuration control requirements for an FP2 fire zone boundary barrier during work activities associated with Maintenance Procedure 7.2.78.2, "Pipe Penetration Seal Installation Using Gasket Placement," Revision 1. Contrary to procedure requirements, during work on a pipe penetration between the radwaste and augmented radwaste buildings, maintenance personnel injected a combustible foam sealant (Avanti-248) on piping that exceeded 150 degrees Fahrenheit. On December 29, 2018, the sealant caught fire, resulting in emission of toxic smoke and declaration of a Notification of Unusual Event.			
Description: On December 29, 2018, Cooper experienced a fire in the augmented offgas (AOG) system pipe penetration 'F' between the radwaste (RW) and augmented radwaste (ARW) buildings. The fire created hazardous smoke, preventing normal access to the RW and ARW buildings. As a result, the licensee declared a Notification of Unusual Event. The fire was caused by the licensee's inappropriate injection of Avanti AV-248, a combustible foam sealant, into the penetration to address groundwater in-leakage. Specifically, on September 19, 2018, maintenance personnel removed some of the insulation on piping running through penetration 'F' and injected AV-248 sealant in response to groundwater in-leakage. The penetration contained AOG piping that normally operates at 500 degrees Fahrenheit (F). The licensee had a history of in-leakage at this location and had previously injected various types of Avanti sealant in 2004, 2011, and July 2018. During the July 2018 injection, noncombustible AV-315 was used because AV-248 was not allowed to be used in this location. On September 19, 2018, after AV-315 failed to adequately prevent the			

in-leakage, maintenance personnel injected AV-248 into the penetration. At the time the work activity occurred, the maintenance personnel questioned the use of AV-248 due to procedure limitations. Specifically, Maintenance Procedure 7.2.78.2, "Pipe Penetration Seal Installation Using Gasket Placement," Revision 1, which was controlling the work, stated in Step 2.1, "Avanti AV-248 Flexseal can be installed on piping systems with a maximum operating temperature up to 150 degrees F and, due to head pressure limitations, is not to be used on a penetration with the lowest point less than 886 feet elevation." Penetration 'F' contained piping with 500 degrees F normal operating temperatures and was located in a basement elevation below 886 feet. Despite procedure compliance concerns, work continued due to an assumption that AV-248 was only combustible in its liquid form, and curing would occur prior to placing the 500 degrees F piping back in service.

On December 27, 2018, the licensee noticed a smoky haze around Penetration 'F'. After engaging the vendor and discovering that the sealant material in the penetration was combustible, operations personnel acted to secure steam to AOG so that the combustible sealant could be removed. The licensee waited approximately 35 hours before opening access covers on either side of the penetration tunnel. Sealant removal was performed with two teams, one on either side of the penetration. When the first team opened the access cover on the RW side and began removing sealant, they discovered unexpected smoke and notified supervision. Plant supervision determined that the first team should wait for the smoke to dissipate before resuming work. However, rather than stop the activity due to the uncertain conditions that were discovered, the licensee allowed the second team to continue work on the ARW side of the penetration. When the second team removed enough sealant from the second access point, they introduced fresh air into the space, which caused the AV-248 sealant that was already smoldering to ignite and release toxic fumes (carbon dioxide, carbon monoxide, nitrogen oxides).

Following the event, the inspectors reviewed the licensee's apparent cause evaluation and applicable fire protection program requirements. The penetration in question was part of an FP2 fire zone boundary barrier. While not a fire-rated barrier credited in NFPA-805 nuclear safety capability analysis or controlled by the technical requirements manual, the barrier was credited in the licensee's fire probabilistic risk analysis. As a result, according to Fire Protection Program Procedure 0.23, "CNS Fire Protection Plan," Revision 79, FP2 barriers are qualified fire boundaries that must meet the requirements of the fire protection program. Because the fire protection program requires control of installed combustible materials via configuration control through approved plant procedures, the inspectors determined that this issue represented a violation of the licensee's fire protection program.

Corrective Action(s): Corrective actions included extinguishing the fire, removing all combustible sealant from the penetration, and long term actions to seal the penetration with a mechanical seal.

Corrective Action Reference(s): CR-CNS-2018-08638

Performance Assessment:

Performance Deficiency: The licensee's failure to implement fire protection program configuration control requirements for an FP2 barrier was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the protection against external factors (including fire) attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective to limit

the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in a fire that prevented normal access to the radwaste and augmented radwaste building basements, prevented operation of the augmented offgas system, and resulted in a plant emergency declaration.

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012. The inspectors determined that the finding required a detailed risk evaluation (DRE) because it impacted the frequency of a fire or internal flooding initiating event. The DRE combined initiating event probabilities with the total conditional core damage and conditional large early release probabilities and estimated that the fire resulted in an increase in core damage frequency of 7.0E-7/year, and an increase in large early release frequency of 3.1E-8/year. As a result, the performance deficiency had very low safety significance (Green). The DRE is included as Attachment 1 to this report.

Cross-cutting Aspect: H.11 - Challenge the Unknown: Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before proceeding. Specifically, workers were uncertain about the use of AV-248 prior to sealant injection, and again when smoke was unexpectedly found during subsequent sealant removal from the penetration; however, in each case the work activity was not stopped, and risks were not evaluated or addressed prior to proceeding.

Enforcement:

Violation: License Condition 2.C(4) requires, in part, that, "NPPD shall implement and maintain in effect all provisions of the approved fire protection program." Fire Protection Program Procedure 0.23, "CNS Fire Protection Plan," Revision 79, defines FP2 barriers as qualified fire boundaries that meet the requirements of the Fire Protection Program, and further states, in Section 5, "Fire Prevention," that nontransient combustible materials are controlled by the configuration control process. Procedure 0.31, "Equipment Status Control," Revision 89, states, "all deviations from normal configuration shall be controlled by approved documents." Maintenance on the FP2 barrier penetration between the radwaste and augmented radwaste building basements was controlled by Maintenance Procedure 7.2.78.2, "Pipe Penetration Seal Installation Using Gasket Placement," Revision 1. Step 2.1 states, in part, "Avanti AV-248 Flexseal can be installed on piping systems with a maximum operating temperature up to 150 degrees F."

Contrary to the above, on September 19, 2018, the licensee failed to ensure that Avanti AV-248 Flexseal was installed on piping systems with a maximum operating temperature of up to 150 degrees F. Specifically, maintenance personnel injected AV-248, a combustible foam sealant, into an FP2 barrier penetration between the radwaste and augmented radwaste building basements on piping with an operating temperature of 500 degrees F. As a result, on December 29, 2018, the sealant caught fire, resulting in emission of toxic smoke and declaration of a Notification of Unusual Event.

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

EXIT MEETINGS AND DEBRIEFS

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

- On April 18, 2019, the inspectors presented the quarterly integrated resident inspection results to Mr. K. Dia, Acting Site Vice President and Chief Nuclear Officer, and other members of the licensee staff.

THIRD PARTY REVIEWS

Inspectors reviewed the most recently issued Institute of Nuclear Power Operations report during the inspection period.

DOCUMENTS REVIEWED

71111.01 – Adverse Weather Protection

Condition Reports (CR-CNS-)
2019-00304

Procedures Number	Title	Revision
5.1FLOOD	Flood	25, 26, 27
5.1WEATHER	Operation During Weather Watches and Warnings	19
7.0.11	Flood Control Barriers	31

Drawings Number	Title	Revision
4003	Overall Site & Vicinity Plan	45
4005, Sheet 5	Paving, Grading & Drainage	3
L-21755	Cooper Nuclear Station – 345/161 kV Substation	6

71111.04 – Equipment Alignment

Condition Reports (CR-CNS-)				
2016-03874	2016-06346	2017-06179	2018-01346	2019-01343
2019-01346	2019-01368			

Work Orders		
5238426	5240696	5242443

Procedures Number	Title	Revision
2.2.33A	High Pressure Coolant Injection System Component Checklist	32
2.2.33B	High Pressure Coolant Injection System Instrument Valve Checklist	8
2.2.74A	Standby Liquid Control System Component Checklist	11
2.2.74B	Standby Liquid Control System Instrument Valve Checklist	1
2.2A.DG.DIV2	Standby AC Power System (Diesel Generator) Component Checklist	7
2.2A.REC.DIV2	Reactor Equipment Cooling Water System Component Checklist	1
2.2B.REC.DIV2	Reactor Equipment Cooling Water System Instrument Valve Checklist	0

Drawings Number	Title	Revision
2031, Sheet 2	Flow Diagram – Reactor Building – Closed Cooling Water System	N65
2031, Sheet 3	Flow Diagram – Reactor Building – Closed Cooling Water System	AB/34
2044	High Pressure Coolant Injection and Reactor Feed System	84
2045	Flow Diagram – Standby Liquid Control System	N21

Miscellaneous Documents Number	Title	Revision/Date
	High Pressure Coolant Injection System Health Report	12/2018
EC 18-055	Backseating Evaluation of HPCI-MOV-MO16	0
VM-0248	Crane Valve Composite Manual	16
VM-1282	Ohio Brass Valves	0
VM-1692	CT224 12 Channel Temperature Monitor, SLC-C-100 Controller	3

71111.05 – Fire Protection

Procedures Number	Title	Revision
0.23	CNS Fire Protection Plan	79
0-BARRIER-MAPS	Barrier Maps	9
5.1INCIDENT	Site Emergency Incident	39
5.4POST-FIRE-Turbine	Turbine Building/Outside Areas Post-Fire Operational Information	5
6.FP.305	Halon 1301 Service Water Pump Room Fire Suppression Surveillance Checks	17
6.FP.606	Fire Barrier/Penetration Seal Visual Examination	25

Miscellaneous Documents Number	Title	Revision/Date
	Fire Brigade Scenario #38	01/15/2019
CED 6029281	Bypass SW Halon Tanks Pressure Switches	0
CNS-FP-392	Reactor Building Suppression Pool, Elevation 859’-9”	AA/00
CNS-FP-214	Reactor Building Southwest Quadrant, Elevation 859’-9” and 881’-9”	4
CNS-FP-39	Reactor Building Suppression Pool, Elevation 881’-9”	AA/00
CNS-FP-251	Turbine Building – Turbine Operating Floor	AC/11

Miscellaneous Documents Number	Title	Revision/Date
CNS-FP-252	Turbine Building – Non-Critical Switchgear Room	AB/04
CNS-FP-256	Intake Structure, Elevation 903’ -6”	5
CNS-FP-257	Radwaste Building Basement Floor, Elevation 877’-6”	8
CNS-FP-262	Augmented Radwaste Building Basement Floor, Elevation 877’-6”	4
CNS-FP-265	Fire Protection Pump Rooms, Elevation 903’-6”	3

71111.11 – Licensed Operator Requalification Program

Condition Reports (CR-CNS-)		
2019-01048	2019-01049	2019-01890

Procedures Number	Title	Revision
0-EN-TQ-210	Conduct of Simulator Training	9C3
2.1.10	Station Power Changes	116
2.2.28.1	Feedwater System Operation	97
2.3_A-2	Panel A – Annunciator A-2	41
15.RF.101	RFPT Stop Valve Test	6
15.RF.102	RFPT Backup Oil Pumps and Filter/Cooler Differential Pressure Alarm Tests	7
15.RF.103	RFPT Thrust Bearing Wear and Failure Alarm Test	3

Miscellaneous Documents Title
Licensed Operator Requalification Scenario for 3/26/19

71111.12 – Maintenance Effectiveness

Condition Reports (CR-CNS-)				
2016-07742	2018-07736	2018-07780	2018-08411	2019-00668

Work Orders	
5274155	5274250

Miscellaneous Documents Number	Title	Revision
	Maintenance Rule Function PC-COMP1	3
	Maintenance Rule Function PC-F03	4
	Maintenance Rule Function PC-PF02	8

Miscellaneous Documents Number	Title	Revision
	Maintenance Rule Function MS-F04 Performance Criteria Basis	4
5274251	TCC	
DEC-5274251	MS-AOV-739AV Indicating Lights	1

Notifications			
11579749	11584473	11586252	11589374

71111.13 – Maintenance Risk Assessments and Emergent Work Control

Condition Reports (CR-CNS-)				
2018-00440	2018-00674	2019-00241	2019-00305	2019-00333
2019-00425				

Work Orders	
5284609	5284612

Procedures Number	Title	Revision
0-BARRIER	Barrier Control Process	27
0-CNS-WM-104A	On-Line Fire Risk Management Actions	4
0-PROTECT-EQP	Protected Equipment Program	44

Miscellaneous Documents Number	Title	Revision/Date
	Missouri River Flood Protection Plan	
	Protected Equipment Program Tracking Form – DG 1 LCO Maintenance Week 1906	02/04/2019
	Protected Equipment Program Tracking Form – EE-CHG-125VDC 1B Maintenance Window	01/13/2019
	Protected Equipment Program Tracking Form – RCIC Window Week 1910	03/04/2019
	Protected Equipment Program Tracking Form – RHR Div 2 Window	01/23/2019
	Protected Equipment Program Tracking Form – RHR Pump D Maintenance	01/15/2019
	Protected Equipment Program Tracking Form – SWBP D Maintenance Window	01/15/2019
	Protected Equipment Program Tracking Form – Week 1909 REC HX A Maintenance	03/03/2019
OI 11	Operations Instruction – Aggregate Risk Assessment	12

71111.15 – Operability Determinations and Functionality Assessments

Condition Reports (CR-CNS-)

2005-03329	2019-00439	2019-00443	2019-00534	2019-00549
2019-00553	2019-00569	2019-00702	2019-00757	2019-01659
2019-01680	2019-01945			

Work Orders

5174247	5183073

Procedures

Number	Title	Revision
2.3_DG1	Panel DG-1 – Annunciator DG-1	21
6.HPCI.312	HPCI Pump Low Discharge Flow Channel Calibration	10
6.HPCI.712	HPCI Pump Low Discharge Flow Channel Functional Test	4

Drawings

Number	Title	Revision
2044	Flow Diagram High Pressure Coolant Injection and Reactor Feedwater Systems	76
2005, Sheet 2	Flow Diagram – Misc. Drains, Vents and Seal Systems	N49
2192	Composite Yard Piping Arrangement Plan	AB06
2193	Composite Yard Piping Arrangement Sections	N05
450212268	Detector Wear	N03
454223426	Composite Control Air Schematic	AB/09

Miscellaneous Documents

Number	Title	Revision
	Floating Head Heat Exchanger Training Documents	
NEDC 97-023	HPCI Minimum Flow Line Evaluation	1, 2, 3

Notifications

11583394	11586078	11594524

71111.18 – Plant Modifications

Condition Reports (CR-CNS-)

2018-08548	2018-08579	2019-00149	2019-00305	19-00339
2019-00498				

Work Orders

5175367	5279727	5284046	5284609

Procedures

Number	Title	Revision
2.2.28A	Feedwater System Component Checklist	31
6.HPCI.201	HPCI Valve Operability Test (IST)	28

Drawings

Number	Title	Revision
452015081	18” Anchor Gate Valve	N01

Miscellaneous Documents

Title	Revision/Date
CEM Slides for WO 5284609 to Address Temporary Leak Repair of Reactor Feed A Discharge Valve	
Risk Management Plan for Downpower and Reactor Feed Pump A Discharge Valve Maintenance	02/22/2019
Valve Pack AX MSDS	
Valve Packing Datasheet: CNS-0-RF-MOV-29MV	1

Engineering Reports

Number	Title	Revision
EC 18-055	Backseating Evaluation of HPCI-MOV-MO16	0
EC 5284612	RF-MOV-29MV Packing Injection	0-2

71111.19 – Post Maintenance Testing

Condition Reports (CR-CNS-)

2019-00092	2019-00117	2019-00157	2019-00305	2019-00398
2019-00579	2019-00582	2019-01955	2019-01956	

Work Orders

5117595	5171525	5175369	5188891	5207682	5209529	5209530
5209531	5209532	5209539	5209540	5209542	5209544	5209570
5209576	5209577	5209584	5210430	5210828	5211204	5211566
5232527	5266729	5268847	5284609	5284612	52114961	

Procedures

Number	Title	Revision
0.31MOV	Motor Operated Valves	4
2.2.28	Feedwater System Startup and Shutdown	107
6.FP.101	Fire Pump Operability Test	43
6.SLC.101	SLC Pump Operability Test	26
6.1REC.101	REC Surveillance Operation (IST)(DIV 1)	20
6.2RHR.101	RHR Test Mode Surveillance Operation	38

Procedures Number	Title	Revision
6.2RHR.201	RHR Power Operated Valve Operability Test	34
7.0.5	CNS Post-Maintenance Testing	59
7.5.8	Limitorque Mechanical/Electrical Examination	18

Miscellaneous Documents Number	Title	Revision
NUREG-1482	Guidelines for Inservice Testing at Nuclear Power Plants	2

71111.22 – Surveillance Testing

Condition Reports (CR-CNS-)				
2016-03034	2019-00277	2019-00298	2019-00747	2019-00756
2019-00758	2019-00759	2019-00761	2019-00844	2019-01241

Work Orders	
5112642	5207784

Procedures Number	Title	Revision
6.HPCI.103	HPCI IST and 92 Day Test Mode	58
6.SLC.601	SLC Tank Sampling	12
6.1DG.401	Diesel Generator Fuel Oil Transfer Pump IST Flow Test	37
6.1EE.306	4160 Bus 1F Undervoltage Relay Channel Functional Test	4
6.1HV.603	Air Flow Test of Fan Coil Unit FC-R-1J (DIV 1)	3
7.3.28.1	Lead Removal/Installation and Lug Installation	32
8.7.1.4	Boron Potentiometric Analysis (High Range)	12

Miscellaneous Documents Number	Title	Revision
EN-MA-118	Foreign Material Exclusion	9C0
GE SIL-336	Surveillance Testing Recommendations for HPCI and RCIC Systems	0, 1
GE SIL-352	HPCI Turbine Stop Valve Steam Balance Chamber Pressure Adjustment Implemented	0

71114.06 – Drill Evaluation

Condition Reports (CR-CNS-)	
2019-01118	2019-01467

Procedures

Number	Title	Revision
0-EN-EP-306	Drills and Exercises	9C0
5.7.1	Emergency Classification	62
5.7.2	Emergency Director EPIP	36

Miscellaneous Documents

Title
Drill Scenario Package for 2/26/19 EP Drill

71151 – Performance Indicator Verification

Miscellaneous Documents

Title	Date
2018 PI Validation Package	01/14/2019
CNS Operations Narrative Logs – May 2018 and November 2018	

71152 – Problem Identification and Resolution

Condition Reports (CR-CNS-)

2017-02937	2018-01346	2018-04112	2018-04585	2018-04586
2018-08579	2018-08584	2018-08609	2018-08614	2018-08615
2018-08621	2018-08638	2018-08657	2019-00026	2019-00161
2019-00184	2019-00214	2019-00248	2019-01383	2019-01977
2019-02073	2019-02093			

Work Orders

4368108	4783927	4789594	5254033	5260786	5260787	5266327

Procedures

Number	Title	Revision
0.23	CNS Fire Protection Plan	79
0.31	Equipment Status Control	89
0.31.1	Configuration Control During Maintenance Activities	9
0.7.1	Control of Combustibles	40
0-BARRIER	Barrier Control Process	27
2.0.12	Operator Challenges	12
6.FP.606	Fire Barrier/Penetration Seal Visual Examination	25
7.2.78.2	Pipe Penetration Seal Installation Using Gasket Placement	1

Drawings

Number	Title	Revision
4428	Structural Augmented Radwaste Building Modifications to Existing Radwaste Building – SH 1	4

Miscellaneous Documents

Number	Title	Revision
	Curtis Wright Packing Guide	5
EE 18-028	Various MOV Packing Load Adjustment Calculation Revisions	0
EE 18-030	HPCI-MOV-MO16 Packing Adequacy	0
EPRI Technical Report	Valve Packing Maintenance and Program Practices	1
NEDC 10-004	Fire PRA Plant Boundary Definition and Partitioning	2
NEDC 10-080	NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements Review	4
NEDC 14-043	Fire Safety Analysis for Entire Power Block	1
Operations Instruction #25	Operations Routine Duties	73

Notifications

10656343	11152470	11343404	11361838	11375256	11383555	11425458
11458460	11465713	11470178	11480499	11494730	11513724	11515171
11542935	11547258	11559692	11563581	11564210	11564621	11566741
11567991	11568779	11569204	11570043	11571041	11575092	11575173
11575663	11577547	11577550				

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

Condition Reports (CR-CNS-)

2018-01323	2018-01327	2018-01341	2018-01344	2018-01346
2018-01369	2018-06301	2018-06791	2019-00005	2019-00534
2019-00549	2019-00553	2019-00569	2019-01754	2019-01757
2019-01765				

Work Orders

5238426

Procedures

Number	Title	Revision
2.2.27	Equipment, Floor, and Chemical Drain System	59
2.3_S-1	Panel S – Annunciator S-1	30
5.1FLOOD	Flood	25, 26
6.MS.401	Main Steam Safety Valve (SV) Testing (IST)	13

Drawings

Number	Title	Revision
2037	Flow Diagram – H&V Standby Gas Treatment & Off Gas	71

Drawings Number	Title	Revision
	Filters	

Miscellaneous Documents Number	Title	Revision/Date
LBDCR 2007-018	TRM 3.7.1 and Bases River Level Change	06/12/2007
M266	Elevated Release Point Sump Drain Valve Installation	10
TR-113560	EPRI Topical Report for Dresser 3700 Series Relief Valves	09/2000

Detailed Risk Evaluation

Cooper Nuclear Station

Penetration Sealant Fire

The analyst assumed that the sealant ignited and due to its location, the sealant could have burned further and could have potentially caused fires in both the augmented radwaste building basement and the radwaste building basement. As a result, two fire scenarios, one in each basement room, were considered.

The analyst developed the initiating event probabilities for the two fire scenarios using the following equation set forth in Volume 2, "External Events," of the Risk Assessment of Operational Events (RASP) Handbook:

$IE_{freq} = F_{if} * SF * P_{ns}$, where
F_{fi} = Fire ignition frequency
SF = Severity Factor
P_{ns} = Non-suppression probability

Using the guidance in Chapter 8, "Initiating Events Analysis," Volume 1, "Internal Events," of the RASP Handbook, the analyst set F_{fi}, the fire ignition frequency, equal to 1.0 since an actual fire event had occurred and all other fire initiating events were set to 0.0.

For development of the severity factor of the fires, the analyst used Appendix D, "Severity Factor vs. Vertical Distance to Target Above Ignition Source," and Appendix E, Severity Factor vs. Radial Distance from Ignition Source to Target," from Attachment 8, "Tables and Plots Supporting the Phase 2 Risk Quantification," of Appendix F, of Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process." After reviewing publicly published information on the sealant material, the analyst considered the fire was best treated as a transient fire. Discussions with the resident inspectors who toured the area of the fire shortly after the fire event revealed that there were no targets or intervening combustibles within 3 feet of the fire event or sealant. Using Figure D.01, "Severity Factor vs. Vertical Target Distance for Motor, Pump, and Transient Fires," and Figure E.01, "Severity Factor vs. Radial Target Distance for Motor, Pump, and Transient Fires," the analyst estimated a severity factor of 0.02. This analyst considered this to be a conservative assumption since there were no risk significant targets in the areas and the combustibles were farther away than the lowest severity factor of 0.02 in the referenced figures.

The analyst assigned a nonsuppression probability of 1.0 and assumed there were no automatic suppression systems in the rooms and that the fire brigade would not be effective at suppressing the fire. The analyst also viewed this as a conservative assumption.

In combining the assumed values, the initiating event probabilities of the fires in the two rooms was estimated to be 2.0E-2, as calculated by:

$IE_{freq} = F_{if} * SF * P_{ns}$
$IE_{freq} = 1.0 * 0.02 * 1.0$
$IE_{freq} = 0.02$ or 2.0E-2

The analyst used the licensee's fire probabilistic risk assessment results to obtain a conditional core damage probability to apply. Licensee Calculation NEDC 09-085, "Task 7.14, Fire Risk Quantification," Revision 3, Table D-6, "All Fire Scenarios Sorted by Core Damage Frequency – Post NFPA 805," detailed the following:

	Scenario Conditional Core Damage Probability	Scenario Conditional Large Early Release Probability
Radwaste Building Basement	2.44E-5	8.69E-7
Augmented Radwaste Building Basement	1.04E-5	6.65E-7
Combined Total	3.48E-5	1.53E-6

The analyst noted that the conditional core damage probability resulted largely from random probabilistic failures and not from actual mitigating equipment becoming damaged in postulated fire scenarios which led to considering the total conditional core damage and large early release probabilities to be conservative.

When the analyst combined the initiating event probabilities with the total conditional core damage and conditional large early release probabilities and multiplied the results by an inverse year, estimates of an increase in core damage frequency of 7.0E-7/year and an increase in large early release frequency of 3.1E-8/year for the fire event resulted. Use of qualitative considerations for the conservatism of the assumptions led to analyst concluding that this issue was of very low safety significance (Green).

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