UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

July 29, 2016

Mr. Oscar A. Limpias
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 05000298/2016002

Dear Mr. Limpias:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Cooper Nuclear Station. On July 13, 2016, the NRC inspectors discussed the results of this inspection with you and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection 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 NRC 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, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; 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 Regional Administrator, Region IV; and the NRC resident inspector at the Cooper Nuclear Station.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public

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Sincerely,

/RA/

Greg Warnick, Branch Chief
Project Branch C
Division of Reactor Projects

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

Enclosure:
Inspection Report 05000298/2016002
w/ Attachment: Supplemental Information

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Letter to Oscar A. Limpias from Greg Warnick dated July 29, 2016

SUBJECT: COOPER NUCLEAR STATION – NRC INTEGRATED INSPECTION REPORT 05000298/2016002

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000298
License:	DPR-46
Report:	05000298/2016002
Licensee:	Nebraska Public Power District
Facility:	Cooper Nuclear Station
Location:	72676 648A Ave Brownville, NE
Dates:	April 1 through June 30, 2016
Inspectors:	P. Voss, Senior Resident Inspector C. Henderson, Resident Inspector J. Kirkland, Senior Operations Engineer P. Elkmann, Senior Emergency Preparedness Inspector G. Guerra, Emergency Preparedness Inspector N. Greene, Health Physics Inspector C. Young, Senior Project Engineer J. Melfi, Project Engineer, DRP/D
Approved By:	Greg Warnick Chief, Project Branch C Division of Reactor Projects

SUMMARY

IR 05000298/2016002; 04/01/2016 – 06/30/2016; Cooper Nuclear Station; Maintenance Effectiveness, Post-Maintenance Testing, and Follow-up of Events and NOEDs.

The inspection activities described in this report were performed between April 1 and June 30, 2016, by the resident inspectors at the Cooper Nuclear Station and inspectors from the NRC's Region IV office. Three findings of very low safety significance (Green) are documented in this report. All of these findings involved violations of NRC requirements. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Mitigating Systems

- Green. The inspectors reviewed a self-revealed, non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to verify the adequacy of design of the high pressure coolant injection auxiliary lube oil pump 125 Vdc starter circuit. Specifically, in 1984, the licensee modified the design of the starter circuit and eliminated a resistor that served to protect the circuit from shorting due to indication light bulb failures. As a result, on April 26, 2016, a shorted light bulb resulted in the loss of power to the auxiliary lube oil pump, rendering the high pressure coolant injection system inoperable and unavailable. Immediate corrective actions included replacing the light socket and blown fuse and changing out the nonessential light bulb with an essential bulb. This event was entered into the licensee's corrective action program as Condition Report CR-CNS-2016-02318, and the licensee initiated a root cause evaluation to investigate the failure.

  The licensee's failure to verify the adequacy of design of the high pressure coolant injection auxiliary lube oil pump starter circuit in accordance with 10 CFR Part 50, Appendix B, Criterion III, was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the equipment performance 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. Specifically, at the time the modification was installed, the licensee had not taken sufficient actions to ensure that the electrical circuit was protected from light bulb shorting failures, resulting in the high pressure coolant injection system ultimately being rendered inoperable. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, inspectors determined that the finding required a detailed risk evaluation because it represented a loss of the system and function of high pressure coolant injection. The inspectors determined that the finding was of very low safety significance (Green) through performing a detailed risk evaluation. A cross-cutting aspect was not assigned to this finding because the performance deficiency occurred in 1984, and therefore, is not indicative of current licensee performance (Section 4OA3).

Cornerstone: Barrier Integrity

- Green. The inspectors identified a non-cited violation of Technical Specification 3.6.1.3, "Primary Containment Isolation Valves," for the licensee's failure to maintain traversing in-core probe B ball valve, a primary containment isolation valve, operable for its containment isolation function. Specifically, on May 5, 2016, from 5:20 a.m. until 1:08 p.m., the licensee failed to maintain the traversing in-core probe B ball valve operable or isolate its flow path within 4 hours of indications that the mechanical in-shield limit switch had failed. This failure prevented the ball valve from performing its containment isolation function. The licensee took immediate corrective actions upon discovery to restore compliance with Technical Specification 3.6.1.3 by de-energizing the ball valve's solenoid operating valve, causing it to close. The licensee entered this deficiency into their corrective action program for resolution as Condition Report CR-CNS-2016-03665.

  The licensee's failure to maintain the traversing in-core probe B ball valve, a primary containment isolation valve, operable for its containment isolation function, in violation of Technical Specification 3.6.1.3, was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the human performance attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases and that the radiological barrier functionality of containment is maintained. Specifically, the traversing in-core probe B ball valve was unable to perform its primary containment isolation function with a failed mechanical in-shield limit switch. 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 was of very low safety significance (Green) because it 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 an actual reduction in function of hydrogen igniters in the reactor containment. The finding had a cross-cutting aspect in the area of human performance associated with conservative bias because the licensee failed to use decision-making practices that emphasized prudent choices over those that were simply allowable and failed to ensure proposed actions were determined to be safe in order to proceed, rather than unsafe in order to stop. Specifically, the licensee failed to validate the assumption that the traversing in-core probe B ball valve would fulfill its containment isolation function with a failed mechanical in-shield limit switch, and failed to validate the degraded condition prior to exceeding the 4-hour completion time of Technical Specification 3.6.1.3 (Section 1R12). [H.14]

Multiple Cornerstones: Mitigating Systems and Barrier Integrity

- Green. The inspectors identified two examples of a non-cited violation of Technical Specification 5.4.1.a, associated with the licensee's failure to perform required post-maintenance testing for safety-related ventilation systems in accordance with documented instructions, prior to system restoration. Specifically, the licensee failed to follow work order instructions contained in Work Orders 5062878 and 5065112 for (1) performing surveillance testing to measure the airflow of emergency diesel generator supply fan coil unit HV-DG-1C following maintenance, and (2) performing leak testing of a newly created control room ventilation boundary penetration. Corrective actions included performing the required surveillance test for the diesel generator ventilation unit, retesting the control room penetration in accordance with the procedure, and initiating site-wide communications

discussing the errors and reemphasizing procedural adherence. The licensee entered these deficiencies into their corrective action program for resolution as Condition Reports CR-CNS-2016-02207 and CR-CNS-2016-02232.

The licensee's failure to perform required post-maintenance testing for safety-related ventilation systems, in accordance with documented instructions, was a performance deficiency. This performance deficiency was associated with multiple cornerstones. The first example of the performance deficiency was more than minor, and therefore a finding, because it was associated with the human performance 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. Specifically, the failure to measure supply fan coil unit HV-DG-1C airflow resulted in delayed identification that the maintenance had resulted in degraded flow through the ventilation unit. The second example of the performance deficiency was more than minor, and therefore a finding, because it was associated with the human performance attribute of the Barrier Integrity Cornerstone and affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases and that the radiological barrier functionality of the control room is maintained. Specifically, the licensee's failure to follow post-maintenance testing instructions resulted in a challenge to the operability of the newly created control room boundary penetration seal. 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 was of very low safety significance (Green) because it did not represent a design or qualification deficiency; did not represent a loss of safety function; did not represent a loss of a single train for greater than its technical specification allowed outage time; did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating events; did not represent an actual open containment pathway; and did not involve a reduction in function of hydrogen igniters. The finding had a cross-cutting aspect in the area of human performance associated with work management, because the licensee failed to implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority, including the need for coordination with different work groups or job activities. Specifically, the licensee failed to control, execute, and coordinate safety-related ventilation work activities to ensure all required post-maintenance testing was completed satisfactorily prior to declaring the associated equipment operable (Section 1R19). [H.5]

PLANT STATUS

The Cooper Nuclear Station began the inspection period at full power, where it remained for the rest of the reporting period, except for minor reductions in power to support scheduled surveillances and rod pattern adjustments.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

Readiness to Cope with External Flooding

a. Inspection Scope

On June 7, 2016, the inspectors completed an inspection of the station's readiness to cope with external flooding. After reviewing the licensee's flooding analysis, the inspectors chose one plant area that was susceptible to flooding:

- Intake structure and service water pump room

The inspectors reviewed plant design features and licensee procedures for coping with flooding. The inspectors walked down the selected areas to inspect the design features, including the material condition of seals, drains, and flood barriers. The inspectors evaluated whether credited operator actions could be successfully accomplished.

These activities constituted one sample of readiness to cope with external flooding, as defined in Inspection Procedure 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

Partial Walkdown

a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- May 9, 2016, Emergency diesel generator 1 jacket water system
- May 10, 2016, Emergency diesel generator 1 starting air system
- May 11, 2016, Emergency diesel generator 1 lube oil system

The inspectors reviewed the licensee's procedures and system design information to determine the correct lineup for the systems. They visually verified that critical portions of the systems were correctly aligned for the existing plant configuration.

These activities constituted three partial system walkdown samples, as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

Quarterly Inspection

a. Inspection Scope

The inspectors evaluated the licensee's fire protection program for operational status and material condition. The inspectors focused their inspection on four plant areas important to safety:

- April 13, 2016, Service water pump area, Fire Area IS-A, Zone 20A
- May 20, 2016, Cable spreading room, Fire Area CB-D, Zone 9A
- June 27, 2016, Battery room 1A, Fire Area CB-A-1, Zone 8E
- June 27, 2016, DC switchgear room 1A, Fire Area CB-A-1, Zone 8H

For each area, the inspectors evaluated the fire plan against defined hazards and defense-in-depth features in the licensee's fire protection program. The inspectors evaluated control of transient combustibles and ignition sources, fire detection and suppression systems, manual firefighting equipment and capability, passive fire protection features, and compensatory measures for degraded conditions.

These activities constituted four quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On May 10, 2016, the inspectors completed an inspection of the station's ability to mitigate flooding due to internal causes. After reviewing the licensee's flooding analysis, the inspectors chose one plant area containing risk-significant structures, systems, and components that were susceptible to flooding:

- Reactor building southeast and southwest quads

The inspectors reviewed plant design features and licensee procedures for coping with internal flooding. The inspectors walked down the selected areas to inspect the design features, including the material condition of seals, drains, and flood barriers. The

inspectors evaluated whether operator actions credited for flood mitigation could be successfully accomplished.

These activities constituted completion of one flood protection measures sample, as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

On May 9, 2016, the inspectors completed an inspection of the readiness and availability of risk-significant heat exchangers. The inspectors reviewed the inspections for the emergency diesel generator 1 and 2 jacket water, lube oil, and intercooler heat exchangers. Additionally, the inspectors walked down the heat exchangers to observe their performance and material condition and verified that the heat exchangers were correctly categorized under the Maintenance Rule and were receiving the required maintenance.

These activities constituted completion of one heat sink performance annual review sample, as defined in Inspection Procedure 71111.07.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)

.1 Review of Licensed Operator Requalification

a. Inspection Scope

On May 18, 2016, the inspectors observed a portion of an annual requalification test for licensed operators. The inspectors assessed the performance of the operators and the evaluators' critique of their performance. The inspectors also assessed the modeling and performance of the simulator during the requalification activities.

These activities constituted completion of one quarterly licensed operator requalification program sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

The inspectors observed the performance of on-shift licensed operators in the plant's main control room. At the time of the observations, the plant was in a period of heightened activity and risk due to control room emergency ventilation being out of service and control rod manipulations. The inspectors observed the operators' performance of the following activities:

- May 17, 2016, Control room lights dimmed during control room emergency filtration maintenance
- June 24, 2016, Down power and rod pattern adjustment, including the pre-job brief

In addition, the inspectors assessed the operators' adherence to plant procedures, including the conduct of operations procedure and other operations department policies.

These activities constituted completion of one quarterly licensed operator performance sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.3 Annual Review of Requalification Examination Results

a. Inspection Scope

The inspector conducted an in-office review of the annual requalification training program to determine the results of this program.

On June 23, 2016, the licensee informed the inspector of the following Cooper Nuclear Station operating test results:

- 7 of 7 crews passed the simulator portion of the operating test
- 40 of 40 licensed operators passed the simulator portion of the operating test
- 40 of 40 licensed operators passed the job performance measure portion of the operating test

There were no remediations performed for the Cooper Nuclear Station operating tests.

These activities constituted completion of one annual licensed operator requalification program sample, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed three instances of degraded performance or conditions of safety-related structures, systems, and components (SSCs):

- April 9, 2016, Emergency diesel generator 1 and 2 bolting torque requirements 10 CFR 50.65(a)(1) monitoring plan
- June 10, 2016, Residual heat removal system motor operated valve testing
- June 22, 2016, Traversing in-core probe system containment isolation valve failure

The inspectors reviewed the extent of condition of possible common cause SSC failures and evaluated the adequacy of the licensee's corrective actions. The inspectors reviewed the licensee's work practices to evaluate whether these may have played a role in the degradation of the SSCs. The inspectors assessed the licensee's characterization of the degradation in accordance with 10 CFR 50.65 (the Maintenance Rule), and verified that the licensee was appropriately tracking degraded performance and conditions in accordance with the Maintenance Rule.

These activities constituted completion of three maintenance effectiveness samples, as defined in Inspection Procedure 71111.12.

b. Findings

Introduction. The inspectors identified a Green, non-cited violation of Technical Specification (TS) 3.6.1.3, "Primary Containment Isolation Valves," for the licensee's failure to maintain traversing in-core probe (TIP) B ball valve, a primary containment isolation valve, operable for its containment isolation function. Specifically, on May 5, 2016, from 5:20 a.m. until 1:08 p.m., the licensee failed to maintain the TIP B ball valve operable or isolate its flow path within 4 hours of indications that the mechanical in-shield limit switch had failed.

Description. On May 5, 2016, at 5:20 a.m., the licensee was retracting TIP B in accordance with Station Procedure 4.1.4, "Traversing In-Core Probe System," Revision 31. During retraction, TIP B failed to stop automatically at its mechanical in-shield limit switch position of 9646 and continued to retract toward the TIP drive mechanism. Additionally, the in-shield light on the TIP B drive control unit failed to illuminate once the limit switch position was passed. These conditions provided indications that the limit switch had failed. The licensee took immediate action to stop TIP B by placing the drive control unit manual switch to off. This action stopped TIP B at position 9628, maintaining it in the chamber shield. The station verified that TIP B was in the fully retracted and shielded position using an evaluation of the radiation levels in the reactor building. Although indications of an equipment failure existed, operations personnel assumed the TIP B ball valve automatic containment isolation function was not impacted, and the valve was maintained open. The basis for the licensee's decision was the assumption that the Group 2 containment isolation signal was not impacted and would have functioned to close the ball valve. The licensee entered this deficiency into

their corrective action program (CAP) for resolution as Condition Report CR-CNS-2016-02424.

The licensee commenced validation of the limit switch failure on May 5, 2016, at 12:05 p.m. and quickly confirmed the condition. Next, the licensee attempted to secure TIP B per Station Procedure 4.1.4, and the TIP B ball valve failed to close. Operations personnel still concluded the TIP B ball valve would have closed on the Group 2 signal at this time; however, they initiated a review of the Group 2 isolation logic to verify this assumption. In parallel, the licensee identified an alternate method of de-energizing the TIP B ball valve's solenoid operated valve (SOV), causing it to close at 1:08 p.m. This action restored compliance with TS 3.6.1.3, approximately 7 hours after the time of identification that the mechanical in-shield limit switch had failed. The licensee then determined the limit switch failure would have prevented the TIP B ball valve from closing on the Group 2 signal. As a result, the licensee declared the TIP B ball valve inoperable; entered TS 3.6.1.3, Required Action A.1; and verified all actions were completed at 1:33 p.m. A manual action from the control room to close the containment isolation shear valve was available during this timeframe per Station Procedure 4.1.4. The licensee entered this deficiency into their CAP for resolution as CR-CNS-2016-02434.

The inspectors reviewed Condition Reports CR-CNS-2016-02424 and CR-CNS-2016-02434 and the timeline for the failure of the mechanical in-shield limit switch. The inspectors identified that the licensee had failed to meet the requirements of TS 3.6.1.3. Specifically, on May 5, 2016, from 5:20 a.m. until 1:08 p.m., the licensee failed to maintain the TIP B ball valve operable from the time of indication that the mechanical in-shield limit switch had failed until the flow path was successfully isolated. Initial indications of the failure occurred on May 5, 2016, at 5:20 a.m., when TIP B failed to stop. The inspectors determined that the licensee could have identified the failure to meet TS 3.6.1.3 earlier, and concluded that two factors impacted the licensee's ability to recognize the valve inoperability. The first factor was the licensee's initial assumption that the TIP B ball valve maintained its containment isolation function with a limit switch failure. The second factor was associated with the licensee's failure to commence validation of the limit switch condition commensurate with the safety significance of the TIP ball valve. This safety significance was governed by the 4-hour completion time from TS 3.6.1.3, Required Action A.1, to isolate the TIP B penetration flow path. The licensee entered this deficiency into their CAP for resolution as CR-CNS-2016-03665.

Analysis. The licensee's failure to maintain the TIP B ball valve, a primary containment isolation valve, operable for its containment isolation function, in violation of TS 3.6.1.3, was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the human performance attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases and that the radiological barrier functionality of containment is maintained. Specifically, the TIP B ball valve was unable to perform its primary containment isolation function with a failed mechanical in-shield limit switch. 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 was of very low safety significance (Green) because it 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 an actual reduction in function of hydrogen igniters in the reactor containment. The finding had a cross-cutting aspect in the area of human performance associated with conservative bias because the licensee failed to use decision-making practices that emphasized prudent choices over those that were simply allowable and failed to ensure proposed actions were determined to be safe in order to proceed, rather than unsafe in order to stop. Specifically, the licensee failed to validate the assumption that the TIP B ball valve would fulfill its containment isolation function with a failed mechanical in-shield limit switch, and failed to validate the degraded condition prior to exceeding the 4-hour completion time of TS 3.6.1.3, Required Action A.1. [H.14]

Enforcement. Technical Specification 3.6.1.3, "Primary Containment Isolation Valves," requires, in part, "Each primary containment isolation valve, except the reactor building-to-suppression chamber vacuum breakers, shall be operable." Contrary to the above, on May 5, 2016, from 5:20 a.m. until 1:08 p.m., the licensee failed to maintain the TIP B ball valve, a primary containment isolation valve, operable. Specifically, the licensee failed to maintain the TIP B ball valve operable or isolate its flow path within 4 hours of indications that the mechanical in-shield limit switch had failed, preventing the valve from performing its containment isolation function. The licensee took immediate corrective actions when the valve inoperability was recognized to restore compliance with TS 3.6.1.3 by isolating the affected penetration flow path. Because this violation was of very low safety significance (Green) and was entered into the licensee's corrective action program as Condition Report CR-CNS-2016-03665, this violation is being treated as a non-cited violation (NCV) in accordance with Section 2.3.2.a of the Enforcement Policy. (NCV 05000298/2016002-01, "Failure to Meet Technical Specification Requirements for Traversing In-Core Probe B Ball Valve")

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed three risk assessments performed by the licensee prior to changes in plant configuration and the risk management actions taken by the licensee in response to elevated risk:

- April 8, 2016, Emergency diesel generator 1 maintenance window
- April 12, 2016, Residual heat removal service water booster pump A unavailable during maintenance
- April 19, 2016, High pressure coolant injection maintenance window

The inspectors verified that these risk assessments were performed timely and in accordance with the requirements of 10 CFR 50.65 (the Maintenance Rule) and plant procedures. The inspectors reviewed the accuracy and completeness of the licensee's risk assessments and verified that the licensee implemented appropriate risk management actions based on the result of the assessments.

The inspectors also observed portions of two emergent work activities that had the potential to affect the functional capability of mitigating systems:

- April 23, 2016, Unplanned limiting condition for operation entry for service water pump B low gland water flow

- April 27, 2016, Unplanned high pressure coolant injection limiting condition for operation for loss of control power to the auxiliary lube oil pump

The inspectors verified that the licensee appropriately developed and followed a work plan for these activities. The inspectors verified that the licensee took precautions to minimize the impact of the work activities on unaffected structures, systems, and components.

These activities constituted completion of five maintenance risk assessments and emergent work control inspection samples, as defined in Inspection Procedure 71111.13.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed six operability determinations that the licensee performed for degraded or nonconforming structures, systems, or components (SSCs):

- April 5, 2016, Operability determination of 10-inch high pressure coolant injection high energy line break scenario in the reactor building southwest quad

- April 9, 2016, Operability determination of missed post-maintenance test following emergency diesel generator 1 fan coil unit maintenance

- April 12, 2016, Operability determination of emergency diesel generator 1 diesel stack and fill connection corrosion

- April 20, 2016, Operability determination of SGT-DPIC-546 standby gas treatment system flow controller failure

- April 22, 2016, Operability determination of high pressure coolant injection outboard steam isolation valve HPCI-MOV-16 when opening starter rack panel door EE-STR-125HPCI MO16 at power

- May 12, 2016, Operability determination of emergency diesel generator 1 fan coil unit degraded performance trend

The inspectors reviewed the timeliness and technical adequacy of the licensee's evaluations. Where the licensee determined the degraded SSC to be operable, the inspectors verified that the licensee's compensatory measures were appropriate to provide reasonable assurance of operability. The inspectors verified that the licensee had considered the effect of other degraded conditions on the operability of the degraded SSC.

These activities constituted completion of six operability and functionality review samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

On June 7, 2016, the inspectors reviewed a temporary modification to Surveillance Procedure 6.HV.105, "Control Room Envelope Pressurization and CREFS Flow Test," a procedural change to allow only one pressure equalization damper to be open during testing, which affected risk-significant structures, systems, and components (SSCs).

The inspectors verified that the licensee had installed this temporary modification in accordance with technically adequate design documents. The inspectors verified that this modification did not adversely impact the operability or availability of affected SSCs. The inspectors reviewed design documentation and plant procedures affected by the modification to verify the licensee maintained configuration control.

These activities constituted completion of one sample of temporary modifications, as defined in Inspection Procedure 71111.18.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed seven post-maintenance testing activities that affected risk-significant structures, systems, or components (SSCs):

- April 20, 2016, Replacement of diesel generator lube oil DGLO-CV-10CV gaskets
- April 21, 2016, Alternate shutdown panel high pressure coolant injection controller repair
- April 22, 2016, Increase in emergency diesel generator 1 heating, ventilation, and air conditioning HV-DG-1C airflow
- April 22, 2016, FLEX penetration core boring in the cable spreading room
- April 26, 2016, High pressure coolant injection EE-STR-250 Vdc ALOP 27 relay replacement
- May 24, 2016, Service water pump B maintenance
- May 26, 2016, Residual heat removal flange X39B work

The inspectors reviewed licensing- and design-basis documents for the SSCs and the maintenance and post-maintenance test procedures. The inspectors observed the performance of the post-maintenance tests to verify that the licensee performed the tests in accordance with approved procedures, satisfied the established acceptance criteria, and restored the operability of the affected SSCs.

These activities constituted completion of seven post-maintenance testing inspection samples, as defined in Inspection Procedure 71111.19.

b. Findings

Introduction. The inspectors identified two examples of a Green, non-cited violation (NCV) of Technical Specification (TS) 5.4.1.a, associated with the licensee's failure to perform required post-maintenance testing (PMT) for safety-related ventilation systems in accordance with documented instructions, prior to system restoration. Specifically, the licensee failed to follow work order (WO) instructions contained in WOs 5062878 and 5065112 for (1) performing surveillance testing to measure the airflow of emergency diesel generator (EDG) supply fan coil unit HV-DG-1C following maintenance, and (2) performing leak testing of a newly created control room envelope (CRE) ventilation boundary penetration.

Description. The inspectors identified two examples of the licensee's failure to perform required PMT activities in accordance with documented maintenance WO instructions. As a result of breakdowns in the work coordination process and in the execution of the WO instructions, the inspectors determined that the licensee violated the documented instructions contained in WOs 5062878 and 5065112, associated with safety-related ventilation testing. TS 5.4.1.a requires implementation of Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2, Appendix A, Section 9.a.; which describes the requirements for procedures for performing maintenance, and states, in part, "Maintenance that can affect the performance of safety-related equipment should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances."

For these examples, the inspectors determined that multiple work management process barriers failed, which resulted in the restoration of TS equipment without completion of all required PMTs. In both cases, the same engineering personnel failed to follow WO instructions containing required PMT steps. Also, in each case, operations personnel failed to provide the necessary post-work reviews prior to system restoration to ensure that no new deficiencies had been created, the equipment would perform its required function, and the PMT demonstrated operability, consistent with Administrative Procedure 0-CNS-WM-102, "Work Implementation and Closeout," Revision 4. Finally, in both cases, the PMT steps were not clearly broken out into separate functions in the WOs to ensure that they were signed off and executed as required. Consistent with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," dated May 6, 2016, because these issues represented multiple examples of the same performance deficiency that shared the same cause and corrective actions, the inspectors determined that they should be documented as a single finding.

Example 1: On April 21, 2016, the inspectors reviewed WO 5062878 for EDG supply fan coil unit HV-DG-1C maintenance to verify all required PMTs were identified and

completed satisfactorily. This review was completed after the licensee had completed its review and declared supply fan coil unit HV-DG-1C and EDG 1 operable on April 7, 2016. The inspectors identified Surveillance Procedure 6.1HV.602, "Air Flow Test of Fan Coil Unit HV-DG-1C (DIV 1)," Revision 8, was not performed as a required PMT in accordance with WO 5062878, Operation 130, Step 2. The inspectors informed the licensee of this deficiency. As an immediate action, the licensee assessed operability of EDG 1 to provide reasonable expectation of operability. The licensee's operability assessment estimated supply fan coil unit HV-DG-1C airflow as 31,793 cfm. On May 5, 2016, in order to correct the deficiency, the licensee performed Surveillance Procedure 6.1HV.602, and the measured airflow was 29,276 cfm. This measured airflow was above the supply fan coil unit HV-DG-1C operability limit, but lower than the previously measured airflow of 30,365 cfm. The estimated airflow had been determined by using the fan laws, which used only differential pressure (DP) of the fan to estimate the airflow, and did not account for all parameters affecting fan airflow, such as changes in duct work resistance or filter DP. The licensee attributed the unexpectedly degraded flow to dirt breaking loose during the cleaning process conducted in WO 5062878. The inspectors determined that engineering personnel executing the PMT had failed to recognize that performance of the surveillance procedure was required by the WO. In addition, the inspectors noted that operations personnel had failed to review the PMT to ensure that appropriate test activities were completed prior to returning the equipment to service. Specifically, no documentation of the surveillance existed because it was not performed, which should have been identified during review by the operations department, consistent with Administrative Procedure 0-CNS-WM-102.

Example 2: On April 18, 2016, the inspectors observed work activities associated with installation of a new conduit penetration that required a breach of the CRE ventilation boundary under WO 5065112. The work required the control room emergency filtration system (CREFS) boundary to be declared inoperable until the penetration was properly sealed. While workers prepared grout prior to sealing the penetration, the inspectors observed the engineer responsible for performing leak testing of the sealed penetration, as he placed a sheet of paper over the unsealed penetration and commented that he felt a suction being drawn on the piece of paper. Following restoration of the penetration to operable status, the inspectors discovered that a PMT had not been documented, despite the fact that Administrative Procedure 0-Barrier, "Barrier Control Process," Revision 21, contained detailed instructions for the PMT. Work order 5065112 stated, "Perform CRE boundary leak testing and restoration per 0-Barrier, Attachment 11, when core bore is complete and sealed." Administrative Procedure 0-Barrier, Attachment 11, stated, "Verify a DP of ≥ 0.15" wg for leak test exists per Steps 2.5.1.1 through 2.5.1.5." The steps that followed included directions for how to take measurements using measuring and test equipment (M&TE), and included lines on which to record these measurements. Interviews with the engineering individual and his supervision revealed that the individual had credited placing the piece of paper over the unsealed hole, and marked the DP measurement steps as "not applicable." In addition, the inspectors noted that operations personnel had failed to review the PMT to ensure that appropriate test activities were completed prior to returning the equipment to service. The failure of this barrier was evident in that engineering personnel had failed to mark the PMT activity as complete in the work management system and failed to include any documentation of the test steps that were completed. These issues should have been reviewed and identified as inadequate during review by the operations department. Ultimately, when the test was later correctly performed, operations personnel were required to start CREFS in order to establish a DP of ≥ 0.15" wg.

The inspectors determined that in both cases, the licensee failed to control, coordinate, and execute work activities to verify all required PMT activities were completed satisfactorily prior to declaring the affected ventilation systems operable.

Analysis. The licensee's failure to perform required post-maintenance testing for safety-related ventilation systems in accordance with documented instructions was a performance deficiency. Specifically, the licensee failed to follow work order instructions contained in WOs 5062878 and 5065112 for (1) performing surveillance testing to measure the airflow of emergency diesel generator supply fan coil unit HV-DG-1C following maintenance, and (2) performing leak testing of a newly created control room ventilation boundary penetration. This performance deficiency was associated with multiple cornerstones. The first example of the performance deficiency was more than minor, and therefore a finding, because it was associated with the human performance 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. Specifically, the failure to measure supply fan coil unit HV-DG-1C airflow resulted in delayed identification that the maintenance had resulted in degraded flow through the ventilation unit. The second example of the performance deficiency was more than minor, and therefore a finding, because it was associated with the human performance attribute of the Barrier Integrity Cornerstone and affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases and that the radiological barrier functionality of the control room was maintained. Specifically, the licensee's failure to follow PMT instructions resulted in a challenge to the operability of the newly created control room boundary penetration seal. 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 was of very low safety significance (Green) because it did not represent a design or qualification deficiency; did not represent a loss of safety function; did not represent a loss of a single train for greater than its technical specification allowed outage time; did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating events; did not represent an actual open containment pathway; and did not involve a reduction in function of hydrogen igniters. The finding had a cross-cutting aspect in the area of human performance associated with work management, because the licensee failed to implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority, including the need for coordination with different work groups or job activities. Specifically, the licensee failed to control, execute, and coordinate safety-related ventilation work activities to ensure all required post-maintenance testing was completed satisfactorily prior to declaring the associated equipment operable. [H.5]

Enforcement. Technical Specification 5.4.1.a, requires, in part, that procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2. Section 9.a of Appendix A to Regulatory Guide 1.33, Revision 2, requires, "Procedures for Performing Maintenance." The licensee established WOs 5062878 and 5065112 for performing maintenance on EDG ventilation and the control room ventilation boundary to meet the Regulatory Guide 1.33 requirement. For example (1), Step 2 of WO 5062878 operation 0130, states, in part, "Measure flow rate per [surveillance] procedure 6.1HV.602." For example (2), WO 5065112 states, in part, "Perform CRE

boundary leak testing and restoration per 0-Barrier Attachment 11 when core bore is complete and sealed."

Contrary to the above, the licensee did not implement required procedures for performing maintenance on safety-related ventilation systems, when:

- (Example 1) On April 7, the licensee failed to implement WO 5062878 when they did not measure flow rate per Surveillance Procedure 6.1HV.602 for Division 1 EDG ventilation following maintenance; and

- (Example 2) On April 18, the licensee failed to implement WO 5065112 when they did not perform CRE boundary leak testing and restoration per 0-Barrier, Attachment 11, when core bore activities were complete and sealed following maintenance.

Corrective actions to restore compliance included performing the required surveillance test for the EDG ventilation unit, retesting the control room penetration in accordance with the procedure, and initiating site-wide communications discussing the errors and reemphasizing procedural adherence. Because this violation was of very low safety significance (Green) and was entered into the licensee's corrective action program as Condition Reports CR-CNS-2016-02207 and CR-CNS-2016-02232, this violation is being treated as a non-cited violation (NCV) in accordance with Section 2.3.2.a of the NRC Enforcement Policy. (NCV 05000298/2016002-02, "Failure to Follow Work Instructions for Post-Maintenance Testing of Safety-Related Ventilation Systems")

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed five risk-significant surveillance tests and reviewed test results to verify that these tests adequately demonstrated that the structures, systems, and components (SSCs) were capable of performing their safety functions:

In-service tests:

- May 17, 2016, Emergency diesel generator starting air system check valve surveillance testing

Other surveillance tests:

- April 14, 2016, Reactor core isolation cooling system steam line high flow channel functional test

- May 31, 2016, Emergency diesel generator supply fan coil unit HV-DG-1C air flow test, Division 1

- May 31, 2016, 4160V Bus 1F undervoltage relay testing

- June 7, 2016, Emergency diesel generator fuel oil testing surveillances

The inspectors verified that these tests met technical specification requirements, that the licensee performed the tests in accordance with their procedures, and that the results of the test satisfied appropriate acceptance criteria. The inspectors verified that the licensee restored the operability of the affected SSCs following testing.

These activities constituted completion of five surveillance testing inspection samples, as defined in Inspection Procedure 71111.22.

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP1 Exercise Evaluation (71114.01)

a. Inspection Scope

The inspectors observed the June 14, 2016, biennial emergency preparedness exercise to verify the exercise acceptably tested the major elements of the emergency plan, and provided opportunities for the emergency response organization to demonstrate key skills and functions. The scenario demonstrated the licensee's capability to implement its emergency plan through the simulation of:

- A discharge of toxic gas inside a vital area;
- Loss of an offsite power line to the site because of a nearby tornado;
- The unexpected closure of a main steam isolation valve because of an internal failure; and
- An unisolable steam break outside of the drywell, creating a filtered and monitored radiological release to the environment through the Standby Gas Treatment System (reactor building ventilation) and the Elevated Release Point.

During the exercise the inspectors observed activities in the control room simulator and the following dedicated emergency response facilities:

- Technical Support Center
- Operations Support Center
- Emergency Operations Facility
- Joint Information Center

The inspectors focused their evaluation of the licensee's performance on the risk-significant activities of event classification, offsite notification, recognition of offsite dose consequences, and development of protective action recommendations.

The inspectors also assessed recognition of, and response to, abnormal and emergency plant conditions, the transfer of decision-making authority and emergency function responsibilities between facilities, onsite and offsite communications, protection of emergency workers, emergency repair evaluation and capability, and the overall

implementation of the emergency plan to protect public health and safety, and the environment. The inspectors reviewed the current revision of the facility emergency plan, emergency plan implementing procedures associated with operation of the licensee's emergency response facilities, procedures for the performance of associated emergency functions, and other documents as listed in the attachment to this report.

The inspectors attended the post-exercise critiques in each emergency response facility to evaluate the initial licensee self-assessment of exercise performance. The inspectors also attended a subsequent formal presentation of critique items to plant management.

The inspectors discussed with the licensee their discovery of a participant with limited foreknowledge of the exercise scenario and their determination that the participant did not compromise the integrity of the exercise.

The inspectors reviewed the scenarios of previous biennial exercises and licensee drills conducted between September 2014 and May 2016, to determine whether the June 14, 2016, exercise was independent and avoided participant preconditioning, in accordance with the requirements of 10 CFR Part 50, Appendix E, IV.F(2)(g). The inspectors also compared observed exercise performance with corrective action program entries and after-action reports for drills and exercises conducted between September 2014 and May 2016 to determine whether identified weaknesses had been corrected in accordance with the requirements of 10 CFR 50.47(b)(14), and 10 CFR Part 50, Appendix E, IV.F.

These activities constituted one exercise evaluation sample, as defined in Inspection Procedure 71114.01.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The inspectors performed in-office reviews of Emergency Plan Implementing Procedure 5.7.1, "Emergency Classification," Revision 53, effective February 3, 2016, and Emergency Plan, Revision 68, effective March 28, 2016. These revisions:

- Added notes to all emergency action levels with associated time limits to clarify the application of those time limits;
- Implemented a new Emergency Plan Implementing Procedure 5.7.17.1, "Dose Assessment (Manual)," Revision 0;
- Transferred an emergency preparedness staff position to the site training department; and,
- Updated the licensee's Memorandum of Agreement with the State of Nebraska.

These revisions were compared to their previous revisions, to the criteria of NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, to Nuclear Energy Institute Report 99-01, "Emergency Action Level Methodology," Revision 5, and to the standards in 10 CFR 50.47(b) to determine if the revisions adequately implemented the requirements of 10 CFR 50.54(q)(3) and 50.54(q)(4). The inspectors verified that the revisions did not decrease the effectiveness of the emergency plan. This review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, these revisions are subject to future inspection.

These activities constituted completion of two emergency action level and emergency plan change samples, as defined in Inspection Procedure 71114.04.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

Training Evolution Observation

a. Inspection Scope

On June 1, 2016, the inspectors observed simulator-based licensed operator requalification training that included implementation of the licensee's emergency plan. The inspectors verified that the licensee's emergency classifications, offsite notifications, and protective action recommendations were appropriate and timely. The inspectors verified that any emergency preparedness weaknesses were appropriately identified by the evaluators and entered into the corrective action program for resolution.

These activities constituted completion of one training observation sample, as defined in Inspection Procedure 71114.06.

b. Findings

No findings were identified.

1EP8 Exercise Evaluation – Scenario Review (71114.08)

a. Inspection Scope

The licensee submitted the preliminary exercise scenario for the June 14, 2016, biennial exercise to the NRC on April 14, 2016, in accordance with the requirements of 10 CFR Part 50, Appendix E, IV.F(2)(b). The inspectors performed an in-office review of the proposed scenario to determine whether it would acceptably test the major elements of the licensee's emergency plan and provide opportunities for the emergency response organization to demonstrate key skills and functions. The inspectors discussed the preliminary scenario with staff at the Federal Emergency Management Agency (FEMA), Region VII, to determine whether the preliminary scenario supported the FEMA exercise evaluation objectives.

These activities constituted completion of one scenario evaluation sample, as defined in Inspection Procedure 71114.08.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures (MS05)

a. Inspection Scope

For the period of April 1, 2015 through March 31, 2016, the inspectors reviewed licensee event reports (LERs), maintenance rule evaluations, and other records that could indicate whether safety system functional failures had occurred. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, and NUREG-1022, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73," Revision 3, to determine the accuracy of the data reported.

These activities constituted verification of the safety system functional failures performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Reactor Coolant System Specific Activity (BI01)

a. Inspection Scope

The inspectors reviewed the licensee's reactor coolant system chemistry sample analyses for the period of April 1, 2015 through March 31, 2016, to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the reactor coolant system specific activity performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Reactor Coolant System Total Leakage (BI02)

a. Inspection Scope

The inspectors reviewed the licensee's records of reactor coolant system total leakage for the period of April 1, 2015 through March 31, 2016, to verify the accuracy and completeness of the reported data. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the reactor coolant system leakage performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.4 Drill/Exercise Performance (EP01)

a. Inspection Scope

The inspectors reviewed the licensee's evaluated exercises, emergency plan implementations, and selected drill and training evolutions, that occurred between October 2015 and March 2016, to verify the accuracy of the licensee's data for classification, notification, and protective action recommendation (PAR) opportunities. The inspectors reviewed a sample of the licensee's completed classifications, notifications, and PARs to verify their timeliness and accuracy. The inspectors used Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data. The specific documents reviewed are described in the attachment to this report.

These activities constituted verification of the drill/exercise performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.5 Emergency Response Organization Drill Participation (EP02)

a. Inspection Scope

The inspectors reviewed the licensee's records for participation in drill and training evolutions, between October 2015 and March 2016, to verify the accuracy of the licensee's data for drill participation opportunities. The inspectors verified that all members of the licensee's emergency response organization (ERO) in the identified key positions had been counted in the reported performance indicator data. The inspectors reviewed the licensee's basis for reporting the percentage of ERO members who participated in a drill. The inspectors reviewed drill attendance records and verified a sample of those reported as participating. The inspectors used Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7,

to determine the accuracy of the reported data. The specific documents reviewed are described in the attachment to this report.

These activities constituted verification of the emergency response organization drill participation performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.6 Alert and Notification System Reliability (EP03)

a. Inspection Scope

The inspectors reviewed the licensee's records of alert and notification system tests, conducted between October 2015 and March 2016, to verify the accuracy of the licensee's data for siren system testing opportunities. The inspectors reviewed procedural guidance on assessing alert and notification system opportunities and the results of periodic alert and notification system operability tests. The inspectors used Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data. The specific documents reviewed are described in the attachment to this report.

These activities constituted verification of the alert and notification system reliability performance indicator, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

.1 Routine Review

a. Inspection Scope

Throughout the inspection period, the inspectors performed daily reviews of items entered into the licensee's corrective action program and periodically attended the licensee's condition report screening meetings. The inspectors verified that licensee personnel were identifying problems at an appropriate threshold and entering these problems into the corrective action program for resolution. The inspectors verified that the licensee developed and implemented corrective actions commensurate with the significance of the problems identified. The inspectors also reviewed the licensee's problem identification and resolution activities during the performance of the other inspection activities documented in this report.

b. Findings

No findings were identified.

.2 Semiannual Trend Review

a. Inspection Scope

The inspectors reviewed the licensee's corrective action program, performance indicators, system health reports, and other documentation to identify trends that might indicate the existence of a more significant safety issue. The inspectors verified that the licensee was taking corrective actions to address identified adverse trends. The inspectors did not review any cross-cutting themes because none exist at the site.

The inspectors identified the following trend that might indicate the existence of a more significant safety issue, and reviewed the licensee's response to it. The inspectors identified multiple examples associated with the organization's implementation of their process for planning, controlling, and executing work activities such that nuclear safety is the overriding priority; which includes the identification and management of risk commensurate with the work and the need for coordination with different work groups or job activities [H.5 Work Management]. These examples included:

- CR-CNS-2015-06546. NCV 05000298/2015003-03, "Failure to Control Licensed Material." This finding was assigned an H.5 Work Management cross-cutting aspect. The licensee's corrective actions for this issue were to: (1) generate a work order for removing material from the protected area (PA) requiring radiation protection (RP) support, and (2) revise radiation worker procedure to require licensee personnel to contact RP prior to removing material from the PA.

- CR-CNS-2016-02402. NCV 05000298/2016001-02, "Failure to Assess Operability of Technical Specification System Functions during Surveillance Testing." This finding was also assigned an H.5 Work Management cross-cutting aspect. The licensee's corrective action was to revise the surveillance procedures to notify the shift manager when opening environmentally qualified (EQ) terminal boxes.

- CR-CNS-2016-02207. NCV 05000298/2016002-02, "Failure to Follow Work Instructions for Post-Maintenance Testing of Safety-Related Ventilation Systems." This finding, documented in Section 1R19 of this Inspection Report, was also assigned an H.5 Work Management cross-cutting aspect. The licensee's corrective actions for the two examples documented in the finding were focused on individual accountability; however, an additional causal evaluation was initiated as a result of this finding.

- CR-CNS-2016-00401. The inspectors identified a failure to implement fire risk management actions (RMAs) for residual heat removal (RHR) maintenance. The licensee implemented the fire RMAs and closed the condition based on actions taken.

- CR-CNS-2016-00013. The licensee identified a failure to implement fire RMAs for a FLEX service water RHR connection modification. The licensee's corrective action was to provide training to the Work Control Department on the use of risk codes in the maintenance process application.

- CR-CNS-2016-00846. The licensee identified a failure to implement fire RMAs for disassembly and inspection of service water valve SW-V-107. The licensee's corrective action was to revise its fire risk management procedure for this issue.

- CR-CNS-2016-02113. The inspectors identified a failure to evaluate the opening of the EQ high pressure coolant injection (HPCI) 125 Vdc starter cabinet. Specifically, the licensee did not evaluate the impact on the containment isolation function of HPCI steam admission valve HPCI-MOV-16. Following NRC identification, the licensee assessed operability of HPCI-MOV-16 for this condition and determined that the internal components of the HPCI 125 Vdc were EQ with the cabinet open. This action was completed prior to opening the HPCI 125 Vdc starter cabinet.

- CR-CNS-2015-03709. The licensee identified a failure to authorize non-essential lubricant prior to use for service water pump B maintenance under work order (WO) 4895872. The licensee's corrective action was to conduct training with the planners on the requirements of the work planning standard procedure for the use of non-essential material in essential systems.

- CR-CNS-2016-01429. The licensee identified a failure to authorize non-essential lubricant prior to use for emergency diesel generator 1 and 2 maintenance under WOs 5000070 and 5031309. The licensee's corrective action was to revise the work planning standard procedure to ensure planners had the appropriate evaluation completed prior to allowing the use of non-essential material in essential systems.

- CR-CNS-2016-02838. The licensee identified that an inappropriate post-maintenance test had been assigned and performed for work associated with hydro-lazing a Division 2 drywell spray line under WO 4958742. The work should have been assigned a containment local leak rate test. This issue was corrected via performance of the correct test upon discovery.

- CR-CNS-2016-02830. The licensee initiated this condition report for six examples of error likely situations while controlling work activities to ensure appropriate controls were in place. This condition report was closed to trend. Examples included the following condition reports:

    1. CR-CNS-2016-02431. WO 5061279 scheduled work activities in work week 1618 were delayed due to conflicts in limiting condition of operation (LCO) activities.

    2. CR-CNS-2016-02400. WO 4945820 Operations 0030, 0035, 0040, and 0050 could not be completed as scheduled on April 28, 2016, due to posted protected equipment.

    3. CR-CNS-2016-02500. WO 5060787 required a stand-alone clearance order due to a technical specification conflict. This conflict was not identified during the work management process for the Division 1 RHR system maintenance window.

    4. CR-CNS-2016-02041. During performance of Station Procedure 6.RCIC.302 an EQ terminal box was identified. However, this terminal box was not listed

as an EQ terminal box in station procedures. Following identification, the required actions for opening the terminal box were taken.

5. CR-CNS-2016-02813. WO 5060772 calibrated a service water instrument and required entry to an EQ terminal box in the reactor building. Opening this terminal box impacted technical specification required equipment. This was identified by the licensee prior to authorizing the work activity and not during the planning process.

6. CR-CNS-2016-02402. (Previously discussed) NCV 05000298/2016001-02 was an example of the complicated work coordination that needed to take place for EQ terminal box testing.

These activities constituted completion of one semiannual trend review sample, as defined in Inspection Procedure 71152.

b. Observations and Assessments

The inspectors reviewed the trend identified above and produced the following observations and assessments:

- The inspectors reviewed the above examples and concluded that four categories of the work management process were impacted. These categories included: (1) planning of WOs; (2) coordination of WO activities and organizational resources; (3) execution of WO activities; and (4) verification that WO post-maintenance testing was completed satisfactorily prior to declaring safety-related equipment operable. The licensee's corrective actions and evaluations for the above examples focused on the specific area of the work management process that was impacted in each case. However, the licensee did not initially recognize the existence of a trend in this area and consequently did not consider all aspects of the work management process. In response to the inspectors' observations, the licensee established an interdisciplinary team of individuals to review the trend in work management. The licensee entered this trend into their corrective action program for resolution as Condition Report CR-CNS-2016-03783.

c. Findings

No findings were identified.

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)

.1 (Closed) Licensee Event Report (LER) 05000298/2016001-00, "De-Energized High Pressure Coolant Injection Auxiliary Lube Oil Pump Caused by Relay Failure Results in Loss of Safety Function and Condition Prohibited by Technical Specifications"

a. Inspection Scope

On April 26, 2016, a licensed operator performing a control room panel walkdown noted that the green light for the high pressure coolant injection (HPCI) auxiliary lube oil pump (ALOP) was not illuminated. A non-licensed operator went to the local 250 Vdc starter rack to investigate and found that both the green and red power indicating lights on the

starter rack were extinguished. Operations personnel attempted to start the ALOP, and it failed to start. Due to the inoperability of the ALOP, the licensee declared HPCI inoperable and entered Technical Specification Limiting Condition for Operation (LCO) 3.5.1, Condition C. Condition C required verification by administrative means that the reactor core isolation cooling (RCIC) system was operable within 1 hour; and restoration of the HPCI system to operable status within 14 days. Operations personnel immediately verified RCIC was operable by administrative means to meet this action.

The licensee initiated a root cause evaluation and created a complex troubleshooting team to determine the cause of the condition. Investigation revealed that an electrical relay for the ALOP that had been installed during a maintenance window 6 days earlier had failed due to infant mortality. Specifically, the relay coil internal to the relay had failed after approximately 133 hours of service. The failure was attributed to the overheating of the coil windings, caused by a manufacturing defect. The licensee's root cause evaluation found that the commercial grade dedication process used by the vendor of the relay did not have sufficient checks to identify the infant mortality failure of the relay. Corrective actions included replacement of the relay and improvements within the vendor's dedication process.

Because HPCI was a single train system, the licensee reported this failure under 10 CFR 50.72 and 50.73 as a condition that could have prevented the fulfillment of the safety function of a structure, system, or component (SSC) needed to mitigate the consequences of an accident. In addition, the event was reported under 50.73 as a condition prohibited by technical specifications because, due to the HPCI inoperability, verification of the RCIC system inoperability exceeded LCO action requirements prior to the licensee's discovery of the defective component.

These activities constituted completion of one event follow-up sample, as defined in Inspection Procedure 71153. This LER is closed.

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report (LER) 05000298/2016002-00, "De-Energized High Pressure Coolant Injection Auxiliary Lube Oil Pump Caused by Light Bulb Failure Results in Loss of Safety Function"

a. Inspection Scope

On April 26, 2016, operations personnel in the control room noted that the green light for the high pressure coolant injection (HPCI) auxiliary lube oil pump (ALOP) was not illuminated. The HPCI system had been restored to operable status only a few hours earlier following replacement of a failed relay. A non-licensed operator went to the local 250 Vdc starter rack to investigate, and found that both the green and red power indicating lights on the starter rack were extinguished. However, in this case, the green bulb was found to be shattered and charred. Operations personnel attempted to start the ALOP, and it failed to start. Due to the inoperability of the ALOP, the licensee declared HPCI inoperable and entered Technical Specification LCO 3.5.1, Condition C.

The licensee initiated a root cause evaluation and created a complex troubleshooting team to determine the cause of the event. Investigation revealed that the light bulb installed in the green lamp socket had failed and introduced a short into the HPCI ALOP 125 Vdc control power circuit. As a result, a blown fuse caused the loss of power to the ALOP control power circuit. The failed bulb had been replaced a few hours earlier, during HPCI restoration from maintenance. The licensee's root cause evaluation found that a lack of engineering knowledge with regard to the bulb shorting failure mechanism led to a 1984 design change that reduced the robustness of the circuit. Corrective actions included replacement of the bulb and socket, and implementation of training for engineering personnel with respect to this failure mechanism.

Because HPCI was a single train system, the licensee reported this failure under 10 CFR 50.72 and 50.73 as a condition that could have prevented the fulfillment of the safety function of an SSC needed to mitigate the consequences of an accident.

These activities constituted completion of one event follow-up sample, as defined in Inspection Procedure 71153. This LER is closed.

b. Findings

Introduction. The inspectors reviewed a self-revealed, Green, non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to verify the adequacy of design of the HPCI auxiliary lube oil pump (ALOP) 125 Vdc starter circuit. Specifically, in 1984, the licensee modified the design of the starter circuit and eliminated a resistor that served to protect the circuit from shorting due to indication light bulb failures.

Description. On April 26, 2016, at approximately 5:36 p.m., operations personnel in the control room observed that the green light indication on the control room panel for the HPCI ALOP was not illuminated. A non-licensed operator was dispatched to check the local 250 Vdc starter rack and found that the power indicating lights on the starter rack were also extinguished. The individual also observed that the local green light bulb was charred and shattered. Operations personnel attempted to start the HPCI ALOP, and the pump failed to start. After determining the HPCI ALOP had lost its control power, the licensee declared HPCI inoperable and unavailable.

The licensee initiated a root cause evaluation and determined that the green light indicating bulb had shorted in its socket, which resulted in a blown fuse in the 125 Vdc HPCI ALOP circuit. As a direct result, the circuit was deenergized, rendering the loss of power to the HPCI ALOP. The light bulb had been replaced approximately 4.5 hours earlier that day following replacement of a failed relay.

The licensee's root cause evaluation discovered that the original design of the HPCI ALOP starter rack circuit had included a local indication light dropping resistor. The dropping resistor served to help prevent the loss of ALOP control power due to bulb-related shorts, by limiting the current on the indication bulb side of the circuit. However, in 1984, the circuit was modified, and a direct voltage light and socket were substituted for the dropping resistor and light combination, thereby removing the dropping resistor protection from the circuit. The licensee determined that a lack of engineering knowledge led to this design change which made the circuit vulnerable to a bulb-related short, and ultimately rendered HPCI inoperable. A contributing cause was associated

with the licensee's use of nonessential bulbs in the essential HPCI circuit which further increased vulnerability to this failure mechanism. The inspectors determined that this issue was self-revealed because it was identified as a result of a condition that became apparent through a readily detectable degradation in material condition, capability, or functionality of equipment or plant operations; and constituted an obvious equipment failure.

Analysis. The licensee's failure to verify the adequacy of design of the HPCI ALOP starter circuit in accordance with 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because it was associated with the equipment performance 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. Specifically, at the time the modification was installed, the licensee had not taken sufficient actions to ensure that the electrical circuit was protected from light bulb shorting failures, resulting in HPCI being rendered inoperable. Using Manual Chapter 0609, Attachment 0609.04, "Initial Characterization of Findings," the inspectors were directed to Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power," dated June 19, 2012. Using Appendix A, the inspectors assumed that the finding represented a loss of system and function of high pressure coolant injection and determined the finding required a detailed risk evaluation. A senior reactor analyst performed a detailed risk evaluation assuming high pressure coolant injection would have failed to start. The exposure time was estimated by applying a "t/2" exposure period methodology to the approximately 4 hours since the circuit was last known to be working and obtained 2 hours of exposure time. The analyst then added in the 19 hour repair time to yield a 21 hour total exposure period. These assumptions yielded an increase in core damage frequency of 5.2E-8/year and the finding was therefore of very low safety significance (Green). The estimate was attained using the Cooper Nuclear Station SPAR Model, Revision 8.22, run on SAPHIRE, Version 8.1.4. Transients, losses of service water, and losses of condenser heat sink were the dominant core damage sequences. The reactor core isolation cooling system and the ability to depressurize with safety relief valves were the major remaining equipment which mitigated the increase in core damage frequency. A cross-cutting aspect was not assigned to this finding because the performance deficiency occurred in 1984, and therefore, is not indicative of current licensee performance.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that for those systems, structures, and components to which this appendix applies, "Design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program." Contrary to the above, since 1984, for quality-related components associated with the HPCI ALOP starter circuit, to which 10 CFR Part 50, Appendix B, applies, the licensee failed to ensure that design control measures provided for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, in 1984, the licensee modified the design of the starter circuit and eliminated a resistor that served to protect the circuit from shorting due to indication light bulb failures. Immediate corrective actions included replacing the light socket and blown fuse, and changing out the nonessential light bulb with an essential bulb. Because this

violation was of very low safety significance (Green) and was entered into the licensee's corrective action program as Condition Report CR-CNS-2016-02318, this violation is being treated as a non-cited violation (NCV) in accordance with Section 2.3.2.a of the NRC Enforcement Policy. (NCV 05000298/2016002-03, "Failure to Maintain Design Control for High Pressure Coolant Injection System Electrical Circuit")

4OA5 Other Activities

Follow Up Inspection for Three or More Severity Level IV Traditional Enforcement Violations in the Same Area in a 12-Month Period

a. Inspection Scope

The inspectors performed Inspection Procedure (IP) 92723, "Follow Up Inspection for Three or More Severity Level IV Traditional Enforcement Violations in the Same Area in a 12-Month Period," based on the results of the NRC's annual review of station performance as documented in the 2015 assessment letter dated March 2, 2016 (ML 16061A312). In 2015, the NRC issued the following three Severity Level (SL) IV traditional enforcement violations in the area of impeding the regulatory process:

- NCV 05000298/2015004-02, "Failure to Update the Updated Safety Analysis Report"
- NCV 05000298/2015007-03, "Failure to Update the Final Safety Analysis Report (FSAR)"
- NCV 05000298/2015003-04, "Failure to Make a 10 CFR 50.72(b)(2)(xi) Notification"

The inspectors reviewed the licensee's cause evaluation and corrective actions associated with these issues in order to determine whether the licensee's actions met the IP 92723 inspection objectives to provide assurance that: (1) the cause(s) of the violations are understood by the licensee, (2) the extent of condition and extent of cause of the violations are identified, and (3) licensee corrective actions to the violations are sufficient to address the cause(s).

b. Findings and Observations

No findings were identified.

The inspectors determined that the licensee's actions to identify the causes of the violations were adequate to meet objective (1) above, and that the licensee's corrective actions were adequate to meet objective (3). The inspectors developed the following observations with regard to the licensee's actions to meet objective (2) regarding identification of extent of condition and extent of cause.

The inspectors noted that the NCVs referenced above included five examples of failures to update the updated safety analysis report (USAR) in accordance with the requirements of 10 CFR 50.71(e). Three of these examples involved new or updated information that was included in license amendments, while two examples involved new information that was introduced in licensee procedure changes. The inspectors

determined that the licensee's extent of condition evaluation included a review of a sample of license amendments to determine whether additional examples of failures to make appropriate corresponding updates to the USAR existed. The inspectors observed that the evaluation did not include a sample of output of any other change processes by which new or updated information affecting the content of the USAR could be developed, such as licensee procedure changes.

The inspectors also observed that, for the identified cause of "failure to apply the proper rigor for regulatory requirements associated with USAR maintenance," the licensee's extent of cause evaluation did not assess the applicability of the cause for other programs or activities, such as whether proper rigor is being applied for maintaining licensee-controlled licensing basis documents other than the USAR.

Based on these observations, the inspectors concluded that objective (2) above was not met, in that the licensee did not fully identify the extent of condition and extent of cause of multiple SL IV traditional enforcement violations. The licensee entered these observations into the corrective action program as Condition Reports CR-CNS-2016-03780 and CR-CNS-2016-03708 for further evaluation.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On May 3, 2016, the inspectors conducted a telephonic discussion of the preliminary exercise scenario for the June 14, 2016, exercise, submitted April 14, 2016, with Mr. J. Stough, Manager, Emergency Preparedness, and other members of the licensee staff. The licensee acknowledged the issues presented.

On June 23, 2016, the inspectors conducted a telephonic exit meeting to present the results of the inspection of the licensee's biennial emergency plan exercise conducted June 14, 2016, to Mr. K. Higginbotham, General Manager, Plant Operations, and other members of the licensee staff. The licensee acknowledged the issues presented.

On June 23, 2016, the inspector obtained the final annual requalification training program cycle results and exited with Mr. E. Jackson, Exam Writer. The inspector did not review any proprietary information during this inspection.

On June 30, 2016, the inspectors presented the results of the IP 92723 inspection to Mr. O. Limpias, Vice President and Chief Nuclear Officer, and other members of the licensee staff. The licensee acknowledged the issues presented.

On July 13, 2016, the inspectors presented the inspection results to Mr. O. Limpias, Vice President and Chief Nuclear Officer, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Bacon, Manager, Training
K. Bantz, Manager, Work Control
T. Barker, Manager, Engineering Program and Components
K. Billesback, Manager, Material, Purchasing and Contracts
D. Buman, Director, Engineering
W. Chapin, Manager, Maintenance
T. Chard, Manager, Quality Assurance
L. Dewhirst, Manager, Corrective Action and Assessment
K. Dia, Manager, System Engineering
R. Estrada, Design Engineering Manager
J. Flaherty, Senior Licensing Engineer
J. Florence, Supervisor, Simulator
D. Goodman, Manager, Operations
B. Hasselbring, Assistant Manager, Operations, Shift
K. Higginbotham, General Manager, Plant Operations
E. Jackson, Exam Writer
J. Kahanca, Assistant Manager, Operations, Training
D. Kimball, Director, Nuclear Oversight
O. Limpias, Vice President, Chief Nuclear Officer
R. Penfield, Director, Nuclear Safety Assurance
J. Shaw, Manager, Licensing
J. Stough, Manager, Emergency Preparedness
C. Sunderman, Manager, Radiation Protection
M. Tackett, Manager, Outage
D. VanDerCamp, Senior Licensing Engineer
C. Walgren, Site Manager, Procurement

NRC Personnel

C. Gregg, Branch Chief, Technological Hazards Branch, FEMA Region VII
N. Valentine, Senior Site Specialist, FEMA Region VII
C. Christianson-Riley, Site Specialist, FEMA Region VII

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000298/2016002-01	NCV	Failure to Meet Technical Specification Requirements for Traversing In-Core Probe B Ball Valve (Section 1R12)
05000298/2016002-02	NCV	Failure to Follow Work Instructions for Post-Maintenance Testing of Safety-Related Ventilation Systems (Section 1R19)
05000298/2016002-03	NCV	Failure to Maintain Design Control for High Pressure Coolant Injection System Electrical Circuit (Section 4OA3)

Closed

05000298/2016001-00	LER	De-Energized High Pressure Coolant Injection Auxiliary Lube Oil Pump Caused by Relay Failure Results in Loss of Safety Function and Condition Prohibited by Technical Specifications (Section 4OA3)
05000298/2016002-00	LER	De-Energized High Pressure Coolant Injection Auxiliary Lube Oil Pump Caused by Light Bulb Failure Results in Loss of Safety Function (Section 4OA3)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Miscellaneous Documents

Number	Title	Revision
2191	Burns and Roe, Composite Piping Yard Plans, Sections, and Details	N07
2192	Burns and Roe, Composite Yard Piping Arrangement Plan	0
4833277	WP, Flood Barriers Acceptance Testing	0

Procedures

Number	Title	Revision
0-Barrier	Barrier Control Process	21
2.1.11.1	Turbine Building Data	151
2.2.27	Equipment, Floor, and Chemical Drain System	53
5.1 Flood	Flood	16
7.0.11	Flood Control Barriers	30

Condition Reports (CRs)

CR-CNS-2011-03050 CR-CNS-2016-02060

Work Orders

5028669

Section 1R04: Equipment Alignment

Drawings

Number	Title	Revision
KSV46-5	Cooper Nuclear Station Lube Oil Schematic	26
KSV-47-9NP	Jacket Water Schematic	8

Procedures

Number	Title	Revision
2.2.20	Standby AC Power System (Diesel Generator)	92
2.2.20.1	Diesel Generator Operations	66
2.2A.DG.DIV 1	Standby AC Power System (Diesel Generator) Component Checklist (DIV 1)	6
2.3_DG1	Panel DG-1 – Annunciator DG-1	21
6.1DG.101	Diesel Generator 31 Day Operability Test (IST)(DIV 1)	84

Section 1R05: Fire Protection

Miscellaneous Documents

Number	Title	Revision
11-088	NEDC, Fire Safety Analysis for Fire Area CB-D EPM Report R1906-008-CBD	3
5065112	FP16-FSEALS	

Procedures

Number	Title	Revision
CNS-FP-256	Intake Structure	5
0.23	CNS Fire Protection Plan	73
0.7.1	Control of Combustibles	39
0-Barrier	Barrier Control Process	21
0-Barrier-Control	Control Building	6
0-CNS-WM-104A	On-line Fire Risk Management Actions	2
6.FP.606	Fire Barrier/Penetration Seal Visual Examination	25

Condition Reports (CRs)

CR-CNS-2015-02946 CR-CNS-2016-02019

Work Orders

5065112

Section 1R06: Flood Protection Measures

Miscellaneous Documents

Number	Title	Revision
02-059	Engineering Evaluation, Maintaining Acceptable Water Level in SE Quad Following a DBA LOCA	0
09-102	NEDC, Internal Flooding – HELB, MELB, and Feedwater Line Break	1, 1C4, 1C5
13-30	Engineering Evaluation, Internal Flooding – HELB, MELB, and feewater Line Break	0, 1, 2, 3
93-128	NEDC, Flooding Interaction Between Torus Area and Quads	3
98-038	NEDC, Post LOCA Leakage in Rx Bldg Quad Sumps A-E	3
2004	Burns and Roe, Cooper Nuclear Station Flow Diagram Condensate and Feedwater Systems, Sheet 2	N50
2004	Burns and Roe, Cooper Nuclear Station Flow Diagram Condensate and Feedwater Systems, Sheet 3	58
2038	Burns and Roe, Cooper Nuclear Station Flow Diagram Reactor Building Floor and Roof Drain Systems, Sheet 1	N54

Procedures

Number	Title	Revision
0.19	Equipment Record and Functional Location File Program	31
2.3_S-1	Panel S – Annunciator S-1	24
3.12.3	Environmental Qualification Design Input File Control	12
3.12.7	Control of Master Equipment List (MEL)	9
3-EN-DC-167	Classification of Structures, Systems, and Components	4C1
15.Sump.101	Sump Pump Operability Test	24

Section 1R07: Heat Sink Performance

Miscellaneous Documents

Number	Title	Revision
91-239	NEDC, DGLO/DGJW/DG Intercooler Heat Exchanger Evaluation	5
KSV-47-8	Cooper Nuclear Station Diesel Generator 1 and 2 Cooling Water Schematic	N27

Procedures

Number	Title	Revision
3.3.34	Heat Exchanger Program Implementation	15
6.1DG.101	Diesel Generator 31 Day Operability Test (IST)(DIV 1)	84
6.2DG.101	Diesel Generator 31 Day Operability Test (IST)(DIV 2)	79
7.2.42	Heat Exchanger Cleaning	28
EN-DC-316	Heat Exchanger Performance and Condition Monitoring	5C0

Condition Reports (CRs)

CR-CNS-2014-06325	CR-CNS-2014-06464	CR-CNS-2014-08854	CR-CNS-2015-00181
CR-CNS-2015-04543	CR-CNS-2016-02498		

Work Orders

4848585	4911475	4911476	4950086	4953685
4953686				

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Miscellaneous Documents

Number	Title	Revision/Date
22A1047	General Electric Lighting Design Specification	0
29-023	RMP, Core Management Downpower – Control rod pattern adjustment	June 22, 2016
SKL052-52-48	Exam Scenario 48	6
SKL052-52-83	Exam Scenario 83	5

Procedures

Number	Title	Revision
2.1.10	Station Power Changes	112
10-EN-RE-215	Reactivity Maneuver Plan	4C2

Section 1R12: Maintenance Effectiveness

Miscellaneous Documents

Number	Title	Revision
	Inservice Testing Basis Document	9
00-110	NEDC, MOV Program Valve Margin Determination	10
15-045	Engineering Evaluation, Use as is DG Engine Drive Lube Oil Pump Fittings	0
95-003	Determination of Allowable Operating Parameters for CNS MOV Program MOVs	31
791E260	Traversing In-core Probe Calibration System	N05
920D473	Elementary Diagram Drive Mechanism	
PBD-MOV	Motor Operated Valve Program Basis Document	0

Procedures

Number	Title	Revision
0.31MOV	Motor Operated Valves	2
0-EN-HU-106	Procedure and Work Instruction Use and Adherence	3C0
3.33	Motor Operated Valve Program	24
3.9	ASME OM Code Testing of Pumps and Valves	29
4.1.4	Traversing In-Core Probe System	31
6.PC.203	TIP Ball Valve Exercising and Timing Test (IST)	7
6.TIP.601	TIP Ball and Shear Valve Assembly Maintenance	11
7.0.4	Conduct of Maintenance	38
7.3.50.5	Limitorque Electrical Maintenance	19
7.5.3	MOV Diagnostics	10
7.5.12	SMB-0 Through SMB-4 MOV Refurbishment	16
7.5.35	Installation of Teledyne Quick Sensors (QSS) and Easy Torque Thrust Sensors (ETT)	9
14.2.11	TIP System Operational Checkout and Testing	12

Condition Reports (CRs)

CR-CNS-2014-01365	CR-CNS-2014-01835	CR-CNS-2014-06885	CR-CNS-2014-08250
CR-CNS-2016-01213	CR-CNS-2016-01295	CR-CNS-2016-03024	CR-CNS-2016-03027
CR-CNS-2016-03308	CR-CNS-2016-03322		

Work Orders

4445753	4992468	5044377	5067809	5089525
5098565	5121068			

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Miscellaneous Documents

Number	Title	Revision/Date
	Protected Equipment List, Week 1614	April 5, 2016
	Protected Equipment List, Week 1614	April 20, 2016
3058	Burns and Roe, Cooper Nuclear Station DC One Line D Diagram	66
5075573	Engineering Change, Allen Bradley 700DC-P220Z2 Relay Material Change	0
791E271	Elementary Diagram HPCI System Cooper Nuclear Station, Sheet 10	N21
11234602	ECR, DG1 Fuel Oil Booster Pump Starter Contact Stuck Closed	0
10013610-01	PCS, SW Pump Cross Section,	E
CNS-EQ-122	Cooper Nuclear Station EQ Configuration Terminal Boxes and Equipment Enclosures, Sheet 2	5

Procedures

Number	Title	Revision
0-Barrier	Barrier Control Process	21
0-Barrier-Reactor	Reactor Building	11
0-CNS-WM-104	On-Line Schedule Risk Assessment	3
0-CNS-WM-104A	On-Line Fire Risk Management Actions	2

Procedures

Number	Title	Revision
0-PROTECT-EQP	Protected Equipment Program	34
6.1.DG.104	Diesel Operability Test with Isolation Switches in Isolate (DIV 1)	19
7.2.15	Service Water Pump Column Maintenance and Bowl Assembly Replacement	37
7.3.16	Low Voltage Relay Removal and Installation	22

Condition Reports (CRs)

CR-CNS-2016-01448	CR-CNS-2016-01552	CR-CNS-2016-01555	CR-CNS-2016-01557
CR-CNS-2016-01581	CR-CNS-2016-01582	CR-CNS-2016-01804	CR-CNS-2016-01831
CR-CNS-2016-02217	CR-CNS-2016-02237	CR-CNS-2016-02250	CR-CNS-2016-02281
CR-CNS-2016-02284			

Work Orders

5039271	5039824	5040329	5040339	5040586
5061212	5062878	5089525	5098565	5106836
5129903	5129839	5130230		

Section 1R15: Operability Determinations and Functionality Assessments

Miscellaneous Documents

Number	Title	Revision
	Inservice Testing Program Basis Document	9
00-095D	NEDC, HELB EQ – RB Pressure/Temperature Response	1
02-005	NEDC, HELB EQ – Mass and Energy Release	1
02-006	NEDC, HELB EQ – RB Gothic Model	1
03-012	NEDC, Thermal Lag Analysis for EQ Equipment	2
09-102	NEDC, Internal Flooding – HELB, MELB, and Feedwater Line Break	1
13-061	Engineering Evaluation	0
91-103	NEDC, Cooling of the DG Rooms w/o HVAC Cooling Coils	2
2016-0100	Barrier Control Permit,	

Miscellaneous Documents

Number	Title	Revision
2016-018	Engineering Report, Evaluation of Opening EE-STR-125HPCI MO16 Panel During Power Operations	0
2020	Burns and Roe, Flow Diagram Reactor Building Heating and Ventilation	N61
2037	Burns and Roe, Flow Diagram H&V Standby Gas Treatment & Off Gas Filters	68
3038	Standby Gas Treatment System Valves Solenoid Operated, Sheet 37	37
EDDP.1.144	Nutherm Starter Panel	12
KSV-96-3	Air Intake and Exhaust Piping Schematic	6

Procedures

Number	Title	Revision
0.5.OPS	Operations Review of Condition Reports/Operability Determination	55
0-CNS-WM-102	Work Implementation and Closeout	4
6.1HV.602	Air Flow Test of Fan Coil Unit HV-DG-1C (DIV 1)	7 and 8

Condition Reports (CRs)

CR-CNS-2015-00710	CR-CNS-2015-01504	CR-CNS-2016-01763	CR-CNS-2016-01837
CR-CNS-2016-01838	CR-CNS-2016-01872	CR-CNS-2016-02077	CR-CNS-2016-02113
CR-CNS-2016-02207	CR-CNS-2016-02585		

Work Orders

5039271	5062878	5070282

Section 1R18: Plant Modifications

Procedures

Number	Title	Revision
0.26	Surveillance Program	70
2.2.84	HVAC Main Control Room and Cable Spreading Room	53
6.HV.105	Control Room Envelope Pressurization and CREFS Flow Test	16 and 17

Condition Reports (CRs)

CR-CNS-2015-02046

Section 1R19: Post-Maintenance Testing

Miscellaneous Documents

Number	Title	Revision/Date
	CRE Floor Penetration Leak Test Timeline	May 25, 2016
15-013	Core Drill Permit-BLDG-FSEAL-C9APC500F	April 18, 2016
2016-0004	Barrier Control Permit – Control Room Envelope Breach	April 19, 2016
10013610-01	PCS, SW Pump Cross Section	E

Procedures

Number	Title	Revision
0-Barrier	Barrier Control Process	21
0-CNS-WM-102	Work Implementation and Closeout	4
0-EN-WM-107	Post-Maintenance Testing	4C1
3.6.1	Fire Barrier Control	21
3.9	ASME OM Code Testing of Pumps and Valves	29
6.HPCI.102	HPCI Test Mode Surveillance Operation From ASD-HPCI Panel	28
6.HPCI.314	HPCI Pump Discharge Flow Indication Calibration	12
6.PC.518	Residual Heat Removal (RHR) Local Leak Rate Tests	25
6.1HV.602	Air Flow Test of Fan Coil Unit HV-DG-1C (DIV 1)	8
6.2SW.101	Service Water Surveillance Operation (IST) (DIV 2)	48
7.0.5	CNS Post-Maintenance Testing	51
7.2.15	Service Water Pump Column Maintenance and Bowl Assembly Replacement	37
7.2.53.12	Cooper Bessemer Bolting and Torque Program	12
7.3.21.1	Fire Barrier Seal Installation-Grouting	13

Condition Reports (CRs)

CR-CNS-2015-00701	CR-CNS-2016-01448	CR-CNS-2016-01804	CR-CNS-2016-01872
CR-CNS-2016-02111	CR-CNS-2016-02179	CR-CNS-2016-02186	CR-CNS-2016-02189

CR-CNS-2016-02190	CR-CNS-2016-02191	CR-CNS-2016-02192	CR-CNS-2016-02198
CR-CNS-2016-02207	CR-CNS-2016-02217	CR-CNS-2016-02232	CR-CNS-2016-02237
CR-CNS-2016-02250	CR-CNS-2016-02284	CR-CNS-2016-02838	CR-CNS-2016-03610
CR-CNS-2016-03611			

Work Orders

4911555	4958792	5002448	5060108	5061009
5062878	5065112	5077865	5089525	5129839
5129903	5134139			

Section 1R22: Surveillance Testing

Miscellaneous Documents

Number	Title	Revision
13-061	Engineering Evaluation	0
87-052	Emergency Diesel Generator Storage Tank Fuel Capacities	5
91-103	NEDC	2
97-012	Emergency Diesel Generator Fuel On-Site Storage Technical Specification Requirements	3
2077	Burns and Roe, Diesel Generator Building Service Water, Starting, Fuel Oil, Sump System and Roof Drains	N78
BCP-2014-0405	Barrier Control Permit – RB 932' Switchgear Room F	
CNS-EQ-122	EQ Configuration Detail Terminal Boxes and Equipment Enclosures, Sheet 1	6
CNS-EQ-122	EQ Configuration Terminal Boxes and Equipment Enclosures, Sheet 2	5

Procedures

Number	Title	Revision
0-Barrier	Barrier Control Process	21
0-Barrier-Reactor	Reactor Building	11
0.36.8	Electrical Safety Rule Book	21
6.DG.602	Diesel Fuel Oil Availability	20
6.1DG.402	IST Closure Testing of DGSA Receiver Inlet Check Valves	10

Procedures

Number	Title	Revision
6.1EE.302	4160V Bus 1F Undervoltage Relay and Relay Timer Functional Test (DIV 1)	36
6.1HV.602	Air Flow Test of Fan Coil Unit HV-DG-1C (DIV 1)	8
6.1RCIC.701	RCIC Steam Line High Flow Channel Functional Test (DIV 1)	6
6.1DG.105	Diesel Generator Starting Air Compressor Operability (IST)(DIV 1)	21
6.2DG.105	Diesel Generator Starting Air Compressor Operability (IST)(DIV 2)	22
6.2DG.401	Diesel Generator Fuel Oil Transfer Pump IST Flow Test	27
6.2DG.402	IST Closure Testing DGSA Receiver Inlet Check Valves (DIV 2)	11

Condition Reports (CRs)

CR-CNS-2015-00701 CR-CNS-2016-02041 CR-CNS-2016-02585 CR-CNS-2016-02686 CR-CNS-2016-02695

Section 1EP1: Exercise Evaluation

Procedures

Number	Title	Revision/Date
	Cooper Station Emergency Plan	68
EPIP 5.2	Fuel	19
EPIP 5.7.1	Emergency Classification, March 28, 2016	54
EPIP 5.7.1	Emergency Classification, Attachment 2, Emergency Action Level Technical Bases, March 28, 2016	54
EPIP 5.7.2	Emergency Director EPIP, February 2, 2016	34
EPIP 5.7COMMUN	Communications	27
EPIP 5.7.6	Notifications, March 3, 2016	68
EPIP 5.7.7	Activation of TSC, March 3, 2016	37
EPIP 5.7.8	Activation of OSC, June 2, 2015	27
EPIP 5.7.9	Activation of EOF, February 3, 2016	35
EPIP 5.7.12	Emergency Radiation Exposure Control	16
EPIP 5.7.14	Stable Iodine Thyroid Blocking	21

Procedures

Number	Title	Revision/Date
EPIP 5.7.15	OSC Team Dispatch	20
EPIP 5.7.18	Off-site and Site Boundary Monitoring	24
EPIP 5.7.19	On-site Radiological Monitoring	14
EPIP 5.7.20	Protective Action Recommendations, March 28, 2016	28
	After-Action Evaluation Report for the Team 1 ERO Exercise	March 18, 2015
	After-Action Evaluation Report for the March 3 through April 7, 2015, Minidrills	April 30, 2015
	After-Action Evaluation Report for the 2015 Unannounced ERO Drill	May 22, 2015
	After-Action Evaluation Report for the July 2015 Team 3a PI Drill	August 14, 2015
	After-Action Evaluation Report for the September 15, 2015, EP Drill	October 6, 2015
	After-Action Evaluation Report for the December 10, 2015, EP Exercise	December 31, 2015
	After-Action Evaluation Report for the March 29, 2016, ERO Exercise	April 20, 2016
	Procedure Change Request Form, EPIP 5.7.1	March 28, 2016

Condition Reports (CRs)

CR-CNS-2015-02485	CR-CNS-2015-05863	CR-CNS-2015-05879	CR-CNS-2015-05882
CR-CNS-2015-05928	CR-CNS-2015-06041	CR-CNS-2015-06106	CR-CNS-2015-06220
CR-CNS-2015-06350	CR-CNS-2015-06481	CR-CNS-2015-06530	CR-CNS-2015-06713
CR-CNS-2015-07042	CR-CNS-2015-07113	CR-CNS-2015-07195	CR-CNS-2015-07200
CR-CNS-2015-07277	CR-CNS-2016-00550	CR-CNS-2016-01223	CR-CNS-2016-01423
CR-CNS-2016-03357	CR-CNS-2016-03364	CR-CNS-2016-03367	CR-CNS-2016-03370
CR-CNS-2016-03372	CR-CNS-2016-03376	CR-CNS-2016-03377	CR-CNS-2016-03389
CR-CNS-2016-03406	CR-CNS-2016-03408	CR-CNS-2016-03412	CR-CNS-2016-03413

Section 4OA1: Performance Indicator Verification

Procedures

Number	Title	Revision
EN-LI-114	Performance Indicator Process	5-2
	EP Desk Guide 2, Attachment G-1, Emergency Preparedness Performance Indicator Guide	25
EPIP 5.7.27.1	Emergency Notification System	
	EP Desk Guide 2, Attachment C-1, Semi-Monthly Alert and Notification System Siren Testing	16
	EP Desk Guide 2, Attachment C-5, Annual Full Cycle Sounding of the Alert and Notification System Sirens	13

Condition Reports (CRs)

CR-CNS-2015-05879	CR-CNS-2015-06106	CR-CNS-2015-06220	CR-CNS-2015-06350
CR-CNS-2015-06481	CR-CNS-2015-06713	CR-CNS-2015-07113	CR-CNS-2015-07277
CR-CNS-2016-00048	CR-CNS-2016-01423		

Section 4OA2: Problem Identification and Resolution

Miscellaneous Documents

Number	Title	Revision
CNS-SW-29	Cooper Nuclear Station Service Water Columns	9

Procedures

Number	Title	Revision
0-CNS-LI-102	Corrective Action Process	3
0-CNS-WM-101	Work Week Process	9
0-CNS-WM-102	Work Implementation and Closeout	4
0-CNS-WM-104	On-Line Schedule Risk Assessment	3
0-CNS-WM-104A	On-Line Fire Risk Management Actions	2
7.0.4	Conduct of Maintenance	38
7.2.15	Service Water Pump Column Maintenance and Bowl Assembly Replacement	38

Procedures

Number	Title	Revision
7.2.53.12	Cooper Bessemer Bolting and Torque Program	10

Condition Reports (CRs)

CR-CNS-2014-06885	CR-CNS-2015-02083	CR-CNS-2015-03709	CR-CNS-2016-00013
CR-CNS-2016-00401	CR-CNS-2016-00447	CR-CNS-2016-00562	CR-CNS-2016-00846
CR-CNS-2016-01061	CR-CNS-2016-01429	CR-CNS-2016-01761	CR-CNS-2016-01793
CR-CNS-2016-01794	CR-CNS-2016-01798	CR-CNS-2016-01804	CR-CNS-2016-01821
CR-CNS-2016-02217	CR-CNS-2016-02342	CR-CNS-2016-02589	

Work Orders

4895872	5000070	50034963	5031309	5042864
5067899	5069451	5074721		

Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion

Miscellaneous Documents

Number	Title	Revision/Date
	HPCI Aux Lube Oil Pump Failed to Start FMEA	April 27, 2016
IN 94-68	Safety-Related Equipment Failures Caused by Faulted Indicating Lamps	September 27, 1994
LCOTR TS16-HPCI	Maintenance LCO Tracker, Week 1616	April 18, 2016
RCE 2016-02281	HPCI Declared Inoperable Twice in Two Days	0
791E272	Elementary Diagram-HPCI System, Sheet 10	N21
4033-55750-23	Nutherm Panel EE-STR-250-HPCI (ALOP) Schematic	N06

Procedures

Number	Title	Revision
EN-LI-108	Event Notification and Reporting	10
0-CNS-LI-102	Corrective Action Process	4
0-EN-LI-118	Root Cause Evaluation Process	18C5

Procedures

Number	Title	Revision
5.3.10	Maintenance Work Practice-Auxiliary Relay Setup	1
7.3.16	Low Voltage Relay Removal and Installation	22

Condition Reports (CRs)

CR-CNS-2013-02323	CR-CNS-2013-07245	CR-CNS-2016-02318	CR-CNS-2016-02452
CR-CNS-2016-02589	CR-CNS-2016-02753	CR-CNS-2016-02881	

Work Orders

5002448	5130230

Section 4OA5: Other Activities

Miscellaneous Documents

Number	Title	Revision/Date
	HPCI Aux Lube Oil Pump Failed to Start FMEA	April 27, 2016
IN 94-68	Safety-Related Equipment Failures Caused by Faulted Indicating Lamps	September 27, 1994
LCOTR TS16-HPCI	Maintenance LCO Tracker, Week 1616	April 18, 2016
RCE 2016-02281	HPCI Declared Inoperable Twice in Two Days	0
791E272	Elementary Diagram-HPCI System, Sheet 10	N21
4033-55750-23	Nutherm Panel EE-STR-250-HPCI (ALOP) Schematic	N06

Procedures

Number	Title	Revision
0-CNS-LI-104	Self-Assessment and Benchmark Process	1
0-CNS-LI-102	Corrective Action Process	3
0-EN-LI-119	Apparent Cause Evaluation (ACE) Process	16C4
0-EN-LI-123	NRC Inspection Support	3C1
0-EN-LI-123-03	Pre-Inspection Assessments for IP92723	0C0
2.0.5	Reports to NRC Operations Center	47

Procedures

Number	Title	Revision
0-EN-LI-100	Process Applicability Determination	18C0
0.29.2	USAR Control and Maintenance	20
0.4	Procedure Change Process	64
0.29.1	License Basis Document Changes	35

Condition Reports (CRs)

CR-CNS-2016-00227	CR-CNS-2015-06547	CR-CNS-2015-03788	CR-CNS-2016-00738
CR-CNS-2016-00638	CR-CNS-2016-00637	CR-CNS-2016-00424	CR-CNS-2016-00298
CR-CNS-2016-00151	CR-CNS-2016-00905	CR-CNS-2015-06240	CR-CNS-2016-00841
CR-CNS-2015-06483	CR-CNS-2015-05948	CR-CNS-2015-05044	CR-CNS-2015-02106
CR-CNS-2015-02393	CR-CNS-2015-02090	CR-CNS-2014-04453	CR-CNS-2013-03992
CR-CNS-2010-02327	CR-CNS-2007-7623	CR-CNS-2016-00424	CR-CNS-2016-03708
CR-CNS-2016-03780			