**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
REGION III
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February 13, 2018

Mr. Joel P. Gebbie
Senior VP and Chief Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106

SUBJECT: DONALD C. COOK NUCLEAR POWER PLANT, UNITS 1 AND 2—NRC INTEGRATED INSPECTION REPORT 05000315/2017004; 05000316/2017004; AND EMERGENCY PREPAREDNESS ANNUAL INSPECTION REPORT 05000315/2017501; 05000316/2017501

Dear Mr. Gebbie:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Donald C. Cook Nuclear Power Plant, Units 1 and 2. On January 24, 2018, the NRC inspectors discussed the results of this inspection with yourself and other members of your staff. The results of this inspection are documented in the enclosed report. The NRC also completed its annual inspection of the Emergency Preparedness Program. This inspection began on January 1, 2017, and the issuance of this letter closes Inspection Report 05000315/2017501; 05000316/2017501.

Based on the results of this inspection, the NRC has identified three issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that three violations are associated with these issues. Because the licensee initiated condition reports to address these issues, these violations are being treated as Non-Cited Violations (NCVs), consistent with Section 2.3.2 of the Enforcement Policy. These NCVs are described in the subject inspection report. Further, inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating this violation as an NCV consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555–0001, with copies to the Regional Administrator, Region III; the Director, Office of Enforcement; and the NRC Resident Inspector at the Donald C. Cook Nuclear Power Plant.

If you disagree with the cross-cutting aspect assigned to any finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555–0001; with copies to the Regional Administrator, Region III; and the NRC Resident Inspector at the D.C. Cook Nuclear Power Plant.

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

Sincerely,

***/RA/***

Kenneth Riemer, Chief
Branch 2
Division of Reactor Projects

Docket Nos. 50–315; 50–316
License Nos. DPR–58; DPR–74

Enclosure:
IR 05000315/2017004; 05000316/2017004;
05000315/2017501; 05000316/2017501

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Letter to Joel P. Gebbie from Kenneth Riemer dated February 13, 2018

SUBJECT: DONALD C. COOK NUCLEAR POWER PLANT, UNITS 1 AND 2—NRC INTEGRATED INSPECTION REPORT 05000315/2017004; 05000316/2017004; AND EMERGENCY PREPAREDNESS ANNUAL INSPECTION REPORT 05000315/2017501; 05000316/2017501

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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|---|---|
| Docket Nos: | 05000315; 05000316 |
| License Nos: | DPR–58; DPR–74 |
| Report No: | 05000315/2017004; 05000316/2017004;<br>05000315/2017501; 05000316/2017501 |
| Licensee: | Indiana Michigan Power Company |
| Facility: | Donald C. Cook Nuclear Power Plant, Units 1 and 2 |
| Location: | Bridgman, MI |
| Dates: | October 1 through December 31, 2017 |
| Inspectors: | J. Ellegood, Senior Resident Inspector<br>T. Taylor, Resident Inspector<br>M. Domke, Reactor Inspector<br>M. Garza, Emergency Preparedness Inspector<br>T. Go, Health Physicist<br>M. Holmberg, Reactor Inspector<br>J. Park, Reactor Inspector<br>J. Benjamin, Senior Reactor Inspector<br>J. Bozga, Reactor Inspector<br>J. Mancuso, Reactor Inspector |
| Approved by: | K. Riemer, Chief<br>Branch 2<br>Division of Reactor Projects |

Enclosure

**TABLE OF CONTENTS**

## SUMMARY

Inspection Report (IR) 05000315/2017004, 05000316/2017004, 05000315/2017501, 05000316/2017501; 10/01/2017 – 12/31/2017; Donald C. Cook Nuclear Power Plant, Units 1 & 2; Maintenance Effectiveness, Problem Identification & Resolution.

This report covers a 3–month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Three Green findings were identified by the inspectors. The findings involved Non-Cited Violations (NCVs) of the U.S. Nuclear Regulatory Commission (NRC) requirements. The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG–1649, "Reactor Oversight Process," Revision 6.

**Cornerstone: Mitigating Systems**

- Green. The inspectors identified a finding and associated NCV of Title 10 of the *Code of Federal Regulations* (CFR) Title 50, Appendix B Criterion XVI for failing to promptly correct a condition adverse to quality (CAQ). Specifically, in Inspection Report (IR) 05000315/316–2015008 the NRC issued an NCV of 10 CFR 50 Appendix B Criterion III for the licensee's failure to leak test isolation valves between redundant trains of the component cooling water (CCW) systems for Units 1 and 2. Despite opportunities to restore compliance, for Unit 1, the licensee suffered the violation from November 17, 2015, through November 4, 2017. As of December 31, 2017, the licensee continues to be in violation on Unit 2. The licensee tested the Unit 1 isolation valves during the fall 2017 outage and has scheduled testing of the Unit 2 valves in the spring 2018 outage.

  The inspectors determined that the licensee's failure to promptly correct the CAQ by not testing the CCW leak isolation valves or otherwise restoring compliance was more than minor. The inspectors determined the issue was more than minor because it adversely affected the Mitigating Systems cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. The issue was not greater than green because it did not render CCW inoperable. The inspectors determined the finding included a cross-cutting aspect of H.1, Resources. (Section 4OA2.3(1))

- Green. A finding and associated violation of 10 CFR 50 Appendix B Criterion III self-revealed when licensee personnel could not obtain a water sample from a location designated as a connection point for a safety related temporary modification. Specifically, the licensee developed a temporary modification to add water to CCW but failed to verify the adequacy of the design in that the licensee did not validate the connection point could supply sufficient water as a source for CCW make-up. As an immediate action the licensee reestablished flow through the valves.

  The inspectors determined that the licensee's failure to verify the adequacy of the design for the temporary modification was more than minor because it was associated with

equipment performance attribute of Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. The finding was of very low safety significance (Green) because the finding affected the qualification of CCW but did not render it inoperable. In this case, CCW remained operable based on credit taken for isolation valve capability. The finding includes a cross-cutting aspect in the human performance area of H.14, Conservative Bias. (Section 4OA2.3(2))

- Green. The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action" for the licensee's failure to correct a design non-conformance reported to the licensee through two related 10 CFR Part 21 reports. In March 2013, the licensee identified that 28 safety-related Anchor Darling double disc gate valves (ADDDGVs) may not have been assembled with an assumed amount of valve stem to wedge pre-torque before the stem was pinned into the wedge. The licensee had restored compliance to only one of these valves and had no plans to restore quality to the remaining 27 valves prior to the inspection. The licensee entered the inspector's conclusions into their corrective action program (CAP) as AR 2017–10399. At the end of this inspection the licensee's plan was to restore compliance by either correcting the Part 21 issue or changing the design to accept the stem not having any pre-torque into the wedge.

  The performance deficiency was determined to be more than minor because if left uncorrected could become a more significant safety concern. Specifically, the failure to correct the design deficiencies could result in the valve pin breaking and consequential valve damage if the valves were operated at a high enough torque and/or thrust value(s). The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of Mitigating Systems. Specifically, the licensee performed an operability determination which concluded that all 28 valve wedge pins had not sheared based upon the known historic operational history, pin material properties, and for using stem to wedge thread friction in some cases. The inspectors determined that this finding was not indicative of recent performance and therefore did not have a cross-cutting aspect assigned. (Section 1R12.1)

**Other Findings**

- A violation of very low safety or security significance that was identified by the licensee has been reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's CAP. This violation and CAP tracking numbers are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period defueled. On November 26, 2017, the licensee took the reactor critical. On November 28, the licensee synchronized Unit 1 to the grid. Unit 1 reached 100 percent on December 2, 2017 and remained at or near 100 percent for the remainder of the inspection period.

Unit 2 remained at or near 100 percent power for the entire inspection period.

### 1. REACTOR SAFETY

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness**

1R01 Adverse Weather Protection (71111.01)

.1 Winter Seasonal Readiness Preparations

a. Inspection Scope

The inspectors conducted a review of the licensee's preparations for winter conditions to verify that the plant's design features and implementation of procedures were sufficient to protect Mitigating Systems from the effects of adverse weather. Documentation for selected risk-significant systems was reviewed to ensure that these systems would remain functional when challenged by inclement weather. During the inspection, the inspectors focused on plant specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant specific procedures. Cold weather protection, such as heat tracing and area heaters, was verified to be in operation where applicable. The inspectors also reviewed corrective action program (CAP) items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures. Documents reviewed are listed in the Attachment to this report. The inspectors' reviews focused specifically on the following plant systems due to their risk significance or susceptibility to cold weather issues:

- Condensate Storage Tank;
- Refueling Water Storage Tank; and
- Exterior wall integrity.

This activity constituted one winter seasonal readiness preparations sample as defined in Inspection Procedure (IP) 71111.01–05.

b. Findings

No findings were identified.

.2 Readiness for Impending Adverse Weather Condition—High Winds Predicted

a. Inspection Scope

On October 27, 2017, high winds were predicted in the area for the day and continuing into the weekend. The inspectors discussed the site's preparations with operations, maintenance, and environmental staff. The inspectors reviewed the adverse weather procedure and walked down outside areas near station transformers, including roof areas above the transformer yards, to check for transient material that could threaten electric power distribution. The inspectors also reviewed the CAP for any issues that could impact the availability of emergency power sources should they be needed. The inspectors also reviewed items in the CAP to verify that the licensee was identifying general adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures. Documents reviewed are listed in the Attachment to this report.

This activity constituted one readiness for impending adverse weather condition sample as defined in IP 71111.01–05.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 1 batteries and battery chargers;
- Fire pumps;
- Travelling Water Screens; and
- Essential Service Water (ESW) during Unit 1 east ESW pump replacement.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, Technical Specification (TS) requirements, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of Mitigating Systems or barriers and entered them into the CAP

with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

These activities constituted four partial system walkdown samples as defined in IP 71111.04–05.

b. Findings

No findings were identified.

.2 Semi-Annual Complete System Walkdown

a. Inspection Scope

During the fourth quarter of 2017, the inspectors performed a complete system alignment inspection of the Unit 1 Emergency Core Cooling System Accumulators to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment lineups; electrical power availability; system pressure and temperature indications, as appropriate; component labeling; component lubrication; component and equipment cooling; hangers and supports; operability of support systems; and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding WOs was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved. Documents reviewed are listed in the Attachment to this report.

These activities constituted one complete system walkdown sample as defined in IP 71111.04–05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

The inspectors conducted fire protection walkdowns which were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- Unit 1 4 kilovolt (kV) complex;
- Unit 1 AB and CD Battery rooms;
- Unit 1 Reactor Cable Tunnel Quadrants 1, 3 and 4; and
- Unit 2 Auxiliary Building 633' elevation.

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and implemented adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan.
The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event.
Using the documents listed in the Attachment to this report, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP. Documents reviewed are listed in the Attachment to this report.

These activities constituted four quarterly fire protection inspection samples as defined in IP 71111.05–05.

b. Findings

No findings were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee's testing of the Unit 1 Component Cooling Water (CCW) heat exchangers to verify that potential deficiencies did not mask the licensee's ability to detect degraded performance, to identify any common cause issues that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors reviewed the licensee's observations as compared against acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. Inspectors also verified that test acceptance criteria considered differences between test conditions, design conditions, and testing conditions. Documents reviewed for this inspection are listed in the Attachment to this document.

This activity constituted one annual heat sink performance sample as defined in IP 71111.07–05.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

From September 18, 2017, through November 1, 2017, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the Unit 1 reactor coolant system (RCS), steam generator (SG) tubes, emergency feedwater systems, and risk-significant piping and components.

The reviews described in Sections 1R08.1, 1R08.2, R08.3, IR08.4, and 1R08.5 below constituted one inspection sample as described by IP 71111.08–05.

.1 Piping Systems Inservice Inspection

a. Inspection Scope

The inspectors observed and reviewed records for the following non-destructive examinations (NDE) mandated by the American Society of Mechanical Engineers (ASME) Code Section XI (or approved U.S. Nuclear Regulatory Commission (NRC) alternative) to evaluate compliance with the ASME Code Section XI, and Section V requirements, and if any indications and defects were detected, to determine if these were dispositioned in accordance with the ASME Code, or NRC requirements.

- Ultrasonic (UT) examination of pressurizer safety valve line welds 1–RC–05S and 1RC-06S; and
- Magnetic Particle examination of SG manway studs STM–12.

The inspectors observed the following NDE conducted as part of the licensee's program for monitoring thermal fatigue cracking in residual heat removal system mixing tee piping to determine if the examination was conducted in accordance with the licensee's program and associated examination procedures and if any indications and defects were detected, to determine if these were dispositioned in accordance with approved procedures and NRC requirements:

- UT examination of residual heat removal elbow to pipe weld 1-RH-4-01 to meet Electric Power Research Institute (EPRI) Materials Reliability Program (MRP) 192, "Assessment of Residual Heat Removal Mixing Tee Thermal Fatigue in PWR [Pressurized Water Reactor] Plants."

The inspectors observed or reviewed video records of the following NDE conducted as part of the licensee's Aging Management Program for vessel internals cracking to determine if the examination was conducted in accordance with the licensee's program and associated examination procedures and if any indications and defects were detected, to determine if these were dispositioned in accordance with approved procedures and NRC requirements:

- UT examination of a sample of baffle-former bolts to meet MRP 227, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines;" and
- VT–3 examination of a sample of the baffle-edge bolts visible from the core side of the baffle plates to meet MRP 227, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines."

The licensee had not identified any recordable indications during surface and volumetric examinations performed since the beginning of the previous refueling outage. Therefore, no NRC review was completed for this inspection procedure attribute.

The inspectors reviewed records of the following pressure boundary welds completed for risk-significant systems during the last Unit 1 refueling outage to determine if the licensee applied the pre-service NDE and acceptance criteria required by the construction Code. Additionally, the inspectors reviewed the welding procedure specification and supporting weld procedure qualification records to determine if the weld procedure(s) was qualified in accordance with the requirements of the Construction Code and the ASME Code Section IX:

- Field Welds No. OW1 and OW2 on the containment spray line pipe (Work Order 55399396–52); and
- Field Welds No OW1–OW4, on the residual heat removal line during replacement of valve 1–ILA–111–V1 per EC–54240 (Work Order 55470265).

b. Findings

No findings were identified.

.2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities

a. Inspection Scope

For the Unit 1 vessel head, no examination was required pursuant to Title 10 of the *Code of Federal Regulations* (CFR), Part 50.55a(g)(6)(ii)(D) and NRC approved relief request letter ISIR 04–02, dated June 11, 2015, for the current refueling outage. Therefore, no NRC review was completed for this inspection procedure attribute. Additionally, the licensee did not perform any welded repairs to vessel head penetration nozzles since the beginning of the preceding outage for Unit 1. Therefore, no NRC review was completed for this inspection procedure attribute.

b. Findings

No findings were identified.

.3 Boric Acid Corrosion Control

a. Inspection Scope

On September 13–17, 2017, the inspectors performed an independent walkdown on portions of the of the reactor coolant system and connected system(s) within containment which had received a recent licensee boric acid walkdown to determine if the licensee's visual examinations had effectively identified boric acid leakage that potentially degraded safety-related components.

The inspectors reviewed the following licensee evaluations of components with boric acid deposits to determine if the affected components were documented and properly evaluated in the corrective action system. Specifically, the inspectors evaluated the licensee's corrective actions to determine if degraded components met the component Construction Code and/or the ASME Section XI Code.

- Action Request (AR) 2016–3678; Boric Acid Leak at 1–NPS–121 Reactor Coolant Hot Leg Pressure Transmitter; and
- AR 2016–5227; Boric Acid Leak at 1–NSO–61–64 Pressurizer Head Vent Flange.

The inspectors reviewed the following corrective actions related to evidence of boric acid leakage to determine whether the corrective actions completed were consistent with the requirements of the ASME Code Section XI, and 10 CFR Part 50, Appendix B, Criterion XVI:

- AR 2016–3373; Boric Acid Leak at 1–HV–CLV–3 Containment Spray Ring Header.

b. Findings

No findings were identified.

.4 Steam Generator Tube Inspection Activities

a. Inspection Scope

The NRC inspectors observed acquisition of eddy current testing (ET) data, observed ET data analysis, observed SG tube plugging and reviewed procedures implementing the SG ISI Program to determine if:

- in-situ SG tube pressure testing screening criteria used were consistent with those identified in the EPRI TR–107620, Steam Generator In-Situ Pressure Test Guidelines and that these criteria were properly applied to screen degraded SG tubes for in-situ pressure testing;
- the numbers and sizes of SG tube flaws/degradation identified was bound by the licensee's previous outage Operational Assessment predictions;
- the SG tube ET examination scope and expansion criteria were sufficient to meet the Technical Specifications, and the EPRI 1003138, "Pressurized Water Reactor Steam Generator Examination Guidelines;"
- the SG tube ET examination scope included potential areas of tube degradation identified in prior outage SG tube inspections and/or as identified in NRC generic industry operating experience applicable to these SG tubes;
- the licensee identified new tube degradation mechanisms and implemented adequate extent of condition inspection scope and repairs for the new tube degradation mechanism;
- the licensee implemented repair methods which were consistent with the repair processes allowed in the plant Technical Specification requirements and implemented at appropriate tube locations;
- to determine if qualified depth sizing methods were applied to degraded tubes accepted for continued service;
- the licensee implemented an inappropriate "plug on detection" tube repair threshold (e.g., no attempt at sizing of flaws to confirm tube integrity);
- the licensee primary-to-secondary leakage (e.g., SG tube leakage) was below 3 gallons-per-day or the detection threshold during the previous operating cycle;
- the ET probes and equipment configurations as documented on the Examination Technique Specification Sheets used to acquire/analyze data from the SG tubes

were qualified to detect and/or size the known/expected types of SG tube degradation in accordance with Appendix H and I, "Performance Demonstration for Eddy Current Examination," of EPRI 1003138, "Pressurized Water Reactor Steam Generator Examination Guidelines;"

- the licensee performed secondary side SG inspections for location and removal of foreign materials;
- the licensee implemented repairs or appropriately evaluated SG tubes damaged by foreign material; and
- inaccessible foreign objects were left within the secondary side of the SGs, and if so, that the licensee implemented evaluations which included the effects of foreign object migration and/or tube fretting damage.

The licensee did not perform in-situ pressure testing of SG tubes. Therefore, no NRC review was completed for this inspection attribute.

b. Findings

No findings were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI/SG-related problems entered into the licensee's Corrective Action Program, and conducted interviews with licensee staff to determine if:

- The licensee had established an appropriate threshold for identifying ISI/SG-related problems;
- the licensee had identified issues related to excessive deposit buildup on the SG tube bundle and/or excessive SG tube wear indicative of fluid-elastic instability within the SG tube bundle;
- The licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and
- The licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report.

During UT examination of the Unit 1 baffle-former bolts in accordance with MRP 227, the licensee identified 48 potentially defective baffle-former bolts and identified 4 bolt locations which could not be adequately UT examined. To address this issue, the licensee implemented baffle-bolt replacement and replaced a total of 212 bolts that included the potentially defective bolts and bolts which could not be UT examined. The inspectors observed a sample of baffle-former bolt replacement activities and performed a review of the licensee's planned corrective actions for this condition to determine if these actions were consistent with MRP 227 and supplemental industry guidance.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review of Licensed Operator Requalification (71111.11Q)

a. Inspection Scope

On October 24, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training. The inspectors verified that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and that training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms;
- correct use and implementation of abnormal and emergency procedures;
- control board manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications.

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one quarterly licensed operator requalification program simulator sample as defined in IP 71111.11–05.

b. Findings

No findings were identified.

.2 Resident Inspector Quarterly Observation During Periods of Heightened Activity or Risk (71111.11Q)

a. Inspection Scope

On November 23, the inspectors observed the on shift crew perform portions of a plant heat up. On November 27, the inspectors observed main turbine warming and overspeed trip testing. These were activities that required heightened awareness or was related to increased risk. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms (if applicable);
- correct use and implementation of procedures;

- control board (or equipment) manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate Technical Specification (TS) actions and Emergency Plan actions and notifications (if applicable).

The performance in these areas was compared to pre-established operator action expectations, procedural compliance and task completion requirements. Documents reviewed are listed in the Attachment to this report.

This activity constituted one quarterly licensed operator heightened activity/risk sample as defined in IP 71111.11–05.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk-significant systems:

- Component cooling water;
- Auxiliary Feedwater (AFW) and ESW pump room ventilation;
- Main Steam;
- 10 CFR Part 21 Issue: Anchor Darling Double Disc Gate Valve Stem to Wedge Lack of Pre-Torque; and
- AFW.

The inspectors reviewed events such as where ineffective equipment maintenance had resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- implementing appropriate work practices;
- identifying and addressing common cause failures;
- scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;
- characterizing system reliability issues for performance;
- charging unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2), or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program (CAP) with the

appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

This activity constituted five quarterly maintenance effectiveness samples as defined in IP 71111.12–05.

b. Findings

Failure to Correct Numerous Anchor Darling Double Disc Gate Valve Non-Conformances

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated Non-Cited Violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action" for the licensee's failure to correct a design non-conformance reported to the licensee through two related 10 CFR Part 21 reports. In March 2013, the licensee identified that 28 safety-related Anchor Darling double disc gate valves (ADDDGVs) may not have been assembled with an assumed amount of valve stem to wedge pre-torque before the stem was pinned into the wedge. The licensee had restored compliance to only one of these valves and had no plans to restore quality to the remaining 27 valves prior to the inspection.

Description: On January 4, 2013, Tennessee Valley Authority issued a 10 CFR Part 21 report following the failure of an ADDDGV reactor side disc to seat properly due to a broken wedge pin. The report described that the cause of the pin failure was determined to be that the valve stem was not adequately torqued into the upper wedge when assembled by the vendor.

On February, 25, 2013, the valve vendor, Flowserve, issued a separate but related 10 CFR Part 21 report for the same Tennessee Valley Authority valve failure. Flowserve described that the pin was designed to ensure that the joint does not loosen due to vibration and other secondary loads and that the pin shearing can allow stem rotation and ultimately result in stem separation and valve inoperability and loose parts introduced in the piping systems. Similarly, the report identified that the wedge pin failed due to excessive load on the pin because the system operating torque had exceeded the unknown preassembly torque to tighten the stem into the upper wedge combined with the wedge pin material strength. Attachment 1 within this 10 CFR Part 21 report, provided a recommended standard stem preload torque based upon valve size and pressure class to restore compliance. D.C. Cook was listed in the Part 21 report as a customer for the parts and was sent a copy of the 10 CFR Part 21 report from Flowserve.

On March 6, 2013, the licensee entered the issue into their CAP as AR 2013–3554. The licensee determined that 28 safety-related valves associated with the Part 21s were in service. The licensee evaluated operability following receipt of the Part 21 reports, and as a follow up to the inspector's questions. The licensee concluded that all 28 valves were operable/functional based upon several factors including: no related valve failures to date; historic valve operating torque loadings; wedge pin strength, and stem to wedge friction.

The inspectors reviewed the licensee's corrective actions to restore compliance. During the fall 2017 refueling outage, the licensee inspected 1–IMO–255, "Boron Injection Tank Train 'A' Inlet Shutoff Valve", based upon known valve seat leakage and identified that

the wedge pin was intact and in good shape but the stem was not torqued into the wedge. The licensee restored compliance to this valve by replacing the stem to wedge assembly with one that was properly pre-torqued. The inspectors discussed the status of resolving the Part 21 issue for the remaining 27 valves with the licensee. The licensee informed the inspectors that they had no plans to address the remaining 27 valves further because they had performed an evaluation demonstrating that the wedge pin would not break. Specifically, the licensee compared the highest measured historical torque values for each MOV against the wedge pin's material strength with credit for stem to wedge thread friction in some cases. The inspectors reviewed the licensee's operability evaluation and determined that the evaluation only addressed current operability and did not constitute a design change. Specifically, the evaluation did not change the valve design to conform with the assumptions discussed in the operability evaluation (e.g. wedge pin loaded component, stem thread to wedge thread friction, updated weak link analysis, etc...).

The licensee entered the inspector's conclusions into their CAP as AR 2017–10399. At the end of this inspection the licensee's plan was to restore compliance by either correcting the Part 21 issue or changing the design to accept the stem not having any pre-torque into the wedge. The list of the 27 safety-related valves that require corrective action are:

- Unit 1 and Unit 2 Boron Injection Tank Train 'A' Outlet Containment Isolation Valves;
- Unit 1 and Unit 2 Boron Injection Tank Train 'B' Outlet Containment Isolation Valves;
- Unit 2 Boron Injection Tank Train 'A' Inlet Shutoff Valve;
- Unit 1 and Unit 2 Boron Injection Tank Train 'B' Inlet Shutoff Valves;
- Unit 1 and Unit 2 East Residual Heat Removal (RHR) Heat Exchanger to Charging Pump Suction Shutoff Valves;
- Unit 1 and Unit 2 West RHR Heat Exchanger Outlet to Safety Injection Pump Suction Shutoff Valves;
- Unit 1 and Unit 2 East RHR 1–HE–17E Discharge Crosstie Shutoff Valves;
- Unit 1 and Unit 2 West RHR Pump PP–35W Suction Shutoff Valves;
- Unit 1 and Unit 2 Recirculation Sump to East RHR/CTS Pumps Suction Containment Isolation Valves;
- Unit 1 and Unit 2 Recirculation Sump to West RHR/CTS Pumps Suction Containment Isolation Valves;
- Unit 1 and Unit 2 East RHR Pump PP–35E Suction Shutoff Valves;
- Unit 1 and Unit 2 West RHR Pump PP–35W Suction Shutoff Valves;
- Unit 1 North Safety Injection Pump PP–26N Discharge Containment Isolation Valve;
- Unit 1 South Safety Injection Pump PP–26S Discharge Containment Isolation Valve; and
- Unit 1 and Unit 2 Refueling Water Storage Tank TK–33 to RHR Pumps Suction Shutoff Valves.

Analysis: The inspectors determined the failure to correct 27 non-conforming conditions related to the same Part 21s was contrary to 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," and was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected could become a more

significant safety concern. Specifically, the failure to correct the design deficiencies could result in the valve pin breaking and consequential valve damage if the valves were operated at a high enough torque and/or thrust value(s).

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," issued on October 7, 2016. Because the finding impacted the Mitigating Systems cornerstone, the inspectors screened the finding through IMC 0609 Appendix A, "The Significance Determination Process for Findings At-Power," issued on June 19, 2012, using Exhibit 2, "Mitigating Systems Screening Questions." The finding screened as of very low safety significance (Green) because it did not result in the loss of operability or functionality of Mitigating Systems. Specifically, the licensee performed an operability determination which concluded that all 28 valve wedge pins had not sheared based upon the known historic operational history, pin material properties, and for using stem to wedge thread friction in some cases.

The inspectors determined that this finding was not indicative of recent performance and therefore did not have a cross-cutting aspect assigned.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that conditions adverse to quality, such as non-conformances are corrected.

Contrary to the above, from March 6, 2013 through December 31, 2017 the licensee failed to correct 27 conditions adverse to quality listed. Specifically, the 27 safety-related valves described above had a known non-conforming design deficiency associated with an unknown amount of stem to wedge pre-torque. This condition has been known to the licensee for approximately five years and no corrective actions were planned until the issue was identified by the inspectors.

The licensee is still evaluating its planned corrective actions. However, the inspectors determined that the continued non-compliance does not present an immediate safety concern because the licensee performed an evaluation that reasonably concluded that the affected structures will remained operable or functional.

Because this violation was of very low safety significance (Green) and was entered into the licensee's CAP as CR–2017–10399, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.
**(NCV 05000315/2017004–01; 05000316/2017004–01; Failure to Correct Numerous Anchor Darling Double Disc Gate Valve Non-Conformances)**

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- Yellow risk associated with mode ascension, week of 19 November, 2017;
- Hydrogen leak on Unit 1 turbine; and
- 69kV outage on November 8, 2017.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

Documents reviewed during this inspection are listed in the Attachment to this report.

These activities constituted three maintenance risk assessments and emergent work control samples as defined in IP 71111.13–05.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Unit 1 E Essential Service Water pump coating;
- Operability Evaluation associated with AR 2017–7865; Westinghouse Bulletin NSAL–17–3, 93A RCP Casing and Support;
- U1 Control room filtration surveillance failure;
- Fire protection air system mis-alignment;
- Unit 1 Turbine-Driven AFW pump failure to reach rated speed; and
- Failure to leak test CCW isolation valves.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and USAR to the licensee’s evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies

associated with operability evaluations. Documents reviewed are listed in the Attachment to this report.

This operability inspection constituted six samples as defined in IP 71111.15–05.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification(s):

- Unit 1 generator isophase bus links.

The inspectors reviewed the configuration changes and associated 10 CFR 50.59 safety evaluation screening against the design basis, the Updated Final Safety Analysis Report (UFSAR), and the TS, as applicable, to verify that the modification did not affect the operability or availability of the affected system(s). The inspectors, as applicable, observed ongoing and completed work activities to ensure that the modifications were installed as directed and consistent with the design control documents; the modifications operated as expected; post-modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modifications did not impact the operability of any interfacing systems. As applicable, the inspectors verified that relevant procedure, design, and licensing documents were properly updated. Lastly, the inspectors discussed the plant modification with operations, engineering, and training personnel to ensure that the individuals were aware of how the operation with the plant modification in place could impact overall plant performance. Documents reviewed are listed in the Attachment to this report.

This activity constituted one permanent plant modification sample as defined in IP 71111.18–05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed the following post-maintenance (PM) activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- Installation of open-phase-condition modification on Unit 1;
- Testing of Unit 1 W CCW pump following motor and damaged-lead replacement;

- Unit 1 AB Emergency Diesel Generator testing following outage maintenance;
- Unit 1 west Residual Heat Removal heat exchanger;
- Supplemental diesel generators following maintenance;
- Testing of new EP transformer;
- Unit 1 Pressurizer Power Operated Relief Valves following maintenance; and
- Unit 1 Turbine-Driven AFW pump following troubleshooting.

These activities were selected based upon the structure, system, or component's ability to impact risk. The inspectors evaluated these activities for the following (as applicable): the effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed; acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate; tests were performed as written in accordance with properly reviewed and approved procedures; equipment was returned to its operational status following testing (temporary modifications or jumpers required for test performance were properly removed after test completion); and test documentation was properly evaluated. The inspectors evaluated the activities against TSs, the UFSAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the CAP and that the problems were being corrected commensurate with their importance to safety. Documents reviewed are listed in the Attachment to this report.

This activity constituted eight post-maintenance testing sample as defined in IP 71111.19–05.

b. Findings

No findings were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan (OSP) and contingency plans for the Unit 1 refueling outage (RFO), conducted September 13 through November 26, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below:

- licensee configuration management, including maintenance of defense-in-depth commensurate with the OSP for key safety functions and compliance with the applicable TS when taking equipment out of service;
- implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;

- installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- controls over the status and configuration of electrical systems to ensure that TS and OSP requirements were met, and controls over switchyard activities;
- monitoring of decay heat removal processes, systems, and components;
- controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system;
- reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- controls over activities that could affect reactivity;
- maintenance of secondary containment as required by TS;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- refueling activities, including fuel handling and reactor assembly/disassembly;
- startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the containment to verify that debris had not been left which could block emergency core cooling system suction strainers, and reactor physics testing; and
- licensee identification and resolution of problems related to RFO activities.

Documents reviewed are listed in the Attachment to this report.

Inspections activities performed in the third quarter coupled with those in the fourth quarter constituted one RFO sample as defined in IP 71111.20–05.

b. Findings

(Opened) Unresolved Item 05000315/2017004–02, Unit 1 Letdown System Safety Valve Lift During Preparations for Cooldown

Introduction: Shortly after the shutdown for the Unit 1 refueling outage in September 2017, the licensee was establishing conditions in the charging and letdown system for the upcoming cooldown. After lowering letdown flow and attempting to adjust pressure, a letdown safety valve lifted and failed to completely reseat. Review of plant parameters following the event revealed that the evolution created saturation conditions in the letdown system. Subsequently, the steam bubbles collapsed causing a water hammer that lifted and damaged a relief in the system. The event was discussed in Section 4OA3 of Inspection Report 05000315/05000316/2017003.

Description: The inspectors reviewed the licensee's follow up of the issue in the CAP and spoke to personnel in the operations and maintenance departments. The licensee identified potential issues in the areas of procedure adequacy, operator performance, and equipment performance. However, the inspectors could not reconcile information on plant conditions with licensee's statements regarding the cause. Because of ambiguity regarding the cause, the inspectors could not determine whether the corrective actions taken by the licensee were adequate. The licensee determined that an apparent cause evaluation need not be done therefore the inspectors reviewed available data, including plant computer data and a prior event from 2004. Since it is unclear what, if any, performance deficiency exists associated with this issue, the inspectors determined an unresolved item (URI) was necessary pending further follow up of the issue.

Following the lifting of the safety valve, the licensee isolated letdown to stop the remaining leakage through the valve. The licensee then cycled the valve sufficiently enough for it to reseat so letdown could be restored and the cooldown continued. The safety valve was later discovered to be damaged from the event, so it was also repaired. Walkdowns were also conducted of the letdown piping to ensure no damage had occurred during the pressure transient. As part of their corrective actions, the licensee made some changes to the letdown procedure, recalibrated a letdown flow control valve, and developed actions to cover the event and lessons-learned in training. However, as stated above, the inspectors were unable to determine if these were sufficient to address the prevailing cause of the issue. The inspectors developed a series of questions for the licensee to explore more of the details behind the various potential issues. In order close the URI, the inspectors need to review the licensee's response to questions provided and review available documentation of the event. **(URI 05000315/2017004–02, Unit 1 Letdown System Safety Valve Lift During Preparations for Cooldown)**

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

The inspectors reviewed the test results for the following activities to determine whether risk-significant systems and equipment were capable of performing their intended safety function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- 12–MHP–4030–010–001, Ice Condenser Basket Weighing Surveillance (ice condenser);
- 1–SI–158 L2 and L3 Emergency Core Cooling System check valve testing (routine);
- Unit 1 Ice Condenser door surveillances (ice condenser);
- NESW valves at containment penetration 85 (containment isolation valve); and
- CCW isolation valve leak testing (routine).

The inspectors observed in-plant activities and reviewed procedures and associated records to determine the following:

- did preconditioning occur;
- the effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis;
- plant equipment calibration was correct, accurate, and properly documented;
- as-left setpoints were within required ranges; and the calibration frequency was in accordance with TSs, the USAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other

applicable procedures; jumpers and lifted leads were controlled and restored where used;

- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and reference values were consistent with the system design basis;
- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;
- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and
- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report.

These inspections constituted two routine surveillance testing samples, two ice condenser samples and one containment isolation valve sample as defined in IP 71111.22, Sections–02 and–05. In addition, the inspectors did not identify any performance degradation in the reactor coolant system (RCS) leakage for the entire cycle. The reactor coolant system leak detection inspection sample was not performed as defined in IP 71111.22, Section–02.

b. Findings

No findings were identified.

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

a. Inspection Scope

The regional inspectors performed an in-office review of the latest revisions to the Emergency Plan, Emergency Action Levels (EALs), and EAL Bases document to determine if these changes decreased the effectiveness of the Emergency Plan. The inspectors also performed a review of the licensee's 10 CFR 50.54(q) change process, and Emergency Plan change documentation to ensure proper implementation for maintaining Emergency Plan integrity.

The NRC review was not documented in a safety evaluation report, and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection. The specific documents reviewed during this inspection are listed in the Attachment to this report.

This EAL and Emergency Plan Change inspection constituted one sample as defined in IP 71114.04.

b. Findings

No findings were identified.

## 2. RADIATION SAFETY

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

.1 Radiological Hazard Assessment (02.02)

a. Inspection Scope

The inspectors assessed the licensee's current and historic isotopic mix, including alpha emitters and other hard-to-detect radionuclides. The inspectors evaluated whether survey protocols were reasonable to identify the magnitude and extent of the radiological hazards.

The inspectors determined if there have been changes to plant operations since the last inspection that may have resulted in a significant new radiological hazard for onsite individuals. The inspectors evaluated whether the licensee assessed the potential impact of these changes and implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard. The inspectors reviewed the last two radiological surveys from selected plant areas and evaluated whether the thoroughness and frequency of the surveys were appropriate for the given radiological hazard.

The inspectors conducted walkdowns of the facility, including radioactive waste processing, storage, and handling areas to evaluate material conditions and performed independent radiation measurements as needed to verify conditions were consistent with documented radiation surveys.

The inspectors assessed the adequacy of pre-work surveys for select radiologically risk-significant work activities.

The inspectors evaluated the radiological survey program to determine if hazards were properly identified. The inspectors discussed procedures, equipment, and performance of surveys with radiation protection staff and assessed whether technicians were knowledgeable about when and how to survey areas for various types of radiological hazards.

The inspectors observed work in potential airborne areas to assess whether air samples were being taken appropriately for their intended purpose and reviewed various survey records to assess whether the samples were collected and analyzed appropriately. The inspectors also reviewed the licensee's program for monitoring contamination which has the potential to become airborne.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors reviewed select radiation work permits used to access high radiation areas and evaluated the specified work control instructions or control barriers. The inspectors also assessed whether workers where made aware of the work instructions and area dose rates.

The inspectors reviewed electronic alarming dosimeter dose and dose rate alarm setpoint methodology. For selected electronic alarming dosimeter occurrences, the inspectors assessed the worker's response to the alarm, the licensee's evaluation of the alarm, and any follow-up investigations.

The inspectors reviewed the licensee's methods for informing workers of changes in plant operations or radiological conditions that could significantly impact their occupational dose.

The inspectors reviewed the labeling of select containers of licensed radioactive material that could cause unplanned or inadvertent exposure to workers.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.3 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

The inspectors observed locations where the licensee monitors material leaving the radiologically controlled area and assessed the methods used for control, survey, and release of material from these areas. As available, the inspectors observed health physics personnel surveying and releasing material for unrestricted use.

The inspectors observed workers leaving the radiologically controlled area and assessed their use of tool and personal contamination monitors and reviewed the licensee's criterial for use of the monitors.

The inspectors assessed whether instrumentation was used at its typical sensitivity levels based on appropriate counting parameters or whether the licensee had established a de facto release limit.

The inspectors selected several sealed sources from the licensee's inventory records and assessed whether the sources were accounted for and verified to be intact. The inspectors also evaluated whether any transactions, since the last inspection, involving nationally tracked sources were reported in accordance with 10 CFR, Part 20.2207.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions during tours of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, radiation work permits, and worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination controls. The inspectors evaluated the licensee's use of electronic alarming dosimeters in high noise areas as high radiation area monitoring devices.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with licensee procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or that the licensee properly employed an NRC approved method of determining effective dose equivalent.

The inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel in work areas with significant dose rate gradients.

For select airborne area radiation work permits, the inspectors reviewed airborne radioactivity controls and monitoring, the potential for significant airborne levels, containment barrier integrity, and temporary filtered ventilation system operation.

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials stored within pools and assessed whether appropriate controls were in place to preclude inadvertent removal of these materials from the pool.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.5 High Radiation Area and Very High Radiation Area Controls (02.06)

a. Inspection Scope

The inspectors observed posting and physical controls for high radiation areas and very high radiation areas to assess adequacy.

The inspectors conducted a selective inspection of posting and physical controls for high radiation areas and very high radiation areas to assess conformance with performance indicators.

The inspectors reviewed procedural changes to assess the adequacy of access controls for high and very high radiation areas to determine whether procedural changes substantially reduced the effectiveness and level of worker protection.

The inspectors assessed the controls the high radiation areas greater than 1 rem/hour and areas with the potential to become high radiation areas greater than 1 rem/hour for compliance with Technical Specifications and procedures.

The inspectors assessed the controls for very high radiation areas and areas with the potential to become very high radiation areas. The inspectors also assessed whether individuals were unable to gain unauthorized access to these areas.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.6 Radiation Worker Performance and Radiation Protection Technician Proficiency (02.07)

a. Inspection Scope

The inspectors observed radiation worker performance and assessed their performance with respect to radiation protection work requirements, the level of radiological hazards present, and radiation work permit controls.

The inspectors assessed worker awareness of electronic alarming dosimeter set points, stay times, or permissible dose for radiologically significant work as well as expected response to alarms.

The inspectors observed radiation protection technician performance and assessed whether the technicians were aware of the radiological conditions and radiation work permit controls and whether their performance was consistent with training and qualifications for the given radiological hazards.

The inspectors observed radiation protection technician performance of radiation surveys and assessed the appropriateness of the instruments being used, including calibration and source checks.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

.7 Problem Identification and Resolution (02.08)

a. Inspection Scope

The inspectors assessed whether problems associated with radiological hazard assessment and exposure controls were being identified at an appropriate threshold and were properly addressed for resolution. For select problems, the inspectors assessed the appropriateness of the corrective actions. The inspectors also assessed the licensee's program for reviewing and incorporating operating experience.

The inspectors reviewed select problems related to human performance errors and assessed whether there was a similar cause and whether corrective actions taken resolve the problems.

The inspectors reviewed select problems related to radiation protection technician error and assessed whether there was a similar cause and whether corrective actions taken resolve the problems.

These inspection activities constituted one complete sample as defined in IP 71124.01–05.

b. Findings

No findings were identified.

2RS2 Occupational As-Low-As-Reasonably-Achievable Planning and Controls (71124.02)

.1 Implementation of As-Low-As-Reasonably-Achievable and Radiological Work Controls (02.04)

a. Inspection Scope

The inspectors conducted observations of in-plant work activities and assessed whether the licensee had effectively integrated the planned administrative, operational, and engineering controls into the actual field work to maintain occupational exposure as-low-as-reasonably-achievable. The inspectors observed pre-job briefings, and determined if the planned controls were discussed with workers. The inspectors evaluated the placement and use of shielding, contamination controls, airborne controls, radiation work permit controls, and other engineering work controls against the as-low-as-reasonably-achievable plans.

These inspection activities supplemented those documented in IR 2016004 and constituted one complete sample as defined in IP 71124.02–05.

b. Findings

No findings were identified.

.2 Problem Identification and Resolution (02.06)

a. Inspection Scope

The inspectors reviewed self-assessments and/or audits performed of the As-Low-As-Reasonably-Achievable Program and determined if these reviews identified problems or areas for improvement.

The inspectors assessed whether problems associated with as-low-as-reasonably-achievable planning and controls were being identified by the licensee at an appropriate threshold and properly addressed for resolution.

These inspection activities constituted one complete sample as defined in IP 71124.02–05.

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 Mitigating Systems Performance Index—Emergency Alternating Current Power System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI)—Emergency Alternating Current (AC) Power System performance indicator (PI) Units 1 and 2, for the period from the fourth quarter 2016 through the third quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's MSPI derivation reports, issue reports, event reports and NRC Integrated Inspection Reports for the period of fourth quarter 2016 through the third quarter 2017 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none. Documents reviewed are listed in the Attachment to this report.

This activity constituted two MSPI emergency AC power system sample as defined in IP 71151–05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—High Pressure Injection Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—High Pressure Injection Systems PI Units 1 and 2, for the period from the third quarter of 2016 through the second quarter of 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of the third quarter of 2016 through the second quarter of 2017 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This activity constituted two MSPI high pressure injection system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index—Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—Heat Removal System PI Units 1 and 2, for the period from the third quarter of 2016 through the second quarter of 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports, MSPI derivation reports, and NRC Integrated Inspection Reports for the period of third quarter of 2016 through the second quarter of 2017 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two MSPI heat removal system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.4 Mitigating Systems Performance Index—Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—Residual Heat Removal System PI Units 1 and 2, for the period from the third quarter of 2016 through the second quarter of 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of third quarter 2016 through the second quarter 2017 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This activity constituted two MSPI residual heat removal system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.5 Mitigating Systems Performance Index—Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—Cooling Water Systems PI Units 1 and 2 for the period from the fourth quarter 2016 through the third quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of the fourth quarter 2016 through the third quarter of 2017 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This activity constituted two MSPI cooling water system samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.6 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the RCS Leakage PI Units 1 and 2, for the period from the fourth quarter of 2016 through the third quarter of 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, issue reports, event reports and NRC Integrated Inspection Reports for the period of the fourth quarter of 2016 through the third quarter of 2017 to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This activity constituted two reactor coolant system leakage samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.7 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Exposure Control Effectiveness PI for the period from the first quarter 2016 through the first quarter 2017. The inspectors used PI definitions and guidance contained in the NEI Document 99–02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's assessment of the PI for occupational radiation safety to determine if indicator related data was adequately assessed and reported. To assess the adequacy of the licensee's PI data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review and the results of those reviews. The inspectors independently reviewed electronic personal dosimetry dose rate and accumulated dose alarms and dose reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of numerous locked high and very high radiation area entrances to determine the adequacy of the controls in place for these areas. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one occupational exposure control effectiveness sample as defined in IP 71151–05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Items Entered into the Corrective Action Program

a. Inspection Scope

As discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into the licensee's corrective action program at an appropriate threshold, adequate attention was being given to timely corrective actions, and adverse trends were identified and addressed. Some minor issues were entered into the licensee's corrective action program as a result of the inspectors' observations; however, they are not discussed in this report.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure they were considered an integral part of the inspections performed during the quarter.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector corrective action program item screening discussed in Section 4OA2.1 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the 6–month period of July, 2017, through December 2017, although some examples expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the corrective action program in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's corrective action program trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

This activity constituted one semi-annual trend review inspection sample as defined in IP 71152.

b. Observations and Assessments

During the review, the inspectors identified two trends in licensee performance. The first trend concerns six examples of licensee personnel errors occurring over short period of time. The examples are:

- Opening incorrect heat drain pump valve;
- Hanging a tag on the wrong component in chemical addition line;
- Tagging out an AFW ventilation fan on the wrong unit;
- Taking a chemistry sample using the incorrect attachment;
- Failure to know status of demineralizer during cooldown; and
- Failure to close a bypass valve in the fire suppression system.

These examples are notable because they represent a breakdown in fundamental job performance by the licensee. In each case, human performance tools should have precluded the error. In addition, in each case at least two employees made the same error. Had either employee identified the error, the condition would have been precluded or ameliorated. The licensee has taken steps to address this adverse trend in human performance. The inspectors believe additional time is needed to assess the licensee's effectiveness at eradicating these errors.

The inspectors also noted that the licensee has a large number of non-conforming conditions open. The licensee considers discrepant conditions to be non-conformances with design or licensing requirements. As part of start-up preparations, the licensee reviews open operability determinations and discrepant condition evaluations. The inspectors reviewed the licensee's operability determination to assess the collective significance and concluded the aggregations of conditions did not create a safety concern. However, the inspectors also concluded that in some cases the license could have resolved the discrepant condition. The operability determination evaluation includes three open operability determinations and 20 non-conformances. The large number of conditions yet to be resolved indicates the licensee needs to place higher priority in restoring compliance. The inspectors have included two findings in this report that include violations of 10 CFR 50, Criterion XVI that are related to the trend of not correcting non-conforming conditions.

c. Findings

No findings were identified.

.3 Annual Follow-Up of Selected Issues: Resolution of U.S. Nuclear Regulatory Commission Findings associated with Component Cooling Water Isolation valves

a. Inspection Scope

The inspectors selected the following condition reports for in-depth review:

- 2015–14961, Inability of CCW to Supply Make-up; and
- 2017–6217, Comp Action Will not Supply Adequate Flow for CCW Make-up.

The inspectors selected this issue because the one of the corrective actions for inability to supply make up would not work. The inspectors reviewed the original finding and noted that the finding addressed both inability to make up CCW inventory as well as a

failure to test isolation valves. The inspectors determined additional inspection was warranted to ascertain if the licensee had corrected the Non-Cited Violation (NCV) identified in report 05000315\316–2015008.

As appropriate, the inspectors verified the following attributes during their review of the licensee's corrective actions for the above condition reports and other related condition reports:

- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the root and contributing causes of the problem;
- identification of corrective actions, which were appropriately focused to correct the problem; and
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue.

The inspectors discussed the corrective actions and associated evaluations with licensee personnel.

This activity constituted one in-depth problem identification and resolution inspection sample as defined in IP 71152.

b. Observations and Assessments

The inspectors observed that the licensee had failed to correct the condition identified to test isolation valves in the CCW system. While the CCW valves could not be tested in all modes of operation, opportunities to test the CCW isolation valves occur during outages. Between December 2015 and December 2017, both Cook units had refueling outage which provided an opportunity to test the isolation valves for leakage.

c. Findings

(1) Failure to Promptly Correct A Condition Adverse to Quality by Not Testing the Component Cooling Water Leak Isolation Valves

Introduction: The inspectors identified a finding and associated NCV of 10 CFR 50, Appendix B Criterion XVI for failing to correct a condition adverse to quality (CAQ). Specifically, in Inspection Report 05000315/316–2015–008 the NRC issued an NCV of 10 CFR 50 Appendix B Criterion III for the licensee’s failure to leak test isolation valves between redundant trains of the CCW systems for Units 1 and 2. Despite opportunities to restore compliance, for Unit 1, the licensee continued the violation from November 17, 2015 through November 4, 2017; and as of December 31, 2017, the licensee continued in violation on Unit 2.

Discussion: During an NRC design bases inspection in November 2015, the inspectors identified that the licensee did not verify the design of the CCW system to ensure that passive failures in safety related portions and non-safety related portions of the CCW system could be isolated. The inspectors issued an NCV (05000315/2015008–07; 05000316/2015008–07) of 10 CFR 50, Appendix B, Criterion III, Design Control for failing to verify the design of the CCW isolation valves. Without verifying the isolation capability of these valves, the licensee could not ensure that sufficient inventory would remain to maintain the CCW system operable if a leak from a passive failure developed in one train of CCW. In response, the licensee performed an operability determination concluding that the system would remain operable based on assumptions that the isolation valves would not leak in excess of assumed passive failures in connected systems. However, the operability determination also concluded the valves were operable but non-conforming with testing of the valves required to resolve the non-conforming condition. Specifically, absent the testing, the system would remain in non-conformance with the design, and the condition adverse to quality would remain.

Although the valves cannot be reasonably tested at power, they can be tested during refueling outages. For Unit 1, a refueling outage occurred between March 23, 2016, and April 27, 2016; for Unit 2 a refueling outage occurred between October 2, 2016, and January 1, 2017. Although both outages provided plant conditions suitable to test the valves and reasonable time to prepare for and schedule the testing, the licensee failed to do so. In June of 2017, the inspectors identified that the licensee had failed to test the valves during these outages. The licensee documented this issue as AR 2017–6217. As of November 4, 2017, the AR remained open with no actions assigned to verify the isolation capability of these valves. Consequently, by not performing the testing or otherwise validating the design, the licensee did not take prompt action to correct the CAQ and the valves remained in non-conformance with their design. Subsequently, the licensee completed testing of the Unit 1 valves in the fall of 2017 and scheduled testing of the Unit 2 valves during the next, respective refueling outage.

Analysis: The inspectors determined that the licensee's failure to promptly correct the CAQ by not verifying the design of the CCW leak isolation valves or otherwise restoring compliance was a performance deficiency that warranted a significance determination. Using Inspection Manual Chapter (IMC) 0612, Appendix B dated December 13, 2017, the inspectors concluded that the performance deficiency was more that minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to test for valve leakage to ensure the Units 1 and 2 CCW isolation valves could prevent loss of inventory should a leak occur in one train of CCW or a connected SSC. Consequently, by not performing the testing or otherwise verifying the design, the CCW isolation valves remained in non-conformance with their design.

The inspectors evaluated the finding using IMC 0609 Attachment 4, dated October 7, 2016, initial characterization of findings. The inspectors determined the finding affected the Mitigating Systems cornerstone. Using IMC 0609 Appendix A, Exhibit 2, dated June 19, 2012, the inspectors determined that the finding was of very low safety significance (Green) because the finding affected the qualification of CCW but did not render it inoperable. The inspectors evaluated the finding for a cross-cutting aspect. The inspectors determined that the finding had a cross-cutting aspect of

resources, in the human performance area (H.1) because the licensee did not ensure resources were available to correct the CAQ.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that conditions adverse to quality, such as non-conformances are corrected. Contrary to the above, from November 17, 2015 through December 31, 2017, the licensee failed to correct a condition adverse to quality specifically, a non-conformance identified in November 2015 associated with the safety related CCW system. The NRC issued an NCV on January 4, 2016 for the licensee's failure to verify by checking or testing the adequacy of the isolation valve design. To correct the condition, the licensee determined testing of the isolation valves in the safety related CCW system was needed. Although the valves cannot be reasonably tested at power, they can reasonably be tested during refueling outages. For Unit 1, a refueling outage occurred between March 23, 2016 and April 27, 2016 provided plant conditions suitable to test the valves; however, the licensee failed to do so. For Unit 2, a refueling outage between October 2, 2016 and January 1, 2017 afforded the opportunity to test the valve; however the licensee failed to do so. Consequently, by not performing the testing or otherwise validating the design, the CCW isolation valves remained in non-conformance with their design and the associated CAQ remained uncorrected.

As stated, the licensee did test the Unit 1 CCW valve isolation capability and has initiated action to test the Unit 2 valve during its next scheduled refueling outage. Because this violation was of very low safety significance (Green) and was entered into the licensee's CAP as AR–2017–6217, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.
**(NCV 05000315/2017004–03; 05000316/2017004–03, Failure to Promptly Correct The CAQ by Not Testing the CCW Leak Isolation Valves)**

(2) Failure to Verify the Adequacy of the Design for a Temporary Modification

Introduction: A finding and associated violation of 10 CFR 50 Appendix B Criterion III self-revealed when licensee personnel could not obtain a water sample from a location designated as a connection point for a safety related temporary modification. Specifically, the licensee developed a temporary modification to add water to CCW but failed to verify the adequacy of the design in that the licensee did not validate the connection point could supply sufficient water as a source for CCW make-up. As an immediate action the licensee reestablished flow through the valves.

Discussion: In response to NRC findings NCV–0500315/316/2015008–07 (Failure to Verify the Stations Capability to Isolate Postulated CCW System Out-Leakage) and NCV–05000315/316/2015008–04, (Failure to Consider All Design Bases CCW Passive Failures) the license developed temporary modification 12–TM–15–49–R3. This modification consisted of instructions describing how to cross-connect specific valves between the essential service water (ESW) and the CCW system, thereby allowing the ESW to serve as a safety-related backup source of water to the CCW. This would ensure that the CCW could satisfy its design/license condition to function for 30 days following a passive failure. Although this modification was not installed, the licensee intended staff to install the modification during license bases accidents; therefore, the design needed to function with substantial post installation testing or corrective actions.

During a routine sample in June 2017, chemistry discovered that the connection points to ESW would not pass flow. In designing and planning the temporary modification to

install a hose between the two systems, the licensee failed to validate the design assumptions regarding the flow through the valves selected as a source for ESW to CCW. For example, licensee performed a hydraulic analysis of the temporary modification and used standard values for the k value (hydraulic resistance co-efficient). However, when selecting the k value, the licensee did not account for corrosion or corrosion product from ESW piping (a reasonably foreseen condition) which could negate assumptions made for hydraulic resistance. In addition, the licensee did not test the modification to verify that it would deliver adequate flow to the CCW. Licensee procedure EHI–5045, "Design Control," Revision 9, Attachment 1 states that design reviews shall address adequate description of assumptions used in the design and that design verification shall address the adequacy of pre-operational and periodic testing requirements. In this instance, the licensee failed to verify the adequacy of the design either by verifying the assumptions in the hydraulic analysis and/or performing pre-operational testing.

Immediately after identifying the condition, the licensee mechanically agitated the two sample valves in unit 1. This resulted in flow from the ESW to the west CCW train of 2.5 gallons per minute (gpm) and to the east CCW train of 12 gpm. A minimum flow of 11.3 gpm to each CCW train was required for the modification to meet its intended function. As evident, the function for the west CCW train was not met based on the actual flow rates. Although the flow to the east CCW train was adequate, as stated, the design did not account for potential reduction in flow due to fouling, which may decrease the flow to below the minimum required.

Although the temporary modification would not work as designed, the licensee evaluated isolation valves in the system and concluded that the valves would limit CCW inventory loss. The licensee used this as a bases for continued operability of the CCW system. During a planned Unit 1 outage in the fall of 2017, the licensee replaced the clogged valves with larger valves to preclude future fouling. The same modification will be made for Unit 2 during the upcoming spring outage. In addition, the licensee plans on determining a test regimen to validate the connection point remains viable.

Analysis: The inspectors determined that the licensee's failure to verify the adequacy of the design for the temporary modification warranted a significance review. Using IMC 0612, Appendix B dated December 13, 2017, the inspectors concluded that the performance deficiency was more than minor because it was associated with the equipment performance attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to verify that the temporary modification would supply sufficient safety-related make up flow from the ESW to the CCW system, compromising the ability of the CCW to remain operable in the event of a passive failure. The inspectors evaluated the finding using IMC 0609 Attachment 4, dated October 7, 2016 initial characterization of findings. The inspectors determined the finding affected the mitigating systems cornerstone. Using IMC 0609 Appendix A, Exhibit 2, dated June 19, 2012 the inspectors determined the finding was of very low safety significance (Green) because the finding affected the qualification of CCW but did not render it inoperable. In this case, CCW remained operable based on credit taken for isolation valve capability to limit inventory loss.

The finding includes a cross-cutting aspect in the human performance area of H.14, conservative bias. Specifically, the licensee failed to determine that the modification was capable of performing its design function, prior to determining it was acceptable.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that the licensee provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods, or by the performance of a suitable testing program. Licensee procedure EHI–5045, "Design Control," Revision 9, Attachment 1 states that design reviews shall address adequate description of assumptions used in the design and that design verification shall address the adequacy of pre-operational and periodic testing requirements.

Contrary to the above, on December 12, 2015, the licensee failed to verify the adequacy of design for the safety-related temporary modification, intended to utilize the ESW system as an additional source of make-up water to the CCW system, in the event of a passive failure of CCW. Specifically, the licensee failed to either verify the assumptions in the hydraulic analysis and/or perform pre-operational testing prior to implementing the modification. These deficiencies led to the assumption that the modification would provide sufficient makeup flow to the CCW from the ESW during accident conditions. Subsequent evidence demonstrated that the modification would not work as designed.

Because this violation was of very low safety significance (Green) and was entered into the licensee's CAP as AR–2017–6217, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.
**(NCV 05000315/2017004–04; 05000316/2017004–04, Failure to Verify the Adequacy of the Design for a Temporary Modification)**.

.4 Annual Follow-Up of Selected Issues: Westinghouse NSAL on RCP Casings

a. Inspection Scope

The inspectors selected the following condition reports for in-depth review:

- AR 2017–7865; Westinghouse Bulletin NSAL–17–3, 93A RCP Casing and Support; dated August 15, 2017.

As appropriate, the inspectors verified the following attributes during their review of the licensee's corrective actions for the above condition report and other related condition reports:

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance; and
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue.

The inspectors discussed the corrective action and associated evaluation with licensee personnel.

This review constituted one in-depth problem identification and resolution inspection sample as defined in IP 71152.

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On January 24, 2018, the inspectors presented the inspection results to Mr. J. Gebbie and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The inspection results for the Radiation Safety Program review with Mr. S. Lies, Site Vice President, on October 6, 2017;
- The results of the Emergency Preparedness Program inspection with Mr. R. Seiber, Emergency Preparedness Manager, conducted over the phone on November 6, 2017; and
- The results of the ISI were discussed with Ms. K. Ferneau, and other members of the licensee staff on November 1, 2017.

The inspectors confirmed that none of the potential report input discussed was considered proprietary. Proprietary material received during the inspection was returned to the licensee. Proprietary information reviewed by the inspectors was controlled in accordance with appropriate NRC policies regarding sensitive unclassified information.

4OA7 Licensee-Identified Violations

The following violation of very low significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as an NCV.

> Title 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings” states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings appropriate to the circumstances and shall be accomplished in accordance with those instructions, procedures, and drawings. Equipment tagging is a safety related process implemented by procedure 12–OHP–2110–CPS–001, “Clearance Permit System.” Contrary to 12–OHP–2110–CPS–001 step 4.4.3, which directs operators to comply with the tagout on the Unit 2 East Motor Driven AFW pump room cooler, the operators mistakenly secured and tagged the Unit 1 East Motor Driven AFW pump room cooler instead. This rendered the Unit 1 East Motor Driven AFW pump inoperable. The violation occurred at 0219 on September 6, 2017, and concluded at 0623 the same day after the error was realized and corrected. The licensee entered the issue into their CAP

as AR–2017–8509. The finding screened to Green because there was no loss of system function, nor loss of a train for greater than the Technical Specification allowed outage time.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

## KEY POINTS OF CONTACT

Licensee

J. Gebbie, Site Vice President
J. Bower, Acting Radiation Protection (RP) Manager
T. Curtis, Regulatory Affairs
R. Keller, RP Supervisor
S. Mims, RP Supervisor
S. Mitchell, Regulatory Affairs
B. Roger, RP Supervisor
R. Sieber, Emergency Preparedness Manager
K. Simpson, Emergency Preparedness Supervisor

U.S. Nuclear Regulatory Commission

K. Riemer, Chief, Reactor Projects Branch 2
N. Shah, Project Engineer, Branch 2
J. Rankin, Project Manager

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

| | | |
|---|---|---|
| 05000315/2017004–01;<br>05000316/2017004–01 | NCV | Failure to Correct Numerous Anchor Darling Double Disc Gate Valve Non-Conformances (1R12) |
| 05000315/2017004–02 | URI | Unit 1 Letdown System Safety Valve Lift During Preparations for Cooldown (1R20) |
| 05000315/2017004–03;<br>05000316/2017004–03 | NCV | Failure to Promptly Correct The CAQ by Not Testing the CCW Leak Isolation Valves (4OA2.3(1)) |
| 05000315/2017004–04;<br>05000316/2017004–04 | NCV | Failure to Verify the Adequacy of the Design for a Temporary Modification (4OA2.3(2)) |

Closed

| | | |
|---|---|---|
| 05000315/2017004–01;<br>05000316/2017004–01 | NCV | Failure to Correct Numerous Anchor Darling Double Disc Gate Valve Non-Conformances (1R12) |
| 05000315/2017004–03;<br>05000316/2017004–03 | NCV | Failure to Promptly Correct The CAQ by Not Testing the CCW Leak Isolation Valves (4OA2.3(1)) |
| 05000315/2017004–04;<br>05000316/2017004–04 | NCV | Failure to Verify the Adequacy of the Design for a Temporary Modification (4OA2.3(2)) |

Discussed

None.

## LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspector reviewed the documents in their entirety, but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

1R01 Adverse Weather

- 12-OHP-4022-001-010, Severe Weather, Revision 21
- AR 2017-10848, 2AB EDG Field Volt Indications Fluctuated, October 26, 2017
- AR 2017-9627, Holes in Outer Turbine Wall East Side 609, September 28, 2017
- AR-2017-11360, Outside Scaffold Enclosure Issues, November 9, 2017
- Letter Norick to Ross, Seasonal readiness Affirmation, November, 6, 2017

1R04 Equipment Alignment

- 12-FPP-2270-066-029,Operation of the Fire Protection Fire Pumps, Revision 8
- 12-OHP-4021-057-005, Operation of Screen Wash and traveling Screens, Revision 23
- 1-OHP-4021-008-002, Placing Emergency Core Cooling System in Standby Readiness, Revision 36
- 1-OHP-4021-082-006, Operation of 1AB and 1CD Battery Chargers, Revision 11
- AR 2014-13198, NRC Identified Condensation Dripping on Cable Tray, October 22, 2014
- AR 2017-11214, Boric Acid on 1-OME-6-1, November 6, 2017
- AR 2017-11236, 1-IRV-110 Local Indication Needs Adjustment, November 6, 2017
- AR 2017-11263, Accumulator #1 Vent Valve Support Issues, November 7, 2017
- AR 2017-11355, Legacy Sodium Tetra Borate on Unit 1 Accumulators 1 & 2, November 8, 2017
- OP-1-5113-101, Flow Diagram Essential Service Water, May 27, 2016
- OP-1-5142-48, Flow Diagram Emergency Core Cooling (SIS)1-OHP-4021-008-006, Adjusting Pressure in an Accumulator
- OP-1-5143-79, Flow Diagram Emergency Core Cooling (RHR) Unit No. 1
- OP-1-5143A-7, Flow Diagram, Emergency Core Cooling (RHR) Accumulator Piping Unit No. 1
- R-ESW-ESWE-0945, 1-PP-7E-MTR, Ease Essential Service Water Pump PP-7E Motor, October 30, 2017
- R-ESW-ESWE-1022, 1-PP-&E, East Essential Service Water Pump, October 30, 2017
- R-RCS-SS-0850(001), 1-OME-1, Reactor VEsselR-ECS-ACC-0054, 1-IMO-110, Accumulator 1 Outlet Valve
- R-RHR-RHRW-0239(001), 1-IMO-325, West RHR HX and South SI Pump to RC Loops 2 & 3 Hot Legs Shutoff Valve
- WO 55454360, NRC Identified Condensation Dripping on Cable Tray
- WO 55504010, Support 1-OHP-4030-114-011 AT#11 Accumulator Valves
- WO 55510839, U-1 #4 Accumulator Pressure Lowering Approximately 2.2 psi Per Day

1R05 Fire Protection

- Fire Pre-Plans Volume 1, Revision 31
- PMP-2270-CCM-001, Control of Combustible Materials, Revision 40

1R07 Heat Sink

- 12-EHP-8913-001-002, Heat Exchanger Inspection Report for 1-HE-15W, Work Order 55496590-19
- 1-OHP-5030-019-002E, East Essential Service Water System Flush and Flow Test, Revision 11
- 1-OHP-5030-019-002W, West Essential Service Water Flush and Flow Test, Revision 11
- AR-2017-10175, 1-HE-15E Tube Leak, October 9, 2017
- AR-2017-10181, 1-HE-15E Tube Severed in Tube Sheet, October 9, 2017
- AR-2017-10480, FME in 1-HE-17W Divider Head, October 16, 2017
- AR-2017-10604, Obstructed Tubes in 1-HE-17W, October 18, 2017
- AR-2017-7888, 1-HE-15W, Indications of Tube Leakage, August 16, 2017
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## LIST OF ACRONYMS USED

| | |
|---|---|
| AC | Alternating Current |
| ADDDGV | Anchor Darling Double Disc Gate Valve |
| AFW | Auxiliary Feedwater |
| AR | Action Request |
| ASME | American Society of Mechanical Engineers |
| CAP | Corrective Action Program |
| CAQ | Condition Adverse to Quality |
| CCW | Component Cooling Water |
| CFR | *Code of Federal Regulations* |
| EAL | Emergency Action Levels |
| EPRI | Electric Power Research Institute |
| ESW | Essential Service Water |
| ET | Eddy Current Testing |
| gpm | Gallons Per Minute |
| IMC | Inspection Manual Chapter |
| IP | Inspection Procedure |
| IR | Inspection Report |
| ISI | Inservice Inspection |
| kV | Kilovolts |
| MRP | Materials Reliability Program |
| MSPI | Mitigating Systems Performance Index |
| NCV | Non-Cited Violation |
| NDE | Non-destructive Examination |
| NEI | Nuclear Energy Institute |
| NRC | U.S. Nuclear Regulatory Commission |
| OSP | Outage Safety Plan |
| PI | Performance Indicator |
| RCS | Reactor Coolant System |
| RFO | Refueling Outage |
| SG | Steam Generator |
| SSC | Structures, Systems, and Components |
| TS | Technical Specification |
| UFSAR | Updated Final Safety Analysis Report |
| URI | Unresolved Item |
| UT | Ultrasonic Testing |