



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE RD. SUITE 210
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April 29, 2015

Mr. Bryan C. Hanson
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President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2015001;
05000265/2015001

Dear Mr. Hanson:

On March 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. The enclosed report documents the results of this inspection, which were discussed on April 7, 2015, with Mr. K. Ohr, and other members of your staff.

Based on the results of this inspection, two self-revealed findings of very low safety significance were identified. The findings involved a violation of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as non-cited violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy. Additionally, two licensee-identified violations of very low safety significance are listed in Section 4OA7 of this report.

If you contest the subject or severity of this NCV, 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 a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission-Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Quad Cities Nuclear Power Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at the Quad Cities Nuclear Power Station.

B. Hanson

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In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

James McGhee, Acting Chief
Branch 1
Division of Reactor Projects

Docket Nos. 50-254; 50-265
License Nos. DPR-29; DPR-30

Enclosure:
IR 05000254/2015001; 05000265/2015001
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-254; 50-265
License Nos: DPR-29; DPR-30

Report No: 05000254/2015001; 05000265/2015001

Licensee: Exelon Generation Company, LLC

Facility: Quad Cities Nuclear Power Station, Units 1 and 2

Location: Cordova, IL

Dates: January 1 through March 31, 2015

Inspectors: R. Murray, Senior Resident Inspector
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Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

Inspection Report 05000254/2015001, 05000265/2015001; 01/01/2015–03/31/2015; Quad Cities Nuclear Power Station, Units 1 & 2; Operability Determinations and Functional Assessments, and Follow-Up of Events and Notices of Enforcement Discretion.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Two Green findings were self-revealed. The findings were considered non-cited violations (NCV) of NRC regulations. 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 June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas" effective date 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 5, dated February 2014.

Cornerstone: Mitigating Systems

Green. A finding of very low safety significance (Green) and associated NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," was self-revealed on January 6, 2015, when an electrical maintenance worker found a tripped breaker in motor control center (MCC) 28-1, for the Unit 2 power feed to the common unit (Unit 0) fuel oil transfer pump (FOTP). The licensee determined that an HGA relay in the FOTP power transfer circuit had failed due to aging and not having any associated preventive maintenance task. The inspectors determined the licensee failed to establish and maintain the service life for the FOTP HGA relay, which was a performance deficiency. This also resulted in the inoperability of the Unit 0 emergency diesel generator (EDG) for longer than its technical specification allowed outage time, which was a violation of Technical Specification 3.8.1, "AC Sources-Operating." The immediate corrective actions included replacing the failed relay and declaring the EDG operable following post-maintenance testing. The licensee captured the issue in their corrective action program (CAP) as Issue Report (IR) 2433389.

The performance deficiency was determined to be more than minor and a finding because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency caused an unplanned inoperable condition for the Unit 0 EDG. The inspectors evaluated the finding using IMC 0609, Appendix A, "The SDP for Findings At-Power," issued June 19, 2012. The issue resulted in the EDG being inoperable for longer than the Technical Specification (TS) allowed outage time. A detailed risk analysis was performed and determined the finding was of very low safety significance. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because the licensee did not thoroughly evaluate issues to ensure that the resolution addressed causes and extent of conditions commensurate with their safety significance. Specifically, the licensee identified other EDG electrical component failures that occurred at the station where the causes were identified as failure to have associated preventive maintenance for the affected components and equipment. The extent of condition evaluations for those events failed to identify additional

safety related components that did not have any associated preventive maintenance tasks or documented service life, including replacement schedules [P.2]. (Section 1R15)

Green. A finding and non-cited violation of very low safety significance (Green) was self-revealed for the licensee's failure to ensure the Unit 1 high pressure coolant injection (HPCI) system was in a standby lineup configuration in accordance with station procedures. This represented a violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." The performance deficiency resulted in a steam release into the Unit 1 HPCI room. The licensee took immediate actions to terminate the steam release by closing the HPCI steam isolation valves. The licensee captured the issue in their corrective action program as IR 2450896.

The performance deficiency was determined to be more than minor and a finding because it was associated with the configuration control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors evaluated the finding using IMC 0609, Appendix A, "The SDP for Findings At-Power," and answered "No" to all of the screening questions in Exhibit 2 "Mitigating Systems," and concluded the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in the area of Human Performance, Work Management, because the organization failed to implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority; and the work process did not include the identification and management of risk commensurate to the work, and the need for coordination with different job activities. Specifically, the licensee failed to coordinate the simultaneous performance of two tests and ensure the HPCI system was in the proper lineup and configuration prior to test execution [H.5]. (Section 4OA3)

Licensee-Identified Violations

Violations of very low safety or security significance or Severity Level IV that were identified by the licensee have been reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's CAP. These violations and CAP tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1

Unit 1 operated at full power from January 1–27, 2015, with the exception of planned downpowers for routine testing and rod pattern adjustments. On January 27, 2015, Unit 1 reduced power to approximately 30 percent in response to the 1B reactor recirculation pump tripping. The licensee returned to full power on January 28, 2015, following replacement of the 1B adjustable speed drive supply breaker to the 1B reactor recirculation pump.

Unit 1 remained at full power from January 28 to March 2, 2015, with the exception of planned downpowers for routine testing and rod pattern adjustments. Unit 1 shut down on March 2, 2015, for a planned refueling outage, Q1R23. Unit 1 restart commenced on March 21, 2015, and Unit 1 returned to full power on March 25, where it remained until the end of the reporting period on March 31, 2015.

Unit 2

Unit 2 operated at full power from January 1 to March 31, 2015, with the exception of planned downpowers for routine testing and rod pattern adjustments.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 External Flooding

a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the Updated Final Safety Analysis Report (UFSAR) for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, checked that the roofs did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined that barriers required to mitigate the flood were in place and operable. Additionally, the inspectors performed a walkdown of the protected area to identify any modification to the site which would inhibit site drainage during a probable maximum precipitation event or allow water ingress past a barrier. The inspectors also reviewed the abnormal operating procedure for mitigating the design basis flood to ensure it could be implemented as written. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one external flooding sample as defined in Inspection Procedure (IP) 71111.01–05.

b. Findings

No findings were identified.

.2 Readiness for Impending Adverse Weather Condition–Extreme Cold Conditions

a. Inspection Scope

Since extreme cold conditions were forecasted for February 15–20, 2015, the inspectors reviewed the licensee’s overall preparations/protection for the expected weather conditions. On February 17 and 18, the inspectors walked down the electrical systems that provide heat to safety and non-safety related equipment, such as the contaminated condensate storage tanks and heating boilers, because their functions could be affected or required as a result of the extreme cold conditions forecasted for the facility. The inspectors observed insulation, heat trace circuits, space heater operation, and weatherized enclosures to ensure operability of affected systems. The inspectors reviewed licensee procedures and discussed potential compensatory measures with control room personnel. The inspectors focused on plant management’s actions for implementing the station’s procedures for ensuring adequate personnel for safe plant operation and emergency response would be available. Documents reviewed are listed in the Attachment to this report.

This inspection 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 reactor core isolation cooling (RCIC) system during routine testing and maintenance of the HPCI system;
- Unit 1 HPCI system during routine testing and maintenance of the RCIC system;
- Unit 0 (common unit) EDG system following routine testing and maintenance;
- Unit 1 ‘B’ residual heat removal (RHR) system while protected with ‘A’ RHR in service for shutdown cooling; and
- Unit 2 alternating current (AC) electrical distribution system with Unit 1 Transformer 12 out of service for maintenance.

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, TS requirements, outstanding work orders (WOs), 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 five 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

On January 6–12, 2015, the inspectors performed a complete system alignment inspection of the Unit 0 EDG following planned maintenance 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:

- Fire Zone (FZ) 8.2.7.C, Unit 1/2 Turbine Building (TB), Elevation 611'-6", Adjustable Speed Drive Coolers and Turbine Oil Reservoirs;
- FZ 9.2, Unit 2 TB, Elevation 595'-0", Diesel Generator;
- FZ 8.2.6.A and B, Unit 1 TB, Elevation 595'-0", Hallway and Low Pressure Heater Bay; and
- FZ 11.4.B, Crib House, Elevation 595'-0", Ground Floor/Service Water Pumps.

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.

1R08 Inservice Inspection Activities (71111.08P)

From March 2-16, 2015, 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, risk-significant piping and components, and containment systems.

The ISIs described in Sections 1R08.1 and 1R08.5 below constituted one inspection sample as defined in IP 71111.08-05.

.0 Piping Systems In-Service Inspection

a. Inspection Scope

The inspectors either observed or reviewed the following Non-Destructive Examinations (NDEs) mandated by the American Society of Mechanical Engineers (ASME) Section XI Code 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 an NRC-approved alternative requirement:

- Manual Ultrasonic Examination (UT) of a nozzle-to-safe end weld (30A–S0) in the main steam system;
- Manual UT of the reactor vessel flange-to-shell weld (RPV–CW–C4FLG) in the reactor coolant system;
- Manual UT examination of a valve-to-elbow weld overlay (14A–F11) in the core spray system; and
- Dye penetrant examination of the snubber-to-pipe attachment weld (1403-W-103A) in the core spray system.

The inspectors observed the following NDEs conducted as part of the licensee's Industry Initiative Inspection Programs for managing vessel internals cracking to determine whether the examinations were conducted in accordance with the licensee's Augmented Inspection Program, industry guidance documents and associated licensee examination procedures, and if any indications and defects were detected to determine whether these were dispositioned in accordance with approved procedures and NRC requirements:

- In-vessel remote underwater visual EVT–1 examination of steam dryer support lug and internal core spray pipe welds to meet the Reactor Pressure Vessel, Internals Examination Guidelines–EPRI [Electric Power Research Institute] Report TR–105696–R16 (BWRVIP–03) and BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines–EPRI Report TR-1016568 (BWRVIP-18a).

During non-destructive surface and volumetric examinations performed since the previous refueling outage, the licensee had not identified any recordable indications. Therefore, no NRC review was completed for this inspection procedure attribute.

The inspectors reviewed records for the following pressure boundary weld repairs completed for risk-significant systems during the last outage to determine whether the licensee applied the pre-service NDEs and acceptance criteria required by the construction code, and/or the NRC-approved code relief request. Additionally, the inspectors reviewed the welding procedure specifications and supporting weld procedure qualification records to determine whether the weld procedures were qualified in accordance with the requirements of the construction code and the ASME code, Section IX:

- Welds 1, 2, and 3 fabricated during the removal and reinstallation of a section of high-pressure coolant injection pipe at the turbine stop valve (WO No. 00880894).

b. Findings

No findings were identified.

.2 Reactor Pressure Vessel Upper Head Penetration Inspection Activities (Not Applicable)

.3 Boric Acid Corrosion Control (Not Applicable)

.4 Steam Generator Tube Inspection Activities (Not Applicable)

.5 Identification and Resolution of Problems

a. Inspection Scope

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

- the licensee had established an appropriate threshold for identifying ISI-related problems;
- 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 Title 10, Code of Federal Regulations (CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. Documents reviewed are listed in the Attachment to this report.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program (71111.11)

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

a. Inspection Scope

On February 5, 2015, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator regualification training to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems and 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.

b. Findings

No findings were identified.

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

a. Inspection Scope

On March 2, 2015, the inspectors observed control room operators during the planned shutdown of Unit 1 for its refueling outage Q1R23. This was an activity that required heightened awareness and 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 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 inspection constituted one quarterly licensed operator heightened activity/risk sample as defined in IP 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- Unit 1 main steam isolation valves.

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

This inspection constituted one quarterly maintenance effectiveness sample as defined in IP 71111.12-05.

b. Findings

No findings were identified.

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:

- Work Week 15-02-04: Risk during U2 125 Vdc ground and cold weather alert;

- Work Week 15–03–05: Risk during U1 RCIC planned maintenance and testing, 1A core spray logic test, and planned station particulate, iodine and noble gas instrument maintenance;
- Work Week 15–07–09: Risk during U1 HPCI planned maintenance and testing, 1A RPS MG set overhaul, and U2 125 Vdc ground troubleshooting;
- Work Week 15–09–11: Risk during cold weather alert, planned U2 RCIC maintenance, and unplanned U2 EDG limiting condition for operation (LCO);
- Work Week 15–10–12: Unit 2 online risk and shutdown safety for Unit 1 during Q1R23 week 1; and
- Work Week 15–11–13: Unit 2 online risk and shutdown safety for Unit 1 during Q1R23 week 2.

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 maintenance risk assessments and emergent work control activities constituted six 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:

- IR 2439235: Associated with Preconditioning of 0–5741–338, the Flow Control Valve to the 'B' Control Room HVAC Refrigeration Control Unit;
- IR 2433389: Unit ½ EDG Fuel Oil Transfer Pump Unit 2 Breaker Found Tripped;
- IR 2427286: 2–1002–C RHR Control Switch Potentially Non-Conforming for Part 21 on General Electric- Hitachi SBM Switches; and
- WO 1695375: 1A RR Pump Speed Reads 159 Percent (operator workaround).

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 UFSAR 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. The inspectors also conducted a review of potential operator workarounds. Documents reviewed are listed in the Attachment to this report.

This operability inspection constituted four samples as defined in IP 71111.15-05.

b. Findings

(1) Failure to Establish and Maintain Service Life for Safety-Related Relay Results in Failure and Inoperability

Introduction: A finding of very low safety significance (Green) and NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was self-revealed on January 6, 2015, when an electrical maintenance worker found a tripped breaker in MCC 28-1, for the Unit 2 power feed to the common unit (Unit 0) fuel oil transfer pump (FOTP). The licensee determined that an HGA relay in the FOTP power transfer circuit had failed due to aging and not having any associated preventive maintenance task. The inspectors determined the licensee failed to establish and maintain the service life for the FOTP HGA relay. This also resulted in the inoperability of the Unit 0 EDG for longer than its technical specification allowed outage time, which was a violation of TS 3.8.1, "AC Sources-Operating."

Description: On January 6, 2015, during a non-related maintenance activity at MCC 28-1A, an electrical maintenance worker discovered that the breaker for the Unit 2 power feed to the Unit 0 FOTP was in the tripped position and reported the condition to the control room. Further investigation by the licensee found a faulty HGA relay in the power transfer circuit for the Unit 0 fuel oil transfer pump. The licensee was unable to determine the exact time that the breaker tripped and therefore assumed it had most likely occurred during the last Unit 0 EDG surveillance test on December 30, 2014, when the EDG was operated for post-maintenance testing. During this test, the breaker trip went unnoticed. Therefore, the start of the inoperability and LCO clock occurred at the start of the planned maintenance window on December 29, 2014. The licensee determined the U0 EDG was inoperable from when the issue was discovered on December 29, 2014, through January 8, 2015, when the EDG was finally declared operable following replacement of the relay and post maintenance testing. The total LCO time of 10 days exceeded the allowed outage time of seven days specified in TS 3.8.1 for one inoperable EDG and thus represented a violation of TS.

The licensee conducted an Apparent Cause Evaluation (ACE) into the failure of the HGA relay in the power transfer circuit, and determined that high resistance contacts in the relay caused the failure. The licensee sent the relay to Exelon Power Labs to conduct an analysis of the relay. One of the conclusions of the analysis stated that the "overall condition of the relay and contacts suggest that the relay may have reached end of life." The licensee also determined that neither the panel where the relay was located

(panel 2212–50) nor the relay have specified preventive maintenance tasks, including no specified replacement frequency.

The HGA relay that failed was a General Electric Model 12HGA11H70 relay. The licensee was unable to identify any documentation specifying the service life for this relay. The licensee provided the inspectors with the station’s generic performance centered maintenance (PCM) template. The PCM template indicated that HGA100 Series relays had a service life of >80 years. However, the inspectors identified that the HGA relay that failed was an older model than the 100 series relay to which the PCM template refers. Therefore, the PCM template was not applicable for this component. The inspectors identified several additional problems with applying the PCM template to this relay.

The station’s PCM template was based on information contained in the Electric Power Research Institute (EPRI) Report 3002000541, “Relay Series–Specific Guidance: Generic Service Life Analyses (GSLA) and Preventive Maintenance (PM) Templates.” The report indicated that it was “only applicable to certain vintage relays... that have been evaluated in this analysis. Prior to applying this analysis to relays that are installed... a similarity evaluation should be performed since changes in configuration or materials of construction could affect the established service life of these relays.” The licensee had not performed a similarity evaluation to address material and configuration changes prior to applying the analysis contained in the EPRI report to their PCM template for the failed relay model (12HGA11H70). In addition, EPRI Report 3002000541 stated, “Relays mounted in small non-ventilated boxes need to be analyzed based on actual service conditions, i.e., they are not addressed in this evaluation.” The failed relay was mounted in panel 2212–50, which was a small non-ventilated box. Finally, the inspectors noted that the EPRI report cited by the licensee’s PCM template stated, “The service lives established in this evaluation assume that all recommended preventive maintenance, inspections and surveillances are performed as intended.” Because the licensee did not perform any preventive maintenance on the associated relay or panel, the PCM template was not applicable for the failed relay.

In addition, the inspectors noted that the PCM template was inconsistent with and less conservative than applicable vendor documents. Specifically, the vendor manual for the GE HGA100 Century Series relays stated:

- “The Century Series coil design provides longer operating life than previous designs as a result of changes in the entire coil insulation system”; and
- “Accelerated life tests—conducted at elevated temperature and maximum voltage—have established a projected service life of 40 years to 1 percent failure (that is when 1 percent of all such relays have failed).”

The inspectors were concerned because service life is a critical element in the selection of safety-related SSCs to ensure they are capable of performing their specified function. The licensee captured the inspectors concern in the CAP as IR 2433389.

The inspectors determined that the performance deficiency had a cross cutting aspect because it was related to current licensee performance. The licensee’s ACE for this event looked at previous operating experience to determine if any insights could be gained. The operating experience review identified an unplanned inoperability on the

Unit 1 EDG that occurred on August 20, 2013, which was documented in IR 1548635. This event identified a hard ground in the EDG terminal box, which had no associated preventive maintenance tasks. The licensee also identified that on January 24, 2014, the U2 EDG start failure relay failed its surveillance test, which was due to aging. This event was also caused by the failure to specify a service life and the relay did not have any associated preventive maintenance tasks. The inspectors were concerned that the licensee's extent of condition for these events failed to identify additional components without any associated preventive maintenance tasks and documented service life.

Analysis: The inspectors determined that the failure to establish and maintain the service life for the Unit 0 FOTP power transfer circuit HGA relay, 0-5203-127FO, which resulted in the inoperability of the Unit 0 EDG for longer than its technical specification allowed outage time, was contrary to the requirements of 10 CFR 50, Appendix B, Criterion III, "Design Control," and TS 3.8.1, "AC Sources-Operating" and was therefore a performance deficiency.

The performance deficiency was determined to be more than minor and a finding because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency caused an unplanned inoperable condition for the Unit 0 EDG.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Appendix A, "The Significance Determination Process for Findings at Power" dated June 19, 2012. The inspectors determined a detailed risk analysis was required because they answered "Yes" to question A.3 in Exhibit 2, "Mitigating Systems Screening Questions," because the finding represented an inoperable condition for at least one train of an AC power source for greater than its TS-allowed outage time. The senior risk analysts (SRAs) performed a detailed risk evaluation using version 8.21 of the Standardized Plant Analysis Risk (SPAR) model for Quad Cities that was modified by Idaho National Laboratories to add simplified logic for the Unit 0 EDG fuel oil pump power supplies, including a basic event for the operator to re-close the breaker to recover the pump function. To model the degraded condition, the SRAs assumed that the EDG fuel oil transfer pump power supply was failed but that the operator could recover the pump by closing the breaker. Recovery rules were added to eliminate core damage sequences that occur in less than 4 hours involving the FOTP because the day tank holds adequate fuel for this event duration. An annunciator would alert the operator to a low level in the fuel oil day tank. The action to close the breaker was covered by plant procedures and adequate time existed to recover the fuel oil transfer pump. The human error probability for the operator failing to diagnose the problem and take action to close the breaker was estimated as $2.2E-2$, using the SPAR-H Human Reliability Analysis Method, and assuming high stress conditions. The SRAs used a T/2 exposure time from the last successful surveillance test performed December 1, 2014, in accordance with the Risk Assessment Standardization Project handbook for conditions in which the degradation mechanism (aging) gradually affected the component during the exposure period. The exposure time used was 19.5 days. The estimated change in core damage frequency from internal events was less than $1E-7$ /yr, which represents a finding of very low safety significance (Green). The dominant sequence was a weather-related loss of offsite

power, failure of the emergency power system, and the failure to recover offsite and onsite power.

This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because the licensee did not thoroughly evaluate issues to ensure that the resolution addressed causes and extent of conditions commensurate with their safety significance. Specifically, the licensee identified other EDG electrical component failures that occurred at the station where the causes were identified as failure to have associated preventive maintenance for the affected components and equipment. The extent of condition evaluations for those events failed to identify additional safety related components that did not have any associated preventive maintenance tasks or documented service life, including replacement schedules [P.2].

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” requires, in part, that measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components.

Technical Specification 3.8.1 “AC Sources—Operating” condition B.4 states, in part, that the required inoperable diesel generator be restored to operable status within 7 days.

Contrary to the above, prior to December 30, 2014, the licensee failed to review for suitability of application of parts and equipment essential to the safety-related functions of the Unit 0 EDG FOTP. Specifically, the licensee failed to establish and maintain the service life for the Unit 0 FOTP power transfer circuit HGA relay, 0–5203–127FO, to ensure its suitability for performing its safety related functions, and the relay subsequently failed due to aging. This failure resulted in the inoperability of the Unit 0 EDG for 10 days, which was longer than the technical specification allowed outage time of 7 days.

Immediate corrective actions included replacing the failed relay and declaring the EDG operable following post-maintenance testing. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee’s CAP as IR 2433389. **(NCV 05000254/2015001–01; 05000265/2015001–01, Failure to Establish and Maintain Service Life for Safety-Related Relay Results in Failure and Inoperability)**

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification(s):

- Engineering Change (EC) 396324/396354: Unit 1 and Unit 2 250 Vdc Battery Modification to Crosstie Safety-Related and Non-Safety Related Batteries–FLEX.

The inspectors reviewed the configuration changes and associated 10 CFR 50.59 safety evaluation screening against the design basis, the UFSAR, and the TS, as applicable, to

verify that the modification did not affect the operability or availability of the affected systems. 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 inspection 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 activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- WO 1670367-05: Unit 1 Division I Core Spray Logic Functional Test Following Position Switch Replacement;
- WO 1473372: Unit 1 Division II Anticipated Transient Without a SCRAM (ATWS) Recirculation Pump Trip and Alternate Rod Insertion Logic Test Following Relay Replacements;
- Unit 1 1B Reactor Recirculation Pump Following Maintenance on 1B Adjustable Speed Drive;
- WO 1783974: Unit 2 HPCI Drain Pot Level Switch Test Following HPCI Inlet Drain Pot Level Switch Assembly Replacement;
- WO 1805743-01: Unit 1 RCIC Manual Initiation Test Following Planned Maintenance Performed During Unit 1 Outage Q1R23; and
- WO 1744523-14: Unit 1 4kV Bus Transfer Logic Test Following Modification and Bus 24-1 Planned Maintenance.

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 inspection constituted six post-maintenance testing samples 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) Q1R23, conducted March 2-25, 2015, 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 defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls in place for 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 sipping to detect fuel assembly leakage;

- startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the drywell (primary 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.

This inspection constituted one RFO sample as defined in IP 71111.20–05.

b. Findings

On March 12, 2015, following completion of fuel shuffle number two, during performance of procedure NF–AA–330–1001, “Core Verification,” the licensee identified fuel assembly QAD224 had been inserted in the core in the incorrect orientation and not in accordance with the fuel move sheets. The enforcement aspects of this issue are discussed in Section 4OA7.

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:

- QCOS 6600–41: Unit 1 Emergency Diesel Generator Load Test (Routine);
- Local Leak Rate Test–Main Steam Isolation Valves (Containment Isolation Valve);
- QCOS 0201–02: Primary System Boundary Thermal Limitations–Unit 1 (Routine);
- QCOS 5750–20: Control Room Emergency Ventilation Air Conditioning System (Routine);
- QCOS 6600–50: Unit One Division II Emergency Core Cooling System Simulated Automatic Actuation And Diesel Generator Auto-Start Surveillance (In Service Testing); and
- QCOS 2300–27: Unit 1 HPCI Comprehensive Performance Test (In Service Testing).

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.

This inspection constituted three routine surveillance testing samples, two inservice testing samples, and one containment isolation valve sample as defined in IP 71111.22, Sections–02 and–05.

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

This inspection constituted a partial sample as defined in IP 71124.01–05.

.1 Radiological Hazard Assessment (02.02)

a. Inspection Scope

The inspectors determined if there have been changes to plant operations since the last inspection that may result in a significant new radiological hazard for onsite workers, or

members of the public. The inspectors evaluated whether the licensee assessed the potential impact of these changes, and has 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 to verify conditions.

The inspectors selected the following radiologically risk-significant work activities that involved exposure to radiation:

- RWP 10016382: Control Rod Drive Bull Pen Support;
- RWP 10016380: Control Rod Drive Activities; and
- RWP 10016379: Drywell Valve Maintenance and Support Activities.

For these work activities, the inspectors assessed whether the pre-work surveys performed were appropriate to identify and quantify the radiological hazard, and to establish adequate protective measures. The inspectors evaluated the Radiological Survey Program to determine if hazards were properly identified, including the following:

- identification of hot particles;
- the presence of alpha emitters;
- the potential for airborne radioactive materials, including the potential presence of transuranics and/or other hard-to-detect radioactive materials (This evaluation may include licensee planned entry into non-routinely entered areas subject to previous contamination from failed fuel.);
- the hazards associated with work activities that could suddenly and severely increase radiological conditions and that the licensee has established a means to inform workers of changes that could significantly impact their occupational dose; and
- severe radiation field dose gradients that can result in non-uniform exposures of the body.

The inspectors observed work in potential airborne areas, and evaluated whether the air samples were representative of the breathing air zone. The inspectors evaluated whether continuous air monitors were located in areas with low background to minimize false alarms, and were representative of actual work areas. The inspectors evaluated the licensee's program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors selected various containers holding non-exempt licensed radioactive materials that may cause unplanned or inadvertent exposure of workers, and assessed whether the containers were labeled and controlled in accordance with 10 CFR 20.1904, "Labeling Containers," or met the requirements of 10 CFR 20.1905(g), "Exemptions To Labeling Requirements."

The inspectors reviewed the following radiation work permits used to access high radiation areas, and evaluated the specified work control instructions or control barriers:

- RWP10016379: Drywell Valve Maintenance And Support Activities;
- RWP10016359: Outboard Main Steam Isolation Valve (MSIV) Overhaul; and
- RWP10016378: Drywell Main Seam Safety Relief Valve Activities.

For these radiation work permits, the inspectors assessed whether allowable stay times or permissible dose (including from the intake of radioactive material) for radiologically significant work under each radiation work permit were clearly identified. The inspectors evaluated whether electronic personal dosimeter alarm set-points were in conformance with survey indications and plant policy.

The inspectors reviewed selected occurrences where a worker's electronic personal dosimeter noticeably malfunctioned or alarmed. The inspectors evaluated whether workers responded appropriately to the off-normal condition. The inspectors assessed whether the issue was included in the CAP, and dose evaluations were conducted as appropriate.

For work activities that could suddenly and severely increase radiological conditions, the inspectors assessed the licensee's means to inform workers of changes that could significantly impact their occupational dose.

b. Findings

No findings were identified.

.3 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions (e.g., radiation levels or potential radiation levels) 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 (including audio and visual surveillance for remote job coverage), and contamination controls. The inspectors evaluated the licensee's use of electronic personal 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 high-radiation work areas with significant dose rate gradients.

The inspectors reviewed the following radiation work permits for work within airborne radioactivity areas with the potential for individual worker internal exposures:

- RWP10016378: Drywell Main Steam Safety Relief Valve Activities;
- RWP10016390: Inboard MSIV Overhaul;
- RWP10016379: Drywell Valve Maintenance and Support Activities;
- RWP10016359: Outboard MSIV Overhaul; and
- RWP10016356: Outboard MSIV Activities.

For these radiation work permits, the inspectors evaluated airborne radioactive controls and monitoring, including potential for significant airborne levels (e.g., grinding, grit blasting, system breaches, and entry into tanks, cubicles, and reactor cavities). The inspectors assessed barrier (e.g., tent or glove box) integrity and temporary high-efficiency particulate air ventilation system operation.

b. Findings

No findings were identified.

.4 Radiation Worker Performance (02.07)

a. Inspection Scope

The inspectors observed radiation worker performance with respect to stated radiation protection work requirements. The inspectors assessed whether workers were aware of the radiological conditions in their workplace and the radiation work permit controls/limits in place, and whether their performance reflected the level of radiological hazards present.

The inspectors reviewed radiological problem reports since the last inspection that found the cause of the event to be human performance errors. The inspectors evaluated whether there was an observable pattern traceable to a similar cause. The inspectors assessed whether this perspective matched the corrective action approach taken by the licensee to resolve the reported problems. The inspectors discussed with the radiation protection manager any problems with the corrective actions planned or taken.

b. Findings

No findings were identified.

.5 Radiation Protection Technician Proficiency (02.08)

a. Inspection Scope

The inspectors observed the performance of the radiation protection technicians with respect to all radiation protection work requirements. The inspectors evaluated whether technicians were aware of the radiological conditions in their workplace and the radiation work permit controls/limits, and whether their performance was consistent with their training and qualifications with respect to the radiological hazards and work activities.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

This inspection constituted a partial sample as defined in Inspection Procedure 71124.03–05.

.1 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

For those situations where it is impractical to employ engineering controls to minimize airborne radioactivity, the inspectors assessed whether the licensee provided respiratory protective devices such that occupational doses are as-low-as-reasonably-achievable. The inspectors selected work activities where respiratory protection devices were used to limit the intake of radioactive materials, and assessed whether the licensee performed an evaluation concluding that further engineering controls were not practical, and that the use of respirators is as-low-as-reasonably-achievable. The inspectors also evaluated whether the licensee had established means (such as routine bioassay) to determine if the level of protection (protection factor) provided by the respiratory protection devices during use was at least as good as that assumed in the licensee's work controls and dose assessment.

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 Unplanned Scrams per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams per 7000 Critical Hours performance indicator (PI) for Quad Cities Nuclear Station, Units 1 and 2, for the

period from the first quarter of 2014 through the fourth quarter of 2014. 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, event reports, and NRC integrated inspection reports for the period of January 1, 2014, through December 31, 2014, 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 unplanned scrams per 7000 critical hours sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.2 Unplanned Scrams with Complications

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications PI for Quad Cities Nuclear Station, Units 1 and 2, for the period from the first quarter of 2014 through the fourth quarter of 2014. 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, and NRC integrated inspection reports for the period of January 1, 2014, through December 31, 2014, 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 unplanned scrams with complications sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.3 Unplanned Transients per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Transients per 7000 Critical Hours PI for Quad Cities Nuclear Station, Units 1 and 2, for the period from the first quarter of 2014 through the fourth quarter of 2014. 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, maintenance rule records, event reports, and NRC integrated inspection reports for the period of January 1, 2014, through December 31, 2014, 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 unplanned transients per 7000 critical hours sample as defined in IP 71151-05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

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

a. Inspection Scope

As part of the various baseline inspection procedures 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 CAP at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included: identification of the problem was complete and accurate; timeliness was commensurate with the safety significance; evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent-of-condition reviews, and previous occurrences reviews were proper and adequate; and that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's CAP as a result of the inspectors' observations are included in the Attachment to 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 and documented in Section 1 of this report.

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished through inspection of the station's daily condition report packages.

These daily reviews were performed by procedure as part of the inspectors' daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

.3 Selected Issue Follow-Up Inspection: Part 21 Review for Event Notification 50495 (Oyster Creek) associated with Dresser Electromatic Relief Valves

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized a corrective action item documenting a 10 CFR Part 21 notification associated with dresser electromatic relief valves (ERVs). The licensee documented this issue in the CAP under IR 2387690. The inspectors reviewed the licensee's evaluation of the condition and noted that while Quad Cities had a similar ERV actuator design as mentioned in the event notification, the station has made significant changes to their actuators based on previous operating experience. Quad Cities installed more robust actuator designs in addition to main steam line acoustic side branches to minimize vibration of the main steam line and connected components. Quad Cities has not experienced any vibration related ERV failures since the installation of these modifications.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings were identified.

.4 Selected Issue Follow-Up Inspection: Fuel Oil Transfer Pump Taking Longer than 5 Seconds to Reach 10 Pounds Discharge Pressure

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized a corrective action item documenting an issue with the Unit 1 FOTP on February 16, 2015, documented under IR 2453193. The inspectors reviewed the licensee's evaluation of the condition and noted that the immediate operability was not impacted; however, the licensee did not know what specific degraded component was causing the issue. The licensee suspected either a degraded discharge check valve or potentially the internal

relief valve was lifting prematurely. However, the licensee had supporting evidence to show that the internal relief valve was working properly. The licensee decided to inspect the system during the Unit 1 EDG maintenance window during refuel outage Q1R23, under WO 1808850, completed on April 11, 2015. The inspectors identified that completion notes for WO 1808850 noted that no abnormalities were identified with the discharge check valve and the internal relief valve was shown to not be lifting during the post maintenance test on April 11, 2015. Also, during the post-maintenance test, the licensee again identified that the FOTP took greater than 5 seconds (approximately 2.5 minutes) to build up discharge pressure and documented the condition in IR 2468575 on April 11, 2015. The licensee justified the condition in IR 2468575 due to the fact that the system was drained for maintenance and the licensee ran the surveillance test again the following day, April 12, 2015. During the test, the FOTP operated satisfactorily and the licensee closed out the issue for the FOTP. The inspectors challenged the licensee on closing this issue because there were no degraded conditions noted during inspection and no other corrective actions were taken to address the potential degraded condition identified in IR 2453193 from February 16, 2015. The inspectors suspected that when the licensee ran the FOTP on April 11, the licensee had preconditioned the system for a satisfactory performance the following day. Following the questions from inspectors, the licensee ran the surveillance test on April 19, 2015, after allowing the system to remain idle, and determined that the FOTP again took 2.5 minutes to build up the correct discharge pressure. Further investigation by the licensee revealed that the system had several differences between it and the Unit 2 FOTPs, including a smaller pump motor, no suction loop seal on Unit 1, and a longer run of piping from the pump to the fuel oil storage tank. In addition, the licensee identified that the acceptance criteria for the FOTP surveillance test was changed in 2014 without taking these system differences into account. The inspectors, however, determined that the FOTP was always able to perform its function, and no new degraded conditions were likely ever present. The inspectors did not identify any more than minor performance deficiencies. Documents reviewed are listed in the Attachment to this report.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings were identified.

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

.1 Trip of the Unit 1B Reactor Recirculation Pump

a. Inspection Scope

On January 27, 2015, the inspectors reviewed the plant's response to a Unit 1 unanticipated trip of the 1B reactor recirculation pump from full reactor power. The 1B recirculation pump trip occurred coincident with the completion of logic testing while an equipment operator was re-installing fuses into the 1B anticipated transient without a SCRAM recirculation pump trip logic circuitry. Control room operators took immediate action to insert control rods in order to exit the power to flow map region of instability. Operators completed all other actions in accordance with station procedures to place the

plant in a stable condition with final reactor power at approximately 30 percent. The inspectors also verified the licensee completed all actions as required by plant TS. Documents reviewed are listed in the Attachment to this report.

This event follow-up review constituted one sample as defined in IP 71153-05.

b. Findings

During the response to the 1B reactor recirculation pump trip, the licensee reduced power by fully inserting pre-selected control rods and then by inserting the remaining control rods in accordance with the control rod move sheets. A qualified nuclear engineer was verifying rod configuration when he noted that one of the control rods was not fully inserted as expected. It was determined that the operators had inadvertently inserted control rods out of sequence. The enforcement aspects of this issue are discussed in Section 4OA7.

.2 Steam Release in the Unit 1 HPCI Room

a. Inspection Scope

On February 11, 2015, the inspectors reviewed the plant's response to a steam release in the Unit 1 HPCI room. The steam release occurred during the execution of two TS-required surveillance tests associated with the HPCI system. An individual in the area observed steam coming from the Unit 1 HPCI room sump and notified operators in the control room of the condition. The control room operators took immediate action to close HPCI steam isolation valves, 1-2301-4 and 1-2301-5, terminating the steam release. Operators completed all other actions in accordance with station procedures to place the plant in a stable condition and verify no equipment or personnel had been adversely impacted by the event. The inspectors verified the licensee completed all actions as required by plant TS and station procedures. Documents reviewed are listed in the Attachment to this report.

This event follow-up review constituted one sample as defined in IP 71153-05.

b. Findings

Failure to Ensure Standby Lineup Results in Steam Release in HPCI Room

Introduction: The inspectors documented a self-revealing, Green NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to accomplish an activity affecting quality in accordance with licensee procedures QCOS 2300-06, Revision 39 and QCOS 2300-29, Revision 26. Specifically, prior to performing TS-required testing on the Unit 1 HPCI system in accordance with licensee procedure QCOS 2300-06, the licensee failed to accomplish the prerequisite step to verify the HPCI system was in its normal standby lineup configuration, which resulted in an inadvertent steam release into the HPCI room.

Description: On February 11, 2015, the licensee was performing TS-required surveillance testing on the Unit 1 HPCI system in accordance with licensee procedures QCOS 2300-06, "HPCI System High/Medium Risk Power Operated Valve Test," Revision 39, and QCOS 2300-29, "Unit 1 HPCI Logic Functional Test," Revision 26. According to the licensee's investigation, both procedures were being performed in

conjunction with the other. Step H.254a in QCOS 2300–29 required the licensee to place the HPCI system in its standby lineup configuration. Due to coordination and miscommunication, this step was assumed to have been completed when the licensee transitioned into QCOS 2300–06, which had a prerequisite step to ensure HPCI was in its standby lineup. Thus, when the licensee repositioned the HPCI steam isolation valves, 1–2301–4 and 1–2301–5, in accordance with QCOS 2300–06, steam was inadvertently released into the HPCI room via two open drain valves relieving to the HPCI room sump. Following opening of the HPCI steam isolation valves, the control room operators received a call from an individual in the HPCI room that steam was coming from the Unit 1 HPCI room sump. Upon notification, the operators took immediate action to terminate the steam release by closing the HPCI steam isolation valves. Following the steam termination, the operators identified that the Unit 1 HPCI steam supply valve was left in the open position. A review of documents by the inspectors determined that the licensee marked the standby lineup steps complete in both procedures, though the steps were not completed. The steam release resulted in an area of up to 1000 square feet in the HPCI room being contaminated. The licensee took immediate actions to decontaminate the contaminated area and prohibited personnel access due to the elevated temperatures and dose rates in the area. The licensee also performed a walkdown of the equipment in the area and determined no equipment was impacted by the event.

Analysis: The inspectors determined the failure to ensure HPCI was in its standby lineup configuration was contrary to the requirements of QCOS 2300–06 and QCOS 2300–29, and was a performance deficiency. Specifically, the licensee failed to complete steps D.2 of licensee procedure QCOS 2300–06 and H.254a of licensee procedure QCOS 2300–29, which required the licensee to verify/place HPCI in its standby lineup configuration. The performance deficiency was more than minor and a finding because it was associated with the configuration control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

The inspectors evaluated the finding using IMC 0609, Appendix A, “The SDP for Findings At-Power,” issued June 19, 2012, Exhibit 2 for the Mitigating Systems Cornerstone. Because the inspectors answered “No” to all of the screening questions in Exhibit 2- Mitigating Systems, the inspectors concluded the finding was of very low safety significance (Green).

This finding had a cross-cutting aspect in the area of Human Performance, Work Management, because the organization failed to implement a process of planning, controlling, and executing work activities such that nuclear safety was the overriding priority; and the work process did not include the identification and management of risk commensurate to the work and the need for coordination with different job activities. Specifically, the licensee failed to coordinate the simultaneous performance of two tests and ensure the HPCI system was in the proper lineup and configuration prior to test execution [H.5].

Enforcement: Title 10 CFR Part 50, Appendix B, “Instructions, Procedures, and Drawings,” states, in part, activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these procedures. The licensee established

procedures QCOS 2300–06, “HPCI System High/Medium Risk Power Operated Valve Test”; Revision 39, and QCOS 2300–29, “Unit 1 HPCI System Logic Functional Test”; Revision 26, as the implementing procedures for HPCI surveillance testing, an activity affecting quality.

Procedure QCOS 2300–06, prerequisite step D.2 states, in part, to verify “HPCI in standby lineup per QCOP 2300–15(16)” and Procedure QCOS 2300–29, Step H.254a states, in part, to “Place HPCI in standby lineup per QCOP 2300–15(16).”

Contrary to the above, on February 11, 2015, the licensee failed to follow step D.2 of procedure QCOS 2300–06 and step H.254a of procedure QCOS 2300–29. Specifically, the licensee failed to ensure the HPCI system was in its standby lineup configuration which caused steam to be released into the HPCI room when the HPCI steam isolation valves were opened.

Immediate corrective actions taken by the licensee included closing the steam line isolation valves to stop the steam release. Because this violation was of very low safety significance and was entered into the licensee’s CAP as IR 2450896, “U1 HPCI Steam Supply Valve Open during Sys. Repressurization,” this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy.

(NCV 05000254/2015001–02, Failure to Ensure Standby Lineup Results in Steam Release in HPCI Room)

.3 Contract Electrician Injured while Working On or Near Energized Electrical Equipment on Unit 1 4kV Bus 12

a. Inspection Scope

On March 14, 2015, the inspectors reviewed the plant’s response to a report that a contract electrician was unresponsive after receiving an electrical shock while performing planned maintenance in the auxiliary compartment of the Unit 1 4kV Bus 12. Control room operators did not observe any electrical transients during the event. The inspectors verified that there were no equipment abnormalities that could have impacted the safety-related portions of the electrical distribution system. The inspectors planned to review the licensee’s root cause evaluation when it was completed. Documents reviewed are listed in the Attachment to this report.

This event follow-up review constituted one sample as defined in IP 71153–05.

b. Findings

No findings were identified.

.4 Failure of Control Power Transformer for the Unit 1 EDG 1B Starting Air Compressor

a. Inspection Scope

On March 21, 2015, the inspectors reviewed the plant’s response to a failure of the control power transformer for the Unit 1 EDG 1B starting air compressor. The transformer failure occurred following completion of a TS-required surveillance test of the emergency core cooling system actuation logic. Smoke was observed coming from MCC 19–2, which houses the cubicle for the compressor breaker and transformer, and

the control room was immediately notified of the condition. The control room operators took immediate action to de-energize the MCC and dispatched operators to the field to investigate. Once power was secured to the MCC, smoke cleared the area. No sparks or flames were noted. Operators completed all other actions in accordance with station procedures to place the plant in a stable condition and verify a fire was not present. The inspectors verified the licensee completed all actions as required by plant TS and emergency operating procedures. Documents reviewed are listed in the Attachment to this report.

This event follow-up review constituted one sample as defined in IP 71153–05.

b. Findings

No findings were identified.

.5 (Closed) Licensee Event Report 05000254/2014–004: Reactor Building Interlock Doors Opened Simultaneously Cause Loss of Secondary Containment

On November 18, 2014, the licensee identified that both the Unit 1 reactor building and Unit 2 turbine building doors were momentarily opened simultaneously, causing the licensee to declare secondary containment inoperable. The doors were immediately closed and secondary containment was reestablished and declared operable. Secondary containment pressure remained negative throughout the condition. The cause of the door failure was magnets on the turbine building door failing to engage and maintain the door closed. The licensee made adjustments to the magnets to ensure proper engagement. Documents reviewed are listed in the Attachment to this report. This licensee event report (LER) is closed.

This event follow-up review constituted one sample as defined in IP 71153–05.

.6 (Closed) Licensee Event Report 05000265/2014–004: Unit 2 HPCI Inlet Drain Pot Level Switch Failure

This event, which occurred on November 4, 2014, was discovered during performance testing of the Unit 2 HPCI inlet drain pot level switch when the inlet drain pot level switch failed to reposition as designed. The licensee's subsequent investigation determined the HPCI inlet drain pot level switch had exceeded its number of operational cycles due to multiple actuations caused by rapid pressure surges which occurred during restoration of the HPCI system to its normal, standby lineup configuration. Corrective actions taken by the licensee included replacing the HPCI inlet drain pot level switch assembly, revising the procedure and method for testing the switch, and restoring the HPCI system to its normal lineup. Documents reviewed are listed in the Attachment to this report. This LER is closed.

This event follow-up review constituted one sample as defined in IP 71153–05.

.7 (Closed) Licensee Event Report 05000254/2014–005: Main Control Room Door Unable to Close Causes Loss of Control Envelope Boundary

On December 15, 2014, the licensee was unable to close the south main control room door due to a failure of the closure mechanism. The licensee declared the main control room envelope inoperable and entered TS 3.7.4, Condition C. Immediate corrective

actions were taken to remove the door closure mechanism and shut the main control room door. The licensee replaced the closure mechanism and added a preventative maintenance task to periodically replace the closure` mechanism. Documents reviewed are listed in the Attachment to this report. This LER is closed.

This event follow-up review constituted one sample as defined in IP 71153-05.

.8 (Closed) Licensee Event Report 05000254/2015-001: Unit 0 Fuel Oil Transfer Pump Feed Breaker Found Tripped

On January 6, 2015, during a non-related maintenance activity near the breaker cubicle for the Unit 2 power feed to the Unit 0 FOTP for the Unit 0 EDG, the licensee identified the breaker was in the tripped position and reported the condition to the control room. Further investigation by the licensee identified a faulty HGA relay in the power transfer circuit of the Unit 0 FOTP. The licensee replaced the relay and returned the Unit 0 EDG to service on January 8, 2015. This issue is discussed in Section 1R15 of this report. Documents reviewed are listed in the Attachment to this report. This LER is closed.

This event follow-up review constituted one sample as defined in IP 71153-05.

40A6 Management Meetings

.1 Exit Meeting Summary

On April 7 and 16, 2015, the inspectors presented the inspection results to Mr. K. Ohr, 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 areas of radiological hazard assessment and exposure controls; and in-plant airborne radioactivity control and mitigation with Mr. S. Darin, Site Vice President, on March 13, 2015.
- The inspection results of the ISI area with Mr. S. Darin, Site Vice President, on March 6, 2015, and Mr. B. Stedman, Engineering Director, on March 16, 2015.

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.

40A7 Licensee-Identified Violations

The following violations of very low significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy for being dispositioned as NCVs.

- Title 10 CFR Part 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, of a type appropriate to the

circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. The licensee established procedure NF-AA-309, Attachment 4, "Move Sheet" as their implementing procedure for moving fuel during refuel outage Q1R23, an activity affecting quality. Procedure NF-AA-309, Attachment 4, "Move Sheet" for Q1R23 Shuffle 2 Northwest, step 7, states, in part, to move fuel bundle QAD224 from 53-34 (NW) to 51-40 (SE).

Contrary to the above, on March 10, 2015, the licensee failed to accomplish the steps in licensee procedure NF-AA-309, Attachment 4, when fuel assembly QAD224 was inserted into core location 51-40 in the incorrect orientation (NW). On March 13, 2015, the licensee implemented procedure NF-AA-309, Attachment 4, to retrieve the misoriented fuel assembly from its core location and reinsert it in the proper orientation. The issue was entered into the licensee's CAP as IR 2467903. The failure to meet the requirements of NF-AA-309 was a performance deficiency. The performance deficiency was more than minor and a finding because it was associated with the Barrier Integrity Cornerstone attribute to provide reasonable assurance that physical design barriers (fuel cladding) protect the public from radionuclide releases caused by accidents or events. Specifically, the misoriented fuel bundle placed the core in a configuration for which shutdown margin (negative reactivity insertion needed to maintain the reactor shutdown under accident conditions) had not been previously analyzed. The inspectors evaluated the finding using the SDP in accordance with IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process-Phase 1 Initial Screening and Characterization of Findings," Exhibit 4 for the Barrier Integrity Cornerstone. Because the finding involved a fuel bundle misorientation in the reactor core, per the note in Exhibit 4, the finding screened as very low safety significance (Green).

- Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented procedures of a type appropriate to the circumstances and be accomplished in accordance with these procedures. The licensee established procedure QCOA 0202-04, "Reactor Recirc Pump Trip," as the implementing abnormal operating procedure for responding to a reactor recirculation pump trip transient condition, an activity affecting quality. Procedure 0202-04, step D.3 states, in part, to insert control rods in sequence to TARGET IN position using control rod move sheets.

Contrary to the above, on January 27, 2015, the licensee failed to insert control rods in sequence according to the control rod move sheets. Specifically, the reactor operators inserted control rods in step 20, and two rods in step 19, before a qualified nuclear engineer identified that the operators had missed inserting the rod in step 21. The licensee immediately entered QCOA 0300-04, "Mispositioned Control Rods," and inserted the missed rod per the qualified nuclear engineer's guidance. The licensee documented this issue in their CAP as IR 2443241. The inspectors determined that the finding was more than minor because it was associated with the Mitigating Systems Cornerstone attribute of human performance and adversely affected the cornerstone objective ensuring the reliability, availability, and capability of systems that respond to initiating events. The inspectors screened the finding using Exhibit 2 for Mitigating Systems in IMC 0609, Appendix A, "The Significance Determination Process for Findings At Power," and answered, "Yes" to question C.3 because the finding represented a mismanagement of reactivity by operators. The

inspectors were directed to IMC 0609, Appendix M, "SDP Using Qualitative Criteria," and the finding screened as having very low safety significance (Green) because the licensee determined that there was very little effect on their margin to thermal limits.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

K. Ohr, Plant Manager
K. Akre, RP Operations Manager
W. Beck, Regulatory Assurance Manager
D. Collins, Radiation Protection Manager
H. Dodd, Operations Director
A. Green, RP Tech Support Specialist
T. Petersen, Regulatory Assurance Lead
T. Scott, Work Management Director
P. Simpson, Licensing Manager
B. Stedman, Senior Engineering Manager
B. Wahlheim, Maintenance Director
A. Williams, Site Security Manager
T. Wojick, Nuclear Oversight Manager
J. Wooldridge, Chemistry Manager

Nuclear Regulatory Commission

J. McGhee, Acting Chief, Reactor Projects Branch 1
R. Murray, Senior Resident Inspector
K. Carrington, Resident Inspector

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000254/2015001-01; 05000265/2015001-01	NCV	Failure to Establish and Maintain Service Life for Safety-Related Relay Results in Failure and Inoperability (Section 1R15)
05000254/2015001-02	NCV	Failure to Ensure Standby Lineup Results in Steam Release in the HPCI Room (Section 4OA3)

Closed

05000254/2015001-01; 05000265/2015001-01	NCV	Failure to Establish and Maintain Service Life for Safety-Related Relay Results in Failure and Inoperability (Section 1R15)
05000254/2015001-02	NCV	Failure to Ensure Standby Lineup Results in Steam Release in the HPCI Room (Section 4OA3)
05000254/2014-004	LER	Reactor Building Interlock Doors Opened Simultaneously Cause Loss of Secondary Containment (Section 4OA3)
05000265/2014-004	LER	Unit 2 HPCI Inlet Drain Pot Level Switch Failure (Section 4OA3)
05000254/2014-005	LER	Main Control Room Door Unable to Close Causes Loss of Control Envelope Boundary (Section 4OA3)
05000254/2015-001	LER	Unit 0 Fuel Oil Transfer Pump Feed Breaker Found Tripped (Section 4OA3)

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.

Key:

EC Engineering Change
 FZ Fire Zone
 IR Issue Report
 WO Work Order

<u>Section Number</u>	<u>Document Number</u>	<u>Description or Title</u>	<u>Revision or Date</u>
1R01		NOAA National Weather Service Graphical Forecast for Quad Cities, IA	02/18/2015
1R01		National Weather Service Watch Warning Advisory for Quad Cities IA, IL- 1002 am CST	02/18/2015
1R01		National Weather Service Watches, Warnings & Advisories- Quad Cities IA, IL- 0402 am CST	02/18/2015
1R01		National Weather Service Wind Chill Advisory- Quad Cities IA, IL 1002 am CST	02/18/2015
1R01		Single Point Trend-Analog: BOP Circ Wtr Inlet Temp	2/17-18/2015
1R01		Flex Simplified Design Schematic	01/28/2013
1R01	OP-AA-108-107-1001	Station Response to Grid Capacity Conditions	6
1R01	OP-AA-108-111-1001	Severe Weather And Natural Disaster Guidelines	12
1R01	QCOA 0010-16	Flood Emergency Procedure	22
1R01	QCOA 4400-02	Loss of All Circulating Water Pumps	14
1R01	QCOA 5600-02	Loss of Heating Boiler	10
1R01	QCOP 0010-01	Winterizing Checklist	70
1R01	QCOP 0010-02	Required Cold Weather Routines	44
1R01	QCOP 4100-11	Using Diesel Fire Pumps Via Safe Shutdown Hose Line for Reactor Vessel Level Control or Flood Emergency Injection Source	18
1R01	QCOP 4300-08	Makeup Demineralizer System Mobile Demineralizer	12
1R01	QCOP 4400-06	Circulating Water System Deicing	19
1R01	QOM 1-6700-T12	MCC 16-2 480V Distr. Pnl (4E-1313)	3
1R01	WC-AA-101	On-line Work Control Process	24
1R04	QOM ½-6600-01	Unit ½ Diesel Generator Valve Checklist	16

1R04	QCOP 6600-04	Diesel Generator ½ Preparation for Standby Operation	32
1R04	QCOP 6600-12	Diesel Generator Air Start System Pressure Verification	32
1R04	Drawing M-22, Sheet 3	Diagram of Service Water Piping, Diesel Cooling Water	DZ
1R04	QOM 2-6500-T05	Bus 23-1 4160VAC K/D 4E-2304	8
1R04	IR 2416994	1/2A Fire Pump Diesel Exceeds 7 Day Inoperability Time	11/25/2014
1R04	IR 2348167	NRC Resident Identified Hard to Read Pressure Indicator	01/15/2015
1R04	IR 2424608	Moderate Corrosion on U2 DGCWP Suction Vlv Gland Follower	12/12/2014
1R04	IR 2437384	Corrosion Identified on Components in the RHRSW Vaults	01/15/2015
1R04	IR 2438164	NRC Resident Identified Possible Surface Indication	01/15/2015
1R04	IR 2438165	NRC Resident Identified Missing Rotor Coupling Guard Bolting	01/15/2015
1R04	IR 2438166	NRC Resident Identified Hard to Read Pressure Indicator	01/15/2015
1R04	IR 2438169	NRC Resident Identified Hard to Read Pressure Indicator	01/15/2015
1R04	IR 2438171	NRC Resident Identified Hard to Read Pressure Indicator	01/15/2015
1R04	IR 2439225	2B RHRSW Pump Dish PI Sensing Line Partial Plugging	01/19/2015
1R04	IR 1500033	Junction Box 1TB-120 Integrity Compromised	04/10/2013
1R04	IR 1499022	Wetted Junction Box in Condensate Pit	04/08/2013
1R04	Drawing M-46, Sheet 3	Diagram of HPCI Turbine Lubricating and Hydraulic Oil System and Pump Seal Cooler Piping	G
1R04	Drawing M-46, Sheet 2	Diagram of High Pressure Coolant Injection HPCI Piping	S
1R04	Drawing M-3009G, Sheet 2	Diesel Oil Fire Pump Tank 0-5205B & Instrument Drain Piping Isometric	A
1R04	Drawing M-3216, Sheet 1	System Pressure Test Walkdown Isometric High Pressure Coolant Injection System	A
1R04	Drawing M-46, Sheet 1	Diagram of High Pressure Coolant Injection – HPCI Piping	CD
1R04		Unit 1 Rounds- Operations Standard Inspections	91
1R04	GEK-9546	Reactor Core Isolation Cooling for Quad-Cities Nuclear Power Station Units 1 and 2	March 1970
1R04	QOM 1-1300-04	RCIC System Fuse and Breaker Checklist	5
1R04	QOM 1-1300-02	RCIC Valve Checklist	10
1R04	QOM 1-6600-01	Unit 1 Diesel Generator Valve Checklist	24

1R04	QOM 1-6600-02	Unit 1 Diesel Generator System Fuse and Breaker Checklist	4
1R04	QOM 1-2300-02	HPCI System Fuse and Breaker Checklist	6
1R04	QOM 1-2300-01	HPCI Valve Checklist	13
1R04	ER-AA-335-1008	Code Acceptance & Recording Criteria for Nondestructive (NDE) Surface Examination	3
1R04	ER-AA-335-010	Guidelines for ASME Code Allowable Flaw Evaluation and ASME Code Coverage Calculations	5
1R04	QCOS 0005-09	Unit Two Electrical Distribution Breaker and Voltage Verification	38
1R04	Unit 1 Rounds	Operations Standard Inspections	91
1R04	QOM 1-1000-03	Unit 1 'B' RHR Valve Checklist (Rack 2201-59B, South RHR Room)	5
1R04	QOM 1-1000-04	Unit 1 RHR Valve Checklist (South RHR Room)	13
1R04	QOM 1-1000-07	RHR and RHRSW System Fuse and Breaker Checklist	4
1R04	QOM 1-1000-09	Unit 1 'B' RHR Valve Checklist (Outside 1B RHR Corner Room)	6
1R04	QCOP 1000-05	Shutdown Cooling Operation	51
1R04	QCOP 1000-44	Alternate Decay Heat Removal	22
1R04	QCOP 1000-49	Unit One RHR System Preparation for Standby Operation	1
1R04	IR 2463479	NRC Observation – 1B Core Spray Room Door Open	03/04/2015
1R04	IR 2463774	Trending of Reactor Building Basement Watertight Doors	03/05/2015
1R04	Drawing M-39, Sheet 1	Diagram of Residual Heat Removal RHR Piping	BS
1R05	IR 2438300	Thru Wall Leak on Fire Line 2-4110-B-6	01/16/2015
1R05	IR 2441204	U2 EDG Day Tank Wetpipe System Leaking Water	01/23/2015
1R05	Drawing M-27	Diagram of Fire Protection Piping	T
1R05	FPI 3684	U2 Turbine Building East Fire Header	
1R05	FZ 9.2	Quad Cities Generating Station Pre-Fire Plan, Unit 2 Turbine Bldg. El. 595'-0" Diesel Generator	
1R05	FZ 8.2.7.C	Quad Cities Generating Station Pre-Fire Plan, Unit ½ TB 611'-6" ASD Oil Coolers and Turbine Oil Reservoirs	
1R05	FZ 8.2.6.A	Quad Cities Generating Station Pre-Fire Plan, Unit 1 Turbine Building 595'-0", Elevation Hallway	
1R05	FZ 8.2.6.B	Quad Cities Generating Station Pre-Fire Plan, Unit 1 Turbine Building 595'-0", Elevation Low Pressure Heater Bay	

1R05	FZ 11.4.B	Quad Cities Generating Station Pre-Fire Plan, CH 595'-0" Elevation. Ground Floor/Service Water Pumps	
1R05	QDC-4100-M-0691	Combustible Loading Calculation for Power Block, SBO and Crib House	5
1R05	OP-AA-201-004	Fire Prevention for Hot Work	12
1R05	OP-AA-201-009	Control of Transient Combustible Material	15
1R08	IR 2463814	Review Site Operating Experience on Pressure Testing RCPB	03/05/2015
1R08	IR 2463486	Procedure Enhancement to IVVI Procedure	03/04/2015
1R08	IR 2463469	Containment Acceptance Criteria Not Included in Record	03/04/2015
1R08	IR 2463132	Class 2 Code Breaks Not on Drawing	03/04/2015
1R08	IR 2413814	1D RHR SW Room Cooler Min Wall	11/17/2014
1R08	IR 1687895	Corrosion Pit RHR 1A SW Pump	07/31/2014
1R08	IR 1673588	1B CS Pump Room Cooler	06/17/2014
1R08	IR 1492804	RPV Head Vent Line Leak	03/26/2013
1R08	IR 1488763	Target Rock Internals	03/17/2013
1R08	IR 1488697	Steam Dryer Support Lug Indication	03/17/2013
1R08	IR 1488690	1-1003-A HX Discrepancies	03/16/2013
1R08	IR 1488422	1B RFP FME	03/16/2013
1R08	WO 880894-30	ASME Weld Record, Weld 3	03/23/2013
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4OA3	QCOA 0010-12	Fire/Explosion	46
4OA3	IR 2472002	Control Power Transformer for U1 EDG 1B SAC Failure	03/21/2015
4OA3	QOM 1-6700-T28	MCC 19-2 480 V AC ESS Serv	5
4OA3	EP-AA-1006, Addendum 3	Quad Cities Annex	0
4OA3	LER 05000254/ 2015-001-00:	Unit 0 Fuel Oil Transfer Pump Feed Breaker Found Tripped	03/06/2015
4OA3	IR 2443212	1B Recirc Pump Trip	01/27/2015

4OA3	IR 2443241	Entered QCOA 0300-04 Mispositioned Control rod	01/27/2015
4OA3	IR 2468511	Individual Working on Bus 12 Contacted Energized Equipment	03/14/2015
4OA7	IR 2467903	Fuel Assembly Mis-oriented in the Core During Fuel Shuffle	03/13/2015
4OA7	NF-BEX-15-67, Attachment 1	Shutdown Margin Analysis for Mis-Oriented Bundle for Quad Cities Unit 1 Reload 23	04/01/2015

LIST OF ACRONYMS USED

AC	Alternating Current
ACE	Apparent Cause Evaluation
ADAMS	Agencywide Document Access Management System
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without SCRAM
CAP	Corrective Action Program
CFR	Code of Federal Regulations
dc	Direct Current
DRP	Division of Reactor Projects
EC	Engineering Change
EDG	Emergency Diesel Generator
EPRI	Electric Power Research Institute
ERV	Electromatic Relief Valve
FOTP	Fuel Oil Transfer Pump
FZ	Fire Zone
GSLA	Generic Service Life Analysis
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
ISI	Inservice Inspection
kV	Kilovolt
LER	Licensee Event Report
MCC	Motor Control Center
MSIV	Main Steam Isolation Valve
NCV	Non-Cited Violation
NDE	Non-Destructive Examinations
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
OSP	Outage Safety Plan
PARS	Publicly Available Records System
PCM	Performance Centered Maintenance
PI	Performance Indicator
PM	Preventive Maintenance
RCIC	Reactor Core Isolation Cooling
RFO	Refueling Outage
RHR	Residual Heat Removal
SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk
SRA	Senior Risk Analyst
SSC	Structure, System, Component
TB	Turbine Building
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic
WO	Work Order

B. Hanson

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Sincerely,

/RA/

James McGhee, Acting Chief
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Division of Reactor Projects

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