



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
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July 26, 2016

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 05000254/2016002 AND
05000265/2016002

Dear Mr. Hanson:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. On July 5, 2016, the NRC inspectors discussed the results of this inspection with Mr. K. Ohr and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

Based on the results of this inspection, the NRC has identified two issues that were evaluated under the significance determination process as having very low safety significance (Green). The NRC has also determined that two violations are associated with these issues. These violations are being treated as Non-Cited Violations (NCVs), consistent with Section 2.3.2 of the Enforcement Policy. These NCVs are described in the subject inspection report.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to: (1) the Regional Administrator, Region III; (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector 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 System (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 Charles Phillips Acting for/

Karla Stoedter, Chief
Branch 1
Division of Reactor Projects

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

Enclosure:
IR 05000254/2016002; 05000265/2016002

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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: 05000254/2016002; 05000265/2016002

Licensee: Exelon Generation Company, LLC

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

Location: Cordova, IL

Dates: April 1 through June 30, 2016

Inspectors: R. Murray, Senior Resident Inspector
K. Carrington, Resident Inspector
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Approved by: K. Stoedter, Chief
Branch 1
Division of Reactor Projects

Enclosure

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SUMMARY

Inspection Report 05000254/2016002, 05000265/2016002; 04/01/2016–06/30/2016; Quad Cities Nuclear Power Station, Units 1 and 2; Maintenance Risk Assessments and Emergent Work Control, and Identification and Resolution of Problems.

This report covers a 3-month period of inspection by the resident inspectors and announced baseline inspections by regional inspectors. Two Green findings were identified by the inspectors. The findings involved non-cited violations of the U.S. Nuclear Regulatory Commission (NRC) requirements. The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

Cornerstone: Mitigating Systems

Green. The inspectors identified a finding of very low safety significance and an associated non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the failure to identify a condition adverse to quality. Specifically, the licensee failed to identify the installation of the low pressure coolant injection (LPCI) loop-select differential pressure indicating switches (DPISS) on both units beyond their performance-centered maintenance template recommended replacement frequency and beyond their environmental qualification (EQ) service life established in EQ binder EQ-83Q as conditions adverse to quality (CAQ) in their corrective action program (CAP). The licensee's corrective actions included entering the non-conforming conditions into the CAP (Issue Report 2663100) and evaluating the CAQs for operability. The licensee determined the current DPISS were operable but non-conforming, and replaced all remaining LPCI loop-select DPISS.

The failure to identify CAQs within the CAP was determined to be more than minor because if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to identify when safety-related structures, systems, or components (SSCs) are beyond their qualified life could lead to an SSC not being able to perform its specified safety function. The finding was screened against the Mitigating Systems Cornerstone and determined to be of very low safety significance because the SSC maintained its operability. The inspectors determined this finding affected the cross-cutting area of problem identification and resolution, in the aspect of Identification, which states, "The organization implements a corrective action program with a low threshold for identifying issues. Individuals identify issues completely, accurately, and in a timely manner in accordance with the program." Specifically, the licensee failed to document a condition adverse to quality related to the LPCI loop select DPISS on both units in the CAP in a timely manner [P.1]. (Section 40A2)

Cornerstone: Barrier Integrity

Green. The inspectors identified a finding of very low safety significance and an associated non-cited violation of Technical Specifications (TS) 3.6.2.5 and 3.6.3.1 for the licensee's failure to take actions required by TS 3.6.2.5 and 3.6.3.1. Specifically, on May 25, 2016, the licensee failed to restore the Unit 2 drywell-to-suppression chamber differential pressure and primary containment oxygen concentration to within the TS specified limits, or reduce power below 15 percent rated thermal power as required by TS 3.6.2.5 and 3.6.3.1, Conditions A and B. The licensee's corrective actions included restoring both parameters to within their specified limits on May 25, 2016. The violation was entered into the licensee's corrective action program as Issue Report 2677621.

The performance deficiency was determined to be more than minor and a finding because, if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to maintain drywell-to-suppression chamber differential pressure and primary containment oxygen concentration within their specified limits had the potential to lead to stresses that could challenge the structural integrity of the containment and/or lead to a combustible mixture inside the Unit 2 drywell following a loss of coolant accident, either of which could have challenged the assumptions of the safety analyses. The finding was screened against the Barrier Integrity Cornerstone and was determined to be of very low safety significance by the Region III senior reactor analyst using the insights from IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," Table 6.2, "Phase 2 Risk Significance—Type B Findings at Full Power," because the duration of the condition was shorter than 3 days. The inspectors determined this finding affected the cross-cutting area of human performance in the aspect of Conservative Bias, which states, "individuals use decision making practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe in order to proceed, rather than unsafe in order to stop." Specifically, the licensee failed to exercise prudent judgment when they raised power above 15 percent prior to meeting TS Limiting Condition for Operation 3.6.2.5 and 3.6.3.1 while still in the MODE of Applicability (MODE 1) [H.14]. (Section 1R13)

REPORT DETAILS

Summary of Plant Status

Unit 1

The unit operated at or near full power for the entire inspection period, with the exception of planned power reductions for turbine testing, control rod pattern adjustments, and power changes as requested by the transmission system operator.

Unit 2

The unit began the inspection period shutdown for refueling outage Q2R23. The unit commenced startup on April 6, 2016, and the main turbine generator was synchronized to the grid on April 8. The unit achieved full power on April 9. On May 24, 2016, operators reduced power to approximately 25 percent to repair an oil leak on the 2A recirculation pump. The leak was repaired and, later that afternoon, a second leak was discovered on the pump. Operators reduced power to approximately 14 percent to complete repairs for the second leak. On May 25, the unit was returned to full power, where it remained with the exception of planned power reductions for planned maintenance on the 2C reactor feed pump, turbine testing, control rod pattern adjustments, and power changes as requested by the transmission system operator.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Readiness of Offsite and Alternate Alternating Current Power Systems

a. Inspection Scope

The inspectors verified that plant features and procedures for operation and continued availability of offsite and alternate alternating current (AC) power systems during adverse weather were appropriate. The inspectors reviewed the licensee's procedures affecting these areas and the communications protocols between the transmission system operator (TSO) and the plant to verify that the appropriate information was being exchanged when issues arose that could impact the offsite power system. Examples of aspects considered in the inspectors' review included:

- coordination between the TSO and the plant during off-normal or emergency events;
- explanations for the events;
- estimates of when the offsite power system would be returned to a normal state; and
- notifications from the TSO to the plant when the offsite power system was returned to normal.

The inspectors also verified that plant procedures addressed measures to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system prior to or during adverse weather conditions. Specifically, the inspectors verified that the procedures addressed the following:

- actions to be taken when notified by the TSO that the post-trip voltage of the offsite power system at the plant would not be acceptable to assure the continued operation of the safety-related loads without transferring to the onsite power supply;
- compensatory actions identified to be performed if it would not be possible to predict the post-trip voltage at the plant for the current grid conditions;
- re-assessment of plant risk based on maintenance activities which could affect grid reliability, or the ability of the transmission system to provide offsite power; and
- communications between the plant and the TSO when changes at the plant could impact the transmission system, or when the capability of the transmission system to provide adequate offsite power was challenged.

Documents reviewed are listed in the Attachment to this report. The inspectors also reviewed corrective action program (CAP) items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures.

This inspection constituted one readiness of offsite and alternate AC power systems sample as defined in Inspection Procedure (IP) 71111.01–05.

b. Findings

No findings were identified.

.2 Summer Seasonal Readiness Preparations

a. Inspection Scope

The inspectors performed a review of the licensee’s preparations for summer weather for selected systems, including conditions that could lead to an extended drought.

During the inspection, the inspectors focused on plant specific design features and the licensee’s procedures used to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant specific procedures. Documents reviewed are listed in the Attachment to this report. The inspectors also reviewed CAP items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their corrective action program in accordance with station corrective action procedures. The inspectors’ reviews focused specifically on the following plant systems:

- turbine building and reactor building ventilation systems;
- reactor building closed cooling water system; and
- service water systems.

This inspection constituted one seasonal adverse weather sample as defined in IP 71111.01–05.

b. Findings

No findings were identified.

.3 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 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 IP 71111.01–05.

b. Findings

No findings were identified.

.4 Readiness for Impending Adverse Weather Condition—Severe Thunderstorm Watch

a. Inspection Scope

Since thunderstorms with potential tornados and high winds were forecast in the vicinity of the facility for June 22, 2016, the inspectors reviewed the licensee's overall preparations/protection for the expected weather conditions. The inspectors evaluated the licensee staff's preparations against the site's procedures and determined that the staff's actions were adequate. During the inspection, the inspectors focused on plant-specific design features and the licensee's procedures used to respond to specified adverse weather conditions. The inspectors also toured the plant grounds to look for any loose debris that could become missiles during a tornado. The inspectors evaluated operator staffing and accessibility of controls and indications for those systems required to control the plant. Additionally, the inspectors reviewed the UFSAR and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant specific procedures. The inspectors also reviewed a sample of CAP items to verify that the licensee identified adverse weather issues at an appropriate threshold and dispositioned them through the CAP in accordance with station corrective action procedures. 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 2 high pressure coolant injection (HPCI) system during Unit 2 reactor core isolation cooling (RCIC) and 'B' core spray room cooler replacement;
- Unit 1 station blackout diesel generator system during Unit 2 station blackout diesel system planned maintenance; and
- Unit 2 'C' and 'D' residual heat removal service water (RHRSW) pump systems during Unit 2 'B' RHRSW pump elbow replacement.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, Technical Specification (TS) requirements, outstanding work orders (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 three partial system walkdown samples 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) 5.0, Unit 2 Turbine Building, Elevation 595'-0", Safe Shutdown Pump Room;
- FZ 11.3.4, Unit 2 Reactor Building, Elevation 544'-0", Northeast Corner Room 2A Residual Heat Removal (RHR) Room;
- FZ 4.0, Service Building Computer Room in Aux Electric Room; and
- FZ 1.1.1.2., Unit 1 Reactor Building, Elevation 595'-0", Ground Floor.

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.

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On June 24, 2016, the inspectors observed an announced drill and fire brigade activation at Elevation 595' of the turbine building at the Bus 11, 902 panel for the 1C reactor feed pump due to smoke and arcing from electrical work being performed in the panel. Based on this observation, the inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified

deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were:

- proper wearing of turnout gear and self-contained breathing apparatus;
- proper use and layout of fire hoses;
- employment of appropriate firefighting techniques;
- sufficient firefighting equipment brought to the scene;
- effectiveness of fire brigade leader communications, command, and control;
- search for victims and propagation of the fire into other plant areas;
- smoke removal operations;
- utilization of pre-planned strategies;
- adherence to the pre-planned drill scenario; and
- drill objectives.

Documents reviewed are listed in the Attachment to this report.

These activities constituted one annual fire protection inspection sample as defined in IP 71111.05–05.

b. Findings

No findings were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee’s testing of the Unit 2 ‘A’ RHR heat exchanger to verify that potential deficiencies did not mask the licensee’s ability to detect degraded performance, to identify any common cause issues that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors reviewed the licensee’s observations as compared against acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. Inspectors also verified that test acceptance criteria considered differences between test conditions and design conditions. Documents reviewed for this inspection are listed in the Attachment to this document.

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

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On May 23 and June 2, 2016, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training. The inspectors verified that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and that training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

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

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

b. Findings

No findings were identified.

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

a. Inspection Scope

On April 7-9, 2016, the inspectors observed Unit 2 licensed operators conduct a planned startup from refueling outage Q2R23. This was an activity that required heightened awareness or was related to increased risk. The inspectors evaluated the following areas:

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

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 71111.11–05.

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:

- motor operated valve program; and
- emergency core cooling system room coolers.

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 Title 10 *Code of Federal Regulations* (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 two quarterly maintenance effectiveness samples 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 16–16–06: Unit 2 online risk (OLR) change to yellow during U2 emergency diesel generator planned maintenance, planned maintenance on 2A core spray and RCIC systems' room cooler; emergent inspection/work due to leak from flow element on Unit 1 residual heat removal system containment spray piping;
- Work Week 16–17–07: Emergent work during 1A standby liquid control pump overhaul (test return valve failed), Unit 2 OLR change to yellow due to emergent work on HPCI system turbine steam inlet valve;
- Work Week 16–21–11: Emergent work repair of Unit 2A recirculation pump oil leaks, Unit 2 OLR change to yellow due to drywell de-inerting, U2 RCIC system planned maintenance and testing, U1 OLR change to yellow due to U1 HPCI system planned maintenance and testing; and
- Work Week 16–25–02: Emergent work repair of Unit 2C reactor feed pump inboard bearing, Unit 2 OLR change to yellow due to 'B' residual heat removal room cooler planned maintenance.

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 four samples as defined in IP 71111.13–05.

b. Findings

Failure to Maintain Parameters within Limits of Technical Specifications 3.6.2.5 and 3.6.3.1

Introduction: The inspectors identified a finding of very low safety significance (Green) and non-cited violation (NCV) of TS 3.6.2.5 and 3.6.3.1 for the licensee's failure to take actions required by TS 3.6.2.5 and 3.6.3.1. Specifically, on May 25, 2016, the licensee failed to restore the Unit 2 drywell-to-suppression chamber differential pressure (d/p), and primary containment oxygen concentration to within the TS-specified limits, or

reduce power below 15 percent rated thermal power (RTP) as required by TS 3.6.2.5 and 3.6.3.1, Conditions A and B.

Description: On May 23, 2016, at 12:43 a.m., Quad Cities Unit 2 began a power reduction from 100 percent RTP to 86 percent RTP as requested by their Nuclear Dispatch Office. A few minutes into the power maneuver, Unit 2 received an unexpected alarm in the control room, "RECIRC PUMP 'A' MTR LOWER LUBE OIL LOW LEVEL." The operators immediately suspended the power maneuver and began to troubleshoot the low oil level alarm associated with the 2A recirculation pump. At 5:00 a.m. that morning, the licensee returned the unit back to full power and continued troubleshooting. The licensee made the decision to reduce reactor power the next day to approximately 25 percent and enter the Unit 2 drywell to conduct further investigation after they were unable to determine whether the alarm was valid or assess the amount of oil remaining in the 2A recirculation pump. The licensee commenced lowering power to 25 percent at 1:59 a.m. on May 24, at 2:00 a.m., the licensee began de-inerting the Unit 2 drywell to support personnel accessibility. As a result of de-inerting, on May 24, at 3:10 a.m., the drywell-to-suppression chamber d/p fell below 1 pound per square inch differential (psid) and the licensee entered TS 3.6.2.5, Condition A, which required restoration of the containment parameter to within limits in 24 hours. A few minutes later, at 3:23 a.m., the primary containment oxygen concentration exceeded 4 volume percent and the licensee entered TS 3.6.3.1, Condition A, which also required the licensee to restore the containment parameter to within limits in 24 hours.

At 7:56 a.m. on May 24 the licensee completed the power reduction to 25 percent and made preparations to enter the drywell. Upon entry, the licensee discovered that the oil level for the 2A recirculation pump motor lower bearing was low, outside of its specified band, and identified oil leaking from a threaded connection on a 3/8-inch line going to an oil sight glass for the pump. The licensee repaired the leak and restored the oil level to normal. Subsequent to adding oil, the licensee identified a second oil leak on the pump. The leak was identified to be coming from a hose clamp off a hose leading to the pump's backup oil reservoir. Based on the location of the second leak, work scope of the repair, and time needed to re-inert the drywell, the licensee determined they would exceed the 24 hours allotted to them by TS to restore both parameters within their specified limits, and at 4:18 p.m. took action in accordance with Condition B of both TS 3.6.2.5 and 3.6.3.1 by lowering reactor power below 15 percent. Both TS required the licensee to reduce power below 15 percent RTP within 8 hours from the time the actions in Condition A could not be met.

On the evening of May 24, 2016, the licensee completed the repairs to the 2A recirculation pump and informed the NRC inspectors of their decision to increase power above 15 percent RTP with both containment parameters outside their specified limits. The inspectors questioned the licensee on their interpretation of the TS and their intent to go above 15 percent RTP. The inspectors consulted with the Office of Nuclear Reactor Regulation Technical Specifications Branch to determine if the licensee's actions were appropriate. Meanwhile, at 9:37 p.m. on May 24, 2016, the licensee began their ramp up to full power with both containment parameters outside the TS limits. At 3:10 a.m. and 3:23 a.m. on May 25, 2016, both containment parameters were still outside their TS limits and the 24-hour time clock to restore the parameters to normal had expired. At that point, the licensee had 8 hours to lower reactor power below 15 percent. On May 25 at 11:10 a.m. and 11:23 a.m. (the times when both TS Conditions B expired), the licensee violated TS 3.6.2.5 and 3.6.3.1, respectively,

because the containment parameters had not been restored and power was not less than 15 percent RTP. On May 25 at 1:30 p.m. (2 hours and 7 minutes after the TS 3.6.3.1 Condition B action statement expired), TS 3.6.3.1 was met since the Unit 2 primary containment oxygen concentration fell below 4 volume percent. Likewise, on May 25, at 3:35 p.m. (4 hours and 25 minutes after the TS 3.6.2.5, Condition B action statement had expired), TS 3.6.2.5 was met since the Unit 2 drywell-to-suppression chamber d/p went above 1 psid.

Licensees are required to meet the mode or conditions of applicability requirements for each TS Limiting Condition for Operation (LCO). Limiting Conditions for Operation specify the minimum requirements for ensuring safe operation of the unit. When licensees cannot meet the TS LCO, they must enter the TS LCO Condition and take the Required Action within the specified Completion Time in accordance with LCO 3.0.2. Technical Specification LCO 3.0.2 stated, "That upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met. If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated." Completion Time for Required Actions is referenced to the time of discovery of a situation that requires entering an ACTIONS Condition unless otherwise specified, provided the unit is in a MODE or specified condition stated in the Applicability of the LCO.

Technical Specifications 3.6.2.5 and 3.6.3.1 are applicable when the licensee is operating in MODE 1 during the time period: (1) from 24 hours after thermal power is greater than 15 percent following startup, and (2) 24 hours prior to reducing power below 15 percent prior to the next scheduled reactor shutdown. The licensee was neither within 24 hours following a startup, within 24 hours prior to a scheduled shutdown condition, nor did they exit MODE 1. Therefore, TS 3.6.2.5 and 3.6.3.1 were always applicable since the unit started up from its last refueling outage on April 9, 2016, and remained applicable (in MODE 1) on the date of the violation.

The licensee believed that they were no longer in the MODE of applicability once they took the ACTIONS required by Conditions B of both TS (lowering thermal power less than 15 percent). The licensee misinterpreted the APPLICABILITY of the TS that states, in part, that the LCO is applicable in MODE 1 from 24 hours following a plant startup. The licensee determined that raising power from below 15 percent was equivalent to a reactor startup and met the intent of the TS. The NRC informed the licensee that the MODE of applicability was MODE 1 and since the licensee never exited the MODE of applicability, the licensee was always required to meet the TS LCO ACTIONS by either restoring the containment parameters in the time allotted or reducing power below 15 percent as stated in the applicable CONDITION statements.

On May 27, 2016, the inspectors informed the licensee they violated TS 3.6.2.5 and 3.6.3.1 on May 25. The licensee entered this condition in the CAP as Issue Report (IR) 2677621. No other immediate actions were required by the licensee because at the time of being informed of the issue both containment parameters had been restored to within the acceptable limits.

Analysis: The inspectors determined the failure to maintain drywell-to-suppression chamber d/p and primary containment oxygen concentration within the limits specified or take the actions required by TS 3.6.2.5 and TS 3.6.3.1, Conditions A and B, was a

performance deficiency. The performance deficiency was determined to be more than minor and a finding because, if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to maintain drywell-to-suppression chamber d/p and primary containment oxygen concentration within their specified limits had the potential to lead to stresses that could challenge the structural integrity of the containment and/or lead to a combustible mixture inside the Unit 2 drywell following a loss of coolant accident. Either safety concern could have challenged the assumptions of the safety analyses. The inspectors evaluated the issue using Inspection Manual Chapter (IMC) 0609, Attachment 4, "Initial Characterization of Findings," and IMC 0609 Appendix A, "The Significance Determination Process for Findings at Power," issued June 19, 2012. The inspectors screened the finding against the Barrier Integrity screening questions in Exhibit 3, and answered "Yes" to question B.2, since the finding did not involve an actual reduction in function of the hydrogen igniters in containment but served a similar function in preventing the cause of a hydrogen explosion in containment by limiting the drywell-to-suppression chamber d/p and primary containment oxygen concentration. The inspectors were directed to IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," for further evaluation and sought guidance from the Region III senior reactor analyst. The inspectors determined the finding met the definition of a Type B finding under Appendix H. Although the finding did not exactly match the finding descriptions for a Mark I Containment in Appendix H, the senior reactor analyst determined the finding could be screened as very low safety significance (Green) using the insights from Table 6.2, "Phase 2 Risk Significance—Type B Findings at Full Power," because the duration of the condition was shorter than 3 days.

The inspectors determined this finding affected the cross-cutting area of human performance in the aspect of conservative bias, which states, "individuals use decision making practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe in order to proceed, rather than unsafe in order to stop." Specifically, the licensee failed to exercise prudent judgment when they raised power above 15 percent prior to meeting TS LCOs 3.6.2.5 and 3.6.3.1 while still in the MODE of Applicability (MODE 1) [H.14].

Enforcement: Technical Specification 3.6.2.5 requires, in part, that while the unit is in MODE 1 with reactor power greater than 15 percent RTP, drywell-to-suppression chamber d/p be greater than 1 psid. When the drywell-to-suppression chamber d/p outside of its specified limits, TS requires the parameter be restored to within limits in 24 hours or reduce reactor power to less than 15 percent RTP within the subsequent 8 hours from when the first condition could not be met.

Technical Specification 3.6.3.1 requires, in part, that while the unit is in MODE 1 with reactor power greater than 15 percent RTP, primary containment oxygen concentration be less than 4 volume percent. With primary containment oxygen concentration outside of its specified limits, TS requires the parameter be restored to within limits in 24 hours or reduce reactor power to less than 15 percent RTP within the subsequent 8 hours from when the first condition could not be met.

Contrary to the above, from 11:23 a.m. to 1:30 p.m. on May 25, 2016, the licensee failed to take the required ACTIONS in accordance with TS LCO 3.6.3.1 and restore the primary containment oxygen concentration to less than 4 volume percent or reduce power below 15 percent RTP. In addition, from 11:10 a.m. to 3:35 p.m. on May 25, 2016, the licensee failed to take the required ACTIONS in accordance with TS

LCO 3.6.2.5 and restore the drywell-to-suppression-chamber d/p to greater than 1 psid or reduce power below 15 percent RTP.

Corrective actions included restoring both parameters to within their specified limits on May 25, 2016, at 1:30 p.m. and 3:35 p.m., respectively. These violations are being grouped as one violation and performance deficiency because they occurred on the same date and were related to the same cause. The 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 2677621. **(NCV 05000254/2016002-01; 05000265/2016002-01, Failure to Maintain Parameters within Limits of TS 3.6.2.5 and 3.6.3.1)**

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- IR 2649481: Leak from Diesel Generator Cooling Water Pump Line;
- IR 2654659: Unexpected RCIC Alarm During QCOS 1300-05;
- IR 2654567: UT Vent Verification on 2A Core Spray;
- IR 2659025: IEMA Identified, 1 Dpm Leak on U1 RHRSW Line;
- IR 2662546: Suspected Stem to Disc Separation on SBLC [Standby Liquid Control] Valve 1-1101-22;
- IR 2663100: NRC ID: LPCI [Low Pressure Coolant Injection] Loop Select Pressure Switch Cycle Life; and
- IR 2678958: 1/2 Diesel Generator Cooling Water Pump Failed Suction D/P QCOS 1000-47.

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

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

b. Findings

No findings were identified.

.2 Annual Sample: Review of Operator Workarounds

a. Inspection Scope

The inspectors evaluated the licensee's implementation of their process used to identify, document, track, and resolve operational challenges. Inspection activities included, but were not limited to, a review of the cumulative effects of operator workarounds on system availability and the potential for improper operation of the system, for potential impacts on multiple systems, and on the ability of operators to respond to plant transients or accidents.

The inspectors performed a review of the cumulative effects of operator workarounds. The documents listed in the Attachment were reviewed to accomplish the objectives of the inspection procedure. The inspectors reviewed both current and historical operational challenge records to determine whether the licensee was identifying operator challenges at an appropriate threshold, had entered them into their CAP and proposed or implemented appropriate and timely corrective actions which addressed each issue. Reviews were conducted to determine if any operator challenge could increase the possibility of an Initiating Event, if the challenge was contrary to training, required a change from long-standing operational practices, or created the potential for inappropriate compensatory actions. Additionally, all temporary modifications were reviewed to identify any potential effect on the functionality of Mitigating Systems, impaired access to equipment, or required equipment uses for which the equipment was not designed. Daily plant and equipment status logs, degraded instrument logs, and operator aids or tools being used to compensate for material deficiencies were also assessed to identify any potential sources of unidentified operator workarounds.

This review constituted one operator workaround annual inspection sample as defined in IP 71111.15-02.

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:

- Local leak rate testing of 2A main steam isolation valve following steam line flush;
- Leak testing of reactor vessel class 1 and associated class 2 system in accordance with QCOS 0201-08, following startup from refueling outage, Q2R23;
- Scram time testing of control rod drives in the hot condition in accordance with QCOS 0300-23, following planned maintenance;

- Low pressure operability testing of high pressure coolant injection system following Q2R23;
- Testing of Unit 1A SBLC pump following pump overhaul;
- Calibration and functional testing of emergency core cooling system LPCI recirculation riser high d/p switches in accordance with MA–QC–741–208 and MA–QC–741–207, following switch replacement; and
- Testing of 2B RHRSW pump for operability following pump elbow replacement, in accordance with QCOS 1000–04.

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 seven 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 2 refueling outage (RFO) Q2R23, conducted March 21–April 9, 2016, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below:

- licensee configuration management, including maintenance of defense-in-depth commensurate with the OSP for key safety functions and compliance with the applicable TS when taking equipment out of service;

- implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;
- installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- controls over the status and configuration of electrical systems to ensure that TS and OSP requirements were met, and controls over switchyard activities;
- monitoring of decay heat removal processes, systems, and components;
- controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system;
- reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- controls over activities that could affect reactivity;
- maintenance of secondary containment as required by TS;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- refueling activities, including fuel handling and 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

No findings were identified.

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 6600–47: Unit Two Division I Emergency Core Cooling System Simulated Automatic Actuation and Diesel Generators Auto-start Surveillance (Routine);
- QCOS 1600–48: U2 Outage Primary Containment Isolation Group 2 Isolation Test (Containment Isolation Valve);
- QCOS 1300–07: RCIC Manual Initiation Test (Inservice Test);
- QCOS 2300–05: HPCI Pump Operability Test (Inservice Test);
- QCOS 1600–07: Reactor Coolant System (RCS) Leakage in the Drywell (DWFDS and DWEDS Available) (RCS); and

- QCOS 1000–06: RHR Pump /Loop Operability Test (Inservice Test).

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 one routine surveillance testing sample, three inservice test sample(s), one reactor coolant system leak detection inspection sample, 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)

.1 Radiological Hazard Assessment (02.02)

a. Inspection Scope

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

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

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

The inspectors evaluated the radiological survey program to determine if hazards were properly identified. The inspectors discussed procedures, equipment, and performance of surveys with radiation protection staff and assessed whether technicians were knowledgeable about when and how to survey areas for various types of radiological hazards (i.e., hot particles, alpha emitters, airborne radioactivity).

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

These inspection activities constituted a partial sample as defined in IP 71124.01-05.

b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

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

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

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

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

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

b. Findings

No findings were identified.

.3 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

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

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

b. Findings

No findings were identified.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

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

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

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with licensee procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or that the licensee properly employed a U.S. Nuclear Regulatory Commission (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.

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

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

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

b. Findings

No findings were identified.

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

a. Inspection Scope

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

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

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

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

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

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

b. Findings

No findings were identified.

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

a. Inspection Scope

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

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

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

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

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

b. Findings

No findings were identified.

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

.1 Radiological Work Planning (02.02)

a. Inspection Scope

The inspectors selected three to five work activities of the highest exposure significance or that involved work in high dose rate areas.

The inspectors reviewed the radiological work planning as-low-as-reasonably-achievable (ALARA) evaluations, initial and revised exposure estimates, and exposure mitigation requirements. The inspectors determined if the licensee had reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances.

The inspectors assessed whether the licensee’s planning identified appropriate dose reduction techniques; considered, commensurate with the risk of the work activity, alternate reduction features; and defined reasonable dose goals. The inspectors evaluated whether the licensee’s ALARA assessment had taken into account decreased worker efficiency from use of respiratory protective devices and/or heat stress mitigation equipment (e.g., ice vests). The inspectors determined if the licensee’s work planning considered the use of remote technologies as a means to reduce dose and the use of dose reduction insights from industry operating experience and plant-specific lessons learned. The inspectors reviewed if these ALARA requirements were integrated into work procedure and/or radiation work permit (RWP) documents.

These inspection activities constituted a partial sample as defined in IP 71124.02–05.

b. Findings

No findings were identified.

.2 Implementation of ALARA and Radiological Work Controls (02.04)

a. Inspection Scope

The inspectors reviewed the radiological administrative, operational, and engineering controls planned for selected radiologically significant work activities and evaluated the integration of radiological work controls and ALARA requirements into work packages or work procedures.

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

The inspectors assessed licensee activities associated with work-in-progress to ensure the licensee was tracking doses, performed timely in-progress reviews, and, when jobs did not trend as expected, the licensee appropriately communicated to workers, supervisors, and radiation protection technicians additional methods to be used to reduce dose. The inspectors verified Health Physics and ALARA staff were involved with the management of radiological work control if/when in-field activities deviated from the planned controls. The inspectors assessed whether the Outage Control Center and station management provided sufficient support for ALARA re-planning as needed.

The inspectors assessed the involvement of ALARA staff with emergent work activities during outage or on-line maintenance and, when possible, attended in-progress review discussions, outage status meetings, and/or ALARA committee meetings.

These inspection activities constituted a partial sample as defined in IP 71124.02–05.

b. Findings

No findings were identified.

.3 Radiation Worker Performance (02.05)

a. Inspection Scope

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne radioactivity areas, or high radiation areas to assess whether workers demonstrated the ALARA philosophy in practice and followed procedures. The inspectors observed radiation worker performance to evaluate whether the training and skill level was sufficient with respect to the radiological hazards and the work involved.

The inspectors interviewed individuals from selected work to assess their knowledge and awareness of planned and/or implemented radiological and ALARA work controls.

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

b. Findings

No findings were identified.

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

.1 Engineering Controls (02.02)

a. Inspection Scope

The inspectors reviewed select portable or installed airborne monitoring protocols used to monitor and warn of changing airborne concentrations in the plant to assess whether the alarms and set points were sufficient to prompt licensee/worker action to ensure that doses were maintained within the limits of 10 CFR Part 20 and ALARA. The inspectors determined whether the licensee established trigger points for evaluating levels of airborne beta-emitting and alpha-emitting radionuclides.

These inspection activities constituted a partial sample as defined in IP 71124.03–05.

b. Findings

No findings were identified.

.2 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

The inspectors assessed whether the licensee provided respiratory protective devices such that occupational doses were for those situations where it is impractical to employ engineering controls to minimize airborne radioactivity. The inspectors ensured the licensee performed evaluations which concluded that further engineering controls were not practical and that the use of respirators was ALARA. The inspectors assessed whether the licensee established means to verify that 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.

The inspectors assessed whether the respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) or have been approved by the NRC per 10 CFR 20.1703(b). The inspectors evaluated whether the devices were used consistent with their NIOSH/MSHA certification or any conditions of their NRC approval.

The inspectors evaluated whether selected individuals qualified to use respiratory protection devices had been deemed fit to use the devices by a physician.

These inspection activities constituted a partial sample as defined in IP 71124.03–05.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the RCS leakage performance indicator (PI) for Quad Cities Nuclear Station, Units 1 and 2, for the period from the 2nd quarter 2015 through 1st quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, IRs, event reports and NRC integrated inspection reports for the period of April 1, 2015, through March 31, 2016, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's IR 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 reactor coolant system leakage samples as defined in IP 71151-05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

a. Inspection Scope

As 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 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 40A2.2 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the 6-month period of December 2015 through April 2016, although some examples expanded beyond those dates where the scope of the trend warranted.

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

This review constituted one semi-annual trend inspection sample as defined in IP 71152-05.

b. Findings

No findings were identified.

.4 Annual Follow-up of Selected Issues: Low Pressure Coolant Injection Loop Select Differential Pressure Switch Did Not Respond as Expected

a. Inspection Scope

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

- IR 2637188: DPIS 1–0261–34D, Unit 1; LPCI Loop Select Differential Pressure Switch Did Not Respond as Expected

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

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of the root and contributing causes of the problem;
- identification of corrective actions, which were appropriately focused to correct the problem;
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue;
- effectiveness of corrective actions taken to preclude repetition; and
- evaluate applicability for operating experience and communicate applicable lessons learned to appropriate organizations.

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

(1) Failure to Identify Conditions Adverse to Quality

Introduction: The inspectors identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the failure to identify a condition adverse to quality. Specifically, the licensee failed to identify the installation of the LPCI loop-select differential pressure indicating switches (DPIS) on both units beyond their performance-centered maintenance (PCM) template recommended replacement frequency and beyond their environmental qualification (EQ) service life specified in EQ binder EQ–83Q as conditions adverse to quality (CAQ) non-conforming conditions in their CAP.

Description: On March 7, 2016, the licensee performed MA–QC–741–205, "Unit 1 Emergency Core Cooling System LPCI Recirculation Riser High Differential Pressure Functional Test." During the test, DPIS 1–0261–34D failed to energize relay 10A–K36B

as expected. Switch DPIS 1–0261–34D measured the differential pressure between the ‘A’ and ‘B’ recirculation pump discharge lines and was expected to actuate the relay when differential pressure was greater than 1 pound per square inch differential (psid). Because of the identified condition, the licensee declared the instrument inoperable, entered the appropriate instrument TS, and investigated the condition. The licensee identified a failed microswitch within DPIS 1–0261–34D as the cause. The microswitch was replaced, tested, and DPIS 1–0261–34D was declared operable on March 8, 2016, within the TS allowed outage time of 24 hours.

The inspectors reviewed the approved apparent cause evaluation for this event that was conducted after the licensee sent the instrument to PowerLabs for a failure analysis. The PowerLabs report indicated that the switch failed as a result of cyclic fatigue and overheating damage created by repeated short cycling of the switch. The report also stated that short cycling was damaging to the particular type of switch design due to the small cross-sectional area of the contacts and the short distances between the contacts.

The apparent cause evaluation performed by the licensee indicated that the EQ binder EQ–83Q documented a 60-year or 22,000-cycle qualified life for this component. The system engineer performed an observation of the DPIS in the field and observed the switch cycling 14 times over a 10-minute period. The DPIS had been installed in the plant for 22 years and based on the 10-minute observation, the switch would have cycled over 16 million times during its life. In addition, the licensee identified that their PCM template had a replacement criteria of every 10 years. The licensee did not identify a documented justification for deviating from the PCM template guide nor not meeting the EQ requirements.

Section 3.11.2 of the UFSAR stated, “Electrical equipment having materials susceptible to significant age-related degradation have been identified. A qualified (designated) life has been established for each equipment type with requisite replacement or component refurbishment schedule. The results of these evaluations and analyses are incorporated into the plant maintenance and surveillance program to ensure that equipment qualification is maintained.”

Section 3.11.3 of the UFSAR stated, “The results of the environmental qualification determination for each of these items is in the extensive EQ file and EQ Binders, either created and maintained specifically for Quad Cities Station or for generic CECo nuclear plant applications. The EQ Binders provide documentation of evaluations, analyses, and test results to show that pertinent electrical equipment is environmentally qualified to perform intended functions for its qualified life plus post-design basis event exposure.”

Licensee procedure ER–AA–200, “Preventative Maintenance Program,” established the method that the licensee used to maintain the reliability of plant SSCs. Performance centered maintenance templates were developed as a guide in establishing a maintenance strategy for specific components. Section 4.4.5 stated, “All PCM Template deviations shall have a technical basis documented by the system subject matter expert (SSME).”

The inspectors identified that the licensee had neither documented new condition reports nor corrective actions in the apparent cause or the CAP to identify and correct the remaining DPIS that were installed beyond their qualified lives. The evaluation documented that after a 10 minute observation of the DPISs, the switches could have

cycled more than 16 million times since installation over 22 years ago. The licensee initiated corrective actions to install recorders to verify the actual number of times the DPISs were operating over a longer, or more representative time period. The inspectors also noted that the evaluation indicated that the cycling of the DPISs depended on where the instruments tapped into the jet pumps. The inspectors determined that a common mode failure was possible; the non-conformances to the qualified life and maintenance replacement frequencies represented CAQs that needed to be identified (and corrected). The inspectors expressed their concerns that the licensee had not documented the non-conformances of the remaining switches in the CAP. On April 29, 2016, in response to the inspectors' concerns, the licensee generated IR 2663100, "LPCI Loop Select Pressure Switch Cycle Life," and concluded that the remaining DPISs were operable. Differential Pressure Indicating Switch 1-0261-34D was the oldest switch installed, and failed after 22 years of service. The licensee had not identified any site operating experience indicating a failure of these instruments earlier than 22 years. During 18 hours of instrument monitoring on 8 of the DPISs (4 on each unit), it was indicated that 3 switches were likely to have more than 3 million cycles and 3 more switches had 100-350 thousand cycles. Based on operating experience at both Quad Cities and Dresden stations, the licensee concluded that the environmentally-qualified life could be extended beyond the documented 22,000-cycle life originally established. The licensee created corrective actions which included replacing all of the installed pressure switches on both units. Additionally, the licensee planned corrective actions to update their EQ binders to extend the qualified life of the switches.

Analysis: The inspectors determined that the failure to identify a condition adverse to quality was contrary to 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," and was a performance deficiency. Specifically, the licensee failed to identify that safety-related LPCI loop select differential pressure switches were beyond their recommended replacement frequency and environmentally qualified service life. The performance deficiency was determined to be more than minor because, if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to identify when safety-related SSCs are beyond their qualified life could lead to a SSC not being able to perform its specified safety function.

The inspectors screened the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings at Power," issued June 19, 2012. The finding was screened against the Mitigating Systems Cornerstone in Exhibit 2 and the inspectors answered "Yes" to question A.1; the finding was a deficiency affecting the design or qualification of a mitigating SSC and it was determined to be of very low safety significance because the SSC maintained its operability.

The inspectors determined this finding affected the cross-cutting area of problem identification and resolution, in the aspect of Identification, which states, "The organization implements a corrective action program with a low threshold for identifying issues. Individuals identify issues completely, accurately, and in a timely manner in accordance with the program." Specifically, the licensee failed to document a condition adverse to quality related to the EQs of the LPCI loop-select DPISs on both units in the CAP in a timely manner [P.1].

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” requires, in part, that conditions adverse to quality, such as deficiencies, deviations, and non-conformances are promptly identified.

Contrary to the above, from April 14, 2016, to April 29, 2016, the licensee failed to identify a condition adverse to quality. Specifically, the licensee determined that the safety-related LPCI loop select DPISs on both units were beyond their PCM Template recommended replacement frequency and beyond their EQ service life as established in EQ binder EQ-83Q. However, the licensee failed to document either of these non-conforming conditions in their CAP.

The licensee’s corrective actions included entering the non-conforming conditions into the CAP and evaluating the CAQs for operability. The licensee determined the current DPISs were operable but non-conforming, and replaced all remaining LPCI loop-select DPISs. Additionally, the licensee planned corrective actions to update their EQ binders to extend the qualified life of the switches. 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 2663100. **(NCV 05000254/2016002-02; 05000265/2016002-02, Failure to Identify Conditions Adverse to Quality)**

.5 Annual Follow-up of Selected Issues: Evaluation of Emergency Action Level for a Site Area Emergency, MS3

a. Inspection Scope

During a review of items entered in the licensee’s CAP, the inspectors recognized a corrective action item documenting a question raised by a senior reactor operator regarding the need to evaluate Emergency Action Level (EAL) MS3, “Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal,” for a potential decrease in effectiveness. Specifically, in IR 02659623, the shift manager stated that an emergency classification resulting from EAL MS3 would be lower than that resulting from an assessment of the plant responses and symptoms against Recognition Category F initiating conditions and EAL FG1, “Loss of any two barriers and loss or potential loss of the third barrier.” The inspectors performed an in-office review the IR, EAL, Emergency Plan and associated Emergency Operating Procedures to evaluate the information provided in the IR.

The inspectors assessed the following attributes while reviewing the licensee’s corrective actions associated with the issue:

- the identified problem was documented in the CAP in a complete, accurate, and timely manner;
- operability and reportability issues were evaluated and dispositioned in a timely manner;
- extent of condition, generic implications, and previous occurrences were considered;
- corrective actions were appropriately focused to correct the problem;
- corrective actions were completed in a timely manner commensurate with the safety significance of the issue;
- action taken resulted in the correction of the identified problem;
- operating experience was adequately evaluated for applicability; and

- applicable lessons learned were communicated to appropriate organizations and implemented.

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

b. Findings

No findings were identified.

40A3 Follow-Up of Events and Notices of Enforcement Discretion (71153)

.1 (Closed) Licensee Event Report 05000265/2016-001: Main Steam Isolation Valve Local Leak Rate Tests Exceed Technical Specification Limits

a. Inspection Scope

On March 21, 2016, with Unit 2 shut down for refuel outage Q2R23, the licensee identified that the as-found local leak rate tests (LLRT) for the 'A' main steam line (MSL) inboard main steam isolation valve (MSIV) 2-0203-1A, the 'C' MSL outboard MSIV 2-0203-2C, and the combined total leakage of all MSLs exceeded the minimum pathway criteria (smaller leakage in a line and combined total of the smaller leakage in each line, respectively) of the TS. The minimum pathway leakage for 2-0203-1A and 2-0203-2C exceeded the TS surveillance limit of 34 standard cubic feet per hour (scfh), with a measured leakage of 65.5 and 45 scfh, respectively. The measured combined total leakage of all MSLs was measured at 118.8 scfh, which exceeded the TS limit of 86 scfh for all MSIVs combined min-pathway leakage. After reviewing the as-found test results, the licensee flushed the 'A', 'B', and 'D' MSLs to determine if any of the failures could be attributed to foreign material and to identify a scope for inspection and repair (the licensee had originally planned to repair the 2-0203-2C valve during the outage, so the 'C' MSL was not flushed). Based on the post-flush test results, the licensee determined MSIVs 2-0203-2A and 2-0203-2C were to remain in the scope of inspection and repair for Q2R23. The two MSIVs were successfully repaired and retested with satisfactory results, and all of the as-left LLRT results were satisfactory. The inspectors reviewed historical test results and valve leakage trend information and determined that the LLRT failures were not within the licensee's ability to foresee and correct; therefore, no performance deficiency was identified. The licensee also planned to replace MSIV plugs with an improved spherical nose plug during future outages. The inspectors noted that each unit has already installed the spherical nose plugs on one MSIV on Unit 1 and 2 MSIVs on Unit 2. The licensee is limiting this long term corrective action until operating experience demonstrates the design has been an effective corrective action.

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.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 Component Design Bases Inspection (71111.21)

(Closed) Unresolved Item 05000254/2014008-02; 05000265/2014008-02: Non-Conservative Diesel Generator Cooling Water Pump Break Horsepower Assumed in Emergency Diesel Generator Loading Analysis

a. Inspection Scope

During the 2014 Component Design Bases Inspection, the inspectors identified an Unresolved Item (URI) regarding the motor load measured by the licensee for the Unit 1 Diesel Generator Cooling Water (DGCW) pump that was determined to be less than the vendor certified pump performance data and pump load BHP requirement at maximum flow conditions. Field measured pump motor load data was evaluated by the licensee and utilized as a design input in the Electrical Transient Analysis Program (ETAP) analysis for the emergency bus loading on offsite power and for the bus loading when powered by the Emergency Diesel Generator (EDG). The inspectors noted the licensee did not use vendor certified pump performance data when they evaluated the effects of the pump impeller replacement on the motor load. Instead, the licensee used field measured electrical load data as a design input to the ETAP electrical calculations for bus load flow and EDG loading, which the inspectors determined resulted in the bus and EDG loading being non-conservative. Technical Specification Surveillance Requirement 3.8.1.15 required loading the EDG between ≥ 2340 Kilo Watt (kW) and ≤ 2600 kW for 22 hours and between ≥ 2730 kW and ≤ 2860 kW for 2 hours. The inspectors determined for the $\frac{1}{2}$ EDG (which the licensee identified had the worst case loading), the margin between the actual EDG accident loading and the 2-hour minimum surveillance limit of 2730 kW was further reduced as a result of the increase in required Pump Break Horsepower (BHP) from 90 BHP to 101 BHP based on vendor certified pump performance data. The licensee did not fully evaluate and reconcile the effects on electrical bus and EDG loading analyses for the required pump BHP for the expected pump flow conditions, when the Unit 1 DGCW pump impeller was replaced in 2011 under WO 01301062 and evaluated under Engineering Change 369825. This condition was entered into the CAP as Action Request 2420101 and Action Request 2420905.

The licensee subsequently revised the ETAP analysis (QDC-6700-E-1503, Revision 008B) using 101 HP for the DGCW pumps and determined the worst case accident loading of Unit 1, Unit 2, and swing EDGs as 2694 kW, 2711 kW and 2800 kW respectively compared to their 2000 hour rating of 2860 kW. Based on this information, the inspectors concluded that the EDGs have sufficient margin.

The inspectors did not identify a performance deficiency or violation of U.S. Nuclear Regulatory Commission requirements. This URI is closed.

b. Findings

No findings of significance were identified.

4OA6 Management Meetings

.2 Exit Meeting Summary

On July 5, 2016, the inspectors presented the inspection results to Mr. K. Ohr, Plant Manager, 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.

.3 Interim Exit Meetings

Interim exits were conducted for:

- On April 1, 2016, the inspectors presented the results for the areas of radiological hazard assessment and exposure controls; occupational ALARA planning and controls; and in-plant airborne radioactivity control and mitigation with Mr. S. Darin, Site Vice President.
- On June 30, 2016, the inspectors presented the results for the closure of URI 05000254/2014008-02; 05000254/2014008-02, "Non-Conservative DGCW Pump Break Horsepower," with Mr. T. Petersen, Regulatory Assurance, and R. Swart, Design Engineering Supervisor.

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.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

K. Ohr, Plant Manager
W. Beck, Regulatory Assurance Manager
T. Bell, Engineering Director
K. Boodry, System Engineering Manager
J. Colgan, Chemistry Supervisor
R. Craddick, Organizational Effectiveness Manager
H. Dodd, Operations Director
R. Earley, Work Control Outage Manager
A. Green, Radiation Protection Technical Manager
M. Humphrey, Regulatory Assurance Engineer
T. Kelley, Acting Maintenance Director
R. Luebbe, Regulatory Assurance Engineer
K. Nicely, Corporate Licensing Engineer
T. Petersen, Regulatory Assurance Lead
P. Simpson, Corporate Licensing Manager
R. Swart, Design Engineering Supervisor
A. Williams, Security Manager
T. Wojick, Engineering Manager
E. Zhu, Engineering Supervisor

U.S. Nuclear Regulatory Commission

K. Stoedter, Chief, Reactor Projects Branch 1
R. Murray, Senior Resident Inspector
K. Carrington, Resident Inspector

Illinois Emergency Management Agency (IEMA)

C. Mathews, IEMA

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000254/2016002-01; 05000265/2016002-01	NCV	Failure to Maintain Parameters within Limits of TS 3.6.2.5 and 3.6.3.1 (Section 1R13)
05000254/2016002-02; 05000265/2016002-02	NCV	Failure to Identify Conditions Adverse to Quality (Section 4OA2)

Closed

05000254/2016002-01; 05000265/2016002-01	NCV	Failure to Maintain Parameters within Limits of TS 3.6.2.5 and 3.6.3.1 (Section 1R13)
05000254/2016002-02; 05000265/2016002-02	NCV	Failure to Identify Conditions Adverse to Quality (Section 4OA2)
05000265/2016-001	LER	Main Steam Isolation Valve Local Leak Rate Tests Exceed Technical Specification Limits (Section 4OA3)
05000254/2014008-02; 05000265/2014008-02	URI	Non-Conservative DGCW Pump Break Horsepower Assumed in EDG Loading Analysis (Section 4OA5)

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.

<u>Section Number</u>	<u>Document Number</u>	<u>Description or Title</u>	<u>Revision or Date</u>
Section 1R01			
1R01	OP-AA-108-107	Switchyard Control	4
1R01	OP-AA-108-107-1001	Station Response to Grid Capacity Conditions	6
1R01	OP-AA-108-107-1002	Interface Procedure Between Comed/ PECO and Exelon Generation (Nuclear/ Power) for Transmission Operations	9
1R01	SVP-16-029	Quad Cities Station Certification of 2016 Summer Readiness	05/13/2016
1R01	WC-AA-107	Seasonal Readiness	17
1R01		Quad Cities 2016 Current Summer Readiness Workdown	
1R01		Final Rev 0 Summer Readiness Master Exception List	
1R01	IR 2672453	2A Service Water Pump Excessive Packing Leak	05/22/2016
1R01	IR 2675519	EO ID: 2A Service Water Pump Needs Packing Adjusted	05/30/2016
1R01	IR 2674727	2016 Ventilation Issues Roll-Up	05/27/2016
1R01	QCOA 0010-16	Flood Emergency Procedure	24
1R01	QCMMS 1500-12	Portable Emergency Flood Pump Capacity Test	2
1R01	WO 1763086	Emergency Flood (Darley) Pump Testing	08/06/2015
1R01	WO 1665349	Emergency Flood (Darley) Pump Testing	07/01/2014
1R01		Safety Evaluation by the Division of Reactor Licensing U.S Atomic Energy Commission in the Matter of Commonwealth Edison Company Quad-Cities Station, Units 1 and 2	08/25/1971
1R01		Quad Cities IPEEE Report	1
1R01		Quad Cities Nuclear Power Plant—Review of Individual Examination of External Events (IPEEE) Submittal	04/26/2001
1R01	QCTP 0130-11	Internal Flood Protection Program	5
1R01	WO 1565854	Insp U2 Reactor Bldg Internal Flood Barriers	02/06/2014
1R01	WO 1762522	Insp U2 Reactor Bldg Internal Flood Barriers	01/29/2016
1R01	WO 1448913	Insp U1 Reactor Bldg Internal Flood Barriers	12/10/2012
1R01	WO 1650778	Insp U2 Reactor Bldg Internal Flood Barriers	12/08/2014
1R01	IR 2684174	NRC ID Flood Emergency Procedure Concern	06/21/2016
Section 1R04			

1R04	Drawing M-87, Sheet 2	High Pressure Coolant Injection HPCI Piping	R
1R04	QOM 2-2300-01	Unit 2 HPCI Valve Checklist	18
1R04	IR 2676697	Failed Unit 2 SBO Jacket Water Booster Pump Qtrly Surv	06/01/2016
1R04	QOM 1-6620-03	SBO DG 1 Fuel Oil Valve Checklist	2
1R04	QCOP 6620-07	SBO DG 1(2) Preparation for Normal Start	16
1R04	QOM 1-6620-01	SBO DG 1 Starting Air Valve Checklist	4
1R04	IR 2487794	Unresolved Challenges to RHRSW Elbow OPEVAL	04/19/2015
1R04	IR 1619817	RHRSW Supports Extent of Condition Walkdown	02/11/2015
1R04	IR 2534657	Visual Internal Inspection of 2D RHRSW HP Elbow	07/29/2015
1R04	Drawing M-79	Diagram of RHR Service Water Piping	BJ
1R04	QCOS 1000-04	RHR Service Water Pump Operability Test	58
1R04	QOM 2-1000-05	Unit 2 RHR Service Water Valve Checklist	21
1R04	IR 2678889	NRC Identified Poor Appearance on Ceiling	06/07/2016
1R04	IR 2678887	Lighting Near the B/C RHR Service Water Vault U2 Cond. Pit	06/07/2016
1R04	IR 2678897	NRC Expressed Concern with Housekeeping in 2B/C RHR SW Vault	06/07/2016
1R04	IR 2678899	Standing Water in Bedplate of 2C RHRSW Pump	06/07/2016
Section 1R05			
1R05	FZ 5.0	Quad Cities Generating Station Pre-Fire Plan: Unit 2 Turbine Bldg. El. 595'-0"—Safe Shutdown Pump Room	October 2013
1R05	OP-AA-201-008	Pre-Fire Plan Manual	3
1R05	FZ 11.3.4	Quad Cities Generating Station Pre-Fire Plan: Unit 2 RB 544'-0" Elev. NE Corner Room 2A RHR Room	July 2009
1R05	QDC-4100-M-0691	Quad Cities Combustible Loading Calculation for the Powerblock, SBO Building, and Cribhouse	11/21/2014
1R05	FZ 6.3	SB 595'-0" Elevation Auxiliary Electric Room	
1R05	FZ 4.0	SB 595'-0" Computer Room in Auxiliary Electric Room	
1R05	IR 2674000	NRC ID—Flex Ductwork Connected to Cable Pans in AEER	
1R05	IR 2673989	NRC ID—Cart Clamped to Panel in Aux Electric Room	
1R05	EC 401197	Evaluation of Fire and Explosion Potential of Compressed Gas Cylinders Located in the Plant	
1R05	OP-AA-201-003, Attachment 3	Fire Drill Scenario Information—Fire Drill Scenario No: 16 2 nd Qtr #1 (Bus 11 902 Panel RFP 1C)	15
1R05	FZ 1.1.1.2	Unit 1 RB 595'-0" Elev. Ground Floor Prefire Plan	October 2013
1R05	FZ 1.1.1.2	Fire Hazards Analysis Fire Zone 1.1.1.2	20

1R05	401197	Evaluation of Fire and Explosion Potential of Compressed Gas Cylinders Located in the Plant	0
1R05	IR 1340283	OPEX Review for Flammable Gas Cylinder Issues	03/13/2012
Section 1R07			
1R07		Master-Lee Eddy Current Examination Final Report	04/04/2016
1R07	EC 346690	RHR Heat Exchanger Tube Plugging Criteria, Tube Plugging Limit, and Correct Tube Plug	03/12/2004
1R07	WO 1466784	RHR Heat Exchanger Thermal Performance Test	02/21/2013
1R07	WO 1748989	Perform Eddy Current Test	03/25/2016
Section 1R11			
1R11	QCGP 1-2	Normal Unit 2 Startup	22
1R11	NF-AB-720-F-2, Attachment	Control Rod Move Sheet	0
Section 1R12			
1R12	IR 2668271	NRC ID: Inspect/ Rebuild Actuator Due to Prior Over-Thrust Event	05/11/2016
1R12	IR 2625523	Suspected Backseat Overthrust of RCIC Steam Line Outboard PCIV	02/12/2016
1R12	EC 404742	OpEval 2625523 RCIC Steam Supply Isolation MOV 1-1301-17	03/01/2016
1R12	IR 2649402	MO 2-2399-40 Overthrust During Diagnostic Test	04/01/2016
1R12	IR 1191746	EQ Programmatic Concern	03/24/2011
1R12	IR 2667319	NRC ID Oil Leaking from Valve Operator MO 2-2301-48	05/09/2016
1R12	IR 2667320	NRC ID Oil Leaking from Valve Operator MO 2-2301-9	05/09/2016
1R12	IR 2667322	NRC ID Oil Leaking from Valve Operator MO 2-2301-49	05/09/2016
1R12	IR 2667323	NRC ID Oil Leaking from Valve Operator MO 2-2301-3	05/09/2016
1R12	IR 2667324	NRC ID Oil Leaking from Valve Operator MO 2-2301-10	05/09/2016
1R12	IR 2667325	NRC ID Oil Leaking from Valve Operator MO 2-2301-9	05/09/2016
1R12	IR 2667328	NRC ID Oil Leaking from Valve Operator MO 1-1301-48	05/09/2016
1R12	IR 2667328	NRC ID Oil Drops on 2-1402-3A	05/09/2016
1R12	IR 2667330	NRC ID Oil Leaking from Valve Operator MO 1-2301-15	05/09/2016
1R12	IR 2667331	NRC ID Oil Leaking from Valve Operator MO 1-1301-36	05/09/2016
1R12	IR 2667332	NRC ID Oil Leaking from Valve Operator MO 1-2301-16	05/09/2016
1R12	IR 2667333	NRC ID Oil Leaking from Valve Operator MO 2-2301-36	05/09/2016
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LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agencywide Document Access Management System
ALARA	As-Low-As-Is-Reasonably-Achievable
BHP	Brake Horse Power
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CFR	Code of Federal Regulations
d/p	Differential Pressure
DGCW	Diesel Generator Cooling Water
DPIS	Differential Pressure Indicating Switch
DRP	Division of Reactor Projects
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EQ	Environmental Qualification
ETAP	Electrical Transient Analysis Program
FZ	Fire Zone
HP	Health Physics
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
kW	Kilowatt
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LLRT	Local Leak Rate Testing
LPCI	Low Pressure Coolant Injection
MSHA	Mine Safety and Health Administration
MSIV	Main Steam Isolation Valve
MSL	Mean Sea Level
NCV	Non-Cited Violation
NIOSH	National Institute of Safety & Health
NRC	U.S. Nuclear Regulatory Commission
OLR	Online Risk
OSP	Outage Safety Plan
PARS	Publicly Available Records System
PCM	Performance-Centered Maintenance
PI	Performance Indicator
psid	Pounds Per Square Inch Differential
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RFO	Refueling Outage
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RTP	Rated Thermal Power
RWP	Radiation Work Permit
SBLC	Standby Liquid Control
scfh	Standard Cubic Feet Per Hour
SDP	Significance Determination Process
SSC	Structure, System, and Component

SSME	System Subject Matter Expert
TS	Technical Specification
TSO	Transmission System Operator
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
WO	Work Order

B. Hanson

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Sincerely,

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