



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
2443 WARRENVILLE RD. SUITE 210  
LISLE, IL 60532-4352

January 20, 2017

Mr. Bryan C. Hanson  
Senior VP, Exelon Generation Company, LLC  
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 05000254/2016004; 05000265/2016004;  
05000254/2016501 AND 05000265/2016501

Dear Mr. Hanson:

On December 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. On January 10, 2016, the NRC inspectors discussed the results of this inspection with Mr. S. Darin and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report. The NRC also completed its annual inspection of the Emergency Preparedness Program. This inspection began on January 1, 2016, and issuance of this letter closes Inspection Report Number 2016501.

Based on the results of this inspection, the NRC has identified one issue that was evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that a violation is associated with this issue. Because the licensee initiated condition reports to address this issue, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. The NCV is described in the subject inspection report.

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with 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 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response, (if any), will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary, information so that it can be made available to the Public without redaction.

Sincerely,

*/RA/*

Karla Stoedter, Chief  
Branch 1  
Division of Reactor Projects

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

Enclosure:  
IR 05000254/2016004; 05000265/2016004;  
05000254/2016501; 05000265/2016501

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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: 05000254/2016004; 05000265/2016004  
05000254/2016501; 05000265/2016501

Licensee: Exelon Generation Company, LLC

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

Location: Cordova, IL

Dates: October 1 through December 31, 2016

Inspectors: R. Murray, Senior Resident Inspector  
K. Carrington, Resident Inspector  
M. Doyle, Acting Resident Inspector  
M. Garza, Emergency Preparedness Inspector  
B. Palagi, Operations Engineer  
C. Mathews, Illinois Emergency Management Agency

Approved by: K. Stoedter, Chief  
Branch 1  
Division of Reactor Projects

Enclosure

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## SUMMARY

Inspection Report 05000254/2016004, 05000265/2016004, 05000254/2016501, 05000265/2016501; 10/01/2016–12/31/2016; Quad Cities Nuclear Power Station, Units 1 and 2; Identification and Resolution of Problems.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. One Green finding was identified by the inspectors. The finding involved a non-cited violation 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 November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG–1649, "Reactor Oversight Process," dated July 2016.

### **Cornerstone: Mitigating Systems**

Green. A finding of very low safety significance and an associated non-cited violation of Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed for the licensee's failure to implement foreign material exclusion (FME) controls during the implementation of modification Work Order 1649339, "Modify the Target Rock to Increase the Volume per Engineering Change 394119," and was contrary to MA-AA-716-008, "Foreign Material Exclusion Program," Revision 9. The failure to implement FME controls during maintenance led to the failure of the Unit 2 Target Rock safety relief valve solenoid valve during surveillance testing on April 5, 2016. The licensee's corrective actions included replacing the Target Rock safety relief valve solenoid valve. In addition, the licensee made procedure revisions to the standard template for welding activities to ensure that a FME plan is developed when performing butt welds or weld repairs. The licensee entered this issue into their corrective action program as Issue Report 2703233.

The finding was determined to be more than minor because the finding was associated with the Mitigating Systems Cornerstone attribute of Equipment Performance. The inspectors determined the finding represented a potential loss of the valve function and, therefore, a detailed risk evaluation was required. A regional senior risk analyst performed a detailed risk evaluation and determined the finding was of very low safety significance. This finding had a cross-cutting aspect in the area of Human Performance, Work Management, because the licensee did not implement a process of planning, controlling, and executing work activities such that nuclear safety was an overriding priority. Specifically, during the implementation of Work Order 1649339 and subsequent revisions, the licensee failed to control and execute the work while following FME processes and procedures [H.5]. (Section 4OA2.3)

## **REPORT DETAILS**

### **Summary of Plant Status**

#### **Unit 1**

The unit started the inspection period at 100 percent rated thermal power (RTP).

On December 18, 2016, operators performed an emergent power reduction to approximately 95 percent RTP in response to a feedwater heater transient. The licensee recovered from the transient and, following the implementation of compensatory measures, returned the unit to 100 percent RTP on December 18, 2016.

On December 23, 2016, operators performed an emergent power reduction to 92 percent RTP in response to a feedwater heater transient. The licensee recovered from the transient after implementing repairs to a level control valve that feeds the 1D1 high pressure feedwater heater. Following the repairs, the licensee returned the unit to 100 percent RTP on December 24, 2016.

The unit operated at 100 percent RTP throughout the remainder of the 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 operated at 100 percent RTP 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.

### **1. REACTOR SAFETY**

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 1 reactor core isolation cooling (RCIC) system during Unit 1 high pressure coolant injection (HPCI) system emergent and unplanned maintenance work window;
- Units 1 and 2 reactor building closed cooling water (RBCCW) systems during ½ RBCCW heat exchanger inspection and planned maintenance window; and
- Unit 2 HPCI system during Unit 2 RCIC system planned maintenance window.

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, Updated Final Safety Analysis Report (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 corrective action program (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 Inspection Procedure (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) 1.1.2.4, Unit 2 Reactor Building, Elevation 647'-6", Third Floor;
- FZ 8.2.1.A, Unit 1 Turbine Building, Elevation 547'-0", Condensate Pump Room;
- FZ 8.2.1.B, Unit 1 Turbine Building, Elevation 547'-0", Condensate Pump Room;
- and
- FZ 1.1.1.6, Unit ½ Reactor Building, Elevation 690'-0", Refuel 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.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On October 18 and November 1, 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 and satisfied the inspection program requirement for the resident inspectors to observe a portion of an in-progress annual requalification operating test during a training cycle in which it was not observed by the NRC during the biennial portion of this IP.

b. Findings

No findings were identified.



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

a. Inspection Scope

On October 4, 2016, the inspectors observed a reactor recirculation pump runout limits determination and setting test. 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 (or equipment) manipulations;
- oversight and direction from supervisors; and

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.

.3 Biennial Written and Annual Operating Test Results (71111.11a)

a. Inspection Scope

The regional inspector reviewed the overall pass/fail results of the Annual Operating Test, administered by the licensee from October 11, 2016, through November 15, 2016, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 55.59(a). The results were compared to the thresholds established in Inspection Manual Chapter (IMC) 0609, Appendix I, "Licensed Operator Requalification Significance Determination Process," to assess the overall adequacy of the licensee's Licensed Operator Requalification Training program to meet the requirements of 10 CFR 55.59.

This inspection constitutes one biennial licensed operator requalification inspection sample as defined in IP 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- (Z5711-3) safe shutdown makeup pump and room cooler;
- quality control review of WO 1805965-01 [catalog ID 25281] for 4kV switchgear and WO 1913073-01 [catalog IDs 42511,1432143-2,43545, 44144] for control rod 2-03; and
- 10 CFR 50.65(a)(3) periodic evaluation.

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

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

The inspector performed a quality review for WOs 1913073 and 1805965 as discussed in IP 71111.12, Section 02.02.

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 and one quality control review 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 16–43–07: Bus 23–1 undervoltage relay test, Unit 1 residual heat removal (RHR) torus spray valve testing, 1A 125 Vdc battery charger breaker replacement work and online risk change to yellow, 1B RHR pump breaker maintenance, 1B reactor water cleanup system emergent pump replacement;
- Work Week 16–44–08: U1 HPCI system emergent work and online risk change to yellow, U1 1A 125 Vdc battery charger emergent work and online risk change to yellow, U1 station blackout diesel generator emergent work, U2 HPCI planned maintenance and online risk change to yellow; and
- Work Week 16–45–09: Unit 1 steam jet air ejector radiation monitors and 1B condenser offgas emergent work, Unit 1 HPCI room cooler planned maintenance and online risk change to yellow.

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 three samples as defined in IP 71111.13–05.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Issue Report (IR) 2725625: Degraded Piping Does Not Satisfy Single Failure Criterion; and

- IR 3949824: ½ Emergency Diesel Generator Did Not Start During QCOP 6600–58 Hot Fast Restart.

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 two samples as defined in IP 71111.15–05.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification:

- Engineering Change (EC) 404722: Install Closed Torque Switch Bypass and Motor Pinion Gear Change on MO–1001–23B to Increase S1 and S6 Margin.

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

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

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- Unit 1 RCIC logic functional test following planned maintenance;
- Containment and control room ventilation boundary smoke test following planned maintenance;
- Unit 1 station blackout diesel generator quarterly load test following planned maintenance;
- Unit 2 RCIC drain pot level switch and operability tests following planned maintenance; and
- Safe shutdown makeup pump post-maintenance testing following planned maintenance.

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

This inspection constituted five post-maintenance testing samples as defined in IP 71111.19-05.

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 6500–10: Functional Test of Unit 2 Second Level Undervoltage (Routine).

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

- did preconditioning occur;
- the effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis;
- plant equipment calibration was correct, accurate, and properly documented;
- as-left setpoints were within required ranges; and the calibration frequency was in accordance with TSs, the USAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used;
- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and reference values were consistent with the system design basis;
- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;
- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and

- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report.

This inspection constituted one routine surveillance testing sample as defined in IP 71111.22, Sections–02 and–05.

b. Findings

No findings were identified.

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

a. Inspection Scope

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

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

This EAL and Emergency Plan Change inspection constituted one sample as defined in IP 71114.04–06.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on October 5 and October 12, 2016, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the control room simulator and technical support center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment to this report.

This emergency preparedness drill inspection constituted two samples as defined in IP 71114.06–06.

b. Findings

No findings were identified.

4. **OTHER ACTIVITIES**

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

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index—High Pressure Injection Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI)—High Pressure Injection Systems performance indicator (PI) for Quad Cities Units 1 and 2, for the period from the third quarter 2015 through the third quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99–02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee’s operator narrative logs, IRs, MSPI derivation reports, event reports, and NRC integrated inspection reports for the period of July 1, 2015, through September 30, 2016, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. 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 MSPI high pressure injection system sample as defined in IP 71151–05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index—Heat Removal System PI for Quad Cities Units 1 and 2, for the period from the third quarter 2015 through the third quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99–02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee’s



operator narrative logs, IRs, event reports, MSPI derivation reports, and NRC integrated inspection reports for the period of July 1, 2015, through September 30, 2016, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. 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 MSPI heat removal system sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index—Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index—Residual Heat Removal System PI for Quad Cities Units 1 and 2 for the period from the third quarter 2015 through the third quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, IRs, MSPI derivation reports, event reports, and NRC integrated inspection reports for the period of July 1, 2015, through September 30, 2016, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. 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 MSPI residual heat removal system samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.4 Mitigating Systems Performance Index—Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index—Cooling Water Systems PI for Quad Cities Units 1 and 2 for the period from the third quarter 2015 through the third quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI

Document 99–02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee’s operator narrative logs, IRs, MSPI derivation reports, event reports, and NRC integrated inspection reports for the period of July 1, 2015, through September 30, 2016, to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. 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 MSPI cooling water system 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 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, adequate attention was being given to timely corrective actions, and adverse trends were identified and addressed. Some minor issues were entered into the licensee’s corrective action program as a result of the inspectors’ observations; however, they are not discussed in this report.

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

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee’s 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 4OA2.1 above, licensee trending efforts, and licensee human performance results. The inspectors’ review nominally considered the 6-month period of June 2016 through November 2016,

although some examples expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the 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 review inspection sample as defined in IP 71152.

b. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues: Target Rock Safety Relief Valve Solenoid Valve Failure

a. Inspection Scope

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

- IR 2703233: Target Rock Solenoid Valve Failure.

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.

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

b. Findings

(1) Failure to Implement Foreign Material Exclusion Controls

Introduction: A finding of very low safety significance and an associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed for the licensee's failure to implement foreign material exclusion (FME) controls during the implementation of modification WO 1649339, "Modify the Target Rock to Increase the Volume per EC 394119," and was contrary to MA-AA-716-008, "Foreign Material Exclusion Program," Revision 9. The failure to implement FME controls during maintenance led to the failure of the Unit 2 Target Rock safety relief valve (SRV) solenoid valve during surveillance testing on April 5, 2016.

Description: On April 5, 2016, during Unit 2 refueling outage Q2R23, the Target Rock SRV solenoid valve, 2-0203-3A, failed to hold air during its pressure decay test. The test was performed in accordance with procedure QCOS 4700-02, "Inboard Main Steam Isolation Valve (MSIV) and Target Rock Valve Pneumatic System Leak Test," Revision 8. The licensee documented the failure in IR 2651057, "Investigate Air Leak/ Replace Solenoid for Target Rock." The licensee performed an equipment apparent cause evaluation (EACE) under EACE 2703233, "Target Rock Solenoid Valve Failure."

The licensee sent the solenoid valve to Power Labs for failure analysis. The Power Labs report determined the cause of the solenoid valve failure was due to foreign material in the piston and seat areas of the valve. The material was determined to be made of various metallic particles, including stainless steel. The licensee investigated previous work performed on the system and determined the foreign material was most likely introduced from work performed during the previous refueling outage in 2014.

During a Unit 2 refueling outage in 2014, the licensee performed WO 1649339, "Modify the Target Rock to Increase the Volume per EC 394119," to install a modification to increase the volume of the air accumulator in the system. Due to non-destructive and other post-maintenance testing during the implementation of the work order, there were several revisions that needed to be made to the work order to fix weld indications and identified air leaks. These revisions included weld repairs that entailed grinding out old welds. Investigation by the licensee identified several issues with the original WO and subsequent revisions.

Prior to pre-fabrication work in the weld shop on March 28, 2014, a supervisor signed off the FME requirements that are used for pre-job briefings. This was documented on Attachment 3-B1 of procedure MA-AA-716-008. The inspectors noted that Attachment 3-B2, which is used for work in-progress to document FME internal devices and cleanliness closeout inspection when work spans multiple shifts and crews, was not filled out and was marked as "not applicable" even though Attachment 3-B1 indicated FME devices were required and the WO spanned multiple crews and shifts.

Documented and reviewable portions of the WO failed to show how FME processes and procedures were implemented. In addition, the WO instructions failed to discuss flushing or maintaining internal cleanliness following assembly of the accumulator in the weld shop. The licensee also identified that although a supervisor acknowledged the understanding of the FME requirements, the supervisor failed to ensure proper adherence to FME procedures by not enforcing proper FME work practices and not completing required FME procedural attachments.

The licensee also identified that when weld repairs were required on various field welds, the weld record templates that are used for planning the weld repairs do not direct the workers back to the FME procedures to take appropriate FME controls. The licensee believes that the most likely source of the foreign material was from the weld repairs: one from the pre-fabrication in the weld shop and two repairs that occurred in the field. The licensee determined that an “FME plan...would have likely identified the potential vulnerabilities and created actions to prevent the foreign material from entering the system.”

Due to the multiple locations and revisions of the subject WO, including welding and subsequent repairs, a detailed FME plan would have contained detailed guidance for FME requirements for each location and weld activity. Adding this guidance to the welding templates will ensure that FME plans are developed when performing repairs and butt welds.

The licensee determined the apparent cause of the Target Rock SRV failure to be the incorrect application of requirements for FME plans in accordance with procedure MA-AA-716-008, “Foreign Material Exclusion Program,” Revision 9. The licensee identified a contributing cause as supervision not enforcing the standards of procedural adherence.

Analysis: The inspectors determined that the failure to implement FME controls during the implementation of modification WO 1649339, “Modify the Target Rock to Increase the Volume per Engineering Change EC 394119,” was contrary to MA-AA-716-008, “Foreign Material Exclusion Program,” Revision 9, and was a performance deficiency.

The finding was determined to be more than minor because the finding was associated with the Mitigating Systems Cornerstone attribute of Equipment Performance and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to implement FME controls led to the failure of the SRV solenoid valve and could have prevented subsequent operations of the Target Rock SRV should it have been needed during plant operations.

Using 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 finding was screened against Exhibit 2, the Mitigating Systems Screening Questions. The inspectors answered, “Yes,” to Question A.2 because the finding represented a potential loss of the valve function. Therefore, a detailed risk evaluation was required.

A senior risk analyst (SRA) performed a detailed risk evaluation using Version 8.18 of the Standardized Plant Analysis Risk (SPAR) model for Quad Cities and Systems Analysis Programs for Hands-on Integrated Reliability Evaluations version 8.1.4 software to obtain a delta core damage frequency ( $\Delta$ CDF). The SPAR model was modified by Idaho National Laboratories to incorporate changes for the electromatic relief valves (ERVs) and the Target Rock SRV that had previously been incorporated into the Dresden SPAR model associated with common-cause “alpha factors” and associated with success criteria for manual reactor coolant system (RCS) depressurization and RCS over pressurization. The common-cause group (CCG) for the SRVs was changed from a five-element CCG (that included the 4 ERVs and the Target Rock SRV) to a

four-element CCG for the 4 ERVs (and with the Target Rock SRV separate). This is consistent with the licensee's probabilistic risk assessment model and is based on the differences between the ERVs and the Target Rock SRV in 1) valve design, 2) valve relief capacities, and 3) valve actuation mechanisms.

Even though the self-actuation (safety) mode of operation of the Target Rock SRV remained functional, and only the relief (remote-manual) mode of operation was affected by the performance deficiency, it was conservatively assumed that each mode of operation of the Target Rock SRV was failed. The exposure time was assumed to be one year, which is the maximum time allowed by the Significance Determination Process.

Using the above assumptions, the estimated change in core damage frequency from internal events was less than  $1E-7$ /yr, which represents a finding of very low safety significance (Green). The dominant sequence was a small break loss of coolant accident initiating event with a failure of the power conversion system, failure of main feedwater, failure of HPCI, and failure of manual reactor coolant system depressurization.

This finding had a cross-cutting aspect in the area of Human Performance, Work Management, because the licensee did not implement a process of planning, controlling, and executing work activities such that nuclear safety was an overriding priority. Specifically, during the implementation of WO 1649339 and subsequent revisions, the licensee failed to control and execute the work while following FME processes and procedures [H.5].

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality be prescribed by documented procedures and instructions of a type appropriate to the circumstances and be accomplished in accordance with these procedures and instructions. The licensee established WO 1649339, "Modify the Target Rock to Increase the Volume per EC 394119," as the implementing instructions for installing a piping and accumulator configuration change on the Unit 2 Target Rock SRV, 2-0203-3A, an activity affecting quality.

Work Order 1649339, Step 3.4 states, "FME practices are to be adhered to per the FME forms and procedure MA-AA-716-008 ("Foreign Material Exclusion Program," Revision 9)."

Contrary to the above, from March 28, 2014, to April 20, 2014, the licensee failed to follow Step 3.4 of WO 1649339. Specifically, during the piping pre-fabrication activity on March 28, 2014, there were no documented FME processes used. In addition, on April 1, 2014, during repairs to root welds completed under revisions of WO 1649339, there were no documented FME controls. And finally, on April 20, 2014, additional revisions to WO 1649339 were made to complete more weld repairs and there was no documentation to indicate appropriate FME controls were established.

The licensee's corrective actions included replacing the Target Rock SRV solenoid valve. In addition, the licensee made procedure revisions to the standard template for welding activities to ensure that an FME plan is developed when performing butt welds or weld repairs. 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 2703233. **(NCV 05000254/2016004-01; 05000265/2016004-01, Failure to Implement Foreign Material Exclusion Controls)**

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

.1 Unit 1 High Pressure Coolant Injection Through Wall Leak in Steam Line Drain Valve (Event Notification 52334 and Retraction)

a. Inspection Scope

On October 31, 2016, the licensee identified a minor through-wall leak on the HPCI steam line drain steam trap outlet valve, 1-2301-55. The defect was identified as an audible leak by operators traversing the room on rounds. The licensee declared HPCI inoperable, isolated the steam leak, and reported the condition to the NRC as an event or condition that could have prevented the fulfillment of a safety function under Event Notification (EN) 52334, dated October 31, 2016. The licensee replaced the 1-2301-55 valve on November 1, 2016. Investigation and inspection by the licensee determined the through-wall steam leak was due to a manufacturing defect in the valve body. Subsequent assessment of the event by engineering personnel determined that the pinhole steam leak in the 1-2301-55 valve would not have prevented the HPCI system from performing its intended function. Based on the conclusions documented in engineering evaluation EC 425504, the licensee retracted EN 52334 on December 5, 2016. The inspectors reviewed the licensee's engineering evaluation of the event, in addition to the documents listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report 05000254/2016-003-00: Loss of Control Room Emergency Ventilation Due to Inadvertent High Ammonia Condition

a. Inspection Scope

On July 26, 2016, contractors of the licensee were cleaning the roof in close proximity to the control room emergency ventilation (CREV) intake plenum which has toxic gas monitors that can detect ammonia. The crew cleaning the roof were using a cleaning agent called CS-1 that contained ammonia. The CREV system air filtration units were tripped and locked out when the ammonia was detected by the toxic gas monitors of the CREV system. This resulted in an unplanned entry into Technical Specification 3.7.4, "Control Room Emergency Ventilation System," Condition A, which required the inoperable CREV system be restored to operable status within 7 days. This event was determined to have resulted in a condition that could have prevented the fulfillment of a safety system due to the CREV isolation lockout not being reset in under 40 minutes, as required and described in UFSAR Section 6.4.4.1, Radiological Protection. The CREV system was restored and TS 3.7.4 was exited about 46 minutes after the start of the event. However, the licensee's investigation determined that the toxic gas isolation signal was available to be reset (i.e. could have been reset) within 13 minutes of the

initial isolation. Due to this, the licensee determined that the control room emergency ventilation system would have been able to perform its UFSAR function of being started and filtered with outdoor air within 40 minutes of a loss of coolant accident. The emergency mode of control room ventilation is not a fully automatic operation under accident conditions (i.e. some components must be manually started in the emergency mode). The licensee has established procedures to reset isolation conditions and start the CREV system. The inspectors reviewed the licensee's event report (LER), engineering apparent cause evaluation (EACE) 2696917, and associated CAP action items assigned from the EACE.

Documents reviewed are listed in the Attachment to this report. This LER is closed.

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

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On January 10, 2016, the inspectors presented the inspection results to Mr. S. Darin, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The results of the Licensed Operator Requalification Program inspection was conducted by phone with Mr. E. Pannell, Training Manager, on December 12, 2016.
- The results of the Emergency Preparedness Program inspection was conducted by phone with Mr. K. Ohr, Plant Manager, on December 20, 2016.

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

S. Darin, Site Vice President  
K. Akre, Radiation Protection Operations Manager  
W. Beck, Regulatory Assurance Manager  
T. Bell, Engineering Director  
J. Colgan, Chemistry Supervisor  
H. Dodd, Operations Director  
R. Hight, Maintenance Director  
M. Humphrey, Regulatory Assurance Engineer  
R. Luebbe, Regulatory Assurance Engineer  
K. Nicely, Corporate Licensing Engineer  
T. Petersen, Regulatory Assurance Lead  
A. Scott, Work Management Director  
T. Wojick, Engineering Manager

#### 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

05000254/2016004-01; 05000265/2016004-01	NCV	Failure to Implement Foreign Material Exclusion Controls (Section 4OA2)
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### Closed

05000254/2016004-01; 05000265/2016004-01	NCV	Failure to Implement Foreign Material Exclusion Controls (Section 4OA2)
05000254/2016-003-00	LER	Loss of Control Room Emergency Ventilation Due To Inadvertent High Ammonia Condition (Section 4OA3)

## LIST OF DOCUMENTS REVIEWED

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

<u>Section Number</u>	<u>Document Number</u>	<u>Description or Title</u>	<u>Revision or Date</u>
<b>Section 1R04</b>			
1R04	QOM 1-1300-02	Unit 1 RCIC Valve Checklist (RCIC Room)	10
1R04	QOM 2-3700-01	Unit 2 RBCCW Valve Checklist	8
1R04	QOM 1-3700-01	Unit 1 RBCCW Valve Checklist (Outside Drywell)	10
1R04	QOM 2-2300-01	Unit 2 HPCI Valve Checklist	18
<b>Section 1R05</b>			
1R05	QCMMS 410-71	Periodic Handheld Fire Extinguisher Inspection	37, 38
1R05	FZ 1.1.2.4	Unit 2 RB 657'6" Elev. Third Floor	October 2013
1R05	FZ 8.2.1.A	Unit 1 TB 547'-0" Elev. Condensate Pump Room	July 2009
1R05	IR 2723503	NRC Issues Identified	10/03/2016
1R05	IR 2724621	NRC ID'D Fire Inspection Walkdown Issues	10/05/2016
1R05	FZ 8.2.1.B	Unit 2 TB 547'-0" Elev. Condensate Pump Room	
1R05	FZ 1.1.1.6	Unit ½ Reactor Bldg Elevation 690-'6" Refuel Floor	
1R05	QDC-4100-M-0691	Combustible Loading Calculation	5E
1R05		Transient Combustible Permit #138	
1R05		Transient Combustible Permit #134	
1R05	TCP-15-193	FZ 8.2.1.B	
1R05	TCP-15-194	FZ 8.2.1.B	
1R05	IR 2459210	Transient Combustible Permit Closures	
<b>Section 1R11</b>			
1R11	QCOS 0202-23	Reactor Recirculation Pump Run Out Limits Determination	6
1R11		LORT Annual Exam Status Report Quad Cities Generating Station 2016	
<b>Section 1R12</b>			
1R12	IR 2710635	Superheat Data Collection Identified Circuit 1 as Unsat	08/31/2016
1R12	ER-AA-1200	Critical Component Failure Clock	12
1R12	WC-AA-101-1006	On-line Risk Management and Assessment	2
1R12	OP-AA-201-012-1001	Operations On-line Risk Management	1
1R12	OP-AA-106-101-1006	Operations Decision Making Process	17

1R12		Operations logs	01/01/2015-09/30/2016
1R12		Quality Receipt Inspection Package—Receipt #223018, Catalog ID 42511–2	01/21/2014
1R12		Quality Receipt Inspection Package—Receipt #166852, Catalog ID 1447750–2	05/04/2011
1R12		Quality Receipt Inspection Package—Receipt #187917, Catalog ID 732950–1	12/15/2010
1R12		Quality Receipt Inspection Package—Receipt #203975, Catalog ID 44144–2	11/05/2011
1R12		Quality Receipt Inspection Package—Receipt #221016, Catalog ID 1432143–2	10/15/2013
1R12		Special Quality Assurance Documents (SQAD–1)	12
1R12	PES–S–004	Sampling Plan	2
1R12	SM–AA–300–1001	Procurement Engineering Process and Responsibilities	19
1R12	SM–AA–300–1001–F–03	Procurement Engineering and Design Engineering Interface Agreement	1
1R12	SM–AC–10	Exelon Supply Chain Management Process	7
1R12	WO 1913073–01	PSU Q2R23 Leakage Out Bottom of 2–03	
1R12	WO 1805965–01	EM Perform Horizontal 4kV SwitchGE	
1R12		10 CFR 50.65(a)(3) Periodic Evaluation 05/01/2014–05/01/2016	07/27/2016
<b>Section 1R13</b>			
1R13		Work Week 16–43–07 Safety Profile	
1R13		Work Week 16–44–08 Safety Profile	
1R13		Unit 1—Protected Equipment Checklist on 10/31/2016	
1R13		Unit 2—Protected Equipment Checklist on 10/31/2016	
1R13		Work Week 16–45–09 Safety Profile	
1R13	IR 2737431	901–54 C1 Offgas Condenser Hi Level Unexpected Alarm	11/05/2016
1R13	IR 2737442	1A Offgas Condenser Normal LCV LIC (1–5441–32A) Abnormal	11/05/2016
1R13	IR 2737679	Steam Jet Air Ejectors Rad Monitors Reading Low	11/06/2016
<b>Section 1R15</b>			
1R15	IR 3949824	½ EDG Did Not Start During QCOP 6600–58 Hot Fast Restart	12/06/2016
1R15	IR 3950031	½ EDG Coolant Temperature Switch Alarmed Below Setpoint	12/06/2016
<b>Section 1R18</b>			
1R18		MOV Post-Test Data Review Worksheet for WO 1956456	11/18/2016
1R18	004–E–031	Thermal Overload Reviews	7

1R18	Drawing 4E–1438L	Schematic Diagram RHR System Motor Operated Valves Div II	AE
1R18	Drawing 4E–1680A	Wiring and Schematic Diagram Reactor Building Essential Service 480V MCC 19–4 Part 1	AW
1R18	Drawing 4E–6400B	MOV Limit Switch Development	K
1R18	EC 404722	Install Closed Torque Switch Bypass (CTSB) and Motor Pinion Gear Change on MO 1–1001–23B To Increase S1 and S6 Margin	1
1R18	ER–AA–302–1003	MOV Margin Analysis and Periodic Verification Test Intervals	8
1R18	QCEM 0600–12	Functional Testing and Limit Switch Verification of Motor Operated Valves	38
1R18	WO 1620110	(IST) (MOV) Prog Diagnostic Test	08/20/2014
1R18	WO 1620110–01	EM 1–1001–23B Perform Static Diagnostic Votes Testing	08/20/2014
1R18	WO 1956456	Install CTSB And Motor Pinion Gear Change Per EC 404722	
<b>Section 1R19</b>			
1R19	QCOS 5750–15	Containment and Control Room Ventilation Boundary Smoke Test	1
1R19	QCOS 1300–05	RCIC Pump Operability	55
1R19	QCOS 1300–23	Unit 1 RCIC Logic Functional Test	22
1R19	IR 2458699	20 DPM Leak From U2 RCIC Drain Pot LS Drain Valve	02/24/2015
1R19	WO 1810693–01	20 DPM Leak From U2 RCIC Drain Pot LS Drain Vlv 2–1399–107C	11/22/2016
1R19	WO 1952395–01	RCIC Pump Operability (IST)	11/22/2016
1R19	WO 1952403–01	OP QCOS 1300–18 RCIC Drain Pot Level Switch	11/22/2016
1R19	IR 2735351	Bus 61 Cub 8 Breaker Found Tripped	11/01/2016
1R19	QCOS 6620–01	SBO DG 1(2) Quarterly Load Test	48
1R19	WO 1964069–01	Bus 61 Cub 8 Breaker Found Tripped	11/02/2016
1R19	WO 1839429–01	Safe Shutdown MCC 30 Cubicle Inspection	12/01/2016
<b>Section 1R22</b>			
1R22	QCOS 6500–10	Functional Test of Unit 2 Second Level Undervoltage	34
<b>Section 1EP4</b>			
1EP4	EP–AA–1000	Exelon Nuclear Standardized Radiological Emergency Plan	27 and 28
1EP4	EP–AA–1006, Addendum 3	Emergency Action Levels for Quad Cities	2
1EP4	Evaluation 16–025	50.54(q) Evaluation and Effectiveness Review, Emergency Action Levels for Quad Cities Station	02/26/2016
1EP4		License Amendment Request to Adopt Emergency Action Level Schemes Pursuant to NEI 99–01, Revision 6, “Development of Emergency Action Levels for Non-Passive Reactors”	

<b>Section 40A1</b>			
40A1		Operator Narrative Logs	July 1, 2015-September 30, 2016
40A1		Units 1 and 2 HPCI/RCIC Unavailability/Demands Excel Spreadsheet	July 2015-October 2016
40A1		Units 1 and 2 HPCI/RCIC CDE Form	July 2015-October 2016
40A1	IR 2580987	HPCI Rm Clr Sensing Line Damaged During Maintenance	11/02/2015
40A1	IR 2585588	U1 HPCI Condensate Pump Motor Overload	11/11/2015
40A1	IR 2639451	901-3 F-14 HPCI Lo Flow And MGU Not At HSS Alarm Unexpected	03/12/2016
40A1	IR 2647412	IEMA ID: U1 HPCI Subdoor Found 1 Turn From Full Closed	03/29/2016
40A1	IR 2650823	PSU# U2 HPCI MGU Failed to Reposition	04/05/2016
40A1	IR 2678864	NCV 16-001-01, Clsr Pkg. RCIC-17 Valve LS Submergence	06/07/2016
40A1	IR 2696095	RCIC Flow Controller Showing 53 GPM in Standby Line Up	07/23/2016
40A1	IR 2714204	U1 RCIC Barometric Cond Condensate Pump Lost Light Indication	09/09/2016
40A1	IR 2732939	Revised Sept Indicators to Rescind U1 RCIC Unplanned LCO	10/26/2016
40A1	QC-MSPI-05	MSPI Basis Document	6b
40A1		Units 1 and 2 Decay Heat Removal Unavailability/Demands Excel Spreadsheet	
40A1		Units 1 and 2 Decay Heat Removal CDE Form	
40A1	IR 2716429	MO 1-1001-5B RHRSW HX Discharge Valve Failed to Close	09/16/2016
40A1	IR 2638362	2A RHR Motor Wet Due to Drip Funnel Leak	03/10/2016
40A1	IR 2580681	1A RHRSW LCO Lessons Learned	11/02/2015
<b>Section 40A2</b>			
40A2	IR 2719013	Time Delay Relay for RHR 16B Requires Adjustment	09/22/2016
40A2	IR 2689119	Part 21 Notification—Soft Seat Main Disc and Pilot Disc	07/05/2016
40A2	IR 2699605	Part 21 EN 52055—Target Rock Main Disc Assemblies	08/02/2016
40A2	IR 2680365	AO 1-0220-44 Close Stroke Time Outside Acceptable Range	06/11/2016
40A2	WO 1934483	OP QCOS 0202-12 Rx Recirc Sample Valve Timing Test	09/09/2016
40A2	IR 2648342	Reschedule of U-1 HPCI UT Inspection Required	03/31/2016

4OA2	IR 2727424	B CR HVAC 0–5471–329 Damper Shaft Cap Has Torsional Bending	10/12/2016
4OA2	IR 2732293	1B RWCU Seal Leakage	10/25/2016
4OA2	IR 2736125	IEMA ID'd Scaffold not Seismically Qualified in U–1 HPCI Room	11/02/2016
4OA2	IR 3951643	Pressure Recorder (PR) 2–1640–12 Wide Range Indication Out of Spec	12/10/2016
4OA2	IR 2651057	Investigate Air Leak/ Replace Solenoid for Target Rock	04/05/2016
4OA2	IR 2703233	Target Rock Solenoid Valve Failure	08/11/2016
4OA2	QCOS 4700–02	Inboard MSIV and Target Rock Valve Pneumatic System Leak Test	8
4OA2	WO 1649339	Modify the Target Rock to Increase Volume per EC 394119	04/16/2014
4OA2	IR 3956145	Feedwater Heater Trip and Emergency Power Reduction	12/23/2016
4OA2	IR 3956160	901–6 A7 MST Drain Tank 1A Drain to 1D1 Valve Closed—Did Not Alarm	12/23/2016
4OA2	IR 3956289	Swings of LCV 1–3507–A Lead to Trip of 1D1 Heater	12/24/2016
4OA2	IR 2728302	Shared Ownership of Operational Focus on Unplanned LCOs	10/14/2016
4OA2	IR 2703154	Potential Trend U2 DW CAM Particulate Activity Increase	08/11/2016
4OA2	IR 2718425	Benchmark of Fleet Operations Monthly Trend Reports	09/21/2016
4OA2	IR 3952439	2014–2016 CCF/ MWE Loss Review: Growing Trend of Relay Issues	12/13/2016
4OA2	IR 2709786	DGCWP [Diesel Generator Cooling Water Pump] /RHRSW [Residual Heat Removal Service Water] Common Suction Piping Degradation	08/29/2016
<b>Section 4OA3</b>			
4OA3	IR 2697050	Loss of Control Room Emergency Ventilation System Due to Inadvertent Trip of the Toxic Gas Monitors	09/09/2016
4OA3	EC 389853	Impact of HPCI Steam Leak on HPCI Operation	Revision 2
4OA3	EC 425504	Apply EC 389853 to Steam Leak on Valve 1–2301–55	Revision 1
4OA3	IR 2734706	Through Wall Leak Found on 102301–55 Valve	10/31/2016

## LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
CAP	Corrective Action Program
CCG	Common-Cause Group
CFR	<i>Code of Federal Regulations</i>
CREV	Control Room Emergency Ventilation
DRP	Division of Reactor Projects
EACE	Equipment Apparent Cause Evaluation
EAL	Emergency Action Level
EC	Engineering Change
EN	Event Notification
ERV	Electromatic Relief Valve
FME	Foreign Material Exclusion
FZ	Fire Zone
HPCI	High Pressure Coolant injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
LER	Licensee Event Report
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PI	Performance Indicator
RBCCW	Reactor Building Closed Cooling Water
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RTP	Rated Thermal Power
SPAR	Standardized Plant Analysis Risk
SRA	Senior Reactor Analyst
SRV	Safety Relief Valve
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
WO	Work Order



B. Hanson

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Letter to Bryan C. Hanson from Karla Stoedter dated January 20, 2017

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2—NRC  
INTEGRATED INSPECTION REPORT 05000254/2016004; 05000265/2016004;  
05000254/2016501 AND 05000265/2016501

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