



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE RD. SUITE 210
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January 25, 2018

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 AND EMERGENCY PREPAREDNESS
ANNUAL INSPECTION REPORT 05000254/2017004; 05000265/2017004;
05000254/2017501 AND 05000265/2017501

Dear Mr. Hanson:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. On January 3, 2018, the NRC inspectors discussed the results of this inspection with Mr. H. Dodd and other members of your staff. The results of this inspection are documented in the enclosed report. The NRC also completed its annual inspection of the Emergency Preparedness Program, which began on January 1, 2017, and the issuance of this letter closes Inspection Report 05000254/2017501; 05000265/2017501.

Based on the results of this inspection, the NRC inspectors did not identify any findings or violations of more than minor significance.

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

Sincerely,

/RA/

Karla Stuedter, Chief
Branch 1
Division of Reactor Projects

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

Enclosure:
IR 05000254/2017004; 05000265/2017004;
05000254/2017501; 05000265/2017501

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Letter to Bryan C. Hanson from Karla Stoedter dated January 25, 2018

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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: 05000254/2017004; 05000265/2017004
05000254/2017501; 05000265/2017501

Licensee: Exelon Generation Company, LLC

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

Location: Cordova, IL

Dates: October 1 through December 31, 2017

Inspectors: R. Murray, Senior Resident Inspector
K. Carrington, Resident Inspector
J. Beavers, Health Physicist
B. Bergeon, Operations Engineer
J. Cassidy, Senior Health Physicist
N. Fields, Health Physicist
M. Garza, Emergency Preparedness Inspector
V. Meghani, Reactor Inspector
K. Walton, Senior Operations Engineer

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

Enclosure

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SUMMARY

Inspection Report 05000254/2017004, 05000265/2017004; 10/01/2017 – 12/31/2017; 05000254/2017501, 05000265/2017501; 01/01/2017–12/31/2017; Quad Cities Nuclear Power Station, Units 1 and 2; Routine Integrated Inspection Report.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. 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," Revision 6.

A. NRC-Identified and Self-Revealed Findings

No findings were identified during this inspection.

REPORT DETAILS

Summary of Plant Status

Unit 1

The unit operated at or near full power from October 1 to October 30, 2017. On October 30, 2017, operators reduced power to 68.5 percent core thermal power in response to an unanticipated automatic closure of main turbine control valve number 1. Following repairs to a loose electro-hydraulic control (EHC) system servo cable connection, the unit was returned to full power on October 31, 2017. On November 16, 2017, operators reduced power to 68 percent core thermal power to respond to unanticipated alarms and impending closure of main turbine control valve number 1. Following repairs, which included lock-wire installation on all EHC system servo cable connections to turbine control valves, the unit was returned to full power on November 17, 2017, and remained at or near full power through the end of the inspection period. Operating “at or near full power” includes planned power reductions for turbine testing, control rod pattern adjustments, and other short-term power changes as requested by the transmission system operator.

Unit 2

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 other short-term power changes as requested by the transmission system operator.

1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01)

.1 Readiness for Impending Adverse Weather—Fish Intrusion in the Intake Bay and the Crib House

a. Inspection Scope

During the week of December 18, 2017, the inspectors observed the licensee’s activities associated with readiness and corrective actions in response to an unusual amount of Gizzard Shad, which had infiltrated the station’s intake bay, and affected the Unit 2 traveling water screens in the crib house and also had a noticeable effect on the Unit 2 main condenser differential pressure. The inspectors observed pre-job, pre-shift, and control room briefings to determine whether the briefings met licensee standards. The inspectors reviewed licensee procedures for responding to traveling screen high differential pressure alarms and procedures for directing reversal of flow to the main condenser. The inspectors also discussed potential compensatory measures with control room personnel. Finally, the inspectors periodically reviewed licensee activities and data collection as specified by licensee procedures to determine whether the fish intrusion and associated effects were being adequately monitored. The inspectors also reviewed corrective action program (CAP) items to verify that the licensee was identifying adverse weather/environmental issues at an appropriate threshold and

entering them into their CAP in accordance with station corrective action procedures. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 1 reactor core isolation cooling system following planned maintenance;
- Unit 1 and Unit 1/2 emergency diesel generator (EDG) systems during Unit 2 EDG planned maintenance; and
- Unit 2 high pressure coolant injection (HPCI) system during safe shutdown makeup pump (SSMP) system planned maintenance.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, 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 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 11.1.4, Unit 2 Reactor Building, Elevation 544'-0", HPCI Pump Room;
- FZ 1.1.1.1, Unit 1 Turbine Building, Elevation 595'0", Diesel Generator Room; and
- FZ 1.1.2.1, Unit 1 Reactor Building, Elevation 554'0", Top of Torus Area.

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 September 26 and October 4, 2017, the inspectors observed two fire brigade activations for a report of smoke in cabling for the Unit 1 motor control center (MCC) 18/19-5 and a report of smoke coming from the Unit 2 condensate pit man-lift, respectively. Based on these observations, 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.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On November 7, 2017, the inspectors observed two crews 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.

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 (LOR) 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 October 31, 2017, the inspectors observed operators raise power from approximately 75 percent to full (100 percent) core thermal power on Unit 1 following an emergent load reduction due to a spurious closure of turbine control valve number 1.

On December 11, 2017, the inspectors observed operators perform a pre-job brief and secure the Unit 2 'B' stator cooling water pump to support an emergent pump replacement.

During the week of December 17, 2017, the inspectors observed operators in the control room, on several occasions, during the fish intrusion event that is discussed in Section 1R01, which included multiple main condenser flow reversals.

These were activities that required heightened awareness or were 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 and equipment 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.

.3 Annual Operating Test Results (71111.11A)

a. Inspection Scope

The inspectors reviewed the overall pass/fail results of the Annual Operating Test and the Biennial Written Examination administered by the licensee from October 9, 2017, through November 17, 2017, required by Title 10 of the *Code of Federal Regulations* (CFR), Part 55.59(a). The results were compared to the thresholds

established in IMC 0609, Appendix I, “Licensed Operator Requalification Significance Determination Process (SDP),” to assess the overall adequacy of the licensee’s Licensed Operator Requalification Training (LORT) Program to meet the requirements of 10 CFR 55.59. (02.02)

This inspection constituted one annual licensed operator requalification examination results sample as defined in IP 71111.11–05.

b. Findings

No findings were identified.

.4 Biennial Review (71111.11B)

a. Inspection Scope

The following inspection activities were conducted during the weeks of October 9 and October 16, 2017, to assess: (1) the effectiveness and adequacy of the facility licensee’s implementation and maintenance of its systems approach to training (SAT) based LORT Program put into effect to satisfy the requirements of 10 CFR 55.59; (2) conformance with the requirements of 10 CFR 55.46 for use of a plant referenced simulator to conduct operator licensing examinations and for satisfying experience requirements; and (3) conformance with the operator license conditions specified in 10 CFR 55.53. The documents reviewed are listed in the Attachment to this report.

- Licensee Requalification Examinations (10 CFR 55.59(c); SAT Element 4 as Defined in 10 CFR 55.4): The inspectors reviewed the licensee’s program for development and administration of the LORT biennial written examination and annual operating tests to assess the licensee’s ability to develop and administer examinations that are acceptable for meeting the requirements of 10 CFR 55.59(a).
 - The inspectors conducted a detailed review of one biennial requalification written examination versions to assess content, level of difficulty, and quality of the written examination materials. (02.03)
 - The inspectors conducted a detailed review of ten job performance measures and four simulator scenarios to assess content, level of difficulty, and quality of the operating test materials. (02.04)
 - The inspectors observed the administration of the annual operating test to assess the licensee’s effectiveness in conducting the examination(s), including the conduct of pre-examination briefings, evaluations of individual operator and crew performance, and post-examination analysis. The inspectors evaluated the performance of one crew in parallel with the facility evaluators during two dynamic simulator scenarios, and evaluated various licensed crew members concurrently with facility evaluators during the administration of several job performance measures. (02.05)
 - The inspectors assessed the adequacy and effectiveness of the remedial training conducted since the last requalification examinations and the training planned for the current examination cycle to ensure that they addressed weaknesses in licensed operator or crew performance identified during training and plant operations. The inspectors reviewed remedial training procedures and individual remedial training plans. (02.07)

- Conformance with Examination Security Requirements (10 CFR 55.49): The inspectors conducted an assessment of the licensee's processes related to examination physical security and integrity (e.g., predictability and bias) to verify compliance with 10 CFR 55.49, "Integrity of Examinations and Tests." The inspectors observed the implementation of physical security controls (e.g., access restrictions and simulator I/O controls) and integrity measures (e.g., security agreements, sampling criteria, bank use, and test item repetition) throughout the inspection period. (02.06)
- Conformance with Operator License Conditions (10 CFR 55.53): The inspectors reviewed the facility licensee's program for maintaining active operator licenses and to assess compliance with 10 CFR 55.53(e) and (f). The inspectors reviewed the procedural guidance and the process for tracking on-shift hours for licensed operators, and which control room positions were granted watch-standing credit for maintaining active operator licenses. Additionally, medical records for seven licensed operators were reviewed for compliance with 10 CFR 55.53(l). (02.08)
- Conformance with Simulator Requirements Specified in 10 CFR 55.46: The inspectors assessed the adequacy of the licensee's simulation facility (simulator) for use in operator licensing examinations and for satisfying experience requirements. The inspectors reviewed a sample of simulator performance test records (e.g., transient tests, malfunction tests, scenario based tests, post-event tests, steady state tests, and core performance tests), simulator discrepancies, and the process for ensuring continued assurance of simulator fidelity in accordance with 10 CFR 55.46. The inspectors reviewed and evaluated the discrepancy corrective action process to ensure that simulator fidelity was being maintained. Open simulator discrepancies were reviewed for importance relative to the impact on 10 CFR 55.45 and 55.59 operator actions as well as on nuclear and thermal hydraulic operating characteristics. (02.09)
- Problem Identification and Resolution (10 CFR 55.59(c); SAT Element 5 as Defined in 10 CFR 55.4): The inspectors assessed the licensee's ability to identify, evaluate, and resolve problems associated with licensed operator performance (a measure of the effectiveness of its LORT Program and their ability to implement appropriate corrective actions to maintain its LORT Program up to date). The inspectors reviewed documents related to licensed operator performance issues (e.g., licensee condition/problem identification reports including documentation of plant events and review of industry operating experience from previous 2 years). The inspectors also sampled the licensee's quality assurance oversight activities, including licensee training department self-assessment reports. (02.10)

This inspection constituted one Biennial LOR Program inspection sample as defined in IP 711111.11-05.

b. Findings

Introduction: While performing an assessment of the licensee's processes related to examination physical security and integrity (e.g. predictability and bias) to verify compliance with 10 CFR 55.49, "Integrity of Examinations and Tests," the inspectors

identified that Quad Cities 2015 LOR written examinations were duplicated from the 2013 LOR examinations, that 2017 LOR written examinations were duplicated from the 2015 LOR examinations, and that four individuals were administered the same written examinations from the previous exam cycle.

Description: The inspectors identified that, with few exceptions, the licensee had duplicated or reused questions from the 2015 written exam when they created the 2017 written exam. The licensee created six LOR written exam versions (i.e., A–F), one for each crew. For the 2017 biennial exam, the licensee essentially swapped exam versions from 2015 that were given to each crew (i.e., the 2015 “Version A” was given to crew ‘B’ in 2017 and “Version B” was given to crew ‘A’, etc.). The inspectors noted that no crew received the same exam version in 2017 as they did in 2015. However, due to crew personnel adjustments/realignments, the inspectors requested the licensee to investigate if, and how many, operators were going to receive the same exam in 2017 as in 2015. The licensee identified that one reactor operator had already taken the same exam in 2017 that they were given in 2015. In addition, the licensee also identified that two additional licensed operators were scheduled to take the same exam they had taken in 2015, but they had not yet been given the exam due to the exam schedule. After discussing the issue and concern with the inspectors, the licensee decided to administer those two individuals different exam versions to which they had not been previously exposed. In addition, the inspectors inquired how long the particular set of exam versions had been reused and swapped among the crews (i.e., before 2015). The licensee reviewed biennial written exams in 2013 and 2011 and determined the exam content was different and stated, “there was no predictable pattern in exam versions.” After reviewing all of the 2013 exam versions, the inspectors identified that three versions were a mixture of questions between reused and new questions. For example, 2013 Version ‘A’ was a mixture of questions of 2015 exam Versions ‘C’ and ‘D’ and two unique questions. The 2013 Version ‘B’ was a mixture of 2015 Version ‘C’ and ‘D’ and seven unique questions. The 2013 Version ‘F’ was a mixture of 2015 ‘D’ and ‘F’ and five unique questions. The three remaining versions from 2013 were replicated in 2015, but given to different crews. The inspectors requested the licensee determine the number of personnel that took the same exam in 2015 as in 2013, and the licensee identified three individuals who were given the same exam in 2013 and 2015 (two senior reactor operators and one reactor operator).

The inspectors are considering this issue to be an unresolved item (URI) concerning whether the repeated use of a biennial written examination for sequential requalification programs (consecutive 24 month periods), and the resulting predictability induced to the examination process, constitutes a violation of 10 CFR 55.49, “Integrity of Examinations and Tests.” The inspectors have requested the licensee provide the written examinations in question to the inspectors for further review. The inspectors will review individual questions of the written examinations in order to determine if there were sufficient differences between the examinations to characterize the examinations as either different or similar. The results of the review will be used to determine if a violation of 10 CFR 55.49 requirements exists. **(URI 05000254/2017004–01; 05000265/2017004–01: Repeat Use of Written Exams during Licensed Operator Requalification Examinations)**

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

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

- Units 1 and 2 standby liquid control systems, and
- SSMP system.

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 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 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 17–40–04: Unit 1/2 EDG system extended limiting condition for operation due to emergent work activities and planned Unit 2 core spray system maintenance;
- Work Week 17–42–06: Unit 2 EDG system planned maintenance, planned secondary containment breaches resulting in both units online risk change to yellow, and Unit 2 125 Vdc battery charger load test;
- Work Week 17–46–10: Unit 1 'B' low pressure coolant injection and residual heat removal system planned maintenance resulting in online risk change to yellow, 345 kV line planned maintenance, Units 1 and 2 reactor buildings planned maintenance, and planned secondary containment breaches resulting in both units online risk change to yellow; and
- Work Week 17–51–02: Unit 1 1A 125 Vdc battery charger system emergent maintenance, and Unit 2 fish intrusion in intake bay.

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.

This inspection constituted four maintenance risk assessments and emergent work control samples as defined in IP 71111.13–05.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Issue Report (IR) 4059847: 1–7503 [Unit 1 standby gas treatment system (SBGT) Reactor Building Inlet Valve] Failed to Close During QCOS 7500–08;
- IR 4062552: 'B' Train CREV [control room emergency ventilation] Superheat Value High;
- IR 4062754: 1A Core Spray Motor Bearing Oil Issue;
- IR 4066290: 1A SBLC Pump Accumulator "Schraeder" Valve is Stuck Open;
- IR 4072162: Unit 1 HPCI Did Not Trip During QCOS 2300–05;
- IR 4077502 and IR 4081377: MCC 18/19-5 Overvoltage Relay Target Lit (partial sample); and

- IR 4078677: EO ID [Equipment Operator Identified], Local Control Switch Would Not Start the SSMP and IR 4078579: SSMP Reserve Feed MCR [Main Control Room] Switch Will Not Close.

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.

The inspectors documented one partial operability sample related to MCC 18/19-5 over-voltage relay. The inspection of this sample continued into the next inspection period.

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

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modifications:

- Engineering Change 619131: U–1 HPCI Signal Converter Output Failed Alarm Bypass, Revision 0; and
- Engineering Change 20370: Motor Control Center 18/19–5 Protective Relay Modification.

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

modification with operations, engineering, and training personnel to ensure that the individuals were aware of how the operation with the plant modification in place could impact overall plant performance. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one temporary modification sample and 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:

- 'B' CREV operability test following planned maintenance;
- Unit 1/2 EDG system testing and calibration following governor booster pump and relay replacements and other 2-year planned maintenance;
- 'A' SBGT auto start test, following relay replacement;
- Unit 1 station blackout diesel generator system post-maintenance testing following 2-year planned maintenance activities;
- Unit 1 HPCI pump operability test, following solenoid valve SV 1–2301–8 replacement;
- Unit 2 Division I turbine first stage low pressure above setpoint calibration and functional test, following pressure switch 2–0504–A replacement;
- SSMP system operability test following planned maintenance; and
- Unit 2 station blackout diesel generator system post-maintenance testing following 2-year 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 eight 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 7000-08: U2 SBGT Initiation Logic Test (Routine);
- QCOS 1400-07: Core Spray Pump Comprehensive/Performance Test (In-Service Test); and
- Surveillance Frequency Control Program Surveillance Test Interval Number QDC-17-002: 125/250 Vdc Battery Service Testing (Routine).

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

- did preconditioning occur;
- the effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis;
- plant equipment calibration was correct, accurate, and properly documented;
- as-left setpoints were within required ranges; and the calibration frequency was in accordance with TSs, the USAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used;
- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and reference values were consistent with the system design basis;

- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;
- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and
- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report.

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

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

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

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 November 8, 2017, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Operations Support Center 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 weaknesses 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 CAP. 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 one sample as defined in IP 71114.06–05.

b. Findings

No findings were identified.

2. **RADIATION SAFETY**

Cornerstones: Public Radiation Safety, Occupational Radiation Safety

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

.1 Radiological Work Planning (02.02)

a. Inspection Scope

The inspectors compared the results achieved with the intended dose established in the As-Low-As-Reasonably-Achievable (ALARA) planning. The inspectors compared the person-hour estimates provided by work groups to the radiation protection group with the actual work activity time results, and evaluated the accuracy of these time estimates. The inspectors evaluated the reasons for any inconsistencies between intended and actual work activity doses.

The inspectors evaluated whether post-job reviews were conducted to identify lessons learned and entered into the licensee's CAP.

These inspection activities supplemented those documented in NRC Integrated Inspection Report 05000254/2016002; 05000265/2016002 and constituted one complete sample as defined in IP 71124.02–05.

b. Findings

No findings were identified.

.2 Verification of Dose Estimates and Exposure Tracking Systems (02.03)

a. Inspection Scope

The inspectors assessed whether the assumptions and basis for the current annual collective exposure estimate were reasonably accurate. The inspectors assessed source term reduction effectiveness and reviewed applicable procedures for estimating exposures from specific work activities.

The inspectors reviewed the assumptions and bases in ALARA work planning documents for selected activities and verified that the licensee has established measures to track, trend, and if necessary to reduce, occupational doses for ongoing work activities.

The inspectors determined whether a dose threshold criteria was established to prompt additional reviews and/or additional ALARA planning and controls and evaluated the licensee's method of adjusting exposure estimates, or re-planning work, when unexpected changes in scope or emergent work were encountered. The inspectors determined if adjustments to exposure estimates were based on sound radiation protection and ALARA principles or if they are just adjusted to account for failures to control the work. The inspectors evaluated whether there was sufficient station management review and approval of adjustments to exposure estimates and that the reasons for the adjustments were justifiable.

The inspectors reviewed selected occasions with inconsistent or incongruent results from the licensee's intended radiological outcomes to determine whether the cause was attributed to a failure to adequately plan work activities, or failure to provide sufficient management oversight of in-plant work activities, or failure to conduct the work activity without significant rework, or failure to implement radiological controls as planned.

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

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors compared the radiological results achieved with the intended radiological outcomes and verified that the licensee captured lessons learned for use in the next outage.

These inspection activities supplemented those documented in NRC Integrated Inspection Report 05000254/2016002; 05000265/2016002 and 05000254/2017001; 05000265/2017001 constituted one complete sample as defined in IP 71124.02-05.

b. Findings

No findings were identified.

.4 Problem Identification and Resolution (02.06)

a. Inspection Scope

The inspectors reviewed self-assessments and/or audits performed of the ALARA program and determined if these reviews identified problems or areas for improvement.

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

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

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05)

.1 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors assessed select portable survey instruments that were available for use for current calibration and source check stickers, and instrument material condition and operability.

The inspectors observed licensee staff demonstrate performance checks of various types of portable survey instruments. The inspectors assessed whether high-range instruments responded to radiation on all appropriate scales.

The inspectors walked down area radiation monitors and continuous air monitors to determine whether they were appropriately positioned relative to the radiation sources or areas they were intended to monitor. The inspectors compared monitor response with actual area conditions for selected monitors.

The inspectors assessed the functional checks for select personnel contamination monitors, portal monitors, and small article monitors to verify they were performed in accordance with the manufacturer's recommendations and licensee procedures.

These inspection activities constituted one complete sample as defined in IP 71124.05–05.

b. Findings

No findings were identified.

.2 Calibration and Testing Program (02.03)

a. Inspection Scope

The inspectors assessed laboratory analytical instruments used for radiological analyses to determine whether daily performance checks and calibration data indicated that the frequency of the calibrations was adequate and there were no indications of degraded instrument performance. The inspectors assessed whether appropriate corrective actions were implemented in response to indications of degraded instrument performance.

The inspectors reviewed the methods and sources used to perform whole body count functional checks before daily use and assessed whether check sources were appropriate and aligned with the plant's isotopic mix. The inspectors reviewed whole body count calibration records since the last inspection and evaluated whether calibration sources were representative of the plant source term and that appropriate calibration phantoms were used. The inspectors looked for anomalous results or other indications of instrument performance problems.

Inspectors reviewed select containment high-range monitor calibration and assessed whether an electronic calibration was completed for all range decades, with at least one decade at or below 10 rem/hour calibrated using an appropriate radiation source, and calibration acceptance criteria was reasonable.

The inspectors reviewed select monitors used to survey personnel and equipment for unrestricted release to assess whether the alarm setpoints were reasonable under the circumstances to ensure that licensed material was not released from the site. The inspectors reviewed the calibration documentation for each instrument selected and discussed the calibration methods with the licensee to determine consistency with the manufacturer's recommendations.

The inspectors reviewed calibration documentation for select portable survey instruments, area radiation monitors, and air samplers. The inspectors reviewed detector measurement geometry and calibration methods for portable survey instruments and area radiation monitors calibrated onsite and observed the licensee demonstrate use of the instrument calibrator. The inspectors assessed whether appropriate corrective actions were taken for instruments that failed performance checks or were found significantly out of calibration, and that the licensee had evaluated the possible consequences of instrument use since the last successful calibration or performance check.

The inspectors reviewed the current output values for instrument calibrators. The inspectors assessed whether the licensee periodically measured calibrator output over the range of the instruments used with measuring devices that have been calibrated by a facility using National Institute of Standards and Technology traceable sources and corrective factors for these measuring devices were properly applied in its output verification.

The inspectors reviewed the licensee's Title 10 of the *Code of Federal Regulations*, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," source term to assess whether calibration sources used were representative of the types and energies of radiation encountered in the plant.

These inspection activities constituted one complete sample as defined in IP 71124.05–05.

b. Findings

No findings were identified.

.3 Problem Identification and Resolution (02.04)

a. Inspection Scope

The inspectors evaluated whether problems associated with radiation monitoring instrumentation were being identified by the licensee at an appropriate threshold and were properly addressed for resolution. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involve radiation monitoring instrumentation.

These inspection activities constituted one complete sample as defined in IP 71124.05–05.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (71124.07)

.1 Groundwater Protection Initiative Implementation (02.03)

a. Inspection Scope

The inspectors reviewed leak and spill events and Title 10 of the *Code of Federal Regulations*, Part 50.75(g) records and assessed whether the source of the leak or spill was identified and appropriately mitigated.

These inspection activities supplemented those documented in NRC Integrated Inspection Report 05000254/2017003; 05000265/2017003 and constituted one complete sample as defined in IP 71124.07–05.

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 Specific Activity

a. Inspection Scope

The inspectors sampled licensee submittals for the reactor coolant system specific activity performance indicator (PI) for Quad Cities Nuclear Power Station, Units 1 and 2, for the period from the third quarter 2016 through the third quarter 2017. The inspectors used PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's reactor coolant system chemistry samples, TS requirements, IRs, event reports, and NRC integrated inspection reports 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. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two reactor coolant system specific activity samples as defined in IP 71151-05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—High Pressure Injection Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index (MSPI)—high pressure injection systems PI for Quad Cities Nuclear Power Station, Units 1 and 2, for the period from the fourth quarter 2016 through the third quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the 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 October 1, 2016, through September 30, 2017, 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 samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index—Heat Removal Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—heat removal systems PI for Quad Cities Nuclear Power Station, Units 1 and 2, for the period from the fourth quarter 2016 through the third quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the 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 October 1, 2016, through September 30, 2017, 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 systems samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.4 Mitigating Systems Performance Index—Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—Residual Heat Removal System PI for Units 1 and 2 for the period from the fourth quarter 2016 through the third quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the 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 October 1, 2016, through September 30, 2017, 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 systems samples as defined in IP 71151–05.

b. Findings

No findings were identified.

.5 Mitigating Systems Performance Index—Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—cooling water systems PI Units 1 and 2 for the period from the fourth quarter 2016 through the third quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the 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 October 1, 2016, through September 30, 2017, 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 systems 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 40A2.1 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the 6-month period of June 1, 2017, through November 30, 2017, 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. Observations and Assessments

The inspectors reviewed the licensee's internal trend review which spanned the range of four quarters for emerging cross-cutting themes. The cross-cutting areas identified by the licensee as having been impacted over the last four quarters were work management, training, avoiding complacency, and conservative bias. The inspectors reviewed the licensee's assessment which did not identify any trends/themes in the areas impacted. The inspectors verified the licensee continuously monitored cross-cutting areas for the presence of recurring themes. The inspectors review did not identify any recurring themes with equipment issues or in other areas such as work management, human performance, or problem identification and resolution that were indicative of a more significant safety issue. The inspectors also performed a more focused review of the licensee's corrective action database and resolution and identification of issues associated with safety-related relays. The inspectors reviewed the database to identify if any previous relay failures could be attributed to gaps in the licensee's preventative maintenance strategies and work practices. No trends/themes were identified.

c. Findings

No findings were identified.

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

.1 (Closed) Licensee Event Report 05000265/2017-001-00: High Pressure Coolant Injection Minimum Flow Valve Failed to Open

On May 15, 2017, operations personnel performed surveillance procedure QCOS 2300-05, "HPCI Pump Operability Test." While securing from the test, operators tripped the HPCI turbine, and the HPCI minimum flow bypass valve failed to open on low flow. Operators attempted to manually open the minimum flow bypass valve. However, when they released the control switch, the valve returned to the closed position. Since the acceptance criteria in the surveillance procedure requires proper operation of the minimum flow valve, the licensee declared the HPCI system inoperable due to the apparent failure of the minimum flow valve to operate properly. The licensee documented the issue in IR 4011130, "During HPCI S/D MO 2-2301-14 did not Auto Open." The licensee's investigation identified that the HPCI pump discharge flow indicating switch had an intermittent failure that was caused by a manufacturing defect. The defect caused the minimum flow valve to receive a sporadic continuous closed signal. The licensee replaced the flow indicating switch (FIS), retested the system, and declared HPCI operable. An engineering evaluation by the licensee discussed that the minimum flow bypass valve is designed for pump protection when other discharge line valves are closed (i.e. during testing). Therefore, in the event of a loss of coolant accident, HPCI would have still been able to perform its design safety-related function because the HPCI discharge valves to the reactor would open and no pump damage would be expected to occur. Based on the inspectors' discussions with the licensee, the licensee determined that their procedure direction, to declare HPCI inoperable, may have been overly restrictive and initiated a procedure change to clarify the function of the minimum flow valve. The inspectors reviewed the licensee's evaluation and did not identify a performance deficiency.

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.

.2 Retraction of Event Notification No. 52955: High Pressure Coolant Injection System Inoperable

The original event occurred on September 8, 2017, when the Unit 2 HPCI minimum flow valve, MO 2-2301-14, flow indicating switch, FIS 2-2354, failed to meet the TS allowable value during calibration testing using procedure QCIS 2300-10, "HPCI Pump Discharge Flow Switch Calibration and Functional Test," Revision 8, and HPCI was subsequently declared inoperable. The licensee reported the event as a condition that could have prevented fulfillment of a safety function in accordance with 10 CFR 50.72(b)(3)(v)(D). Since the HPCI system is a single train system, the loss of HPCI would prevent the high pressure injection safety function that HPCI provides. The flow indicating switch, FIS 2-2354, was successfully recalibrated and HPCI was returned to Operable status approximately 10 minutes after it was found out of tolerance.

After reviewing the details of this event under IR 4050176, the licensee determined that the surveillance procedure contained an overly restrictive statement that directed operators to immediately declare the HPCI system inoperable when FIS 2-2354 fails. This statement was in conflict with TS 3.3.5.1, Condition E, which allows 7 days to

restore the HPCI FIS (instrument channel only) to an operable status prior to entry into TS 3.3.5.1, Condition H, which requires declaring HPCI inoperable immediately. Therefore, during the period of the FIS inoperability—10 minutes—the HPCI system was not required to be declared inoperable in accordance with TS. Licensee corrective actions included a revision to the procedure which would direct entry into the appropriate instrumentation TS.

The inspectors reviewed the licensee's basis for the event retraction and verified that HPCI was not required to be declared inoperable at the time of the event. The inspectors noted that while the FIS failed the calibration, it would have still functioned and opened the minimum flow valve. However, it would have opened at a lower flow rate than required by the TS. The inspectors also noted that this FIS calibration surveillance failure differed from the event described in LER 05000265/2017-001 due to the failure mechanism of the FIS. The event described in that LER prevented the minimum flow valve from operating automatically or manually, and the minimum flow valve was declared inoperable during that event, again due to procedural guidance in another surveillance procedure that was later determined to be overly restrictive. No performance deficiencies were identified.

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

.3 (Closed) Licensee Event Report 05000254/2017-003-00: Control Room Emergency Ventilation Air Conditioning Piping Refrigerant Leak Due to High Cycle Fatigue

On September 21, 2017, the licensee identified a refrigerant leak at an expansion joint located on the discharge piping of the CREV air conditioning (AC) system compressor. The licensee declared the refrigeration condensing unit inoperable and entered TS 3.7.5, Condition A, which required restoration of the CREV AC system within 30 days. The licensee was required to report the condition under 10 CFR 50.72/73 (a)(2)(v)(D) because the CREV AC system is a single train safety system required to mitigate the consequences of an accident. The licensee determined that the piping failure was caused by high cycle fatigue at the expansion joint, which had been in service for approximately 20 years. As a result, the licensee replaced the compressor discharge pipe fitting (expansion joint).

The licensee had experienced three compressor failures over the 20-year timespan, which were suspected to be the main causes of the increased vibrations on the piping. Due to previous compressor modifications following the prior failures, the licensee expected the replaced fitting will continue to function beyond the life of the plant. The inspectors reviewed the licensee's evaluation and corrective actions. No performance deficiencies were identified.

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

4OA5 Other Activities

.1 Review of Independent Spent Fuel Storage Installation Storage Pad Design (60856, Appendix A)

a. Inspection Scope

The licensee currently has an Independent Spent Fuel Storage Installation (ISFSI) pad with a capacity to store 60 casks and plans to expand the ISFSI capacity by installation of a new pad to accommodate an additional 114 casks. Title 10 of the *Code of Federal Regulations* (10 CFR) 72.212(b)(5)(ii) requires that licensees perform written evaluations, before use, which establish that cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion.

The inspectors evaluated the licensee's soil and ISFSI pad engineering design evaluations for the new pad to verify the licensee's compliance with the cask Certificate of Compliance (CoC), 10 CFR Part 72 requirements, and industry standards.

The licensee was utilizing the Holtec HI-STORM 100S, Version B (218) dry cask storage system. The new reinforced concrete pad was 35 inches thick and capable of supporting 114 HI-STORM casks in a 6-by-19 array. The pad was 89 feet wide and 307.5 feet long. The licensee designed and constructed the ISFSI pad as an important-to-safety (category C) structure.

The inspectors reviewed the licensee's soil investigation reports and calculations documenting the engineering properties and design soil profile of the ISFSI site based on new geotechnical investigations of the ISFSI areas combined with the data in the plant UFSAR. The inspectors reviewed documents to verify that the pad design duly addressed geological and hydrological considerations using the information from the earlier and the new soil investigations as applicable. The inspectors reviewed the licensee's liquefaction analysis to verify seismic input and safety factors were consistent with Regulatory Guidance 1.198, "Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites."

The inspectors reviewed documents for the generation of new seismic acceleration time histories from the seismic ground motion spectra for the reactor site to be used as inputs for the ISFSI analyses. The inspectors reviewed the soil structure interaction analysis methodology and calculations to verify adequacy of the soil/pad/cask analytical model. The inspectors reviewed the ISFSI pad structural design to verify the methodology, load factors and acceptance criteria, as well as considerations of settlements, static/dynamic and sequential/partial loadings.

The inspectors reviewed the licensee's cask haul path evaluations to verify that maximum expected loads were considered in the design of the new haul path. The inspectors interviewed licensee personnel and performed walkdowns of the haul path and the ISFSI areas to verify that licensee had reviewed the haul path for the right-of-way requirements and potential interferences from nearby structures and overhead lines and that any impact on buried utilities was also addressed, as applicable.

b. Findings

No findings were identified.

.2 On-site Fabrication of Components and Construction of an Independent Spent Fuel Storage Installation (60853)

a. Inspection Scope

The inspectors performed a walkdown of the new ISFSI pad construction site on September 26 and 27, 2017, after the licensee had performed significant earthwork and placed engineered fill for the pad, but before any concrete formwork or rebar for the pad had been placed. The inspectors observed the licensee's process for setting up and performing a plate load test on the engineered fill for the ISFSI pad. The inspectors also interviewed licensee and contractor personnel to evaluate their understanding of the design and construction specifications for the ISFSI pad.

The inspectors evaluated the licensee's construction activities for the new pad to verify the licensee's compliance with the cask CoC, 10 CFR Part 72 requirements, the cask Final Safety Analysis Report, the ISFSI pad design specification, and applicable industry standards.

As the licensee continues the construction process for this ISFSI pad expansion into 2018 to include both rebar and concrete placement, the inspectors will continue to utilize IP 60853 to evaluate the licensee's compliance. The results of this inspection will be documented in a future inspection report.

b. Findings

No findings were identified.

40A6 Management Meetings

.1 Exit Meeting Summary

On January 3, 2018, the inspectors presented the inspection results to Mr. H. Dodd 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 biennial LORT program inspection were presented to Mr. H. Dodd, Plant Manager, and other licensee staff members on October 20, 2017.
- The inspectors presented the characterization of a potential enforcement issue (URI) identified during the biennial LORT inspection to Mr. E. Pannell, Training Manager, and other licensee staff members via telephone conference on January 2, 2018.

- The results of the ISFSI pad inspection were presented to Mr. C. Alguire and other members of the licensee staff via telephone conference on November 20, 2017.
- The results of the emergency preparedness program inspection were presented to Mr. G. Buckley, Emergency Preparedness Manager, via telephone on November 22, 2017.
- The results for the radiation safety program review inspection were presented with Mr. H. Dodd, Plant Manager, on December 14, 2017.

The inspectors confirmed that none of the potential report inputs discussed were considered proprietary. Proprietary material received during the inspections was returned to the licensee.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

H. Dodd, Plant General Manager
M. Anderson, Maintenance Director
J. Bries, Operations Director
T. Bell, Engineering Director
D. Collins, Radiation Protection Manager
J. Cox, Shift Operations Superintendent
R. Craddick, Organizational Effectiveness Manager
M. Humphrey, Regulatory Assurance
T. Petersen, Regulatory Assurance
J. Roos, System Engineering Electrical Manager
T. Wojcik, Engineering Manager
J. Woolridge, Chemistry Manager

U.S. Nuclear Regulatory Commission

L. Kozak, Acting Chief, Reactor Projects Branch 1
R. Murray, Senior Resident Inspector
K. Carrington, Resident Inspector

Illinois Emergency Management Agency (IEMA)

C. Mathews, IEMA
C. Settles, IEMA

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000254/2017004-01; 05000265/2017004-01	URI	Repeat Use of Written Exams during Licensed Operator Requalification Examinations (Section 1R11)
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Closed

05000265/2017001-00	LER	High Pressure Coolant Injection Minimum Flow Valve Failed to Open (Section 4OA3.1)
05000254/2017003-00	LER	Control Room Emergency Ventilation Air Conditioning Piping Refrigerant Leak Due to High Cycle Fatigue (Section 4OA3.3)

Discussed

None.

LIST OF DOCUMENTS REVIEWED

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

<u>Section Number</u>	<u>Document Number</u>	<u>Description or Title</u>	<u>Revision or Date</u>
Section 1R01			
1R01	QCAN 901(2)-7 C-15	Traveling Screens High DP Annunciator Response	5
1R01	QCOP 4400-09	Circulating Water System Flow Reversal-TIC 3452	30a/ TIC 3452
1R01	QCOP 4400-02	Circulating Water System Startup and Shutdown	37
1R01	IR 4084820	Fish Impingement Challenges Unit Availability	12/16/2017
1R01	IR 4084886	EO ID: 2C Traveling Screen Metal Guide Ripped out of Place	12/17/2017
1R01	IR 4084887	One Panel of 2D Traveling Screen Found Partially Detached	12/17/2017
Section 1R04			
1R04	IR 4050467	EO ID: U1 RCIC Turbine Vacuum Pump Leak	09/10/2017
1R04	QOM 1-1300-02	Unit 1 RCIC Valve Checklist (RCIC Room)	10
1R04	QOM 1-1301-03	Unit 1 RCIC Valve Checklist (Not in RCIC Room)	10
1R04	STN 17-073	RCIC Turbine Vacuum Pump	
1R04	QCOP 6600-23	Unit 1 Diesel Generator Preparation for Standby Operation	3
1R04	QCOP 6600-04	Diesel Generator ½ Preparation for Standby Operation	23
1R04	QOM 2-2300-01	Unit 2 HPCI Valve Checklist	18
1R04	QOM 1-2300-02	HPCI System Fuse and Breaker Checklist	6
Section 1R05			
1R05	QDC-4100-M-0691	Combustible Loading Calculation for the Power Block, SBO Building and Crib House	6D
1R05		Fire Hazards Analysis Methodology and Assumptions	22
1R05		Quad Cites Generating Station Pre-Fire Plan: Unit 2 TB 595'0" Elev. Safe Shutdown Pump Room, Fire Zone 5.0	October 2013
1R05		Quad Cites Generating Station Pre-Fire Plan: Unit 2 RB 544'0" Elev. HPCI Pump Room, Fire Zone 11.1.4	July 2009
Section 1R11			
1R11	AT 3984542-04	SA: Pre-NRC 71111.11B	10/12/2017
1R11	IR 4083711	NRC Concern Related to LORT Comprehensive Written Exams	12/13/2017

1R11	IR 4063652	NRC ID: Active License Tracking Log Discrepancies	10/16/2017
1R11	TQ-AA-306	Simulator Management	8
1R11	TQ-AA-155-F04	Simulator Evaluation Forms—Individual, Crew F	10/19/2017
1R11	TQ-AA-155-F05	Simulator Evaluation Forms—Crew, Crew F	10/19/2017
1R11	TQ-AA-155-F04	Simulator Evaluation Forms—Individual, Crew F	10/19/2017
1R11	NOSA-QDC-15-08	Quad Cities Functional Area Audit Report	09/23/2015
1R11		Q1C25 Simulator Core Model Test	
1R11		Q1C25 Simulator Cert Testing	
1R11		LORT 2017 Operating Exam #7 Scenario Based Testing	20
1R11		LORT 2017 Operating Exam #3 Scenario Based Testing	21
1R11		ILT NRC Scenario #2 Scenario Based Testing	0
1R11		Simulator Comparison—CV #4 Failure	04/15/2017
1R11		Simulator Comparison—U1 Feedwater Heater Excursion	05/30/2015
1R11		Simulator Comparison—U1 Feedwater Heater Excursion	11/14/2015
1R11		Simulator Comparison—U1 Manual SCRAM Due to D-Ring Header Steam Leak	04/02/2015
1R11	IR 3949564	Training—Simulator Critical Task List Review	12/05/2016
1R11	IR 2674201	Paragon Knowledge Gap Regarding Drywell Inerted State	
1R11	IR 2687088	Did Not Proactively Ensure REMA Dates Were Valid-Updated for Downpower Extension	
1R11	IR 2697050	Did Not Notify Key Personnel Outside the MCR When HVAC Tripped on High Toxic Gas	
1R11	IR 2716967	Supervisor Left Role—Acknowledged Control Room Alarms Due to Perceived Time Pressure	
1R11	IR 3956869	Missed Opportunity to Update Crew on Status of FW Heater Transient Before Re-Latching of MSDT LCVs	
1R11	IR 4003770	Crew Didn't Recognize Load Drop Exceeded 20% in One Hour, Didn't Request RETS Sample	
1R11	IR 2503095	Update Needed to Time Sensitive Actions in OP-QC-102-106	
1R11	IR 4055629	Training—Simulator Crash During OBE	09/25/2017
1R11	IR 4030214	Simulator Crashed During LORT Training Scenario	07/10/2017
1R11	IR 2741979	QDC-EP-2016-NRC-Simulator Issue	11/16/2016
1R11	IR 2726915	Simulator MST Abort Caused Lost Simulator Training Time	10/11/2016
1R11	IR 2568617	Training—Delay in LORT NRC Exams Due to Simulator Malfunctions	10/07/2015

1R11	IR 2618447	Training: Loss of Training Time Due to Simulator Malfunction	01/28/2016
1R11	SWR 133381	Simulator Crashing When Reactor Depressurizes Less Than 20 psi	10/05/2017
1R11	SWR 133333	Meter Scaling Items from SWR 132888 That Require a Software Change	09/20/2017
1R11	SWR 133628	EC 619744—Cyber Security Remediation: Isolate Recorders from Recorder Server Network	10/12/2017
1R11		Reactivation of License Logs (various)	February 2016 – April 2017
1R11		Active License Tracking Logs	1 st Quarter 2016, 3 rd Quarter 2016, 2 nd Quarter 2017
1R11		2017 Crew 'F' RO Written LORT Annual Requalification Exam	
1R11		2017 Crew 'F' SRO Written LORT Annual Requalification Exam	
1R11		Quad Cities Operation Static Exam Bank, Static Exam: STATIC23	5
1R11	JPM LP-003-II-A	Locally Start of U1/2 DG with Failure of the ½ EDGCWP	1
1R11	JPM LP-040-I	Bypassing RCIC Steam Line Isolation Signal	11
1R11	JPM LS-001-II-A	Startup the RHRWS System with Reduced Pump Capacity	13
1R11	JPM LS-038-I	Perform the Unit 1 Weekly Turbine Generator Tests	3
1R11	JPM LS-083-I	Bypass 'A' Channel of the Reactor Mode Switch to Shutdown Scram	3
1R11	JPM SRO-012-I	Initiate a Fire Impairment Permit Requiring Compensatory Actions	4
1R11	JPM LP-042-II	Main Feedwater Regulator into Local Operation	3
1R11	JPM LP-043-I	Local Emergency Start of the 1(2) SBO Diesel Generator	13
1R11	JPM LS-002-I-A	Shutdown the U ½ 'B' SGBT with a Failure of Damper to Close	8
1R11	JPM LS-005-II	Transfer Auxiliary Power from Xfmr 11 to Xfmr 12	22
1R11	JPM LS-044-I-A	HPCI Startup with an Inadvertent Isolation	4
1R11	JPM SRO-003-I	Review Faulted Jet Pump Operability Surveillance	9
1R11		License Requalification Operating Exam #7, dated 08/17	23
1R11		License Requalification Operating Exam #3, dated 08/17	24

1R11		License Requalification Operating Exam #10, dated 08/17	19
1R11		License Requalification Operating Exam #20, dated 08/17	18
Section 1R12			
1R12		ENGAGE PM Template for SSMP System	
1R12		Maintenance Rule Basis Document—SS2900 (Safe Shutdown Make-Up Pump)	
1R12	IR 1201017	SSMP Room Cooler Trend IR	04/11/2011
1R12	IR 1209711	MRule: Performance Criteria Exceeded (SSMP RM Cooler)	04/29/2011
1R12	IR 1592607	SSMP HS 1–2940–4 Difficult to Place In PTL	12/04/2013
1R12	IR 2633959	SSMP MCC 30 Local Control Switch Failed	03/01/2016
1R12	IR 2728974	MRule Unavailability Missed for SSMP	10/17/2016
1R12	IR 3997936	PSU—MCR SSMP FIC 0–2940–7 Is Not Controlling in Auto or Man	04/13/2017
1R12	IR 4027615	WO to Remove Spare Contacts SSMP MCC 30 C3	06/30/2017
1R12	IR 4030993	WO Needed for SSMP FIC 2940–7	07/12/2017
1R12	IR 4040433	SSMP FIC Would Not Reach 400 GPM with Setpoint at 400 GPM	08/09/2017
1R12	IR 4078579	SSMP Reserve Feed MCR Switch Will Not Close	11/28/2017
1R12	IR 4078677	EO ID: Local Control Switch Would Not Start the SSMP	11/28/2017
Section 1R13			
1R13		Work Week Profile 17–40–04	
1R13		Work Week Profile 17–42–06	
1R13		Work Week Profile 17–46–10	
1R13		Work Week Profile 17–51–02	
1R13	2017.11.13.22.05.49	Protected System/Pathway Checklist	11/13/2017
1R13	ER-AA-600-1042	On-line Risk Management	11
1R13	QC-CRM-38	Overall On-line Risk Determination	0
1R13	WC-AA-101	On-line Work Control Process	27
Section 1R15			
1R15	GEK-9597	Quad Cities Nuclear Power Station Equipment Manual—Chapter 34, Heating, Ventilation, and Air Conditioning	December 1973
1R15	IR 2730448	Lessons Learned From ‘B’ CREVs LCO Week of 10–10–16	10/20/2016
1R15	IR 4062552	B Train CREV Superheat Value High	10/13/2017
1R15	NES 709-3	Installation, Operation and Maintenance Instructions for Refrigeration Condensing Units Control Room HVAC Upgrade Nuclear Electric Generating Facilities at Dresden and Quad Cities	3
1R15	QDC-5700-H-0805	Heat Gain Calculation for Train B Control Room HVAC System	0

1R15	GE Sil No. 657	Standby Liquid Control System Accumulator Bladder	09/07/2006
1R15	IR 4066290	1A SBLC Pump Accumulator "Schraeder" Valve is Stuck Open	10/24/2017
1R15	4E-1527, Sheet 3	Schematic Diagram High Pressure Coolant Injection System Sensors and Auxiliary Relays	Q
1R15	4E-1533	Schematic Diagram HPCI Turbine Motor Gear Unit Speed Exchanger and Auxiliary Valves	AP
1R15	M-46	Diagram of HPCI Turbine Lubricating and Hydraulic Oil System and Pump Seal Cooler Piping	G
1R15	QCOS 2300-05	HPCI Pump Operability Test	79
1R15	IR 4078579	SSMP Reserve Feed MCR Switch Will Not Close	11/28/2017
1R15	IR 4078677	EO ID: Local Control Switch Would Not Start the SSMP	11/28/2017
1R15	QCOP 2900-01	Safe Shutdown Makeup Pump System Preparation for Standby Operation	39
1R15	QCOS 2900-10	Safe Shutdown Makeup Pump Local Panel Flow Test	5
Section 1R18			
1R18	4E-1828	Wiring Diagram HPCI System Signal	N
1R18	EC 619131	U-1 HPCI Signal Converter Output Failed Alarm Bypass	04/18/2017
1R18	IR 3992828	Local Current Meter 1-2386-8206 Erratic	04/01/2017
1R18	IR 3997418	Unexpected 901-3 H-9 Alarm	04/12/2017
1R18	QCAN 901(2)-3	HPCI Controller Signal Converter Output Failed	3
1R18	WO 4625756	Unexpected 901-3 H-9 Alarm	04/28/2017
Section 1R19			
1R19	EC 24448	Replace the ½ Standby Diesel Generator Seismic Qualification Utility Group (SQUQ) Relays and the Associated DC Control Power Transfer Switch	
1R19	IR 4057911	Incorrect Step in QCIPM 6600-03	10/01/2017
1R19	IR 4057926	½ EDG Governor Booster Pump Needs to Be Replaced	10/01/2017
1R19	IR 4067226	½ EDG LCO Extent of Condition Issues	10/26/2017
1R19	QCEPM 0400-10	Emergency Diesel Speed Sensing Circuit Testing and Calibration	26
1R19	QCMMS 6600-03	Emergency Diesel Generator Periodic Preventive Maintenance Inspection	33
1R19	WO 1656769-03	IM Replace U-0 EDG Speed Switch 0-6601-ES	09/29/2016
1R19	WO 1914200	(LR) Diesel Generator Periodic Insp	10/02/2017
1R19	WO 1914200-02	(LR) Diesel Generator Periodic Insp	10/02/2017
1R19	Drawing R107D-1321710-F, Sheet 2	Equipment Arrangement, Control Room Refrigeration Condensing Unit	
1R19	WO 4694130	Control Room Emergency Filtration Sys Test (IST)	10/12/2017
1R19	WO 4697777	B CR HVAC Bundled PMT Review	10/13/2017

1R19	WO 4709406	Unit 1 HPCI Did Not Trip During QCOS 2300–05	11/09/2017
1R19	QCOS 2300–05	HPCI Pump Operability Test	79
1R19	WO 1924709	SBO DG Jacket Water Booster Pump Recirc Valve Pressure Control Test	11/03/2017
1R19	WO 1945526	SBO Overspeed Trip Test	11/03/2017
1R19	WO 4671151	SBO DG Load Test	11/03/2017
1R19	WO 4671154	SBO DG Jacket Water Booster Pump Test	11/03/2017
1R19	WO 4671158	SBO DG Starting Air Compressor 'B'	11/03/2017
1R19	WO 4712561	PS 2–0504–A Did Not Function as Expected	11/16/2017
1R19	QCIS 0500–06	Unit 2 Division I Turbine First Stage Low Pressure Above Setpoint Calibration and Functional Test	7
1R19	QCOS 2900–01	Safe Shutdown Makeup Pump Flow Rate Test	38
1R19	WO 4717433–01	SSMP Reserve Feed MCR Switch Will Not Close	11/29/2017
1R19	WO 4717766–01	Local Control Switch Would Not Start the SSMP	11/29/2017
1R19	QCOP 2900–01	Safe Shutdown Makeup Pump System Preparation for Standby Operation	39
1R19	QCOS 2900–10	Safe Shutdown Makeup Pump Local Panel Flow Test	5
1R19	QCOS 7500–04	Unit 1 Standby Gas Treatment Initiation and Reactor Building Ventilation Isolation Test	36
Section 1R22			
1R22	IR 4059849	Discrepancies to QCOS 7500–08	10/05/2017
1R22	QCOS 1400–07	Core Spray Pump Comprehensive/Performance Test	15
1R22	QCEMS 0230-11	Modified Performance Test of Unit 1(2) 125 VDC Normal or Alternate Battery	10
1R22	IEEE/ANSI 450–1987	Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Batteries for Generating Stations and Substations	03/09/1987
Section 1EP4			
1EP4	EP–AA–1000	Exelon Nuclear Standardized Radiological Emergency Plan	29
1EP4	EP–AA–1006	Quad Cities Emergency Plan Annex	37 and 38
1EP4	EP–AA–1006, Addendum 3	Emergency Actions Levels for Quad Cities	2 and 3
1EP4	EP–QC–1000	Quad Cities Power Station Radiological Emergency Plan	0
1EP4	Evaluation 16–106	50.54(q) Evaluation and Effectiveness Review	09/19/2016
1EP4	Evaluation 17–27	50.54(q) Evaluation and Effectiveness Review	03/20/2017
Section 1EP6			
1EP6		Nuclear Accident Reporting System (NARS) Form for Quad Cities 4 th Qtr PI Drill	11/08/2017
1EP6		Quad Cities Generating Station 2017 4 th Qtr PI Drill	11/08/2017

1EP6	EP-AA-111-F-06	Quad Cities PAR Flowchart	G
Section 2RS2			
2RS2	IR 3995639-04	Occupational ALARA Planning and Controls	10/31/2017
2RS2	IR 3964145	Check-In Self-Assessment; Exposure Controls Inspection	02/28/2017
2RS2	IR 2635387	Check-In Self-Assessment; Fleet ALARA Program	12/21/2016
2RS2	IR 2589636	Check-In Self-Assessment; Exposure Controls Inspection, ALARA	02/22/2016
2RS2	IR 2426117	Check-In Self-Assessment; Occupational ALARA Planning and Controls	07/17/2015
2RS2	IR 3996125	CB&I Accumulated Dose Alarm	04/09/2017
2RS2	RP-AA-203-1001, Attachment 1	Personnel Exposure Investigation; EID Hurley1491	04/09/2017
2RS2	IR 2686986	Potential Adverse Trend for Online Emergent Dose	06/26/2016
2RS2	IR 3994959	Accumulated Dose Alarm Received in Unit MSIV Room	04/06/2017
2RS2	IR 4006044	ALARA Post Job Review QC-01-17-00506	05/03/2017
2RS2	IR 4001030	RWP QC-01-17-00802 TB Main Cond Activities Exceed 25% Estimate	04/21/2017
2RS2	IR 4000935	RWP QC-01-17-00517 Estimate >1 REM & Under Original Estimate	04/21/2017
2RS2	IR 4000935	RWP QC-01-17-00518 Estimate >1 REM & Under Original Estimate	04/21/2017
2RS2	IR 4000612	OLL: RWP QC-01-17-00403-01 OB MSIV Activities Exceeded Estimates	04/20/2017
2RS2	RWP QC-01-17-00506	DW Scaffolding Activities (Q1R24)	Various Dates
2RS2	RWP QC-01-17-00541	DW I/B MSIV Over Haul (Q1R24)	Various Dates
2RS2	RWP QC-01-17-00901	FF Rx Disassembly/Reassembly Activities (Q1R24)	Various Dates
2RS2	RWP QC-02-16-00506	DW Scaffolding Activities	Various Dates
2RS2	RWP QC-02-16-00507	DW Ventilation/Cooler System Activities (Q2R23)	Various Dates
2RS2		Quad Cities Generating Station; Radiation Protection Q1R23 Refueling Outage Report	N/A
2RS2		Quad Cities Generating Station; Radiation Protection Q2R23 Refueling Outage Report	N/A
2RS2		Quad Cities Generating Station; Radiation Protection Q1R24 Refueling Outage Report	07/25/2017
2RS2	RP-AA-400-1001	Establishing Collective Radiation Exposure Annual Business Plan Goals	4
2RS2	RP-AA-401	Operational ALARA Planning and Controls	22
2RS2	CC-AA-401	Maintenance Specification: Installation and Control of Temporary Shielding	10

2RS2	RP-QC-552	Source Term Reduction External System/Component Flushing	1
2RS2	RP-AA-402	Radiation Protection Dose Excellence Planning Process	8
2RS2	RP-AA-402, Attachment 1	Abbreviated Exposure Reduction Plan 2017-2021	0
2RS2	RP-AA-400	ALARA Program	14
2RS2	RP-AA-230	Operation of the Canberra FASTSCAN Whole Body Counter Using ABACOS Plus	3
2RS2	RP-AA-227	Operation of the Canberra ACCUSCAN Whole Body Counter	0
2RS2	RP-AA-700	Controls for Radiation Protection Instrumentation	4
2RS2	RP-AA-700-1401	Operation and Calibration of Eberline Model PM-7 Personnel Contamination Monitor	4
2RS2	RPP-AA-700-1401, Attachment 3	Calibration Data Sheet PM-7 Portal Monitor; Portal Monitor Instrument #PM15	11/30/2017
2RS2	RP-AA-700-1218	Calibration of HI-VOL Air Samplers	3
2RS2	RP-AA-700-1218, Attachment 1	Radeco H-809C, H-809V-I; H-809V-II Calibration Data Sheet; Radeco Serial Number HV098	07/19/2017
2RS2	RP-AA-1208	Operation of the Shepherd Model 89 Calibrator	3
2RS2	RP-AA-700-1208, Attachment 1	Irradiator Reference Data Sheet; Instrument Model Number MGP Telepole WR and FH-40 GL/FH 40 TG and Telepole II	08/10/2017
2RS2	RP-AA-700-1208, Attachment 1	Irradiator Reference Data Sheet; ADM-300 Calibration Record; ADM-300 Serial Number 10651	07/14/2017
2RS2	RP-AA-1231	Operation and Calibration of the Model LAM-11 Large Articles Monitor	2
2RS2	RP-AA-700-1231, Attachment 2	LAM Calibration Data Sheet; LAM-11 Serial Number LAM1	03/10/2017
2RS2	RP-QC-711-100	Calibration of the IPM 7/8 Whole Body Monitors	0
2RS2	RP-QC-700-100, Attachment 1	IPM 7/8 Calibration Record; Monitor Serial Number 365	01/10/2017
2RS2	RP-AA-700-1239, Attachment 2	SAM-12 Calibration Data Sheet; SAM-12 Serial #12234	03/17/2017
2RS2	RP-AA-700-1235	Operation and Calibration of the PM-12 Gamma Portal Monitor	3
2RS2	RP-AA-700-1235, Attachment 3	PM-12 Calibration Data Sheet; PM-12 Serial Number PM1224	07/07/2017
2RS2		Certificate of Calibration; Asset/Equipment #0012244; Model #RO20AA	02/22/2017
2RS2		Certificate of Calibration; Asset/Equipment #076568; Model #FH-40G-L	01/23/2017

2RS2		Certificate of Calibration; Asset/Equipment #076728; Model #ASP-1 w/HP-220	02/23/2017
2RS2		Certificate of Calibration; Asset/Equipment #076927; Model #ASP-1	03/26/2017
2RS2		Certificate of Calibration; Asset/Equipment #0011992; Model Ludlum 3	02/22/2017
2RS2		Certificate of Calibration; Asset/Equipment #0017511; Model # REM 500	08/30/2017
2RS2		Certificate of Calibration; Asset/Equipment #0798022 Model #AMP-100	03/08/2017
2RS2		Certificate of Calibration; Asset/Equipment #0015972; Model # AMS-4/AMS4OPT14	02/23/2017
2RS2	RP-AA-700, Attachment 1	Out of Tolerance Report; 0015972	03/02/2017
2RS2		Certificate of Calibration; Asset/Equipment #078022; Model #FHZ 612	02/23/2017
2RS2	RP-AA-700, Attachment 1	Out of Tolerance Report; 078022	03/02/2017
2RS2	NCS-16-001	Implementation of Weekly Source Checks for RCA/PA Exit Monitors	06/03/2016
2RS2	QDC-15-005	Unconditional Release Detection Thresholds and Dose Consequences	12/30/2015
2RS2	QDC-17-002	2017 LAM Calibration Parameters	11/22/2017
2RS2	WO 1739632-01	Replace DW Rad Monitor (2-2149-B)	12/23/2015
2RS2	IR 2622489	Check In Self-Assessment; Radiation Protection Instrumentation	10/25/2016
2RS2	IR 3992875	NRC Inspection (71124.05) Radiation Monitoring Instrumentation Self-Assessment	10/23/2017
2RS2	IR 04061863	Instruments Not Labelled Appropriately	10/11/2017
2RS2	IR 02652614	CCP: Contradiction between Plan Drawings for ARM 35 & 36	04/07/2016
2RS2		Quad Cities 10 CFR 61 Program Waste Stream Characterization and Scaling Factor Review	2017
2RS2		50.75(g) Documented Contaminated Areas; K:RP/50.75.g	N/A
2RS2	LS-AA-2090	Monthly Data Elements for NRC Reactor Coolant System (RCS) Specific Activity and Supporting Data	07/27/2016 through 09/28/2017
Section 40A1			
40A1		Operator Logs from 10/01/2016 to 09/30/2017	
40A1		Units 1 and 2 HPCI and RCIC Unavailability/Demands Data from 10/01/2016 to 09/30/2017	
40A1		MSPI Basis Document	6a
Section 40A2			
40A2	IR 4054673	U2 CRD Water Analysis Follow Up to IR 4053654	
40A2	IR 4062547	CREV AC Temperature Indication Abnormal	10/13/2017
40A2	IR 4066450	U1 1A 125V DC Battery Charger Amperage Oscillations	10/24/2017

4OA2	IR 4066516	Very Slow Leak from 1A RHR Motor Lower Reservoir Drain Plug	10/24/2017
4OA2	IR 4068539	Part 21 Potential Issue with Speed Switch	10/30/2017
4OA2	IR 4068562	Flex Generator #3 Diesel Fuel High in Water/ Sediment Test	10/30/2017
4OA2	IR 4068571	Flex Diesel Generator #2 Diesel Fuel is Degraded	10/30/2017
4OA2	IR 4068869	U1 Control Valve #1 Suicided Closed	10/31/2017
4OA2		Exelon Nuclear: Quad Cities Station- R.1: Regulatory Inspection Findings & Performance Indicator Overview	October 2017
4OA2	IR 4074136	Debris Found Under Coupling of 2-6657	11/13/2017
4OA2	IR 4057926	½ EDG Governor Booster Pump Needs to be Replaced	10/01/2017
4OA2	IR 4067226	½ EDG LCO Extent of Condition Issues	10/26/2017
4OA2	IR 4068869	U1 Control Valve #1 Suicided Closed	10/31/2017
4OA2	IR 4084574	Review of Dresden IR 4061472 for Impact at Quad Cities	12/15/2017
4OA2	IR 4081789	OOT, PS 1-1462-A, Trend Code B1	12/07/2017
4OA2	IR 4084402	M&TE Evaluation Requires U1 QCIS 1400-01 to be Re-Performed	12/15/2017
4OA2	IR 4086596	RB Floor Drain Line Plugged	12/21/2017
4OA2	IR 4086637	Received Unexpected Alarms 902-4 G-18 and C-18	12/21/2017
4OA2	IR 4086651	Suspect RBEDT Pump Degradation	12/21/2017
Section 4OA3			
4OA3	IR 4050176	OOT, FIS 2-2354, Trend Code B2	09/08/2017
4OA3	IR 5054681	Refrigerant Leak on B Train of CR HVAC Compressor Piping	11/09/2017
4OA5		Letter from Terracon Consultants to Exelon Business Services Co. Re: Plate Load Test Submittal	09/19/2017
4OA5		QCNPS 10 CFR 72.212 Evaluation Report	12
4OA5	ASTM D1196/D1196M	Standard Test Method for Nonrepetitive Static Plate Load Tests of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements	Reapproved 2016
4OA5	CoC 72-1014	Certificate of Compliance for Spent Fuel Storage Casks, Issued to Holtec International	Amendment 8
4OA5	Drawing B-2166	ISFSI Expansion Pad, Sheets 1-6	New
4OA5	Drawing B-2183	ISFSI Expansion Area, Final Slope Configuration	New
4OA5	EC 405175	Dry Cask Storage Project, Installation of ISFSI Pad 2	0
4OA5	HI-2002444	Holtec International HI-STORM 100 System FSAR	11.1
4OA5	QDC-0000-S-1339	Evaluation of Buried Utilities and Existing Building Foundations Along the Haul Path for the Dry Cask Storage Project	3A

4OA5	QDC-0836-S-2205	Seismic Soil Liquefaction Evaluation for ISFSI Pad Site	0
4OA5	QDC-0836-S-2206	Time History Generation for Non-Linear Soil-Structure-Interaction Analysis for ISFSI Pad Expansion	0
4OA5	QDC-0836-S-2234	Geotechnical Slope Stability Analysis for ISFSI Pad Expansion Project	0
4OA5	QDC-0836-S-2235	Geotechnical Analysis of Bearing Capacity, Subgrade Modulus Parameters for ISFSI Pad Expansion	0
4OA5	QDC-0836-S-2238	Strain-Dependent Soil Properties for ISFSI Pad Expansion	0
4OA5	QDC-0836-S-2239	Non-Linear Soil-Structure-Interaction (SSI) Analysis for ISFSI Pad Expansion	0
4OA5	QDC-0836-S-2240	ISFSI Pad Design for ISFSI Pad Expansion	0
4OA5	RRTI-2144-011	Response to Request for Technical Information Holtec International	0
4OA5	Specification Q-2052	ISFSI Expansion: ISFSI Pad, Final Grading and Misc. Concrete Structures	1

LIST OF ACRONYMS USED

AC	Air Conditioning
ADAMS	Agencywide Document Access Management System
ALARA	As-Low-As-Reasonably-Achievable
CAP	Corrective Action Program
CFR	<i>Code of Federal Regulations</i>
CoC	Certificate of Compliance
CREV	Control Room Emergency Ventilation
EAL	Emergency Actions Level
EDG	Emergency Diesel Generator
EHC	Electro-hydraulic Control
FIS	Flow Indicating Switch
FZ	Fire Zone
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
ISFSI	Independent Spent Fuel Storage Installation
LER	Licensee Event Report
LOR	Licensed Operator Requalification
LORT	Licensed Operator Requalification Training
MCC	Motor Control Center
MSPI	Mitigating System Performance Index
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PI	Performance Indicator
SAT	Systems Approach to Training
SBGT	Standby Gas Treatment
SDP	Significance Determination Process
SSMP	Safe Shutdown Makeup Pump
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
WO	Work Order