

May 1, 2006

Mr. Christopher M. Crane
President and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
Quad Cities Nuclear Power Station
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2006004;
05000265/2006004

Dear Mr. Crane:

On March 31, 2006, the U. S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. The enclosed report documents the inspection findings which were discussed on April 4, 2006, with Mr. Tulon and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and to compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no findings of significance were identified.

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Sincerely,

/RA/

Mark A. Ring, Chief
Branch 1
Division of Reactor Projects

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

Enclosure: Inspection Report 05000254/2006004; 05000265/2006004
w/Attachment: Supplemental Information

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C. Crane

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cc w/encl: Site Vice President - Quad Cities Nuclear Power Station
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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.: 05000254/2006004 and 05000265/2006004

Licensee: Exelon Nuclear

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

Location: Cordova, Illinois

Dates: January 1, 2006, through March 31, 2006

Inspectors: K. Stoedter, Senior Resident Inspector
M. Kurth, Resident Inspector
R. Baker, Resident Inspector - Duane Arnold
D. Jones, Reactor Inspector
D. Melendez-Colon, Reactor Engineer
D. Tharp, Resident Inspector - Clinton
R. Winter, Reactor Inspector
R. Ganser, Illinois Emergency Management Agency

Approved by: M. Ring, Chief
Projects Branch 1
Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000254/2006004, 05000265/2006004; 01/01/2006 - 03/31/2006; Quad Cities Nuclear Power Station, Units 1 & 2; Routine Integrated Inspection Report, Permanent Plant Modifications.

The report covered a 3-month period of inspection by resident inspectors, an announced inspection by a regional inservice inspector, and the completion of Temporary Instruction 2515/165, "Operational Readiness of Offsite Power and Impact on Plant Risk." No findings of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

No findings of significance were identified.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period operating at 85 percent power due to potential ERV actuator degradation concerns. On January 6 the licensee shut down Unit 1, inspected the actuators, and found several areas of degradation. Over the next 3 days, the licensee performed ERV actuator replacement activities and other associated outage work. Unit 1 returned to pre-extended power uprate power levels on January 9. Approximately 1 week later, the licensee shut down Unit 1 again due to identifying a new ERV actuator failure mechanism. Over the next 4 days, the licensee re-inspected the ERV actuators to address the new failure mode. Unit 1 returned to power on January 19.

Approximately 1 month later, Unit 1 experienced a reactor scram due to a main power transformer differential current relay actuation. Subsequent troubleshooting determined that the relay actuated due to an electrical ground created by excessive vibrations of the main power transformer. In response to this event, the licensee inspected the main power transformer protective circuitry and wiring. Due to the types and levels of degradation identified, the licensee disconnected portions of the wiring and installed additional wiring external to the transformer. Unit 1 returned to power on February 24. Unit 1 continued to operate at 85 percent power for the remainder of the inspection period.

Unit 2 also began the inspection period operating at 85 percent power. On January 13 the licensee shut down Unit 2 to address additional ERV actuator degradation concerns identified during an NRC Special Inspection. During this shut down, the 3D ERV failed to operate as expected. The licensee's troubleshooting activities identified an additional ERV actuator failure mode which had not been previously identified. As part of the 6 day outage, the licensee completed actions to address concerns developed by the NRC Special Inspection Team and the newly identified failure mechanism. Details regarding the ERV actuator issues and related outages were documented in NRC Special Inspection Report 05000254/2006009 and 05000265/2006009. Unit 2 returned to pre-extended power uprate power levels on January 19 and remained there until the refueling outage began on March 24. The refueling outage was ongoing at the conclusion of the inspection period.

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

The inspectors performed partial walkdowns of the systems listed below to verify the operability of redundant trains and components when safety equipment was inoperable. The inspectors attempted to identify any discrepancies that could impact the function of

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the system, and therefore, potentially increase risk. The inspectors reviewed applicable operating procedures; walked down control systems components; and verified that selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors searched corrective action program documentation to verify 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 to perform their function.

- Unit 1 emergency diesel generator
- Unit 2 emergency diesel generator
- Unit 1 reactor core isolation cooling system
- Units 1 and 2 electrohydraulic control systems

These inspections represented the completion of four quarterly samples.

.2 Complete Walkdown

a. Inspection Scope

The inspectors conducted one complete walkdown of the diesel fire pumps and associated piping. The inspectors used the licensee's procedures and other documents provided in the list of documents reviewed to determine the piping configuration, the position of associated valves, and the types of instrumentation used within the system. The inspectors reviewed design documents to determine the electrical power requirements for the system. The walkdowns also included evaluation of system piping and supports against the following considerations during an in-plant walkdown:

- Piping and pipe supports did not show evidence of water hammer
- Oil reservoir levels appeared normal
- Snubbers did not appear to be leaking hydraulic fluid
- Hangers were functional
- Component foundations were not degraded

A review of outstanding maintenance work orders was performed to verify that the known outstanding deficiencies did not significantly affect the system's ability to perform its function. In addition, the inspectors reviewed the issue report database to verify that fire protection equipment alignment problems were being identified and appropriately resolved.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Fire Protection - Tours

a. Inspection Scope

The inspectors conducted a tour of the 14 areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that combustibles and ignition sources were controlled in accordance with the licensee's administrative procedures; fire detection and suppression equipment was available for use; that passive fire barriers were maintained in good material condition; and that compensatory measures for out-of-service, degraded, or inoperable fire protection equipment were implemented in accordance with the licensee's fire plan.

- Fire Zone 1.1.1.3 - Unit 1 623 Feet Elevation, Mezzanine Level, Reactor Building
- Fire Zone 1.1.2.3 - Unit 2 623 Feet Elevation, Mezzanine Level, Reactor Building
- Fire Zone 3.0 - Service Building 609 Feet Elevation, Cable Spreading Room
- Fire Zone 6.3 - Service Building 595 Feet Elevation, Auxiliary Electric Room
- Fire Zone 8.2.7.A - Unit 1 Turbine Building 615 Feet Elevation, Hydrogen Seal Oil Area and Motor Control Centers
- Fire Zone 8.2.7.E - Unit 2 Turbine Building 615 Feet Elevation, North Mezzanine Floor
- Fire Zone 9.1 - Unit 1 Turbine Building 595 Feet Elevation, Diesel Generator
- Fire Zone 9.2 - Unit 2 Turbine Building 595 Feet Elevation, Diesel Generator
- Fire Zone 17.1.1 - Unit 1 Main Transformer 595 Feet Elevation
- Fire Zone 17.1.2 - Unit 1 Auxiliary Transformer 595 Feet Elevation
- Fire Zone 17.1.3 - Unit 1 Reserve Auxiliary Transformer 595 Feet Elevation
- Fire Zone 17.2.1 - Unit 2 Main Transformer 595 Feet Elevation
- Fire Zone 17.2.2 - Unit 2 Auxiliary Transformer 595 Feet Elevation
- Fire Zone 17.2.3 - Unit 2 Reserve Auxiliary Transformer 595 Feet Elevation

b. Findings

No findings of significance were identified.

.2 Fire Protection - Drill Observation

a. Inspection Scope

The inspectors observed a fire drill conducted in the turbine building on the 611 foot elevation. The drill was observed to evaluate 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 included:

- Proper wearing of turnout gear and self-contained breathing apparatus
- Proper use and layout of fire hoses
- Employment of appropriate fire fighting techniques
- Transporting sufficient fire fighting equipment to the scene
- Effectiveness of fire brigade leader communications, command, and control
- Effectiveness of search for victims and propagation of the fire
- Smoke removal operations
- Utilization of pre-planned strategies
- Adherence to the pre-planned drill scenario
- Accomplishment of drill objectives

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

The inspectors reviewed the licensee's program for inspecting, cleaning, and maintaining the residual heat removal service water intake bay. This item was chosen for inspection because this bay supplies water to the safety related service water systems used to remove heat from the residual heat removal system, the emergency diesel generators, and the emergency core cooling system equipment rooms. The inspectors observed the as-found inspection of the intake bay including visual inspections of the separation screens, the ½ B fire diesel pump strainer, and the residual heat removal service water system intake piping. The inspectors focused on identifying areas where river water debris, silt, or zebra mussels had accumulated and blocked the flow of water to the safety related equipment served by the bay. In addition, the inspectors witnessed an inspection of the concrete structures which form the bay and verified that the concrete had not degraded to a point where the structural integrity of the bay was jeopardized. The inspectors also reviewed prior inspection results and compared them to the as-found inspection results to determine whether the bay conditions were as expected. After the bay was cleaned, the inspectors observed the as-left inspection of the bay to ensure that the debris had been removed and that the equipment served by the bay would continue to perform its safety function.

This inspection represented the completion of one annual heat sink inspection sample.

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection Activities (71111.08)

a. Inspection Scope

From March 20 to 23, 2006, the inspectors conducted a review of the implementation of the licensee's inservice inspection activities program for monitoring degradation of the reactor coolant system boundary and the risk significant piping system boundaries during the Unit 2 outage (Q2R18). The inspectors selected the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI required examinations and Code components in order of risk priority as identified in Section 71111.08-02 of IP 71111.08, "Inservice Inspection Activities," based upon the inservice inspection activities available for review during the onsite inspection period.

The inspectors conducted an onsite review of the following types of nondestructive examination activities to evaluate compliance with the American Society of Mechanical Engineers Code Section XI and Section V requirements and to verify that indications and defects (if present) were dispositioned in accordance with the American Society of Mechanical Engineers Code Section XI requirements. Specifically, the inspectors observed/reviewed the following examinations:

- Ultrasonic examination of a pipe-to-elbow weld (weld 2B-RH-1006C-4), residual heat removal
- Ultrasonic examination of a elbow-to-pipe weld (weld 2B-RH-1006C-3), residual heat removal
- Magnetic Particle examination of the 2A residual heat removal riser clamp lug welds (1008A-W-203A)
- Liquid Penetrant examination of the 2A residual heat removal riser clamp lug welds (1024A-W-201A)

The inspectors reviewed an examination with recordable indications that was accepted for continued service to verify that the licensee's acceptance was in accordance with the American Society of Mechanical Engineers Code or an NRC approved alternative. Specifically, the inspectors reviewed the following record:

- Report No. Q2R17-085, automated ultrasonic examination of the Reactor Pressure Vessel N2A Nozzle, six acceptable indications were recorded which were found to have no determinable throughwall dimensions and were acceptable to the requirements of American Society of Mechanical Engineers IWB-3000

There were no pressure boundary welds for Class 1 or 2 systems completed by the licensee; and hence, the inspectors did not perform the step of the inspection procedure that verifies that the welding process and welding examinations were performed in accordance with American Society of Mechanical Engineers Code requirements or an NRC approved alternative.

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The inspectors performed a review of inservice inspection related problems that were identified by the licensee and entered into the corrective action program. Additionally, the inspectors' review included confirmation that the licensee had an appropriate threshold for identifying issues and had implemented effective corrective actions. The inspectors evaluated the threshold for identifying issues through interviews with licensee staff and review of licensee actions to incorporate lessons learned from industry issues related to the inservice inspection program. The inspectors performed these reviews to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the attachment to this report. In addition, the inspectors verified that the licensee correctly assessed operating experience for applicability to the inservice inspection group.

The reviews as discussed above counted as one inspection sample.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification (71111.11Q)

a. Inspection Scope

On January 30, 2006, the inspectors observed operations crews in the simulator. The observed scenario consisted of reactor power increase using reactor recirculation flow, a failed feedwater flow transmitter, and a loss of stator water cooling.

The inspectors evaluated crew performance in the areas of:

- Clarity and formality of communications
- Ability to make timely actions in the safe direction
- Prioritization, interpretation, and verification of alarms
- Procedure use
- Control board manipulations
- Oversight and direction from supervisors
- Group dynamics

Crew performance in these areas was compared to licensee management expectations and guidelines as presented in the following documents:

- OP-AA-101-111, "Rules and Responsibilities of On-Shift Personnel"
- OP-AA-103-102, "Watchstanding Practices"
- OP-AA-103-104, "Reactivity Management Controls"
- OP-AA-104-101, "Communications"

The inspectors verified that the crews completed the critical tasks listed in the above scenarios. If critical tasks were not met, the inspectors verified that crew and operator

performance errors were detected and adequately addressed by the evaluators. The inspectors verified that the evaluators effectively identified crews requiring remediation and appropriately indicated when removal from shift activities was warranted. Lastly, the inspectors observed the licensee's critique to verify that weaknesses identified during this observation were noted by the evaluators and discussed with the respective crews.

This inspection represented the completion of one quarterly sample.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed documentation associated with the four maintenance rule functions listed below and compared the information to industry guidance to ensure that the functions had been appropriately scoped into the maintenance rule program. Once the scoping was verified, the inspectors reviewed the licensee's performance criteria and performed simple calculations to verify that the criteria would meet pre-established reliability/availability goals provided in the licensee's probabilistic risk assessment. The inspectors then performed searches of the licensee's corrective action program database, open maintenance work documents, and control room logs to identify maintenance work practice issues, common cause issues, or equipment issues which impacted the maintenance rule availability or reliability for the functions inspected. The inspectors then performed additional calculations to determine the amount of maintenance rule unavailability associated with each pre-selected sample. The results of these calculations were then compared to the licensee's data to ensure that unavailability was appropriately captured. The inspectors performed a similar review for those functions which utilized condition monitoring rather than reliability and/or availability. Functions reviewed included:

- Process Radiation Monitoring (Function Z1700)
- Residual Heat Removal System (Function Z1000)
- Service Water (Function Z3900)
- Control Rod Drive (Function Z0300)

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors reviewed the following six activities to verify that the appropriate risk assessments were performed prior to removing equipment for work. The inspectors held discussions with operations, work control, and engineering personnel to verify 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 verified the appropriate use of the licensee's risk assessment tool and risk categories in accordance with procedures.

- Work Week February 6-10 which included planned maintenance on the Unit 1 emergency diesel generator, the Unit 2 125 Volt battery charger, the 1A and 1B residual heat removal service water pumps, and Bus 23-1 and emergent work on the 1 A and 1 B diesel fire pumps
- Work Week February 13-19 which included planned maintenance on the Unit 2 high pressure coolant injection system, the Unit 2 125 Volt direct current charger, and Unit 1 station blackout diesel generator
- Work Week February 27 through March 5 which included planned maintenance on the Unit 1D residual heat removal service water system, the Unit 1C residual heat removal system, and emergent work on the 1 A diesel fire pump
- Work Week March 6-12 which included planned maintenance on the Unit 2 reactor core isolation cooling system, the 1 250 Volt battery charger, the 1 A standby gas treatment system, the 2A service water pump, and the 1C residual heat removal service water pump
- Work Week March 13-18 included surveillance testing of the 1 emergency diesel generator and the Unit 2 station blackout emergency diesel generator, and planned maintenance on the Unit 1 low pressure coolant injection supply valves, the 2C circulating water pump, and the 2B residual heat removal service water pump
- Work Week March 19-25 included surveillance testing of the Unit 1 emergency diesel generator, planned maintenance on the 2A residual heat removal room cooler, pre-outage work associated with the refueling outage, and planned work in the switchyard

b. Findings

No findings of significance were identified. However, Issue Reports 468904 and 469454 were written as a result of this inspection.

1R14 Operator Performance During Non-Routine Evolutions and Events (71111.14)

a. Inspection Scope

The inspectors reviewed the operator performance during the February 22, 2006, unanticipated Unit 1 turbine trip and subsequent reactor scram due to a turbine/generator load reject. The load reject was caused by the actuation of the Unit 1 main power transformer "B" phase differential overcurrent relay. The inspectors verified that the operators entered the appropriate procedures and determined that the reactor scram was initiated and addressed without complications. The inspectors also conducted interviews and reviewed operator logs, plant computer data, and various strip charts to determine that the operators and equipment responded appropriately during the non-routine evolution. In addition, the inspectors verified that the reactor was operated and maintained in a safe shutdown condition following the event.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

For the operability evaluations listed below, the inspectors evaluated the technical adequacy of the evaluations by comparing the results to information contained in Technical Specifications and/or the Updated Final Safety Analysis Report to ensure that operability was properly justified and that the subject component or system remained available to perform its intended function.

- Issue Report 444345 - Control Rod Drive 42-47 Notched to 46 and Was Not Able to be Withdrawn
- Operability Evaluation 244267-02, Revision 3 - 1 A Diesel Fire Pump Unable to Supply All Fire Suppression Systems in Plant if 1 B Fire Pump Out of Service
- Issue Report 438650 - Unit 1 B Core Spray Pump Breaker Tripped Immediately When Starting
- Issue Report 463220 - Component Issues Identified During 4 Hour Load Test - 1 250 Volt direct current Battery Charger
- Operability Evaluation 337433-02, Revision 0 - Reactor Vessel Level Narrow and Wide Range Instrumentation

In addition, the inspectors reviewed any compensatory measures implemented to verify that the measures worked as stated and that the measures were adequately controlled. The inspectors also reviewed a sampling of issue reports to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. This inspection represented the completion of five samples.

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b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17)

a. Inspection Scope

During the inspection period, the inspectors reviewed the following permanent plant modification:

- Engineering Change 358944; "Unit 2 Electromatic Relief Valve Guide Post Beveled Washer Modification," Revisions 0, 1, and 2 (Engineering Change 358947; Revisions 0 and 1, is the equivalent change for Unit 1)

The inspectors reviewed the design adequacy of the modifications by verifying one or more of the following:

- Energy requirements were able to be supplied by supporting systems under accident and event conditions
- Replacement components were compatible with physical interfaces
- Replacement component properties met functional requirements under event and accident conditions
- Replacement components were environmentally and seismically qualified
- Sequence changes remained bounded by the accident analyses and loading on support systems was acceptable
- Structures, systems, and components response times were sufficient to serve accident and event functional requirements assumed by the design analyses
- Control signals were appropriate under accident and event conditions
- Affected operations procedures were revised and training needs were evaluated in accordance with station administrative procedures

The inspectors verified that the post modification testing demonstrated system operability by verifying no unintended system interactions occurred, system performance characteristics met the design basis, and post-modification testing results met all acceptance criteria. The inspectors also reviewed issue reports related to permanent plant modifications to ensure that the licensee was entering issues into its corrective action program at an appropriate threshold. The review represented the completion of one inspection sample.

b. Findings

No findings of significance were identified

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the five post-maintenance tests listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the licensee's test procedure to verify that the procedure adequately tested the safety function(s) that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed the test data, to verify that test results adequately demonstrated restoration of the affected safety function(s).

- Work Order 850917-01 - 1 Diesel Generator Tach and Speed Sensing Switches
- Work Request 200332 - 1 B Fire Diesel Loss of Coolant/Overheating
- Work Order 777072 - Replace 1 A Diesel Fire Pump and Issue Report 450390 - High Vibration Amplitudes on Right Angle Drive
- Work Order 845414 - Repack Reactor Water Cleanup Valve 1-1201-5
- Work Order 590322 - 1D Residual Heat Removal Service Water Pump Motor Inspection

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities (71111.20)

.1 Maintenance Outage and Forced Outage Activities

a. Inspection Scope

As discussed in the Summary of Plant Status Section of this report the licensee conducted three maintenance outages to address ERV actuator degradation concerns. The outages began on January 6 (Unit 1), January 13 (Unit 2), and January 15 (Unit 1). An additional outage occurred on February 22 following a Unit 1 reactor scram. During the outages, the inspectors performed the following activities daily:

- Attended control room operator and/or outage management turnover meetings to verify that the current shutdown risk status was well understood and communicated
- Performed walkdowns of the main control room to observe the alignment of systems important to shutdown risk
- Reviewed selected issues that the licensee entered into its corrective action program to verify that identified problems were being entered into the program with the appropriate characterization and significance

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Additionally, the inspectors observed the following specific activities, as appropriate:

- Shutdown and cooldown activities
- Troubleshooting efforts associated with equipment other than the ERVs
- Reactor startup and power ascension

Issue Report 461761 was initiated as a result of this inspection. These inspections represented the completion of four outage inspection samples.

b. Findings

No findings of significance were identified.

.2 Unit 2 Refueling Outage

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan (offsite power) and contingency plans for the Unit 2 refueling outage, which began on March 24, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below.

- Licensee configuration management, including maintenance of defense-in-depth commensurate with the offsite power for key safety functions and compliance with the applicable Technical Specification when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and an accounting for instrument error
- Controls over the status and configuration of electrical systems to ensure that Technical Specification and outage safety plan requirements were met, and controls over switchyard activities
- Monitoring of decay heat removal processes
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss
- Controls over activities that could affect reactivity
- Maintenance of secondary containment as required by Technical Specification
- Refueling activities, including fuel handling and sipping to detect fuel assembly leakage
- Licensee identification and resolution of problems related to refueling outage activities

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This inspection was not counted as a completed inspection sample since the outage was ongoing at the conclusion of the inspection period.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors witnessed eight surveillance tests and/or reviewed test data of selected risk-significant structures, systems, and components listed below, to assess, as appropriate, whether the structures, systems, and components met the requirements of the Technical Specification; the Updated Final Safety Analysis Report; and American Society of Mechanical Engineers Section XI. The inspectors also determined whether the testing effectively demonstrated that the structures, systems, and components were operationally ready and capable of performing their intended safety functions.

- QCIS 1300-03 - Reactor Core Isolation Cooling Steam Line High Flow Calibration and Functional Test
- QCOS 1400-01 - Quarterly Core Spray System Flow Rate Test (Unit 1 "B")
- MA-QC-IM-1-13101 - Unit 1 Reactor Core Isolation Cooling Low Reactor Pressure Isolation Calibration and Functional Test
- QCOS 2300-06 - High Pressure Coolant Injection System Power Operated Valve Test
- QCOS 2300-10 - High Pressure Coolant Injection Pump Discharge Flow Switch Calibration and Functional Test
- QCOS 2300-11 - Contaminated Condensate Storage Tank/Torus Level Switch Functional Test
- QCOS 2300-12 - High Pressure Coolant Injection Motor Operated Local Controller Test
- QCOS 2300-15 - High Pressure Coolant Injection Drain Pot Level Switch, Drain Valve, Gland Seal Condenser High Level Alarm, and Steam Line Drain Functional Verification

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

Resident inspectors evaluated the conduct of a routine licensee emergency drill on February 21, 2006, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulated control room to verify that event classification and notifications were done in accordance with procedures. The inspectors also attended the licensee critique of the drill to compare any inspector-observed weakness with those identified by the licensee in order to verify whether the licensee was properly identifying failures.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope

Cornerstone: Initiating Events

The inspectors sampled the licensee's records associated with the three initiating events performance indicators listed below. The inspectors used definitions and guidance contained in Revision 3 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," to verify the accuracy of the performance indicator data reported to the NRC. Specifically, the inspectors reviewed licensee records associated with performance indicator data reported for the period of January 2004 through December 2005. Reviewed records included: licensee event reports, operating logs, NRC inspection reports, and issue reports. The following six performance indicators were reviewed:

- Unit 1 and Unit 2 Unplanned Scrams per 7000 Critical Hours
- Unit 1 and Unit 2 Scrams with Loss of Normal Heat Removal
- Unit 1 and Unit 2 Unplanned Transients per 7000 Critical Hours

b. Findings

No findings of significance were identified.

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4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for followup, the inspectors performed screening of all items entered into the licensee' corrective action program. This was accomplished by reviewing the description of each new issue report and attending daily management review committee meetings.

4OA3 Event Followup (71153)

.1 (Closed) Licensee Event Report 05000254/05-006; 05000265/05-006: Failure of the Control Room Emergency Ventilation Air Conditioning Compressor Due to a Manufacturing Defect in an Electrical Relay. On November 30, 2005, the "B" Control Room Emergency Ventilation Air Conditioning compressor failed during monthly testing. The licensee determined that the compressor failed due to an electrical relay in the unloading circuit failing to de-energize once a compressor low suction pressure condition was reached. In response to this event, the licensee sent the failed relay off for further analysis, replaced the failed relay, and completed repairs to the compressor. Subsequent analysis showed that the relay failed to de-energize due to a manufacturing defect. This licensee event report was reviewed by the inspectors and no findings of significance or violations were identified. This issue was previously documented in Inspection Report 05000254/2005006; 05000265/2005006.

.2 (Closed) Licensee Event Report 05000254/05-002; 05000265/05-002: Main Steam Relief Valve Actuator Degradation. This licensee event report was submitted to describe degradation of the ERV actuators which resulted in multiple shutdowns between December 30, 2005, and January 19, 2006. As discussed in previous sections of this report, the NRC also performed a special inspection of the ERV actuator issues. The results of this inspection were documented in Inspection Report 05000254/2006009; 05000265/2006009. The results included the initiation of an unresolved item to address any potential performance deficiencies and findings that were identified following the completion of the licensee's root cause efforts. The inspectors reviewed the event report and determined that no new information was provided. As a result, the inspectors closed this event report to Unresolved Item 05000254/2006009-01; 05000265/2006009-01.

4OA5 Other Activities

.1 (Closed) Unresolved Item 05000265/2005006-02: Adequacy of Risk Assessment Associated with Unit 2 Electromatic Relief Valves. On January 26, 2006, the inspectors were provided with the licensee's analysis of the discrepancies identified between the licensee's risk assessment tool and anticipated transient without scram analysis of record. The licensee's analysis concluded that although the anticipated transient without scram analysis of record required 13 valves to function during an anticipated

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transient without scram event, it was appropriate that the risk assessment tool only required 12 of 13 valves to function following an anticipated transient without scram for the following reasons:

- The licensing calculation which required the 13 valves was overly conservative
- The peak vessel pressure experienced during anticipated transient without scram conditions with only 12 of 13 valves operating increased by only 17 psig
- There was approximately 25 psig of conservatism added to the computer codes used to calculate the peak vessel pressure during an anticipated transient without scram event
- The computer codes used to calculate the peak vessel pressure following an anticipated transient without scram event utilized the reaction time for power operated relief valves rather than ERVs. This resulted in a higher peak vessel pressure since the power operated relief valves operated slower than the ERVs

The inspectors reviewed the licensee's analysis and discussed the results with a regional senior reactor analyst and maintenance rule risk assessment individuals. Through these discussions the inspectors concluded that the licensee's initial ERV risk assessment completed on December 21, 2005, was acceptable.

- .2 (Closed) Unresolved Item 05000254/2005006-03; 05000265/2005006-03: Potential Inoperability of Multiple Electromatic Relief Valves. On January 9, 2006, the NRC initiated a Special Inspection to evaluate the licensee's effectiveness in identifying and correcting the deficiencies which led to the degradation of multiple ERV actuators. As part of this inspection, the Special Inspection Team was tasked with determining the number of ERVs which would have been unable to perform their safety function. At the conclusion of the Special Inspection, the licensee had not completed the analysis needed to determine the number of ERVs that were non-functional. As a result, the Special Inspection Team initiated Unresolved Item 05000254/2006009-01; 05000265/2006009-01 to evaluate the adequacy of the licensee's analysis upon completion. This unresolved item is being closed since the subject of the item will be captured by the item identified during the Special Inspection.
- .3 (Closed) Unresolved Item 05000254/2005003-02; 05000265/2005003-02: Battery Room Ventilation System Heater Currents. The inspectors obtained the minimum licensing and design temperatures for the battery rooms, battery electrolyte, the turbine building and outside air temperatures. Using this information, the inspectors completed a simple calculation (similar to one performed previously by the licensee) and concluded that the battery room ventilation system would remain operable and support continued battery operability during worst case outside air temperature conditions. The results of this calculation were then used to conclude that the licensee's initial maintenance rule (a)(1) classification made in October 2004 was appropriate.

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.4 Implementation of Temporary Instruction 2515/165 - Operational Readiness of Offsite Power and Impact on Plant Risk

a. Inspection Scope

The objective of Temporary Instruction 2515/165, "Operational Readiness of Offsite Power and Impact on Plant Risk," was to confirm, through inspections and interviews, the operational readiness of offsite power systems in accordance with NRC requirements. On March 20 through 23, 2006, the inspectors reviewed licensee procedures and discussed the attributes identified in Temporary Instruction 2515/165 with licensee personnel. In accordance with the requirements of Temporary Instruction 2515/165, the inspectors evaluated the licensee's operating procedures used to assure the functionality/operability of the offsite power system, as well as, the risk assessment, emergent work, and/or grid reliability procedures used to assess the operability and readiness of the offsite power system.

The information gathered while completing this temporary instruction was forwarded to the Office of Nuclear Reactor Regulation for further review and evaluation.

b. Findings

No findings of significance were identified.

4OA6 Meetings

.1 Exit Meeting

The inspectors presented the inspection results to Mr. T. Tulon and other members of licensee management at the conclusion of the inspection on April 4, 2006. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Interim Exit Meetings

Interim exits were conducted for:

- Inservice inspection (Inspection Procedure 71111.08) with Mr. T. Tulon on March 23, 2006.

ATTACHMENT: SUPPLEMENTAL INFORMATION

**SUPPLEMENTAL INFORMATION
KEY POINTS OF CONTACT**

Licensee personnel

T. Tulon, Site Vice President
R. Gideon, Plant Manager
R. Armitage, Training Manager
D. Barker, Work Control Manager
W. Beck, Regulatory Assurance Manager
D. Craddick, Maintenance Manager
D. Moore, Nuclear Oversight Manager
K. Moser, Deputy Engineering Manager
V. Neels, Chemistry/Environ/Radwaste Manager
K. Ohr, Radiation Protection Manager
M. Perito, Operations Manager

Nuclear Regulatory Commission personnel

M. Ring, Chief, Reactor Projects Branch 1
M. Banerjee, NRR Project Manager

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

05000254/05-006 05000265/05-006	LER	Failure of the Control Room Emergency Ventilation Air Conditioning Compressor Due to a Manufacturing Defect in an Electrical Relay (Section 4OA3.1)
05000254/05-002 05000265/05-002	LER	Main Steam Relief Valve Actuator Degradation (Section 4OA3.2)
05000265/2005006-02	URI	Adequacy of Risk Assessment Associated with Unit 2 Electromatic Relief Valves (Section 4OA5.1)
05000254/2005006-03 05000265/2005006-03	URI	Potential Inoperability of Multiple Electromatic Relief Valves (Section 4OA5.2)
05000254/2005003-02 05000265/2005003-02	URI	Battery Room Ventilation System Heater Currents (Section 4OA5.3)
2515/165	TI	Operational Readiness of Offsite Power and Impact on Plant Risk (Section 4OA5.4)

Attachment

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of 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.

Section 1R04: Equipment Alignment

QOM 1-6600-01; U1 Diesel Generator Valve Checklist; Revision 20
QOM 2-1000-04; U2 Diesel Generator Valve Checklist; Revision 18
QOM 1-4100-02; Unit 1 Fire Protection Valve Checklist (Crib House and Misc.); Revision 10
QCOP 4100-01; Firewater System Lineup for Standby Operation; Revision 3
QCOP 4100-03; Diesel Fire Pump Operation; Revision 13
QCOS 4100-04; Quarterly Fire Pump Suppression Valve Position Inspection; Revision 18
QCOS 4100-17; Fire Protection System Outage Report; Revision 9
Drawing - 27; Diagram of Fire Protection Piping; Sheets 1 and 2
WO 878368; Degraded Fire Header Pressure; dated December 28, 2005
Operability Evaluation 244267-02; 1A Diesel Fire Pump; dated December 9, 2005
Issue Report 244267; 1A Diesel Fire Pump; dated August 13, 2004
Issue Report 289649; 1B Fire Diesel Strainer Assembly Detached from Pump; dated January 11, 2005
Issue Report 300407; Unexpected Trouble Received During QCOS 4100-21; dated February 11, 2005
Issue Report 333466; Valve Improperly Labeled; dated May 10, 2005
Issue Report 436794; Degraded Fire Header Pressure; dated December 26, 2005
Issue Report 437152; Out of Tolerance Pressure Switch 0-4141-3; dated December 28, 2005
QOM 1-1300-02; U1 RCIC Valve Checklist (RCIC Room); Revision 5

Section 1R05: Fire Protection

Fire Hazards Analysis for Quad Cities Unit 1 and 2
Pre-Fire Plans
Fire Drill Scenario; 1st Quarter 2006; dated February 21, 2006

Section 1R07: Heat Sink

Work Order 778008; RHR Service Water Bay Inspection; dated June 21, 2005
Work Order 825509; RHRSW Bay Semi-Annual Inspection; dated March 14, 2005
QCMPM 4400-11; RHR Service Water Intake Bay Inspection; Revision 7

Section 1R08: Inservice Inspection Activities

AR00469617, Deficiency Identified During Q2R17 Not Resolved, March 22, 2006
AR00201618, ISI Support # 3953-334 Recordable Indication, February 12, 2004
AR00205846, 90-Day Post Outage ISI Letter for Q1R17, March 3, 2004

GE-PDI-UT-1, PDI Generic Procedure for the Ultrasonic Examination of Ferritic Pipe Welds, March 2006
MT-EXLN-100V4, Procedure for Magnetic Particle Examination (Dry Particle, Color Contrast or Wet Particle, Fluorescent), March 2005
PT-EXLN-104V0, Procedure for Liquid Penetrant Examination Color Contrast (Visible) Solvent Removable, March 2005

Section 1R12: Maintenance Effectiveness

Maintenance Rule Expert Panel Scoping Determination Document
Maintenance Rule Performance Criteria Document
Maintenance Rule Evaluation History for the Process Radiation Monitoring Function; dated February 16, 2006
Issue Report 334872; 2A Refuel Floor Rad Monitor Spurious Upscale Spike; dated May 13, 2005
Issue Report 350322; 2A Refuel Floor Rad Monitor Upscale Failure; dated July 5, 2005
Issue Report 357741; 2B Refuel Floor Radiation Monitor As Found Out of Tolerance in Excess of Technical Specification Allowed Value; dated July 28, 2005
Maintenance Rule Evaluation History for the Residual Heat Removal System; dated January 1, 2006
Issue Report 340903; Failed IST Relief Valve 1-1001-125A; dated June 3, 2005
Issue Report 346864; 2A RHR Service Water Booster Pump Seal Leak During Pump Run; dated June 23, 2005
Issue Report 379171; Removed 2-1001-166A - Failed Relief Valve Test; dated September 28, 2005
Maintenance Rule Evaluation History for Maintenance Rule System Z0300 from January 2005 through March 2006, dated March 9, 2006
Maintenance Rule Performance Criteria for System Z0300, Functions 01, 02, 05, & 08, dated March 9, 2006
System Quarterly Report Control Rod Drive & HCU, dated January 6, 2006
Semi-Annual Overview Report Control Rod Drive & HCU, dated December 2005
Maintenance Rule Evaluation History for Maintenance Rule System Z3900 from January 2005 through March 2006; dated March 9, 2006
Maintenance Rule Performance Criteria for System Z3900, Functions 01, & 04; dated March 9, 2006
System Health Report Service Water, dated February 20, 2006
System Health Overview Report Service Water, dated December 2005
Issue Report 331172, U2 CRD Select Relay Hung Up, May 2, 2005
Issue Report 428063, Q2R18 CRD TMOD Request, dated November 28, 2005
Issue Report 450809, Mechanical Means Used to Isolate CRD HCU, dated February 7, 2006
Issue Report 375100, Cathodic Protection Test of Buried 54" Service Water Header, dated September 19, 2005
Issue Report 390069, AOV has High Friction, TCV 1-3903, dated October 25, 2005
Issue Report 437918, HPCI SW Strainer High DP, dated December 31, 2005

Section 1R13: Maintenance Risk and Emergent Work Evaluation

Work Week Safety Profiles
Daily Production Schedules
Maintenance Rule Guideline Book; dated February 2004
Work Order 891053; 1 EDG Monthly Load Test; dated March 13, 2006
QCOS 6600-43; Unit 1 Diesel Generator Load Test; Revision 23

Section 1R14: Operator Performance During Non-Routine Evolutions and Events

QGA 100; RPV Control; Revision 7
QCGP 2-3; Reactor Scram; Revision 56
QCOS 0201-02; Primary System Boundary Thermal Limitations; Revision 23
QCOA 6000-03; Low Switchyard Voltage; Revision 2
Technical Specifications
Updated Final Safety Analysis Report
Issue Report 456929; Unit 1 Reactor Scram on Load Reject; dated February 22, 2006

Section 1R15: Operability Evaluations

QCAP 1500-01; Administrative Requirements for Fire Protection, Temporary Change dated August 9, 2004
QCOA 4100-17; Fire Protection Outage Report
Issue Report 438650 - Unit 1 "B" Core Spray Pump Breaker Tripped Immediately When Starting; dated January 4, 2006
Issue Report 463220 - Component Issues Identified During 4 Hour Load Test - 1 250 Volt Direct Current Battery Charger; dated March 7, 2006
General Electric Boiling Water Reactor Operations Training Services Manual on Vessel Instrumentation;
General Electric Services Information Letter Number 470; Reactor Water Level Mismatches; Supplements 0, 1, and 2
Information Notice 92-54; Level Instrumentation Inaccuracies Caused by Rapid Depressurization; dated July 24, 1992
Generic Letter 84-23; Reactor Vessel Water Level Instrumentation in BWRs; dated October 26, 1984
Generic Letter 92-04; Resolution of the Issues Related to Reactor Vessel Water level Instrumentation in Boiling Water Reactors Pursuant to 10 CFR 50.54(F); dated August 19, 1992

Section 1R17: Permanent Modifications

CC-AA-103; Configuration Change Control; Revision 10
CC-MW-103-1001; Configuration Change Control Guidance; Revision 5
Issue Report 453425; Resolution of NRC Comments on ERV Washer Modifications; dated February 13, 2006
Engineering Change 358944; Unit 2 Electromatic Relief Valve Guide Post Beveled Washer Modification; Revisions 0,1, and 2

Engineering Change 358947; Unit 1 Electromatic Relief Valve Guide post Beveled Washer Modification; Revisions 0 and 1

Section 1R19: Post Maintenance Testing

Work Order 00850917-01; 1 / 2 Diesel Generator Tach and Speed Sensing Switches Engineering Change 359747; Evaluate Extended Backseat Torque and Waiver of VOTES Test Requirements for Repack of Valve 1-1201-5; dated March 2, 2006
QOP 0040-01; Manual Operation of Limitorque Valves; Revision 16
QCEM 0400-01; 4kV Horizontal Frame AC Motor and Generator Inspections; Revision 12
Piping and Instrumentation Drawing - 22, Sheet 3; Diagram of Service Water Piping Diesel Generator Cooling Water

Section 1R22: Surveillance Testing

QCOS 2300-06; HPCI System Power Operated Valve Test; Revision 29
QCOS 2300-10; HPCI Pump Discharge Flow Switch Calibration and Functional Test; Revision 6
QCOS 2300-11; CCST/Torus Level Switch Functional Test; Revision 24
QCOS 2300-12; HPCI Motor Operated Local Controller Test; Revision 13
QCOS 2300-15; HPCI Drain Pot Level Switch, Drain Valve, Gland Seal Condenser High Level Alarm, and Steam Line Drain Functional Verification; Revision 20
QCOS 1400-01 - Quarterly Core Spray System Flow Rate Test (Unit 1 "B"); Revision 29

Section 4OA3: Event Followup

Vibration and Sound Measurement Report; Analysis of Vibration and Sound Measurements on Exelon/ABB Cordoba Transformers; dated July 2005
Issue Report 456929; Unit 1 Reactor Scram on Load Reject; dated February 22, 2006
Common Cause Analysis 331669; Review Overall Performance Issues of T1 Since Installation; dated June 9, 2005

Section 4OA5: Other Activities

Root Cause Report 429604; Failure of Quad Cities Station's "B" Control Room Emergency Ventilation System Due to a Mechanical Failure of an Electrical Relay; dated January 11, 2006
Exelon PowerLabs Project Number QDC-83029; Failure Analysis of Cutler Hammer Relay AR880AR Relay; dated December 27, 2005
LS-AA-105, Operability determinations, Revision 1
OP-AA-108-107, Switchyard Control, Revision 2
OP-AA-108-107-1001, Station Response to Grid Capacity Conditions, Revision 1
OP-AA-108-107-1002, Interface Agreement between Exelon Energy Delivery and Exelon Generation for Switchyard Operations, Revision 2
QCOA 6000-02, Main Generator Abnormal Operation, Revision 6
QCOA 6000-03, Low Switchyard Voltage, Revision 2
QCOA 6100-03, Loss of Offsite Power, Revision 19
QCOA 6100-04, Station Blackout, Revision 10

WC-AA-101, On-Line Work Control Process, Revision 11
WC-AA-8000, Interface Procedure between Exelon Energy Delivery (ComEd/PECO) and Exelon Generation (Nuclear/Power) for Construction and Maintenance Activities, Revision 0
WC-AA-8003, Interface Procedure between Exelon Energy Delivery (ComEd/PECO) and Exelon Generation (Nuclear/Power) for Design Engineering and Transmission Planning, Revision 0

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DRS	Division of Reactor Safety
ERV	Electromatic Relief Valve
LER	Licensee Event Report
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
SDP	Significance Determination Process
URI	Unresolved Item