October 29, 2004

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 05000254/2004009;
05000265/2004009

Dear Mr. Crane:

On September 30, 2004, 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 September 30, 2004, 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, the inspectors identified four findings of very low safety significance (Green). These four findings were determined to involve violations of NRC requirements. However, because these violations were of very low safety significance and were entered into your corrective program, the NRC is treating these findings as Non-Cited Violations in accordance with Section V1.A.1 of the NRC's Enforcement Policy.

If you contest the subject or severity of a Non-Cited Violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulation Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Quad Cities Nuclear Power Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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 05000254/2004009; 05000265/2004009
w/Attachment: Supplemental Information

cc w/encl: Site Vice President - Quad Cities Nuclear Power Station
Plant Manager - Quad Cities Nuclear Power Station
Regulatory Assurance Manager - Quad Cities Nuclear Power Station
Chief Operating Officer
Senior Vice President - Nuclear Services
Senior Vice President - Mid-West Regional
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Vice President - Mid-West Operations Support
Vice President - Licensing and Regulatory Affairs
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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:	05000254/2004009; 05000265/2004009
Licensee:	Exelon Nuclear
Facility:	Quad Cities Nuclear Power Station, Units 1 and 2
Location:	22710 206th Avenue North Cordova, IL 61242
Dates:	July 1 through September 30, 2004
Inspectors:	K. Stoedter, Senior Resident Inspector M. Kurth, Resident Inspector C. Acosta, Nuclear Engineering Professional J. House, Senior Radiation Specialist P. Lougheed, Senior Engineering Inspector J. Neurauter, Engineering Inspector G. Wilson, Senior Resident Inspector - Duane Arnold R. Ganser, Illinois Emergency Management Agency
Approved by:	M. Ring, Chief Branch 1 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000254/2004009, 05000265/2004009; 07/01/2004-09/30/2004; Quad Cities Nuclear Power Station, Units 1 & 2; Problem Identification and Resolution, Event Followup, and Other Activities.

This report covers a 3-month period of baseline resident inspection, regional radiation protection inspections, and an announced generic issues inspection on Temporary Instruction 2515/159, "Review of Generic Letter 89-13; Service Water System Problems Affecting Safety Related Equipment." The inspection was conducted by Region III inspectors and the resident inspectors. Four Green findings associated with four Non-Cited Violations 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. Inspector-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

Green. A finding of very low safety significance was identified when the setpoint for two of the Unit 2 main steam line high flow switches were found to be higher than allowed by Technical Specification 3.3.6.1 in July 2003. As corrective actions, the licensee recalibrated the switches and performed a root cause analysis.

This finding was more than minor because if left uncorrected the switches could have continued to drift to a level above the analytical limit. Had this occurred, the licensee would have been operating in a condition not previously reviewed by the NRC. This finding was determined to be of very low safety significance since the out of tolerance switches did not result in a loss of safety function for the containment isolation system. However, this finding was a Non-Cited Violation of Technical Specification 3.3.6.1 as the out of tolerance switches resulted in the failure to ensure that two trip systems per channel per steam line were operable during Mode 1 operations. (Section 4OA2.2)

Green. The inspectors identified a finding of very low safety significance due to the failure to adequately correct a July 2003 main steam line high flow switch out of tolerance condition. The failure to correct this condition resulted in a July 2004 out of tolerance event on the Unit 1 main steam line high flow switches. Corrective actions included placing the switches on an increased calibration frequency, performing additional drift analysis procedures, and plans to replace the current switches with differential pressure transmitters during upcoming refueling outages.

This finding was considered to be more than minor because if left uncorrected the condition could have led to the setpoint for multiple main steam line high flow switches

drifting above the analytical limit. This finding was determined to be of very low safety significance since the out of tolerance switches did not result in a loss of safety function for the containment isolation system. A Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XVI, was identified due to the licensee's failure to adequately address the cause of the July 2003 out of tolerance event. In addition, the corrective actions taken following the July 2003 event failed to preclude a repeat event in July 2004. (Section 4OA2.2)

Green. The inspectors identified a finding of very low safety significance involving a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action." As of September 17, 2004, the licensee had failed to promptly identify and correct the adverse effects of corrosive water on residual heat removal service water (RHRSW) valves. Specifically, in August 2002, an operating experience report from the Dresden Station described the failure of three RHRSW supply valves due to stem to disk separation because of corrosion. On December 7, 2002, Work Request 76586 was written to repair a potential disk to stem separation in safety-related 1A RHRSW supply to Train B control room heating, ventilation and air conditioning Valve 1-5799-385. However, as of September 17, 2004, the work request had not yet been completed, and the licensee had not examined any other RHRSW valves for corrosion. The licensee entered this issue into its corrective action program. Valve 1-5799-385 was partially repaired and labeled as "emergency use only" on October 6, 2004.

This issue was more than minor because it involved the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The issue was of very low safety significance since the degraded valve did not result in an loss of safety function for either the residual heat removal service water or the control room emergency ventilation system. (Section 4OA5.1b.1)

Cornerstone: Barrier Integrity

Green. A finding of very low safety significance was self-revealed in January 2004 when the Unit 2 drywell radiation monitor failed downscale due to an un-soldered wire connection. The finding was considered a violation of regulatory requirements due to having a channel check procedure which failed to provide appropriate acceptance criteria to determine whether the radiation monitors remained operable. Corrective actions included validating that additional drywell radiation monitors had soldered wire connections where needed, training personnel to verify the proper operation of the drywell radiation monitors, and revising the appropriate procedures with appropriate quantitative and qualitative acceptance criteria.

This finding was more than minor because it was associated with the containment procedure attribute of the barrier integrity cornerstone and impacted the objective of providing reasonable assurance that the physical design barriers protect the public from radionuclide releases caused by accidents and events. The finding was of very low safety significance because it did not contribute to: (1) a degradation of the radiological

barrier function provided for the control room, the auxiliary building, the spent fuel pool, or the standby gas treatment system; (2) a degradation of the barrier function of the control room against smoke or a toxic atmosphere; or (3) an actual open pathway in the physical integrity of reactor containment. The finding was determined to be a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V due to the failure to have a channel check procedure which contained appropriate acceptance criteria. (Section 4OA3)

B. Licensee-Identified Violations

Violations of very low safety significance, which were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near 85 percent power with the exception of six small power reductions requested by the load dispatcher on August 1, 29, and 30 and September 6, 18, and 28. An additional power reduction was performed on September 19 to complete a control rod pattern adjustment, control rod timing, and control rod scram time testing.

Unit 2 began the inspection period operating at or near 85 percent power. On August 11 operations personnel increased reactor power to approximately 98 percent to obtain additional extended power uprate related data. Unit 2 returned to 85 percent power later the same day. Four small power reductions were performed on August 1, 29, and 30 and September 7 as requested by the load dispatcher. Unit 2 operated at approximately 85 percent power for the remainder of the inspection period.

1. REACTOR SAFETY

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

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

The inspectors performed a partial walkdown of the following risk-significant mitigating systems equipment during times when the equipment was of increased importance due to redundant systems or other equipment being unavailable:

- Unit 2 Emergency Diesel Generator Air Start System B.

The inspectors utilized the valve and breaker checklists listed at the end of this report to verify that the components were properly positioned and that support systems were lined up as needed. The inspectors examined the material condition of the components and observed equipment operating parameters to verify that there were no obvious deficiencies. The inspectors reviewed outstanding work orders and issue reports associated with each system to verify that those documents did not reveal issues that could affect the equipment inspected. The inspectors also used the information in the appropriate sections of the Updated Final Safety Analysis Report to determine the functional requirements of the systems.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

a. Inspection Scope

The inspectors performed routine walkdowns of accessible portions of the following risk significance fire zones:

- Fire Zone 3.0 - Cable Spreading Room;
- Fire Zone 11.1.3 - Unit 1 High Pressure Coolant Injection Room;
- Fire Zone 11.2.1 - Unit 1 Core Spray Pump Room B;
- Fire Zone 11.2.2 - Unit 1 Residual Heat Removal Room B;
- Fire Zone 11.2.3 - Unit 1 Core Spray Pump Room A; and
- Fire Zone 11.2.4 - Unit 1 Residual Heat Removal Room A.

The inspectors verified that transient combustibles were controlled in accordance with the licensee's procedures. During a walkdown of each fire zone, the inspectors observed the physical condition of fire suppression devices and passive fire protection equipment such as fire doors, barriers, penetration seals, and coatings. The inspectors also observed the condition and placement of fire extinguishers and hoses against the Pre-Fire Plan fire zone maps.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification (71111.11Q)

a. Inspection Scope

On July 19, 2004, the inspectors observed an operation's crew during requalification training in the simulator. The training scenario consisted of a local power range monitor failure, a large steam line break, and flooding of the reactor pressure vessel.

The inspectors evaluated the crew's 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; and
- 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,” Revision 0;
- OP-AA-103-102, “Watchstanding Practices,” Revision 1;
- OP-AA-103-104, “Reactivity Management Controls,” Revision 1; and
- OP-AA-104-101, “Communications,” Revision 0.

The inspectors verified that the crew 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 and entered into the corrective action program. The inspectors verified that the evaluators effectively identified when crew or individual remediation was required 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 crew.

b. Findings

No findings of significance were identified.

1R12 Maintenance Implementation (71111.12)

a. Inspection Scope

The inspectors reviewed the licensee’s handling of performance issues and the associated implementation of the maintenance rule (10 CFR 50.65) to evaluate maintenance effectiveness for the systems listed below:

- Electrohydraulic Control System (Function Z5650); and
- Nuclear Boiler Instrumentation (Function Z0263).

These systems were selected based on them being designated as risk significant under the maintenance rule; being in increased monitoring (maintenance rule category a(1) group); or due to a work practice, reliability, or common cause issue that impacted system performance.

The inspectors assessed system performance and maintenance work practices by reviewing system health reports, issue reports, apparent cause reports, root cause reports, common cause reports, functional failure determinations, and corrective action effectiveness reviews. The validity of system specific maintenance rule performance criteria was evaluated by comparing the performance criteria to probabilistic risk assessment and industry performance information. Lastly, the inspectors reviewed the licensee’s maintenance rule scoping by comparing the scoping information to the design basis.

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 documents listed in the "List of Documents Reviewed" section of this report to determine if the risk associated with the activities listed below agreed with the results provided by the licensee's risk assessment tool or qualitative risk assessment. When needed, the inspectors conducted walkdowns to ensure that redundant mitigating systems and/or barrier integrity equipment credited by the licensee's risk assessment remained available. When compensatory actions or administrative controls were required, the inspectors conducted inspections to validate that the actions or controls were appropriately implemented. The inspectors discussed emergent work activities with the shift manager and work week manager to ensure that these additional activities were considered in conjunction with the previous risk assessment results. Lastly, the inspectors ensured that the licensee was entering risk assessment issues into the corrective action program. The activities inspected included:

- Emergent Work on Condenser Flow Reversing Valve 1-4402C on July 9;
- Work Week August 1-7, including planned maintenance on the 2B drywell continuous air monitor, the Unit 2 drywell pneumatic compressor, and the 2A emergency diesel generator air compressor and receiver;
- Work Week August 16-21, including planned maintenance on the 2A drywell continuous air monitor and the 2A control rod drive pump;
- Work Week August 30-September 5, including planned maintenance on the 1C and 1D residual heat removal service water pumps, the 1B service air compressor, and the ½ B fire diesel pump;
- Planned maintenance on Unit 1 residual heat removal system A conducted on September 15; and
- Work Week September 20-25, including planned maintenance on the 2A residual heat removal service water loop, the Unit 2 station blackout diesel generator, and the 2A standby liquid control system.

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Non-Routine Evolutions (71111.14)

.1 Return of Condenser Flow Reversing Valve 1-4402C to Service Following Maintenance

a. Inspection Scope

On July 9, 2004, the inspectors observed control room activities associated with testing condenser flow reversing valve 1-4402C following corrective maintenance. This activity was chosen as an inspection sample because a malfunction of the valve during testing had the potential to degrade condenser vacuum and cause a reactor scram. The inspectors attended the briefing for this infrequently performed evolution and ensured

that the briefing met the requirements of Procedure HU-AA-1211, "Pre-Job, Heightened Level of Awareness, Infrequent Plant Activity, and Post-Job Briefings." The inspectors discussed the test activity with operations, maintenance, engineering, and work control personnel to verify that all the participants were familiar with their roles. Lastly, the inspectors conducted a control room tour to verify that procedures associated with a low condenser vacuum condition were readily available if needed.

b. Findings

No findings of significance were identified.

.2 Extended Power Uprate Testing and Data Collection

a. Inspection Scope

On August 11, 2004, the licensee briefly increased Unit 2 reactor power from 85 percent (100 percent power level prior to extended power uprate) to 96.3 percent to collect data to support the ongoing flow and vibration analyses. The data collected included various vibration readings on systems and components, pressure and flow readings from various steam and water systems, reactor vessel water level readings, and moisture carryover information. The inspectors observed the operators performance during the power ascension to verify that the proper procedures were used. Power was reduced back to 85 percent later the same day.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors assessed the following operability evaluations or issue reports associated with equipment operability issues:

- Operability Evaluation for Issue Reports 215208 and 221282, Switchyard Voltage Below the Required Minimum Voltage Levels;
- Operability Evaluation for Issue Report 230195, Non-Safety Related Part Installed in Safety Related Application;
- Operability Evaluation for Issue Report 244267, ½ A Diesel Fire Pump Degraded;
- Operability Evaluation for Issue Report 192702, Control Room Ventilation Train B Degraded;
- Operability Evaluation for Issue Report 221285, Reactor Protection System Channel A ½ Scram Reset Function Non-Functional;
- Operability Evaluation for Issue Report 245030, Potential Degradation of 4 kV Merlin Gerin Breakers;

- Operability Evaluation for Issue Report 242150, Potential for Fluid Used in Lisega Snubbers to Degrade; and

A. Operability Evaluation for Issue Report 242173, 1A Core Spray Room Drain Valve Failed Leak Test.

The inspectors reviewed the technical adequacy of the evaluation against the Technical Specifications (TSs), Updated Final Safety Analysis Report, and other design information; determined whether compensatory measures, if needed, were taken; and determined whether the evaluations were consistent with the requirements of LS-AA-105, "Operability Determination Process," Revision 0. The inspectors also reviewed selected issues that the licensee entered into its corrective actions program to verify that identified problems were being entered into the program with the appropriate characterization and significance.

b. Findings

One licensee identified violation regarding Operability Evaluation 230195 was documented in Section 4OA7 of this report.

1R16 Operator Workarounds (71111.16)

a. Inspection Scope

The inspectors assessed the following operator workaround issues to determine the potential effects on the functionality of the corresponding mitigating systems:

- Fire Watch Needed due to ½ A Fire Pump Degradation; and
- Compensatory Measures Required to Defeat Reactor Core Isolation Cooling Suction Valve Swap Logic Due to Seismic Concerns.

During these inspections, the inspectors reviewed the technical adequacy of the workaround documentation against the Updated Final Safety Analysis Report and other design information to assess whether the workaround conflicted with any design basis information. The inspectors also compared the information in abnormal or emergency operating procedures to the workaround information to ensure that the operators maintained the ability to implement important procedures when required. Lastly, the inspectors conducted a review of recent issue reports to ensure that operator workaround-related issues were entered into the corrective action system when required.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the post maintenance testing for the activities listed below:

- Corrective maintenance on condenser flow reversing valve 1-4402C;
- Replacing the unloading chamber manual ball valve on the ½ B emergency diesel generator starting air system;
- Adjusting the stop on the 1A core spray room manual ball drain valve 1-4899-123; and
- Removal of the 2B and 2C residual heat removal service water vault door to support replacement of the 2-1001-3B valve.

For each post maintenance activity selected, the inspectors reviewed the TSs and Updated Final Safety Analysis Report against the maintenance work package to determine the function(s) that may have been affected by the maintenance. Following this review, the inspectors verified that the post maintenance test activity adequately tested the function(s) affected by the maintenance, that acceptance criteria were consistent with licensing and design basis information, and that the procedure was properly reviewed and approved. When possible the inspectors observed the post maintenance testing activity and verified that the structure, system, or component operated as expected; test equipment used was within its required range and accuracy; jumpers and lifted leads were appropriately controlled; test results were accurate, complete, and valid; test equipment was removed after testing; and any problems identified during testing were appropriately documented. The inspectors also reviewed selected issues to verify that identified problems were entered into the corrective action program with the appropriate characterization and significance.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed surveillance testing activities and/or reviewed completed surveillance test packages for the tests listed below:

- QCMMS 4100-33, ½ B-4101 Diesel Fire Driven Pump Annual Capacity Test;
- QCOP 5650-02, Unit 1 Electrohydraulic Control Pressure Regulator Adjustments;
- QCOS 6600-43, ½ Emergency Diesel Generator Load Test; and
- QCOS 1300-05, Quarterly Reactor Core Isolation Cooling Pump Operability Test (Unit 1).

The inspectors verified that the structures, systems, and components tested were capable of performing their intended safety function by comparing the surveillance procedure or calibration acceptance criteria and results to design basis information contained in TSs, the Updated Final Safety Analysis Report, and licensee procedures. The inspectors verified that each test or calibration was performed as written, the data was complete and met the requirements of the procedure, and the test equipment range and accuracy were consistent with the application by observing the performance of the activity. Following test completion, the inspectors conducted walkdowns of the associated areas to verify that test equipment had been removed and that the system or component was returned to its normal standby configuration. In addition, the inspectors 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.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope

The inspectors reviewed documentation for the following temporary configuration changes:

- Temporary Modification 350645; Modification for 1A Core Spray Room Floor Drain Plug; and
- Installation of test equipment on the 2B reactor recirculation motor generator set in accordance with Troubleshooting Plan 732002-01.

The inspectors assessed the acceptability of each temporary configuration change by comparing the 10 CFR 50.59 screening and evaluation information, or maintenance rule (a)(4) assessment information, against the design basis, the Updated Final Safety Analysis Report and the TSs as applicable. The comparisons were performed to ensure that the new configurations remained consistent with design basis information. The inspectors performed field verifications to ensure that the modifications were installed as directed; the modifications operated as expected; 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. The inspectors also reviewed issue reports initiated during or following the temporary modification installation to ensure that problems encountered during the installation were appropriately resolved.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Public Radiation Safety

2PS2 Radioactive Material Processing and Transportation (71122.02)

.1 Radioactive Waste System

a. Inspection Scope

The inspectors reviewed descriptions of the liquid and solid radioactive waste systems in the Updated Final Safety Analysis Report. The 2003 Effluent Release Report was reviewed for information on the types and amounts of radioactive waste generated and disposed of. The scope of the licensee's audit program for the radioactive material processing and transportation programs was reviewed to verify that it met the requirements of 10 CFR 20.1101(c). These reviews represented one sample.

b. Findings

No findings of significance were identified.

.2 Radioactive Waste System Walkdowns

a. Inspection Scope

The inspectors performed walkdowns of the liquid and solid radioactive waste processing systems to verify that the systems agreed with the descriptions in the Updated Final Safety Analysis Report and the Process Control Program, and to assess the material condition and operability of the systems. The status of radioactive waste process equipment that was not operational or was abandoned in place was reviewed along with the licensee's administrative and physical controls in order to ensure that the equipment would not contribute to an unmonitored release path, affect operating systems, or be a source of unnecessary personnel exposure.

The inspectors reviewed changes made to the waste processing system for their impact on radioactive waste system operation and to verify that the changes were evaluated and documented in accordance with 10 CFR 50.59, and to assess the impact of these changes on radiation exposure to members of the public. The inspectors reviewed the current processes for transferring waste resin and sludge discharges into shipping or disposal containers to determine if appropriate waste stream mixing and/or sampling procedures were utilized. This included the methodologies for waste concentration averaging to determine if representative samples of the waste product were provided for the purposes of waste classification specified in 10 CFR 61.55 for waste disposal. These reviews represented one sample.

b. Findings

No findings of significance were identified.

.3 Waste Characterization and Classification

a. Inspection Scope

The inspectors reviewed the licensee's radio-chemical sample analysis results for each of the waste streams, including dry active waste, ion exchange resins, filters, sludge, and activation products. The inspectors also reviewed the licensee's use of scaling factors to quantify difficult-to-measure radionuclides such as pure alpha or beta emitters, and isotopes that decay by electron capture. The reviews were conducted to verify that the licensee's program assured compliance with 10 CFR 61.55 and 10 CFR 61.56, as required by Appendix G of 10 CFR Part 20. The inspectors also reviewed the licensee's waste characterization and classification program to ensure that the waste stream composition data accounted for changing operational parameters and thus remained valid between the annual sample analysis updates. These reviews represented one sample.

b. Findings

No findings of significance were identified.

.4 Shipment Preparation

a. Inspection Scope

The inspectors reviewed shipment packaging and surveying, emergency instructions, disposal manifest, and shipping papers provided to the driver. The inspectors verified that the receiving licensee was authorized to receive the shipment package, that the requirements of the transport cask Certificate of Compliance were met, and that the licensee's procedures for cask loading and closure were consistent with the vendor's current approved procedures.

Radiation worker practices were observed in order to verify that the workers had adequate skills to accomplish each task and to determine if the shippers were knowledgeable of the shipping regulations and whether shipping personnel demonstrated adequate skills to accomplish the package preparation requirements for public transport with respect to NRC Bulletin 79-19 and 49 CFR Part 172 Subpart H. The inspectors reviewed the records of training provided to personnel responsible for the conduct of radioactive waste processing and radioactive shipment preparation activities including shipment packaging, surveying, labeling, marking, placarding, vehicle checks, emergency instructions, disposal manifest, shipping papers provided to the driver, and licensee verification of shipment readiness. The review was conducted to verify that the licensee's training program provided training consistent with NRC and Department of Transportation requirements. These reviews represented one sample.

b. Findings

No findings of significance were identified.

.5 Shipping Records

a. Inspection Scope

The inspectors reviewed five non-excepted package shipment manifests/documents completed in 2004 to verify compliance with NRC and Department of Transportation requirements (i.e., 10 CFR Parts 20 and 71, and 49 CFR Parts 172 and 173). This included required emergency response information and the 24 hour contact telephone number. This review represented one sample.

b. Findings

No findings of significance were identified.

.6 Identification and Resolution of Problems For Radioactive Material Processing and Transportation

a. Inspection Scope

The inspectors reviewed condition reports, an audit and a self-assessment, that covered the period from the last inspection of this area, and addressed deficiencies in the radioactive waste and radioactive materials shipping program. This was done in order to verify that the licensee had effectively implemented the corrective action program and that problems were identified, characterized, prioritized and corrected. The inspectors also verified that the licensee's self-assessment program was capable of identifying and addressing repetitive deficiencies or significant individual deficiencies that had been identified in problem identification and resolution.

The inspectors also reviewed corrective action reports from the radioactive material and shipping programs since the previous inspection, interviewed staff and reviewed documents to determine if the following activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk.

- Initial problem identification, characterization, and tracking;
- Disposition of operability/reportability issues;
- Evaluation of safety significance/risk and priority for resolution;
- Identification of repetitive problems;
- Identification of contributing causes;
- Identification and implementation of effective corrective actions;
- Resolution of Non-Cited Violations tracked in corrective action system(s); and
- Implementation/consideration of risk significant operational experience feedback.

These reviews represented one sample.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Identification and Resolution of Problems

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 that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Minor issues entered into the licensee's corrective action system as a result of the inspectors' observations are included in the list of documents reviewed which are attached to this report.

b. Findings

No findings of significance were identified.

.2 Inadequate Problem Resolution Results in Repeat Equipment Out of Tolerance Issue

a. Inspection Scope

The inspectors reviewed the licensee's problem identification and resolution efforts associated with the issues described in Licensee Event Reports 05000265/2003-005 and 05000254/2004-001.

b. Findings

Introduction: Two Green findings with corresponding Non-Cited Violations were identified. During routine surveillance testing in July 2003, the licensee identified that the setpoint for two main steam line high flow switches exceeded the TS allowable value. This resulted in the licensee's failure to meet TS 3.3.6.1. Although the licensee implemented corrective actions for the July 2003 deficiency, these actions were not adequate to prevent the recurrence of an identical deficiency on Unit 1 in July 2004. The failure to correct the July 2003 deficiency, and the recurrence of the deficiency in July 2004, was determined to be a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions."

Description: During routine surveillance testing of the Unit 2 main steam line high flow switches in July 2003, the licensee identified that the as-found setpoints for the Division II switches on main steam line B exceeded the TS allowable value. Immediate corrective actions consisted of recalibrating the switches in order to restore switch operability. As part of the long-term corrective actions, the licensee performed a root cause analysis which required the following actions:

- Perform a drift analysis for the Unit 1 and Unit 2 main steam line flow switches to evaluate the current allowable value, setpoint, setting tolerance, expanded tolerance, and calibration frequencies. This action was to be completed by November 17, 2003; and
- Replace the Unit 1 and Unit 2 main steam line flow switches with differential pressure transmitters by April 15, 2005 (Unit 1), and May 1, 2006 (Unit 2).

The inspectors determined that the licensee's drift analysis was completed by the assigned due date. The new drift analysis resulted in changing the calibration frequency from 92 days to 60 days. The licensee also revised the setting tolerance and the expanded tolerance for the switches. The inspectors confirmed that the revised tolerances were appropriately incorporated into the corresponding surveillance procedures.

Between November 2003 and May 2004, the licensee conducted surveillance testing on the main steam line high flow switches without incident. During Unit 1 main steam line high flow switch testing in July 2004, the licensee discovered that one out of four switches on main steam lines C and D had as-found setpoints that exceeded the TS allowable value.

Review of Corrective Actions and Operating Experience

Due to the repetitive nature of this issue, the inspectors performed an in-depth review of the licensee's July 2003 corrective actions. The inspectors interviewed design engineering personnel and learned that the licensee's November 2003 drift analysis was completed using less than four calibration cycles of data. However, no additional corrective actions were assigned to reperform the drift analysis when four cycles of data were available. The inspectors also identified deficiencies in the licensee's implementation of the instrument trending program. Procedure ER-AA-520, "Instrument Performance Trending," required that issue reports be generated for any instrument found out of tolerance during testing. Step 4.4.5 of the procedure required system managers to review issue reports associated with their systems and initiate a trending issue report if an instrument had two or more issue reports written against it in the last five calibration periods. Inherent to the procedure was the assumption that all safety-related instruments were calibrated on a 24-month frequency. No guidance was provided on performing trending on instruments calibrated more frequently. The inspectors determined that issue reports were initiated for main steam line high flow switches found out of tolerance. However, the licensee was unaware of an adverse trend with these instruments since the trending was only performed every 24 months. The inspectors determined that if the trending of these switches had been actively performed, the licensee should have identified that at least one of the four switches found out of tolerance had exhibited an adverse trend. The licensee documented their failure to perform trending on these instruments in Issue Report 243272. The adverse trend was documented in Issue Report 242779.

Prior to the extended power uprate, Unit 1 utilized Barton Model 278 switches in the main steam line high flow application while Unit 2 used Barton Model 288A switches. The setting range was 0 to 200 psid for both models. Historical information showed that

the Model 278 switch experienced less drift and had better performance than the Model 288A switches. In fact, the performance of the Model 288A switches was so poor that the licensee changed the switch calibration frequency from every 92 days to every 60 days. This was significantly less than the 24 month calibration frequency allowed by TSs. The inspectors also found that the licensee had planned to replace the Barton switches with Rosemount transmitters in 2002. However, the installation of Rosemount transmitters was deferred due to the overall expense of the project. Since switches with a higher setting range were needed in order to implement the power uprate, the licensee installed Barton Model 288A switches with a 0 to 400 psid range.

The inspectors also found an internal Exelon operating experience document from Dresden Station dated June 23, 2004. Nuclear Event Report DR-04-042 not only documented the poor performance of the 0 to 400 psid Barton Model 288A switches, but also documented the deficiencies in the instrument trending program which resulted in Dresden experiencing five TS out of tolerance events in the last 3 years. The inspectors determined that although Quad Cities was aware of the Dresden operating experience report, no action had been taken to address the report due to the low safety significance assigned to the report by the corporate operating experience manager.

Analysis: The inspectors determined that the failure to ensure that the main steam line high flow switches operated within the boundaries established by TS 3.3.6.1 in July 2003 was a performance deficiency. In addition, this finding was more than minor because if left uncorrected the condition could have led to the setpoint for multiple main steam line high flow switches drifting above the analytical limit.

The July 2004 out of tolerance event was also considered a performance deficiency since it occurred due to the licensee's failure to appropriately resolve the July 2003 out of tolerance event. As stated above, this finding was also considered to be more than minor because if left uncorrected the condition could have led to the setpoint for multiple main steam line high flow switches drifting above the analytical limit.

The inspectors determined that both findings could be evaluated using the Significance Determination Process described in Inspection Manual Chapter 0609 because the findings were associated with the operability, availability, reliability and function of a train of a mitigating system. The inspectors determined both findings screened out of the Phase 1 Significance Determination Process since none of the out of tolerance switches resulted in an actual loss of safety function. Therefore, both findings were considered to be of very low safety significance (Green).

Enforcement: Technical Specification 3.3.6.1 requires that two main steam line high flow channels per trip system per main steam line be operable while operating in Modes 1, 2 and 3. The TS also stated that if one or more required channels became inoperable, the channel must be placed in a tripped condition within 24 hours. Contrary to the above, on July 17, 2003, two of the channels for the Unit 2, Division II, main steam line B trip system were discovered to be inoperable while Unit 2 was operating in Mode 1. Because both switches on the Division II trip system were found inoperable, the licensee assumed that the out of tolerance condition had existed for greater than the allowed outage time of 24 hours. Since the out of tolerance condition was unknown to

the licensee prior to July 17, the licensee was unable to take actions to place the channels in a tripped condition within 24 hours as required by the TSs.

10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, deficiencies, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective actions are taken to preclude repetition. Contrary to the above, as of July 13, 2004, the licensee had failed to promptly correct a July 2003 out of tolerance condition associated with the Unit 2 main steam line high flow switches. In addition, the corrective actions taken following the July 2003 out of tolerance event failed to preclude a repeat event in July 2004.

The inspectors determined that both of these violations were of very low safety significance. In addition, the licensee had entered both violations into their corrective action program as Issue Reports 170142 and 235678. Both violations are being treated as Non-Cited Violations consistent with Section VI.A of the NRC's Enforcement Policy **(NCVs 05000265/2004009-01 and 05000254/2004009-02)**. Corrective actions for these events included placing the switches on an increased calibration frequency, performing additional drift analyses using four calibration intervals of data, implementing a new task to review instrument trending results on a quarterly basis, revising drift analysis procedures to provide direction on updating any drift analyses performed with less than four calibration intervals of data, and replacing the current main steam line high flow switches with differential pressure transmitters during the upcoming refueling outages.

4OA3 Event Followup (71153)

(Closed) Licensee Event Report 05000265/2003-005: Technical Specification Allowable Value Exceeded for Main Steam Line Flow Switches due to Inadequate Drift Allowance used in Setpoint Calculation.

This event was discussed in Section 4OA2.2 of this report. The inspectors determined that this issue was of very low safety significance since the switches would have operated prior to reaching the analytical limit. However, this issue was determined to be a violation of TS 3.3.6.1 since both channels in the Unit 2, Division II, main steam line high flow trip system had as-found setpoints greater than the TS allowed outage time.

(Closed) Licensee Event Report 05000254/2004-001: Technical Specification Allowable Value Exceeded for Main Steam Line Flow Switches due to Inadequate Drift Allowance.

This event was discussed in Section 4OA2.2 of this report. The inspectors determined that this issue was of very low safety significance since the switches would have operated prior to reaching the analytical limit. However, this event was a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," since the corrective actions for Licensee Event Report 05000265/2003-005 failed to prevent the same event from occurring on the Unit 1 main steam line high flow switches.

(Closed) Licensee Event Report 05000265/2004-001: Drywell High Radiation Monitor Failure Due to Unsoldered Wiring Connection.

Introduction: A Green finding was self-revealed when the Unit 2 drywell radiation monitor failed downscale due to an unsoldered wire connection. The finding was considered a violation of regulatory requirements due to the failure to provide appropriate acceptance criteria to determine the continued operability of the drywell radiation monitors.

Description: On January 18, 2004, a licensed operator identified that drywell radiation monitor, 2-2419A, was reading 1 R/hr. This reading was significantly lower than the normal reading of 3 R/hr. The operator informed the unit supervisor and an initial evaluation was made which concluded that the monitor was operable. The unit supervisor based this conclusion on the fact that the monitor's green "Operate" light was illuminated and the monitor's reading was presumed to be on-scale at 1 R/hr.

Quad Cities Station has drywell radiation monitors installed in order to assess dose rates inside the primary containment (drywell). When the dose rates reached a predetermined level, the monitors provide a signal to close multiple containment isolation valves. Operability of the drywell radiation monitors was assured through the implementation of QOS 0005-S01, "Operations Department Weekly Summary of Daily Surveillance," which required periodic checks of monitor operation. In addition, operations personnel were required to perform drywell radiation monitor channel checks every 12 hours to ensure compliance with TS Surveillance Requirement 3.3.6.1.1.

On January 19, 2004, a licensed operator initiated Issue Report 196257 to document the disparity in the 2A drywell radiation monitor readings. A unit supervisor reviewed the issue report and determined that the monitor was operable. This was based on the fact the monitor's green "Operate" light was still illuminated and that the channel check requirement in QOS 0005-S01, which required that the Unit 2 drywell radiation monitors read within 10 R/hr of each other, continued to be met. A collective review by the station ownership committee and the management review committee also failed to identify any radiation monitor deficiencies.

On January 28, 2004, the licensee initiated troubleshooting efforts and identified an internal wire which should have been soldered in place was actually looped around a terminal post on the monitor's chassis. This resulted in causing a loss of input to the monitor. After further review, the licensee determined that the monitor's reading of 1R/hr was actually a downscale reading. In addition, the licensee found that the monitor's "Operate" light was not providing a valid indication of the monitor's condition. Based upon this new information, the licensee determined that the drywell radiation monitor had been inoperable for longer than allowed by TSs. In addition, the licensee identified that revisions to QOS 0005-S01 were needed to ensure that appropriate channel checks were performed in the future. The drywell radiation monitor was subsequently returned to an operable condition when the chassis was replaced with a spare.

Analysis: The inspectors determined that the failure to have a procedure which contained appropriate acceptance criteria for determining the continued operability of the drywell radiation monitors was more than minor because it was associated with the containment procedure attribute of the barrier integrity cornerstone and impacted the objective of providing reasonable assurance that the physical design barriers protect the public from radionuclide releases caused by accidents and events. The inspectors also determined that this finding should be evaluated using the significance determination process because the finding was associated with maintaining the integrity of the reactor containment. The inspectors conducted a Phase 1 screening and determined that the finding was of very low safety significance (Green) because it did not contribute to: (1) the degradation of the radiological barrier function provided for the control room, the auxiliary building, the spent fuel pool, or the standby gas treatment system; (2) the degradation of the barrier function of the control room against smoke or a toxic atmosphere; or (3) an actual open pathway in the physical integrity of reactor containment.

Enforcement: 10 CFR Part 50 , Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that instructions, procedures, or drawings, shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Contrary to the above, as of January 28, 2004, the acceptance criteria contained in QOS 0005-S01 were not appropriate for determining the continued operability of the drywell radiation monitors (an important activity required by TS 3.3.6.1). This violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC's Enforcement Policy **(NCV 05000254/2004009-03: 05000265/2004009-03)**. This violation is in the licensee's corrective action program as Issue Report 198137. Corrective actions for this issue included validating that additional drywell radiation monitors had soldered wire connections where needed, training personnel to verify the proper operation of the drywell radiation monitors, and revising the appropriate procedures with appropriate quantitative or qualitative acceptance criteria.

4OA4 Cross-Cutting Aspects of Findings

.1 A finding described in Section 4OA2.2 of this report had, as its primary cause, a problem identification and resolution deficiency, in that, the licensee failed to implement adequate corrective actions to ensure that a July 2003 deficiency regarding the setpoint for the main steam line flow switches had been addressed and would not recur. As a result, the same deficiency recurred in July 2004.

.2 A finding described in Section 4OA5.1 of this report had, as its primary cause, a problem identification and resolution deficiency, in that, as of September 17, 2004, the licensee had failed to promptly identify and correct the adverse effect of corrosive water on RHRSW valves.

4OA5 Other Activities

.1 Review of Generic Letter (GL) 89-13: Service Water System Problems Affecting Safety-Related Equipment (TI 2515/159)

a. Inspection Scope

On July 29, 2004, as part of a Davis-Besse Lessons-Learned Task Force Recommendation [3.1.2(5)] commitment, the NRC issued a temporary instruction (TI) to review the licensee's continued actions in response to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

From September 13 through 17, 2004, two inspectors from the regional office along with the senior resident inspector conducted an inspection at the Quad Cities Nuclear Power Station to assess the licensee's continued actions in response to Generic Letter 89-13. The inspectors reviewed licensee documents such as surveillance procedures, normal and emergency operating procedures, annunciator response procedures, and operating logs. The inspectors also interviewed operations, maintenance, chemistry, engineering and training personnel, and performed walkdowns of the safety-related residual heat removal service water (RHRSW) and diesel generator cooling water (DGCW) systems, and the non-safety-related service water chemical addition system. The objective of this inspection was to review the licensee's activities in response to NRC generic communications by focusing on Generic Letter 89-13. Additionally, the inspection was to gather information to help the NRC staff identify and shape possible future regulatory positions and enhance the agency operating experience program. A complete list of documents reviewed is listed in the attached "List of Documents."

As part of this inspection, the inspectors completed the scope of the following baseline inspections:

71111.04, "Equipment Alignment": One quarterly walkdown required by this baseline inspection was completed in its entirety. Under the activities required to complete Inspection Requirement 03.04 of the TI, a detailed walkdown of the RHRSW system was conducted. The inspectors used both 71111.04 and TI 2515/159, Attachment A, to conduct the walkdown. This comprised one quarterly sample.

71111.07B, "Heat Sink Performance": The biennial portion of this baseline inspection was completed in its entirety. Under the activities required to complete Inspection Requirement 03.02 of the TI, two heat exchangers were reviewed. These heat exchangers were the 1B residual heat removal (RHR) heat exchanger and the Train B control room emergency ventilation unit. Review of these heat exchangers comprised two biennial samples.

71111.12, "Maintenance Effectiveness": Two annual maintenance performance issue reviews required by this baseline inspection were completed. Under the activities required to complete Inspection Requirements 03.01 and 03.05 of the TI, the inspectors reviewed a sample of station logs, maintenance work orders, maintenance rule evaluations, and unavailability records, and a sample of condition reports to verify that

the licensee identified issues related to the maintenance rule at an appropriate threshold and that corrective actions were appropriate. The inspectors verified that the licensee identified, entered, and scoped component and equipment failures within the maintenance rule requirements. The RHRSW and DGCW systems were evaluated. Two samples were considered to be completed by this review.

71111.13, "Maintenance Risk Assessments and Emergent Work Control": Two emergent work issues were completed. Under the activities required to complete Inspection Requirements 03.04 and 03.05 of the TI, the inspectors reviewed documents to determine if the risk associated with the activities listed below agreed with the results provided by the licensee's risk assessment tool. When compensatory actions were required, the inspectors validated the appropriateness of the compensatory action implementation. The inspectors also discussed emergent work activities with the shift manager and work week manager to ensure that these additional activities did not change the risk assessment results. The activities inspected included a retroactive review of the risk associated with compensatory actions taken to isolate a pinhole leak in RHRSW line 1-1043B-14"-L and review of the risk associated with planned maintenance of the Train B control HVAC valve 2-385. Two samples were considered to be completed by this review.

71111.17, "Permanent Plant Modifications": A part of the biennial portion of this baseline procedure was completed. Under the activities required to complete Inspection Requirement 03.04 of the TI, the inspectors reviewed three permanent plant modifications in order to ensure that the modifications had not altered the design basis or introduced any single failure vulnerabilities. As part of the review of these modifications, the inspectors also reviewed associated screenings or evaluations performed pursuant to 10 CFR 50.59 and post-modification testing. The modifications dealt with replacement of piping due to pinhole leaks. Three of the five required biennial samples were considered to be completed by this review.

71111.19, "Post Modification Testing": Review of one post-maintenance test was completed in accordance with this baseline inspection. Under the activities required to complete Inspection Requirement 03.05 of the TI, the inspectors reviewed the maintenance documentation and verified that the post maintenance test activity adequately tested the safety function(s) affected by the maintenance, that acceptance criteria were consistent with licensing and design basis information, and that the procedure was properly reviewed and approved. Specifically, the inspectors reviewed the post-maintenance testing of a check valve in the Unit 2 RHRSW line to the Train B control room emergency ventilation unit.

71111.22, "Surveillance Testing": Review of two surveillance tests were completed in accordance with this baseline inspection. Under the activities required to complete Inspection Requirements 03.02 and 03.04 of the TI, the inspectors reviewed completed surveillance results for the emergency core cooling system room coolers and for the Train B control room emergency ventilation unit to verify that the equipment could perform its intended safety function and that the surveillance tests satisfied the TS requirements. The inspectors also reviewed the surveillance tests to verify the tests were adequate to demonstrate operational readiness consistent with the design and

licensing basis documents, and that the testing acceptance criteria were well documented and appropriate to the circumstances. Two samples were considered to be completed by this review.

71152, "Identification and Resolution of Problems": One semi-annual review of identified problems was completed in accordance with this baseline inspection. Under the activities required to complete Inspection Requirement 03.05 of the TI, the inspectors reviewed maintenance records and corrective action backlog lists to identify trends of equipment problems that might indicate the existence of a more significant safety issue. One sample was considered to be completed by this review.

b. Findings

1. Lack of Timely Corrective Actions for RHRSW Valves

Introduction: The inspectors identified a finding involving a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," having very low safety significance (Green). This finding was associated with the licensee's failure to promptly identify and correct the adverse effects of corrosive water on RHRSW valves.

Description: Temporary Instruction 2515/159 required the inspectors to review the maintenance work history of all safety-related service water systems. During this review, the inspectors identified that Work Request 76586 had been open since December 7, 2002. This work request documented a potential stem to disk separation on valve 1-5799-385, "1A RHRSW Supply to the B Control Room Heating, Ventilation, and Air Conditioning (HVAC) System." The inspectors reviewed the work order and found that the licensee had first planned to repair the valve on April 7, 2003. However, the work was rescheduled to October 6, 2003, due to the unavailability of valve replacement parts. On August 15, 2003, the work was rescheduled to May 10, 2004, and on December 19, 2003, the work was rescheduled to November 8, 2004. For the last two instances, the licensee was unable to provide any information to explain why the work was rescheduled. In January 2004, the system engineer noticed that the work had been rescheduled a third time. The system engineer contacted the cycle manager which resulted in moving the work back to May 10, 2004.

On April 19, 2004, maintenance personnel performed a walkdown of the activities associated with repairing Valve 1-5799-385. During this walkdown, the mechanics identified additional parts that were needed to complete the valve maintenance. Due to the 26-week lead time needed for most valve parts, the work was rescheduled to October 4, 2004. The inspectors considered the licensee's inability to clearly identify the parts needed to perform this maintenance within 18 months to be a weakness in the licensee's work control program.

Subsequent to the inspection, on October 6, 2004, the licensee began work on Valve 1-5799-385. When the valve was opened, the licensee found that there was considerable corrosion inside the valve: where the stem and disk connected, on the T-slot between the stem and disk, and extensive corrosion of the disk guides, to the extent that the guides were basically non-existent. Because a new valve body had not

been ordered, the licensee made temporary repairs and returned the valve to service declaring that it was available for emergency use. As of October 11, 2004, the licensee had not examined any other gate valves in the RHRSW system to determine if they also had similar corrosion.

The inspectors noted that in August 2002, Quad Cities received operating experience from Dresden Station which described the failure of three of four RHRSW to control room emergency ventilation supply valves due to stem to disk separation. The Dresden operating experience specifically noted that the disk ears had completely eroded away at the T-slot in the disk. The operating experience specifically noted that this issue was not limited to a particular manufacturer, that the issue applied to air and motor operated valves, as well as manual ones, and that the failure mechanism was due to carbon steel components being in a corrosive environment along with regular exercising which removed the corrosion layer. The Quad Cities evaluation, which was completed five days after the failure of the 385 valve, focused on the particular manufacturer and determined that the only affected valves were the air operated valves and they were periodically inspected. The Quad Cities evaluation also claimed that the Quad Cities river water was less corrosive than the Dresden lake water.

Analysis: The inspectors determined that the failure to promptly identify and correct the condition which led to the failure of Valve 1-5799-385 was a performance deficiency. This deficiency warranted evaluation in accordance with NRC Inspection Manual Chapter 0612, "Power Reactor Inspection Reports." The inspectors determined that the finding was more than minor because it involved the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

The inspectors determined that the finding could be evaluated using the significance determination process in accordance with Inspection Manual Chapter 0609, "Significance Determination Process," because the finding was associated with the availability and reliability of a train of a mitigating system. The inspectors determined that this issue screened out of the Phase 1 significance determination process since the degraded valve did not result in an actual loss of safety function for either the RHRSW or the control room emergency ventilation system. Therefore, this finding was considered to be of very low safety significance (Green).

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to the above, as of September 17, 2004, the licensee had failed to promptly identify and correct the adverse effects of corrosive water on RHRSW valves. Specifically, in August 2002, an operating experience report from the Dresden Station described the failure of three RHRSW to control room emergency ventilation supply valves due to stem to disk separation because of corrosion. On December 7, 2002, Work Request 76586 was written to repair a potential disk to stem separation in safety-related Valve 1-5799-385. However, as of September 17, 2004, the work request had not yet been

completed, and the licensee had not examined any other RHRSW valves for corrosion. Because this violation was determined to be of very low safety significance, and because the licensee entered the violation into its corrective action program as Issue Reports 253992 and 260608, this violation is being treated as a Non-Cited Violation consistent with Section VI.A of the NRC's Enforcement Policy **(NCV 50-254/04-09-04)**.

2. On Line Risk Assessment of Compensatory Actions Taken in Response to a Pinhole Leak

Introduction: The inspectors identified an unresolved item associated with the licensee's actions in response to an emergent work condition.

Description: On January 14, 2003, the licensee discovered a pinhole leak in the RHRSW piping downstream of the RHR heat exchanger. The leak was in an expander just downstream of the normally closed heat exchanger outlet valve, 1-1001-5A. In order to isolate the leak, the licensee closed normally locked open manual valve 1-1001-201A. Upon closing the valve, the licensee declared the system inoperable, but determined that it was available for performing on-line risk analysis to support plant maintenance activities. The licensee did not have an operator stationed in the room due to dose considerations. The licensee declared the system to be unavailable when an out-of-service tag was hung to begin actual maintenance, approximately seven hours later. Declaring the system unavailable resulted in the on-line risk changing from Green to Yellow, due to a two fold increase in baseline risk.

The inspectors reviewed the licensee's safety system unavailability calculation and determined that, for the purposes of the performance indicator, the time the system was "inoperable but available" was counted as unavailable. However, the inspectors questioned, from an on-line risk management view point, whether the system was properly characterized as available. The licensee indicated that the control room staff would have used an attachment to work control procedure WC-AA-101. The attachment contained examples such as "operable equipment," "inoperable equipment, tagged out of service," "inoperable equipment due to off-normal alignment during testing with automatic realignment," and "testing that would require operator action to restore system." However, none of the examples provided guidance on cases where equipment was placed into an abnormal lineup as a compensatory action due to an emergent work condition.

The inspectors were also concerned because there did not appear to be any type of contingency plan for restoring the system, should it have been required to be put in service. The licensee was unable to provide information that showed that an operator was dedicated to the task of reopening the valve or that an operator would have been able to respond in a timely fashion. The inspectors noted that following a design basis loss of coolant accident, the room would quickly become a high radiation area due to RHR water on the shell side of the RHR heat exchanger.

Because the issue involves a variation on scenarios considered when the maintenance rule (A)(4) was enacted, this issue has been discussed with the Office of Nuclear Reactor Regulation. Pending the results of their review, this item is unresolved (URI 50-254/04-09-05).

3. TI Analysis

In accordance with TI 2515/159 reporting requirements, the inspectors provided the required data to the NRC headquarters staff for further analysis. A summary of the responses to the questions of the TI is provided below.

i. Determine the effectiveness of Generic Letter 89-13 in communicating information.

Generic Letter 89-13 was clear in communicating information about service water system problems, both in the initial letter and the supplement. The licensee did take the actions to which it officially committed in its response. In general, the commitments appeared to encompass the scope of the generic letter recommendations.

The licensee's current programs provided a continued follow-through on the generic letter recommendations. However, both the baseline heat sink inspection and the 2001 baseline safety system performance and design capability inspection provided continuing awareness of service water issues beyond the initial issuance of the generic letter. The licensee did not have a Generic Letter 89-13 program document for the site until the inspection; however, it has consistently maintained an engineering staff position for a Generic Letter 89-13 program coordinator.

ii. Describe the licensee actions that are being implemented for the five recommended actions of Generic Letter 89-13.

Generic Letter 89-13 had five recommendations; the licensee made commitments for on-going programs for three of them.

- The first recommendation was to implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling. The licensee made commitments to: (a) undertake intake structure inspections; (b) provide continuous chlorination for the RHRSW system during periods when the system was running; (c) evaluate the effectiveness of an initial flushing of infrequently used or stagnant lines and the severity of any fouling; and (d) annually sample the water and substrate for Asiatic clams.

  The licensee’s actions in this area were maintaining or improving the commitments. The licensee performed twice yearly examinations of the intake structure to ensure that the structures were physically intact;

review of the most recent reports indicated that these inspections were thorough and were identifying problems. The licensee had improved their overall chlorination program. In 1999, the licensee installed a chlorination and silt dispersant system for the normal (non-safety-related) service water system, in addition to maintaining the safety-related chlorination system which was installed in response to the generic letter. In 2002, the chlorination systems for both the safety-related and non-safety-related service water systems were replaced with a more robust system. The chlorination systems appeared to be effective in preventing biofouling. The licensee continued to monitor for Asiatic clam and other invasive marine species (Zebra mussels) which could cause biofouling of the service water systems. The inspectors determined that the frequency of the monitoring conformed to the licensee's commitment and was effective. While both safety-related service water systems (RHRSW and DGCW) were infrequently used and contained stagnant water, the inspectors did not identify any cases where biofouling occurred as a result. Therefore, the inspectors concluded that the licensee's measures, overall, were meeting the commitment to the generic letter and were preventing biofouling of the safety-related service water systems.

- The second recommendation was to conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. The licensee committed to either inspect or test safety-related open-cycle heat exchangers; unless those coolers were determined not to have a safety-related function.

  At the time of the TI inspection, the licensee had done performance-based testing on the RHR heat exchangers, and opened and inspected the remaining coolers within the program. The performance testing capability of the RHR heat exchangers has been extensively reviewed during baseline heat sink inspections. The remaining coolers have also been found to be on a satisfactory inspection schedule during the baseline heat sink inspections.

  During this inspection, no new issues were identified. The licensee was meeting its Generic Letter 89-13 commitments.

- The third recommendation was to establishing a routine inspection and maintenance program to ensure that corrosion, erosion, protective coating failure, silting, and biofouling could not degrade the performance of the safety-related systems supplied by service water. The licensee committed to incorporating five low flow locations susceptible to silting and five high flow locations susceptible to erosion into its erosion/corrosion program, unless the station determined that the systems were not susceptible to erosion. The station also committed to installing corrosion coupons at the worst case locations to quantify general corrosion rates.

The inspectors determined that there were protective coatings applied to the safety-related RHR heat exchangers. No problems were identified in this area. Additionally, the inspectors determined that the piping was not degraded due to biofouling or silting.

The inspectors determined that in 1999, the licensee transferred control for the piping inspections from the erosion/corrosion program to the GL 89-13 program owner. In 2001, during an NRC safety system design and performance capability inspection, the NRC identified a Non-Cited Violation as the licensee had not taken adequate corrective actions to identify general area erosion following discovery of through-wall pinhole leaks downstream of orifices in the RHRSW system. As a result of this finding, the licensee was developing a program for detecting erosion and corrosion in the safety-related service water system. However, following completion of the inspection, the inspectors learned that implementation of this new program had been delayed for budgetary reasons.

The inspectors noted that, in addition to the above erosion problems, the licensee had encountered repetitive problems with the RHR heat exchanger floating heads and with either erosion or corrosion downstream of an expander in the RHRSW lines. Additionally, subsequent to the inspection, the RHRSW experienced a pipe leak which was greater in size than could be attributed to a pinhole leak. The leak occurred in a section of RHRSW piping which had not previously had pinhole leaks. This issue is being followed by the resident inspectors.

Based on these problems being primarily self-identifying (i.e., through evidence of radioactive water in the RHRSW system or through pin-hole leaks) rather than being identified by the continuing inspection and maintenance program, the inspectors concluded that the licensee's continuing commitment in this area was not successful in ensuring that the objectives of the third recommendation were fully met.

- The fourth recommendation was to confirm that the service water system would perform its intended function in accordance with the licensing basis for the plant. The licensee committed to perform a system design review and later informed the NRC that this review had been completed and that the items resulting from the review were being evaluated.

  In 1992, the NRC performed a service water system operational performance inspection which identified a number of deficiencies. In 1998, the NRC performed an architectural engineer inspection of the residual heat removal system, which encompassed the heat exchangers and portions of the RHRSW system. This inspection also resulted in a number of violations. In 2001, the NRC performed a baseline safety system design and performance capability inspection which reviewed the

RHRSW and DGCW systems. All of these inspections provided continuing reviews of the safety-related service water system design basis.

During this inspection, the inspectors confirmed that the inservice test program ensured that no adverse trends were developing. This program was used in conjunction with the heat exchanger performance testing and inspections to ensure continued operability of the RHRSW and DGCW systems. The modifications restored the systems to their original design capability and did not introduce any new single failure modes. Therefore, the inspectors concluded that the systems were still capable of meeting their design basis.

- The fifth recommendation was to confirm that maintenance practices, operating and emergency procedures, and training that involves the service water system were adequate to ensure that safety-related equipment cooled by the service water system will function as intended and that operators of this equipment would perform effectively. Similar to recommendation four, the licensee committed to perform a procedural review and later informed the NRC that this review had been completed and that the items resulting from the review were being evaluated.

  The inspectors determined that operating procedures were adequate to ensure that the service water systems were operated as described in the design basis documents. Post-accident instrumentation was well maintained and appropriately referenced in the procedures reviewed. Special equipment needed to operate RHRSW and DGCW equipment was readily available for use by the operations department.

  With regards to operations training, the inspectors noted that operations personnel had not received training to respond to a complete loss of safety-related and non-safety related service water. The licensee explained that a total loss of safety-related and non-safety related service water was not credible even in situations where the intake structure was destroyed. The inspectors stated that although the licensee did not consider this event credible, training in this area may be warranted due to the large number of industry events caused by grass and/or fish intrusions.

  The licensee's maintenance training program required personnel qualifying as an "A" mechanic to receive training in the areas of valve selection, valve maintenance and inspection, and heat exchangers. The inspectors determined that the valve selection and heat exchanger lesson plans were detailed and provided maintenance personnel with an extensive working knowledge of valves and heat exchangers. However, maintenance personnel did not receive specific training regarding what an unsatisfactory level of something such as biofouling may look like when contained in a component or a piece of piping.

The inspectors identified that some surveillance or maintenance procedures contained acceptance criteria which required the use of judgement (such as determining that a significant reduction in flow had occurred or identifying unsatisfactory levels of biofouling, silting, corrosion, and erosion) rather than containing criteria which could be consistently applied regardless of the performer.

In reviewing completed and open maintenance work requests and work orders, the inspectors confirmed the presence of two adverse trends on safety-related service water components. First, there have been several RHR heat exchanger leaks over the past 3 years; this trend was similar to a trend in the early 1990's. The licensee determined that the leaks occurred due to corrosion of the carbon steel flange tongues on the internal floating head. This corrosion resulted in a loss of compression on the stainless steel gasket and a loss of integrity in the carbon steel tongue. The licensee has implemented plans to replace the 1B and 2B RHR heat exchanger floating heads. The licensee did not plan to replace 1A RHR heat exchanger floating head as it had a stainless steel flange tongue.

iii. Determine the effectiveness of programmatic maintenance of the actions in response to Generic Letter 89-13.

The licensee has maintained the actions to which they committed in their response to the generic letter. The overall program level has remained steady, with some improvement in regard to its generic letter commitments. However, the licensee actions appeared to be based on either NRC-identified or event-identified issues rather than a proactive approach.

iv. As applicable, describe noteworthy SWS operational history that supports inspection results.

- RHR heat exchanger floating head flange leaks, due to dissimilar metal corrosion, have occurred on three of the four RHR heat exchangers;
- Pinhole leaks or significant wall thinning, due to erosion, occurred downstream of the flow orifices on the DGCW lines from RHRSW pump cubicles;
- Pinhole leaks, due to either erosion or corrosion, occurred downstream of an enlarger in the RHRSW piping from the RHR heat exchangers;
- A leak in the RHRSW discharge piping occurred just subsequent to the inspection; and
- Examination of a gate valve in the RHRSW system to the control room HVAC system revealed extensive interior corrosion, including also complete corrosion of the disc guides on the valve body.

v. Provide an assessment of the effectiveness of licensee's program procedure(s) on related SWS operating experience.

The licensee had a well-defined corporate procedure for review of operating experience. This procedure ensured wide dissemination of operating experience within the corporate fleet. The procedure contained provisions to ensure that reviews were done for those operating experience reports deemed to require reviews by the corporate office.

The licensee's procedure did not require formal reviews to be done for routine operating experience information; only for those pieces of information which were determined to be of some significance.

The inspectors reviewed one formal review which was done for a Dresden operating experience report regarding disc-to-stem separation on three of the four manual valves from the RHRSW system to the control room emergency ventilation system. The formal review was limited to review of valves by the same manufacturer, even though the operating experience specifically stated that it was not unique to a particular manufacturer of type of valve. As noted in the finding discussed in Section 4OA5.1.b.1, this determination was made shortly before the Quad Cities site identifying a potential disc-to-stem separation in one of the four manual valves from its RHRSW system to the control room emergency ventilation system (i.e., in an identical location and environment).

The licensee's program for initiating operating experience was well defined. The inspectors noted that none of the trends, discussed in the previous section, were determined by the licensee as being worthwhile of an operating experience notification.

The inspectors also noted that Generic Letter 89-13 related operating experience was not included in the maintenance training program or in the briefings held prior to performing maintenance work on RHRSW or DGCW components. Furthermore, there was limited Generic Letter 89-13 related operating experience provided for the non-licensed operators.

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 September 30, 2004. 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:

- The radioactive material processing and transportation program with Mr. R. Gideon on August 20, 2004.

- Temporary Inspection (TI 2515/159) on Generic Letter 89-13: Service Water with Mr. T. Tulon on September 17, 2004.

4OA7 Licensee-Identified Violations

The following violations of very low significance were identified by the licensee and are violations of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Manual, NUREG-1600, for being dispositioned as non-cited violations.

Cornerstone: Mitigating Systems

10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components covered by Appendix B are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in the design documents and that deviations from such standards are controlled. Contrary to this requirement, on June 21, 2004, the licensee discovered that they had failed to assure that design basis information regarding the torus water level instrumentation was correctly translated into instructions contained in the Passport system. As a result, a non-safety related torus water level instrument was installed in a safety-related, control room application without documenting the deviation from the quality standards governing safety-related instrumentation. The licensee entered this issue into their corrective action program as Issue Report 230195. The inspectors determined the safety significance of this issue to be of very low safety significance (Green) since the instrument was replaced with a safety-related instrument.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

T. Tulon, Site Vice President
R. Gideon, Plant Manager
R. Armitage, Training Manager
J. Bartlitt, Acting Training Manager
W. Beck, Regulatory Assurance Manager
G. Boerschig, Engineering Manager
T. Hanley, Maintenance Manager
D. Hieggelke, Nuclear Oversight Manager
V. Neels, Chemistry/Environ/Radwaste Manager
K. Ohr, Acting Radiation Protection Manager
M. Perito, Operations Manager
A. Williams, Radioactive Materials Shipping Manager
G. Larson, Corporate 89-13 Program Owner
K. Moser, Engineering
T. Wojcik, Engineering Programs Supervisor

Nuclear Regulatory Commission

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

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000265/20040009-01	NCV	Violation of TS 3.3.6.1 Due to Main Steam Line High Flow Switches Being Found Out of Tolerance (Section 4OA2)
05000254/20040009-02	NCV	Inadequate Corrective Actions for July 2003 Out of Tolerance Event Results in Repeat Event in July 2004 (Section 4OA2)
05000254/2004009-03; 05000265/2004009-03	NCV	Inadequate Channel Check Procedure for Drywell Radiation Monitors (Section 4OA3)
05000254/20040009-04	NCV	Failure to Promptly Correct Deficiencies Associated with a Degraded Residual Heat Removal Service Water Valve (Section 4OA5)

05000254/2004009-05	URI	Review of On Line Risk Assessment of Compensatory Actions Taken in Response to a Pinhole Leak

Closed

05000265/20040009-01	NCV	Violation of TS 3.3.6.1 Due to Main Steam Line High Flow Switches Being Found Out of Tolerance
05000254/20040009-02	NCV	Inadequate Corrective Actions for July 2003 Out of Tolerance Event Results in Repeat Event in July 2004
05000254/2004009-03; 05000265/2004009-03	NCV	Inadequate Channel Check Procedure for Drywell Radiation Monitors
05000254/20040009-04	NCV	Failure to Promptly Correct Deficiencies Associated with a Degraded Residual Heat Removal Service Water Valve
05000265/2003-005	LER	Technical Specification Allowable Value Exceeded for Main Steam Line Flow Switches Due to Inadequate Drift Allowance Used in Setpoint Calculation
05000254/2004-001	LER	Technical Specification Allowable Value Exceeded for Main Steam Line Flow Switches Due to Inadequate Drift Allowance
05000265/2004-001	LER	Drywell High Radiation Monitor Failure Due to Unsoldered Wiring Connection

Discussed

None.

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.

1R04 Equipment Alignment

QOM 2-6600-01; Unit 2 Diesel Generator Valve Checklist; Revision 18

1R05 Fire Protection

QCMMS 4100-01; Fire Extinguisher and Hose Reel Inspection; Revision 18
Quad Cities Units 1 and 2 Pre-Fire Plans
OP-AA-201-001; Fire Marshall Tours; Revision 2
Quad Cities Units 1 and 2 Updated Fire Hazards Analysis

1R11 Licensed Operator Requalification

QGA 100; Reactor Pressure Vessel Control
QGA 101; Reactor Pressure Vessel Control - Anticipated Transient Without Scram
QGA 200; Primary Containment Control
QGA 500-1; Reactor Pressure Vessel Blowdown
QGA 500-4; Reactor Pressure Vessel Flooding

1R12 Maintenance Effectiveness

Maintenance Rule Scoping Criteria for Function Z5650; dated June 23, 2004;
Maintenance Rule Performance Criteria for Function Z5650; dated June 9, 2004
Maintenance Rule Scoping Criteria for Function Z0263; dated June 23, 2004
Maintenance Rule Performance Criteria for Function Z0263; dated June 23, 2004
Condition Report 141946; Received Electrohydraulic Control System Fluid Low Temperature Alarm; dated January 30, 2003
Condition Report 145123; Apparent Cause Evaluation for Unit 2A Master Trip Solenoid Valve Maintenance Rule Functional Failure; dated February 19, 2003
Condition Report 137248; Light Failed to Go Out When Testing “A” Master Trip Solenoid Valve; dated December 24, 2002
Condition Report 155052; Reactor Pressure Increase; dated April 22, 2003
Condition Report 161527; Control Valve #1 Fast Acting Solenoid - Stuck; dated June 2, 2003
Condition Report 175904; Master Trip Solenoid Valve “A” Did Not Extinguish During Turbine Weekly Test; dated September 16, 2003
Condition Report 189539; Maintenance Rule (a)(1) Action Plan Date Missed; dated December 8, 2003

Condition Report 140041; Maintenance Rule Z5650-01 Exceeding Performance Criteria - (a)(1) Candidate; dated January 17, 2003
Condition Report 198425; Events at Dresden Impact Quad Cities Maintenance Rule (a)(1) Action Plan; dated January 30, 2004
Maintenance Rule Expert Panel Meeting Minutes (included (a)(1) action plan); dated June 24, 2004
June 2004 Quarterly System Health Indicators; dated July 22, 2004

1R13 Maintenance Risk Assessment and Emergent Work

Issue Report 233871; Unit 1 Main Condenser Flow Reversal Second Half Failure; dated July 5, 2004
Issue Report 235132; Nuclear Oversight Identified Issues Related to the 1-4402C Work and Testing; dated July 10, 2004
Issue Report 235006; Unit 1 Circulating Water Reversing Valve Motor Pinion Gear Key Broken; dated July 9, 2004
QCEM 0600-01; Electrical Maintenance of Safety Related and Non-Safety Related Motor Operated Valves; Revision 13
Troubleshooting Log for Work Order 714276-01; Unit 1 Condenser Flow Reversal Valve 1-4402C; dated July 5-9, 2004
Work Week Risk Assessments for Weeks of July 5 and August 30, 2004
Daily Production Schedules; dated August 1 - 7, August 29 - September 4, and September 19 - 25, 2004
Work Week Risk Assessment for Weeks of August 1, August 29, and September 19, 2004

1R14 Non-Routine Evolutions

QCOP 4400-09; Circulating Water System Flow Reversal; Revision 16
QCEM 0600-01; Electrical Maintenance of Safety Related and Non-Safety Related Motor Operated Valves; Revision 13
QCEM 0600-12; Functional Testing and Limit Switch Verification of Motor Operated Valves; Revision 18
QCAN 901(2)-7 H-3; Main Condenser A/B/C Low Vacuum; Revision 4
QCAN 901(2)-5 F-5; Main Condenser A/B/C Low Vacuum; Revision 3
QCAN 901-7 C-2; Condenser Flow Reversing Second Half Incomplete; Revision 5
HU-AA-1211; Pre-Job, Heightened Level of Awareness, Infrequent Plant Activity and Post-Job Briefings; Revision 1
QOP 3200-03; Startup of the Second and Third Reactor Feed Pumps; Revision 25
QCTS 0200-02; Unit 2 Steam Dryer, Main Steam, Feedwater, and High Pressure Coolant Injection System and Component Monitoring Plan; Revision 1

1R15 Operability Evaluations

Issue Report 242150; Potential for Fluid Used in Lisega Snubbers to Degrade
Engineering Change 350669; Drywell Gamma Radiation Exposure for Equipment Totally Enclosed by Metal; Revision 0

Com Ed Calculation QDC-0000-N-1070; Extended Power Uprate Impact of Total Integrated Dose for 600 Volt Cables in Containment; Revision 0
Engineering Change 350652; Radiation Resistance Review of Disiloxane Fluids Used in Lisega Snubbers
Quad Cities Nuclear Power Station Fire Hazards Analysis
Appendix B to Branch Technical Position 9.5-1; dated February 24, 1977
Branch Technical Position 9.5-1, "10 CFR Part 50, Appendix R Programs;" dated May 1, 1976
Operational Decision Making Document SER 04-012; Manual Scram Pushbutton 2-590-301A; dated May 25, 2004
QCOA 3900-01; Service Water System Failure; Revision 10
Quad Cities Units 1 and 2 Safe Shutdown Report; Revision 16
Quad Cities Calculation QDC-4100-M-0537; Quad Cities Station Design Basis Hydraulic Calculations; Revision 1G
Work Order 542317-01; Diesel Fire Pump A Capacity Test; dated February 6, 2004
Work Order 665373-01; Diesel Fire Pump A Capacity Test; dated August 12, 2004
Issue Report 228807; Initial Failure Analysis for Two Dresden 4kV Merlin Gerin Breakers; dated June 15, 2004
Issue Report 220964; Recent Merlin Gerin Breaker Closure Failures at Dresden; dated May 10, 2004
Transient Stability Study of Quad Cities and Dresden Uprates; dated July 11, 2000
Issue Report 215208; Evaluate Past Operability for Historical Switchyard Voltage; dated April 15, 2004
Issue Report 199755; Bus 24-1 Degraded Voltage Relays Found Out of Tolerance; dated February 5, 2004
Issue Report 212837; Minimum 345 Switchyard Voltage not Modeled in State Estimator Program; dated April 2, 2004
Issue Report 215208; Evaluate Past Operability for Historical Switchyard Voltage; dated April 15, 2004
Issue Report 218831; Quad Cities Unit 2 Angular Stability Study; dated May 3, 2004
Exelon Internal Operating Experience NER NC-04-002 (Yellow); Degraded Switchyard Voltage; dated May 11, 2004
Quad Cities TSs and Bases
Evaluation of Main Power Transformer Replacement Exelon Nuclear Quad Cities Unit 2; dated December 2003
Quad Cities Generator Angular Stability Assessment; dated March 2004
Dresden Operability Evaluation 212836; Offsite Source Degradation; dated April 7, 2004
Engineering Change 348513; Evaluate Unit 1 and Unit 2 Unit Auxiliary Transformer and Reserve Auxiliary Transformer Parameters to Provide EED With the Information Required to Update the State Estimator Program; dated April 9, 2004
Engineering Change 350115; Past Operability Review for Low Switchyard Voltage Occurrences from April 4, 2003 to April 1, 2004
Exelon Transmittal of Design Information QDC-04-013; Quad Cities Units 1 and 2 Unit Auxiliary Transformer and Reserve Auxiliary Transformer Critical Characteristics, Minimum Required Switchyard Voltage, and Maximum Allowable Switchyard Voltage; dated April 9, 2004
QOA 6500-09; 4kV Bus 14-1 (24-1) Voltage Degraded; Revision 9

QOA 6500-06; 4kV Bus 14-1 (24-1) Failure; Revision 14
QCOS 0005-08; Unit 1 Electrical Distribution Breaker and Voltage Verification; Revision 10
QCOS 6500-10; Functional Test of Unit 2 Second Level Undervoltage; Revision 13
Information Notice 2000-06; Offsite Power Voltage Inadequacies; dated March 27, 2000
Information Notice 95-37; Inadequate Offsite Power System Voltages During Design-Basis Events; September 7, 1995
Information Notice 98-07; Offsite Power Reliability Challenges From Industry Deregulation; dated February 27, 1998
IR 242173; 1A Core Spray Room Failed QCOS 0020-04; August 6, 2004
QCOS 0020-04; Reactor Building Floor Drain Sump Ball Valve Leakage Testing; Revision 1
QOA 900-4 D-18; Reactor Building Floor Drain Sump B High Level; Revision 3
QOA 900-4 C-18; Reactor Building Floor Drain Sump A High Level; Revision 3
QCOA 1600-05; Leak in Torus; Revision 7

1R16 Operator Workarounds

Quad Cities Nuclear Power Station Fire Hazards Analysis
Appendix B to Branch Technical Position 9.5-1; dated February 24, 1977
Branch Technical Position 9.5-1, "10 CFR Part 50, Appendix R Programs;" dated May 1, 1976
IR 244262; OWA Review for Defeating RCIC Suction Valve Swap Logic; August 13, 2004
4E-2484F; Schematic Diagram RCIC System Part 6; Sheet Number 1; Revision T
4E-2484F; Schematic Diagram RCIC System Part 6; Sheet Number 2; Revision O
QCOP 1300-06; Defeating RCIC Suction Automatic Transfer to Torus; Revision 0

1R19 Post Maintenance Testing

QCOP 4400-09; Circulating Water System Flow Reversal; Revision 16
QCEM 0600-01; Electrical Maintenance of Safety Related and Non-Safety Related Motor Operated Valves; Revision 13
QCEM 0600-12; Functional Testing and Limit Switch Verification of Motor Operated Valves; Revision 18
HU-AA-1211; Pre-Job, Heightened Level of Awareness, Infrequent Plant Activity and Post-Job Briefings; Revision 1
Issue Report 233871; Unit 1 Main Condenser Flow Reversal Second Half Failure; dated July 5, 2004
Issue Report 235132; Nuclear Oversight Identified Issues Related to the 1-4402C Work and Testing; dated July 10, 2004
Issue Report 235006; Unit 1 Circulating Water Reversing Valve Motor Pinion Gear Key Broken; dated July 9, 2004
Troubleshooting Log for Work Order 714276-01; Unit 1 Condenser Flow Reversal Valve 1-4402C; dated July 5-9, 2004
Work Order 00463827-01; ½ B EDG Starting Compressor Unloading Chamber Drain Valve - Replace; July 13, 2004

ER-AA-350; Illinois Department of Nuclear Safety's Inspection, Testing, Repair, and Alteration Requirements for Non-ISI Boilers and Pressure Vessels; Revision 4
QCMMS 6600-02; Emergency Diesel Generator Preventive Maintenance Quarterly Inspection; Revision 17
Work Order 00723971; 1A Core Spray Room Drain Valve Failed QCOS 0020-04; August 9, 2004
QCOS 0020-04; Reactor Building Floor Drain Sump Ball Valve Leakage Testing; Revision 1
Updated Final Safety Analysis Report
Quad Cities Unit 2 Operating Logs; dated September 18, 2004
QCAP 0250-06; Control of In-Plant Watertight "Submarine" Doors; Revision 7
CC-AA-201; Plant Barrier Control Program; Revision 5
QCTS 0820-02 (TIC-1059); Leak Test of the RHR Service Water Vault Flood Protection Bulkhead Doors; Revision 7
Work Order 642260-10; Remove/Install the 2B/C Residual Heat Removal Service Water Vault Bulkhead Door to Support Replacement of the 2-1001-3B Valve; dated September 17, 2004

1R22 Surveillance Testing

Updated Final Safety Analysis Report
Technical Specifications
QCMMS 4100-33; 1/2B-4101 Diesel Driven Fire pump Annual Capacity Test; Revision 15
Work Order 636213; Diesel Fire Pump "B" Annual Capacity Test
Issue Report 247877; Pressure Gauge UTC #2693919 Reading Low on Post Calibration
Work Order 709951; ½ DG Monthly Load Test; July 14, 2004
QCOS 6600-43; Unit ½ Diesel Generator Load Test; Revision 17
QCOP 5650-02; EHC Pressure Regulator Adjustments; Revision 3
QCOS 1300-05; Quarterly RCIC Pump Operability Test; Revision 36

1R23 Temporary Modifications

Temporary Modification 350645; Temporary Modification for 1A Core Spray Room Floor Drain Plug; August 6, 2004
QCOS 0020-04; Reactor Building Floor Drain Sump Ball Valve Leakage Testing; Revision 1
QCOA 1600-05; Leak in Torus; Revision 7
QCOA 0010-19; Radioactive Liquid Spill; Revision 3
QCOA 0010-15; Hazardous Material Event; Revision 13
QCAP 0200-10; Emergency Operating Procedures (QGA) Execution Standards; Revision 33
Work Order Troubleshooter 732002-01; 2B Motor Generator Set Scoop Tube Control Drive Circuitry; dated September 22, 2004
CC-AA-112; Temporary Configuration Changes; Revision 8
MA-AA-716-004; Conduct of Troubleshooting; Revision 2

2PS2 Radioactive Material Processing and Transportation

QCOP-2050-19; Transfer of Cleanup Sludge from Cleanup Phase Separator to Cleanup Phase Separator; Revision 6
QOP-2050-09; Transfer of Cleanup Phase Separator to the Solidification System Mixing Tank; Revision 14
RW-AA-100; Process Control Program for Radioactive Wastes; Revision 2
FO-OP-048; Procedure for Installation of the In-line Sampler; Revision 1
RP-AA-605; 10 CFR 61 Program; Revision 0
Part 61 Waste Stream Changes
QC-RP-5620-06 Attachment A; Trending for Shifts in Scaling Factors for 2003, 1st and 2nd Quarters of 2004
R4-01-063-3661; 10CFR61 Analysis Data; dated April 6, 2004
UFSAR Volume 6; Sections 11.2 and 11.4
DOT Radioactive Material Shipper Training Manual; Revision 2
Hazardous Material Transportation Security Plan Training Manual; Revision 0
TQ-AA-210-2103; Quad Cities Shipping Student Exams for 2003; Revision 0
DOT Radioactive Material Truck and Package Inspection Training Manual; Revision 2
NOSA-QDC-04-04; Chemistry, Radwaste, and Process Control Program Audit; dated May 5, 2004
LS-AA-126-1005; Check-In Self Assessment of Radwaste Transportation; dated August 5, 2004
AR188000; Inadequate Controls Shipment of Non-Fuel SNM; dated February 6, 2003
AR201065; Waste Package MDA Value Greater than Class A Limit; dated February 6, 2004
AR173227; RP-AA-607 Does Not Include 2003 IATA Marking Requirements; dated August 27, 2003
AR171602; Radwaste Sample Values Are Misidentified in the Procedure; dated August 14, 2003
AR194402; Numerous CRs Written Against RWCU Resin XFR Campaign; dated January 9, 2004
AR201330; Radwaste Control Room Log Deficiencies; dated February 12, 2004
AR209014; Radwaste Abandoned Equipment Not Identified; dated March 17, 2004
AR214258; Radwaste IRSF Grapple Feet Engagement Problems; dated April 8, 2004
AR217783; NOS Identified Finding: Unresolved Radwaste Issues; dated April 29, 2004
AR222412; Numerous Operator Challenges in the Radwaste Control Room; dated May 20, 2004
AR223877; NOS Identified Improperly Abandoned Equipment; dated May 13, 2003
AR232297; Internal Contamination Found in RW Shipping Cask; dated June 28, 2004
AR243097; Replace RW Mix Pump Packing with Mechanical Seal; dated August 10, 2004
QC-04-004; Radwaste Shipment: Dewatered Powdex Resin; dated April 27, 2004
QC-04-008; Radwaste Shipment: Chem Decon Bead Resin; dated July 27, 2004
QC-04-104; Radioactive Material, LSA Shipment; dated March 2, 2004
QC-04-343; Radioactive Material, SCO Shipment; dated March 8, 2004
QC-04-053; Radioactive Material, LSA Shipment; dated May 4, 2004
SVP-04-034; Solid Waste Disposition Summary For 2003

QC-04-120; Radioactive Material, LSA Shipment; dated May 18, 2004

4OA2 Problem Identification and Resolution

Root Cause Report 235678-05; Main Steam Line Flow Switches out of Tolerance; dated September 8, 2004
Work Order 717710-01; Calibrate Unit 1 Division II Main Steam Line High Flow Switches; dated August 28, 2004
Work Order 717316-01; Calibrate Unit 1 Division I Main Steam Line High Flow Switches; dated August 28, 2004
Effectiveness Review 170142-07; Main Steam Line Flow Instrument Drift; dated July 15, 2004 and August 10, 2004
Root Cause Report 170142-02; Tech Spec Allowable Value Exceeded for Main Steam Line Flow Switches due to Inadequate Drift Allowance Used in Engineering Setpoint Calculations; dated September 12, 2003
NES-EIC-20.04; Analysis of Instrument Channel Setpoint Error and Instrument Loop Accuracy; Revision 3
Condition Report 170142; Main Steam Line High Flow Instrument Drift - Reportable; dated August 8, 2003
Issue Report 240264; Ineffective Corrective Action to Prevent Recurrence for Main Steam Line Flow Switch Root Cause; dated July 30, 2004
QCIS 0200-65; Unit 1 Division II Main Steam Line High Flow Switch Calibration and Functional Test; Revision 3
QCIS 0200-67; Unit 2 Division II Main Steam Line High Flow Switch Calibration and Functional Test; Revision 2
LS-AA-115; Operating Experience Procedure; Revision 4
Condition Report 167988; Unit 2 Main Steam Line High Flow Switches 2F, 2H, and 2P are out of Tolerance; dated July 17, 2003
Condition Report 169283; Unit 1 Main Steam Line High Flow Switch 2L is out of Tolerance; dated July 28, 2003
Condition Report 169427; Unit 1 Main Steam Line High Flow Switch 2S is out of Tolerance; dated July 29, 2003
Condition Report 170142; Main Steam Line High Flow Instrument Drift - Reportable; dated August 4, 2003
Condition Report 182339; Unit 1 Main Steam Line High Flow Switches 2F, 2K, and 2H are out of Tolerance; dated October 22, 2003
Condition Report 209972; Unit 1 Main Steam Line High Flow Switch 2M is out of Tolerance; dated March 22, 2004
Condition Report 220223; Unit 1 Main Steam Line High Flow Switch 2M is out of Tolerance; dated May 11, 2004
Condition Report 226487; Unit 2 Main Steam Line High Flow Switch 2G is out of Tolerance; dated June 7, 2004
Condition Report 226502; Unit 2 Main Steam Line High Flow Switch 2N is out of Tolerance; dated June 7, 2004
Condition Report 226503; Unit 2 Main Steam Line High Flow Switch 2R is out of Tolerance; dated June 7, 2004
Issue Report 226779; Unit 2 Main Steam Line High Flow Switch 2B is out of Tolerance; dated June 8, 2004

Issue Report 226789; Unit 2 Main Steam Line High Flow Switch 2F is out of Tolerance; dated June 8, 2004
Issue Report 226793; Unit 2 Main Steam Line High Flow Switch 2P is out of Tolerance; dated June 8, 2004
Issue Report 226822; Unit 2 Main Steam Line High Flow Switch 2M is out of Tolerance; dated June 8, 2004
Issue Report 235678; Unit 1 Main Steam Line High Flow Switch 2M is out of Tolerance; dated July 13, 2004

4OA3 Event Followup

Issue Report 254263; Drywell Radiation Monitor Fail Channel Check; dated September 18, 2004
Condition Report 198137; Drywell Radiation Monitor Failed due to Unsoldered Switch Contact; dated January 18, 2004
QOS 0005-S01; Operations Department Weekly Summary of Daily Surveillance; Revision 131
QOS 0005-01; Operations Department Weekly Summary of Daily Surveillance; Revision 104
Updated Final Safety Analysis Report
QCOP 1600-11; Primary Containment Integrity; Revision 8
QCAP 0200-10; Attachment D; Initiating Conditions for Group 2 Automatic Isolation; Revision 33
QCIS 2400-07; Unit 2 Division I Drywell Radiation Monitor Functional Test; Revision 0
QCIS 2400-04; Unit 2 Division I Drywell Radiation Monitor Calibration and Functional Test; Revision 2
QCIS 2400-05; Unit 2 Division II Drywell Radiation Monitor Calibration and Functional Test; Revision 2

4OA5 Other

Condition Report 167988; Unit 2 Main Steam Line High Flow Switches 2F, 2H, and 2P are out of Tolerance; dated July 17, 2003
Condition Report 169283; Unit 1 Main Steam Line High Flow Switch 2L is out of Tolerance; dated July 28, 2003
Condition Report 169427; Unit 1 Main Steam Line High Flow Switch 2S is out of Tolerance; dated July 29, 2003
Condition Report 170142; Main Steam Line High Flow Instrument Drift - Reportable; dated August 4, 2003
Condition Report 182339; Unit 1 Main Steam Line High Flow Switches 2F, 2K, and 2H are out of Tolerance; dated October 22, 2003
Condition Report 209972; Unit 1 Main Steam Line High Flow Switch 2M is out of Tolerance; dated March 22, 2004
Condition Report 220223; Unit 1 Main Steam Line High Flow Switch 2M is out of Tolerance; dated May 11, 2004
Condition Report 226487; Unit 2 Main Steam Line High Flow Switch 2G is out of Tolerance; dated June 7, 2004

Condition Report 226502; Unit 2 Main Steam Line High Flow Switch 2N is out of Tolerance; dated June 7, 2004
Condition Report 226503; Unit 2 Main Steam Line High Flow Switch 2R is out of Tolerance; dated June 7, 2004
Issue Report 226779; Unit 2 Main Steam Line High Flow Switch 2B is out of Tolerance; dated June 8, 2004
Issue Report 226789; Unit 2 Main Steam Line High Flow Switch 2F is out of Tolerance; dated June 8, 2004
Issue Report 226793; Unit 2 Main Steam Line High Flow Switch 2P is out of Tolerance; dated June 8, 2004
Issue Report 226822; Unit 2 Main Steam Line High Flow Switch 2M is out of Tolerance; dated June 8, 2004
Issue Report 235678; Unit 1 Main Steam Line High Flow Switch 2M is out of Tolerance; dated July 13, 2004
Issue Report 235688; Unit 1 Main Steam Line High Flow Switch 2P is out of Tolerance; dated July 13, 2004
Root Cause Report for Condition Report 170142; Tech Spec Allowable Value Exceeded for Main Steam Flow Switches due to Inadequate Drift Allowance used in Engineering Setpoint Calculations; dated September 12, 2003
Issue Report 240264; Ineffective Corrective Action to Prevent Recurrence for Main Steam Line Flow Switch Root Cause; dated July 30, 2004
ER-AA-520; Instrument Performance Trending; Revision 3
QCIS 0200-65; Unit 1 Division II Main Steam Line High Flow Switch Calibration and Functional Test; Revision 3
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8730-P-104; Systems Design Description: Refrigeration Condensing Unit ½-9400-102; Revision A
Apparent Cause Report for Issue Report 129737; 2A RHR Heat Exchanger Leakage; dated May 13, 2003
Biocide Availability Information; September 1999 – August 2004
Common Cause Analysis Report for Issue Report 139325; Leaks Occurring in the Residual Heat Removal Service Water System; dated March 17, 2003
D-010; Ultrasonic Examination Data Sheet, 1SW02A; dated October 16, 2000
D-011; Ultrasonic Examination Data Sheet, 1SW03A; dated October 16, 2000
E-3 Walkdown Checklist for Out of Service 27817; dated September 15, 2004
EC 340578; Install Patch Plate Over Pinhole Leak on MO 1-1001-5B Outlet Reducer; Revision 0; dated March 13, 2003
EC 341265; Replace 14" X 12" Carbon Steel Reducer with Stainless Steel in 2-1043A-14"-D; Revision 0
EC 345750; Use of Service Water to Pressurize RHRSW at 2A RHR Heat Exchanger to Diminish Internal Leakage and Minimize Radioactivity to River; Revision 0; dated December 23, 2003
EC 351064; Determine the Need for Emergency Dredging of the Area in Front of the Intake Bay; dated September 7, 2004
EC 351235; Document Revised RHR Heat Exchanger Heat Removal Capacity as a Result of Extended Power Uprate; Revision 0; dated September 13, 2004

EDGCW Maintenance Rule Evaluation History; September 2000 - September 2004
EPRI NP-5580; Detection and Control of Microbiologically Influenced Corrosion by the Electric Power Research Institute; dated June 21, 1905
ER-AA-340; Generic Letter (GL) 89-13 Program Implementing Procedure; Revision 2
ER-AA-340-1001; GL 89-13 Program Implementation Instructional Guide; Revision 2
GL 89-13 Program Basis Document Quad Cities Station; dated September 7, 2004
Inservice Inspection Third Interval Third Period Buried Piping Flow Test; dated April 12, 2004
Inservice Testing (IST) Bases Documents for Diesel Generator Cooling Water and Residual Heat Removal Service Water; dated September 15, 2004
IR 82636; Sustained Service Water High Alarm While Running A-Loop RHRSW; dated November 13, 2001
IR 82810; Inner Head Flange Leak on 1A RHR HX Revealed by Boroscope; dated November 14, 2001
IR 93444; RHRSW Vault Room Cooler Leak Operability Evaluation Inadequate Followup; dated February 1, 2002
IR 98960; 1A RHR Hx Tube Side Drain Bellows; dated March 13, 2002
IR 109578; Possible Tube Leak in the 2A RHR Heat Exchanger; dated May 26, 2002
IR 111121; Leak Discovered on Piping Weld on 1B RHRSW Low Pressure Pump; dated June 8, 2002
IR 116112; Potential Leak on Unit 1 RHR Heat Exchangers; dated July 18, 2002
IR 126431; 1A RHR Heat Exchanger has Developed a Minor Leak; dated October 8, 2002
IR 129737; 2A RHR Heat Exchanger Leaking from Reactor Side to Service Water Side; dated October 31, 2002
IR 133088; Leak Discovered at Threaded Vent Valve to 2C RHRSW Low Pressure Pump; dated November 25, 2002
IR 134450; 1-5799-385 Stem Disc Separation; dated December 7, 2002
IR 139325; Leak in Line 1-1043B-14"-L: Approximately One Gallon per Minute; dated January 14, 2003
IR 143444; Maintenance Rule Functional Failure for Z1000-11 (Original IR 133088); dated February 7, 2003
IR 152821; Valve 0-5741-319B Disc Is Separated from the Stem; dated April 8, 2003
IR 152960; RHRSW Line 2-1043B-14": Localized Thin Spot Detected; dated April 8, 2003
IR 158436; Pitting Detected on 1-1043A-14 Downstream of MO 1-1001-5A"; dated May 12, 2003
IR 161541; Severe Degradation in Valves 0-5741-319A and B; dated June 2, 2003
IR 162164; Service Water and RHRSW Supply to B Train Control Room HVAC; dated June 5, 2003
IR 174404; Unable to Perform Scheduled QCOS 5057-04 due to Unavailable; dated September 4, 2003
IR 180301; 2A RHR HX Leak Rate has Increased; dated October 10, 2003
IR 185389; Zebra Mussel Monitoring of Intake Forebay; dated November 7, 2003
IR 185761; Well Water Piping in Unit 2 RHRSW Vaults Below Minimum Wall; dated November 10, 2003
IR 187704; Extent of Condition for 2B RHRSW Pump Casing Pitting; dated November 21, 2003

IR 189928; Additional Corrective Actions Prudent for Condition Report 110756 (RHRSW Screens); dated December 10, 2003
IR 200744; 2B RHRSW High Pressure Pump Discharge Piping Through Wall Leak; dated February 10, 2004
IR 202464; Repairs to RHRSW B Control Room HVAC Isolation Valve Delayed; dated February 18; 2004
IR 207033; Pitting Discovered on 2-1001-5A Valve Internal Body; dated March 9, 2004
IR 208492; 2B RHRSW High Pressure Pump Discharge Elbow Pipe Plug Leaking; dated March 15, 2004
IR 216081; 1A RHR Heat Exchanger Service Water Activity Higher Than Expected; dated April 21, 2004
IR 220974; Repair of 1-5799-385 Deferred; dated May 13, 2004
IR 225680; Sockolet Threads Corroded on 2C RHRSW High Pressure Pump Suction Elbow; dated June 3, 2004
IR 222935; Leak on Common Supply to 1A and 1B RHR Room Coolers; dated May 22, 2004
IR 228727; Silt Buildup in RHRSW Center Bay; dated June 15, 2004
IR 229613; Small Piece of Loose Concrete Found During RHRSW Inspection; dated June 18, 2004
IR 248158; 1B RHR Heat Exchanger; dated August 28, 2004
IR 248231; Service Water Radiation Monitor Spike During QCOS 1000-04; dated August 31, 2004
IR 249729; Check Valve Failed QCOS-5750-04; dated September 9, 2004
IR 250912; Repair or Replace Corroded Section of Line 1-3948-6"; dated September 8, 2004
IR 253441; Gauge Responded Very Slowly During QCOS 5750-09
IR 253992*; Untimely Repair of 1-5799-385; dated September 17, 2004
IR Q-2001-02132; RHRSW Line 2-1043-A-14"-L Has Pinhole Leak; dated July 10, 2001
IR Q2001-02167; Pinhole Leak in Furmanite Clamp on Work Order 9926382; dated August 12, 2001
IR Q2001-03121; Localized Piping Corrosion in RHRSW and DGCW Systems; dated October 8, 2001
IST Pump Acceptance Criteria Sheet DGCW Unit 1; dated April 4, 2000
IST Pump Acceptance Criteria Sheet DGCW Unit 2; dated August 4, 2004
IST Pump Acceptance Criteria Sheet RHRSW Unit 1, Pump B; dated April 4, 2000
IST Pump Acceptance Criteria Sheet RHRSW Unit 1, Pump D; dated January 2, 2001
IST Pump Acceptance Criteria Sheet RHRSW Unit 2, Pump A; dated April 14, 2000
IST Valve Test Acceptance Criteria Sheet RHRSW Unit 1; dated April 4, 2000
IST Valve Test Acceptance Criteria Sheet RHRSW Unit 2; dated April 14, 2000
Letter from Commonwealth Edison to NRC Providing Response to GL 89-13 for All Commonwealth Edison Stations; dated January 29, 1990
Letter from Commonwealth Edison to NRC Modifying Response to GL 89-13 for All Commonwealth Edison Stations; dated November 14, 1990
Letter from Commonwealth Edison to NRC Providing Supplemental Response to GL 89-13 for Quad Cities Unit 1; dated June 28, 1991
LN-5752; Control Room Ventilation; Revision 08; May 2004
LN-6600; Emergency Diesel Generator; Revision 8; dated January 8, 2004

LNF-1000; Residual Heat Removal; Revision 09; April 2004
LOCT-1031 EPU; Quad Cities Nuclear Power Station Simulator Training Module: Loss of T-12/Station Blackout/RPV Blowdown; Revision 1
LOCT-1032 EPU; Quad Cities Nuclear Power Station Simulator Training Module: Power Change/Loss of T-12/Loss of Feedwater Heating/Loss of Bus 13-1/Steam Cooling; Revision 2
LOCT-1081 EPU; Quad Cities Nuclear Power Station Simulator Training Module: Bus 14 Trip/Control Rod Scram/Stuck Control Rod/Fuel Failure/RCIC Steamline Rupture; Revision 0
LOCT-1123 EPU; Quad Cities Nuclear Power Station Simulator Training Module: Power Change/Total Loss of Service Water, Condensate, RBCCW/TBCCW; Revision 2
LOCT-1141; Quad Cities Nuclear Power Station Simulator Training Module: Loss of Offsite Power/Loss of High Pressure Feedwater/HPCI Fails to Start/RCIC Fails to Start
LOCT-1161 EPU; Quad Cities Nuclear Power Station Simulator Training Module: MSIV Closure/Steam Leak Inside Containment/Station Blackout; Revision 0
LS-AA-115; Operating Experience Procedure; Revision 04
M-22; Sheet 3; Diagram of Service Water Piping Diesel Generator Cooling Water; Revision U; dated April 15, 2003
M-22; Sheet 5; Diagram of Service Water Piping; Revision H; dated May 3, 2002
M-37; Diagram of Residual Heat Removal Service Water Piping; Revision AY
M-69, Sheet 1; Diagram of Service Water Piping, Unit 2; dated March 15, 1999
M-69; Sheet 3; Diagram of Service Water Piping; Revision H, dated May 6, 2003
M-69; Sheet 5; Diagram of Service Water Piping; Revision H
M-79; Diagram of Residual Heat Removal Service Water Piping; Revision AZ
M-725; Sheet 3; Piping and Instrument Diagram – Control Room Heating, Ventilation and Air Conditioning; Revision T
Maintenance Technician Training Module MC20124; Valve Maintenance; Revision 1
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Material Request 1155790; dated April 20, 2004
Material Request 1156903; dated April 20, 2004
Monthly Performance Indicator Data Elements of Safety System Unavailability – Residual Heat Removal Systems; dated February 6, 2003
Nalco Guide to Cooling Water System Failure Analysis by Nalco Chemical Company; dated June 16, 1905
NER 02-042; Valve Disk Separation Resulted in Loss of Cooling Flow and Control Room Ventilation System Inoperability; August 5, 2002; Evaluated; December 10, 2002
NER 02-087; Failure of Essential Service Water Strainer Due to Lack of Appropriate Preventive Maintenance; August 9, 2002; Evaluated; March 6, 2003
NES-G-14.01; Calculation No. VT-16: RHRSW and DGCW Pump Room Cooler Performance Evaluation; Revision 1A; dated April 4, 2000.
Nuclear Generation Group Job Performance Measure CE 01-01-I-F; Startup Torus Cooling with the Heat Exchanger Fouled; Revision 0
Nuclear Design Information Transmittal QDC-99-057; Cooling Water Flow versus Room Cooler Heat Removal Capacity for the Emergency Core Cooling System Room Coolers; dated June 3, 1999
OP-AA-108-103; Locked Equipment Program; Revision 0
OpEx 3855; Shutdown Service Water Problems; undated evaluation

OpEx 5512; Residual Heat Removal Heat Exchanger Fouling and Degradation; undated evaluation
OpEx 6693; Obstruction in Emergency Service Water Emergency Supply Line to Auxiliary Feedwater Pumps; undated evaluation
OpEx 10266; Ultimate Heat Sink Heated to Temperature Greater than Design Limit; undated evaluation
OpEx 11431; Decrease in the Performance of Residual Heat Removal Division II Heat Exchangers; undated evaluation
OpEx 11968; Air Binding of Residual Heat Removal Heat Exchangers on Essential Service Water Tube Side; undated evaluation
OpEx 12295; Essential Service Water Flow Through Auxiliary Feedwater Pump Room Coolers Lost or Degraded Due to Debris Blockage; undated evaluation
OpEx 13168; Essential Cooling Water Strainer Clogged by Fish; undated evaluation
OpEx 14163; Operability of Residual Heat Removal and Core Spray Pumps Related to Seal Operation at Elevated Temperatures; undated evaluation
OpEx 14254; Epoxy Paint Chips Found in Coolers Supplied by Essential Service Water; undated evaluation
OpEx 14698; Silt Found in Safety Related Service Water Dead Legs; undated evaluation
OpEx 14880; Inoperable Service Water Pipe; undated evaluation
OpEx 14997; Service Water Heat Exchanger and Component Inspection Guide Does Not Provide Clear Acceptance Criteria; undated evaluation
OpEx 16642; Residual Heat Removal B Heat Exchanger Long Term Scaling; undated evaluation
OpEx 16986; High Fouling Rates on Service Water Heat Exchanger Resulting from Severe Low Dissolved Oxygen Conditions; undated evaluation
OpEx 17484; Belzona and Tube Damage Noted After Hydrolazing Heat Exchanger Tubes; undated evaluation
OpEx 17651; Safety Injection Pump a Lube Oil Cooler Found Plugged; undated evaluation
OpEx 17815; Heat Exchanger Tube Baffle Plates Degraded; undated evaluation
OpEx 17953; Unplanned Loss of Alternate Decay Heat Removal System Operability; undated evaluation
OpEx 17978; Foreign Material Found in Component Cooling Water Heat Exchanger; undated evaluation
OpEx 18311; Missed and Ineffective Raw Water Macro-fouling Treatments; undated evaluation
OpEx 18492; Heat Exchanger Performance Degradation Due to Incompatible Water Treatment Chemicals; undated evaluation
OpEx 18657; Component Cooling Heat Exchanger Tube Failures Due to High Cycle Fatigue; undated evaluation
Power Point Presentation on Heat Exchangers
PRA Most Likely Core Damage Sequence; Revision 4
QCAN 901-(2)-3 D-6 Unit 1(2); RHR Service Water Pump Trip; Revision 1
QCAN 901-(2)-3 D-7 Unit 1(2); RHR Service Water Heat Exchanger High Inlet/Outlet Temperature/Fuel Pool Cooling Heat Exchanger Outlet High Temperature; Revision 2
QCMMS 1500-01; IST Relief Valve Setpoint Testing; Revision 23
QCOP 1000-04; RHR Service Water System Operation; Revision 15

QCOP 1000-05; Shutdown Cooling Operation; Revision 34
QCOP 1000-09; Torus Cooling Startup and Operation; Revision 16
QCOP 1000-30; Post-Accident RHR Operation; Revision 17
QCOP 6600-06 Unit ½; Diesel Generator ½ Shutdown; Revision 20
QCOS 0005-04 Unit 1(2); IST Valve Position Indication Surveillance; Revision 10
QCOS 1000-04 TIC 949; RHR Service Water Pump Operability Test
QCOS 1000-09 Unit 1(2); RHR Power Operated Valve Test; Revision 16
QCOS 1000-29 Unit 1(2); RHR Heat Exchanger Thermal Performance Test; Revision 10
QCOS 5750-04; Quarterly Testing of Control Room HVAC System Valves and Dampers; Revision 23
QCOS 6600-06 Unit 1(2)(½); Diesel Generator Cooling Water Pump Flow Rate Test; Revision 25
QCOS 6600-08 Unit 1(2); ½ Diesel Generator Cooling Water to Unit 1 and Unit 2 ECCS Room Coolers Flow Test; Revision 19
QCTP 0820-10 Unit 1(2); Heat Exchanger Inspection Report Attachment A; Revision 2; dated April 7, 2003
QDC-5700-M-0806; Emergency Core Cooling System Room Cooler Performance Calculation Under Design Basis and Degraded Conditions; Revision 1
QDC-5700-M-0871; Evaluation of Cooling Water Flow Rate to Control Room HVAC RCU; Revision 1; dated February 18, 2002
QDC-6197; Failure Evaluation of the Residual Heat Removal Service Water Carbon Steel 12" by 14" Expander; dated May 17, 2004
QOP 5750-17; ECCS Room Coolers; Revision 14
Quad Cities Archival Operations Narrative Logs; January 14, 2003 through January 16, 2003
Quad Cities Station Daily Opex Report; dated September 16, 2004
Raw Water Chemical Injection System Design Effectiveness; dated September 10, 2004
RHRSW Maintenance Rule Evaluation History; September 2000 - September 2004
SER; 6-03; Cooling Water System Debris Intrusion; dated December 3, 2004
Time Line for Valve 1-5799-385; 1A RHRSW to 1/2B Control Room HVAC; dated September 16, 2004
TQ-AA-210-3203; Probabilistic Risk Assessment and On-line Maintenance Licensed Operator Requalification Training; Revision 3; dated August 4, 2004
UT-020; Ultrasonic Measurement of Material Thickness: Pipe Line 1-3958-6"-O; dated May 22, 2004
WC-AA-101; On-line Work Control Process; Revision 10
WO 338955; South Core Spray Emergency Cooler Gauge Reads Low - Suspect Plugged Line or Failed Gauge; Completed July 19, 2001
WO 662628; 1B Core Spray Room Cooler Gauge Line Appears Plugged; Completed June 30, 2004
WO 728213; Perform ECCS Room and DGCWP Cubicle Cooler and dP Test; dated September 15, 2004
WR 990020111-01; Quality Control Inspection Report 4755; Ultrasonic Examination Data Sheet, Line ½-10509-16"-D; dated August 5, 1999
WR 990020112-01; Quality Control Inspection Report 47781; Ultrasonic Examination Data Sheet Line ½-10124A-16"-D; dated August 20, 1999

WR 990026400-01; 1B RHR Heat Exchanger Thermal Performance; dated January 12, 2000
WR 990095603-01; Clean and Inspect Heat Exchanger Control Room HVAC Train B Refrigerant Compressor Unit Condenser; dated September 16, 2004

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DGCW	diesel generator cooling water
HVAC	heating, ventilation, and air conditioning
IR	Issue Report
IST	inservice testing
NCV	Non-Cited Violation
OpEx	operating experience
RHR	residual heat removal
RHRSW	residual heat removal service water
SWS	service water system
TI	Temporary Instruction
TS	Technical Specification
URI	unresolved item
WO	Work Order
WR	Work Request