



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
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LISLE, IL 60532-4352

August 5, 2010

Mr. Michael J. Pacilio
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**SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2010003;
05000265/2010003**

Dear Mr. Pacilio:

On June 30, 2010, 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 July 7, 2010, with Mr. M. Prospero and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and 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, one NRC-identified and three self-revealed findings of very low safety significance were identified. Each of the four findings involved a violation of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as non-cited violations (NCVs) in accordance with Section VI.A.1 of the NRC Enforcement Policy.

If you contest the subject or severity of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with 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 addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at the Quad Cities Nuclear Power Station.

M. Pacilio

-2-

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website 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 05000254/2010003; 05000265/2010003
w/Attachment: Supplemental Information

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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: 05000254/2010003 and 05000265/2010003

Licensee: Exelon Nuclear

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

Location: Cordova, IL

Dates: April 1 through June 30, 2010

Inspectors: J. McGhee, Senior Resident Inspector
B. Cushman, Resident Inspector
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Approved by: M. Ring, Chief
Branch 1
Division of Reactor Projects

Enclosure

TABLE OF CONTENTS

SUMMARY OF FINDINGS	1
REPORT DETAILS	4
Summary of Plant Status.....	4
1. REACTOR SAFETY	4
1R01 Adverse Weather Protection (71111.01)	4
1R04 Equipment Alignment (71111.04)	7
1R05 Fire Protection (71111.05)	7
1R11 Licensed Operator Requalification Program (71111.11)	9
1R12 Maintenance Effectiveness (71111.12)	10
1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13).....	10
1R15 Operability Evaluations (71111.15).....	11
1R18 Plant Modifications (71111.18)	12
1R19 Post-Maintenance Testing (71111.19).....	13
1R20 Outage Activities (71111.20)	14
1R22 Surveillance Testing (71111.22).....	15
1EP6 Drill Evaluation (71114.06)	17
2. RADIATION SAFETY	17
2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)	17
2RS2 Occupational As-Low-As-Is-Reasonably-Achievable Planning and Controls (71124.02)	21
2RS4 Occupational Dose Assessment (71124.04)	23
2RS7 Radiological Environmental Monitoring Program (71124.07)	28
4. OTHER ACTIVITIES.....	30
4OA1 Performance Indicator Verification (71151)	30
4OA2 Identification and Resolution of Problems (71152)	31
4OA3 Follow Up of Events and Notices of Enforcement Discretion (71153)	37
4OA5 Other Activities.....	43
4OA6 Management Meetings	44
SUPPLEMENTAL INFORMATION	1
Key Points of Contact.....	1
List of Items Opened, Closed and Discussed.....	1
List of Documents Reviewed	2
List of Acronyms Used	8

SUMMARY OF FINDINGS

IR 05000254/2010003, 05000265/2010003; 04/01/10 - 06/30/10; Quad Cities Nuclear Power Station, Units 1 & 2; Other Activities.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Four Green findings were identified by inspectors and were considered non-cited violations (NCV) of NRC regulations. 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 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green. A self-revealed finding of very low safety significance and a NCV of Technical Specification (TS) 5.4.1 was identified on April 8, 2010, when a Unit 2 Group III containment isolation signal was received during replacement of a primary containment isolation system (PCIS) relay as a result of a disconnected common neutral wire. Immediate corrective actions for this event included restoration of the reactor water cleanup system and rewiring for the PCIS relay to the proper configuration. The inspectors determined that the licensee's failure to identify and provide instructions to mitigate the common neutral during the work planning process was a performance deficiency. The inspectors determined that this finding was cross-cutting in the area of Human Performance, Work Control, because the licensee failed to assess the impact of changes to the work scope during the maintenance activity when plant operating conditions had changed (H.3(b)).

The inspectors determined the finding was more than minor because the performance deficiency impacted the Mitigating Systems Cornerstone attribute of Configuration Control for Operating Equipment Lineup to ensure the availability, reliability and capability of safety systems to respond to initiating events to prevent undesirable consequences. The inspectors performed a Phase 1 SDP evaluation. Using IMC 0609, Attachment 4, Table 4a, Mitigating Systems Cornerstone, all questions were answered "No," and this finding screened as Green, or having a very low safety significance. (Section 4OA2)

- Green. A self-revealed finding of very low safety significance and a NCV of TS 3.0.4 was identified on April 14, 2010, when operators changed operating modes from MODE 2 to MODE 1 without having all required channels of the reactor protection system (RPS) turbine condenser vacuum-low scram function available prior to entering MODE 1. Immediate corrective actions for this event included restoration of the RPS channel. The inspectors determined that performing a MODE change from MODE 2 to MODE 1, without meeting the conditions of the limiting condition for operation (LCO) 3.0.4 or ensuring all required channels of the RPS turbine condenser vacuum-low scram function were available prior to entering MODE 1, was a performance deficiency. The inspectors determined that this finding was cross-cutting in the area of Problem Identification and Resolution - Evaluation, because the licensee failed to

properly classify, prioritize, and evaluate the RPS functional operability of the degraded condenser vacuum indication (P.1(c)).

The inspectors determined the finding was more than minor because the performance deficiency impacted the Mitigating Systems Cornerstone attribute of Configuration Control for Operating Equipment Lineup to ensure the availability, reliability, and capability of safety systems to respond to initiating events to prevent undesirable consequences. The inspectors performed a Phase 1 SDP evaluation. Using IMC 0609, Attachment 4, Table 4a, Mitigating Systems Cornerstone, all questions were answered "No," and this finding screened as Green, or having a very low safety significance. (Section 4OA3)

Cornerstone: Barrier Integrity

- Green. A finding of very low safety significance and a NCV of 10 CFR Part 50.65(a)(4) was self-revealed on March 25, 2010, when operators turned off the electrical power to one of the two electrical freeze seal machines being used to apply a reactor coolant system boundary freeze seal. Specifically, plant staff did not identify the interrelation between the mechanical freeze seal activity and the operations electrical power switching activity during risk assessment activities, and, therefore, did not manage the work activities to prevent loss of power to the freeze seal machines providing the credited boundary to prevent draining the reactor vessel. Immediate corrective actions included restoration of power to the machine and reestablishment of freeze seal temperature.

The finding was determined to be more than minor because required risk management actions were not implemented. These risk management actions were associated with the Barrier Integrity Cornerstone attribute of Configuration Control and affected the cornerstone objective of providing reasonable assurance that the reactor coolant system boundary protects the public from radionuclide releases caused by accidents of events. The inspectors used IMC 0609, "Significance Determination Process," Appendix G, "Shutdown Operations - Significance Determination Process," Attachment 1, "Shutdown Operations - Significance Determination Process: Phase 1 Operational Checklist for Both PWRs and BWRs," and determined that since key safety functions were maintained, the issue screened as Green. The inspectors identified a cross-cutting aspect associated with this finding in Human Performance - Resources, Procedures (H.2(c)). Although the engineering documentation evaluating the risk in using the electric freeze seal machine recommended the power supplies be protected by operations, this information was not translated into the freeze seal procedure, MA-AA-736-610, or the applicable work package. (Section 4OA2)

Cornerstone: Emergency Preparedness

- Green. A NRC-identified finding of very low safety significance and associated NCV of 10 CFR 50.47(b)(9) was identified for delayed corrective action without appropriate compensatory actions for a defective computer point that sends wind direction data to the plant parameter display system (PPDS). This defective computer point resulted in incorrect wind direction on a Nuclear Accident Reporting System (NARS) form transmitted to the State of Illinois as part of the declaration of an Unusual Event on May 19, 2010. Corrective actions included the restoration of the computer point for PPDS. Inspectors identified this performance deficiency had a cross-cutting aspect in

Problem Identification and Reporting - Evaluation because although the non-functional computer point, R234, was identified in December 2009, the licensee failed to thoroughly evaluate, classify, and prioritize the condition of bad data from a computer point and assess how the condition affected PPDS (P.1(c)).

This finding is more than minor because the performance deficiency matches an example of a Green finding from IMC 0609, Appendix B, Section 4.9, page B-20, "Equipment or systems necessary for dose projection are not functional for longer than 24 hours from the TIME OF DISCOVERY without compensatory measures, or corrective actions are inadequate or delayed." Using IMC 0609, Appendix B, Sheet 1, "Failure to Comply Flowchart," the performance deficiency screened as very low safety significance, or Green. (Section 4OA3)

B. Licensee-Identified Violations

No violations of significance were identified.

REPORT DETAILS

Summary of Plant Status

Unit 1

Unit 1 operated at 100 percent thermal power throughout the evaluated period from April 1 through June 30, 2010, with the exception of planned power reductions for routine surveillances, planned equipment repair, and control rod maneuvers.

Unit 2

Unit 2 started the inspection period in refueling outage Q2R20 with the unit in MODE 5. The unit entered MODE 2 and began reactor startup on April 12, 2010. Generator synchronization to the grid on April 13 marked the end of the refueling outage. Three new low pressure turbines were installed during Q2R20 and during post-outage power ascension; high bearing metal temperatures were noted on three low pressure turbine bearings. Although bearing vibrations were normal, operators tripped the turbine on April 14 per the startup test plan. On the evening of April 15, operators started reducing power to shut the unit down after having reached only 12 percent power. The shutdown, completed on the morning of April 16, marked the beginning of forced outage Q2F64. After the shutdown, disassembly of the turbine bearings revealed indications of partially wiped bearings on the three low pressure turbine bearings. These bearings were repaired, and startup was commenced on April 18, 2010. The unit reached full power on April 23, 2010, after all modification testing was completed.

On the evening of May 30, 2010, reactor power was lowered to 67 percent to support control rod pattern adjustment, control rod scram timing, and turbine testing. On the morning of May 31, during testing of turbine control valve #1, the operators did not receive a 1/2 scram as expected. The problem was determined to be a failed electrohydraulic control system pressure switch. The unit was returned to 100 percent power while the replacement instrument was prepped and work instructions were repaired. Later that same day, power was lowered to 82 percent to replace the pressure switch and complete the turbine testing. Power was restored to 100 percent by 1645 hours on May 31, 2010.

Unit 2 operated at 100 percent thermal power throughout the remainder of the evaluated period from May 31 through June 30, 2010, with the exception of planned power reductions for routine surveillances, planned equipment repair, and control rod maneuvers.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

.1 Readiness of Offsite and Alternate Alternating Current Power Systems

a. Inspection Scope

The inspectors verified that plant features and procedures for operation and continued availability of offsite and alternate alternating current (AC) power systems during adverse weather were appropriate. The inspectors reviewed the licensee's procedures affecting these areas and the communication protocols between the transmission

system operator (TSO) and the plant to verify that the appropriate information was being exchanged when issues arose that could impact the offsite power system. Examples of aspects considered in the inspectors' review included:

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

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

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

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

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

b. Findings

No findings of significance were identified.

.2 Summer Seasonal Readiness Preparations

a. Inspection Scope

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

During the inspection, the inspectors focused on plant-specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions.

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

- Units 1 and 2 isophase bus duct cooling,
- Unit 1 stator water cooling, and
- Unit 1 and 2 reactor building ventilation.

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

b. Findings

No findings of significance were identified.

.3 Readiness for Impending Adverse Weather Condition - High Winds

a. Inspection Scope

Since potential high winds were forecast in the vicinity of the facility for April 29, 2010, the inspectors reviewed the licensee's overall preparations/protection for the expected weather conditions. On April 29, 2010, the inspectors walked down all station transformers, in addition to the licensee's emergency alternating current power systems, because their safety-related functions could be affected or required as a result of high winds or tornado-generated missiles or the loss of offsite power. The inspectors evaluated the licensee staff's preparations against the site's procedures and determined that the staff's actions were adequate. During the inspection, the inspectors focused on plant-specific design features and the licensee's procedures used to respond to specified adverse weather conditions. The inspectors also toured the plant grounds to look for any loose debris that could become missiles during high winds. The inspectors evaluated operator staffing and accessibility of controls and indications for those systems required to control the plant. Additionally, the inspectors reviewed the UFSAR and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant-specific procedures. The inspectors also reviewed a sample of CAP items to verify that the licensee identified adverse weather issues at an appropriate threshold and dispositioned them through the CAP in accordance with station corrective action procedures. Specific documents reviewed during this inspection are listed in the Attachment to this report.

This inspection constituted one readiness for impending adverse weather condition sample as defined in IP 71111.01-05.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- 1/2 'A' diesel fire pump;
- Unit 1 emergency diesel generator (EDG) while Unit 1 station blackout diesel generator was out-of-service for maintenance, and
- safe shutdown makeup pump (SSMP) and room cooler after restoration from maintenance.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, Technical Specification (TS) requirements, outstanding work orders (WOs), condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

These activities constituted three partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

The inspectors conducted fire protection walkdowns which were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- Fire Zone 11.2.1, Unit 1 Reactor Building, Elevation 554'-0", Southwest Corner Room - 1A Core Spray;
- Fire Zone 8.2.8.E, Unit 2 Turbine Building, Elevation 639'-0", Main Turbine Floor (Inside Shield Wall);
- Fire Zone 9.3, Unit 1/2 Reactor Building, Elevation 595'-0", 1/2 Diesel Generator;
- Fire Zone 11.2.4, Unit 1 Reactor Building, Elevation 554'-0", NE Corner Room - 1A RHR Room; and
- Fire Zone 19.1, Service Building, Elevation 595'-0", New Computer Room.

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and implemented adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the Attachment to this report, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP. Documents reviewed are listed in the Attachment to this report.

These activities constituted five quarterly fire protection inspection samples as defined in IP 71111.05-05.

b. Findings

No findings of significance were identified.

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On May 25, 2010, the inspectors observed fire brigade activation for a simulated electrical fire in the Unit 1 4kV switchgear. Based on this observation, the inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were:

- proper wearing of turnout gear and self-contained breathing apparatus;
- proper use and layout of fire hoses;
- employment of appropriate firefighting techniques;
- sufficient firefighting equipment brought to the scene;
- effectiveness of fire brigade leader communications, command, and control;
- search for victims and propagation of the fire into other plant areas;

- smoke removal operations;
- utilization of pre-planned strategies;
- adherence to the pre-planned drill scenario; and
- drill objectives.

Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On June 7, 2010, the inspectors observed a crew of licensed operators in the plant's simulator during licensed operator requalification training evaluations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

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

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

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- Function Z0281: Reactor Manual Control System; and
- Function Z0287: Automatic Depressurization System.

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

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

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two quarterly maintenance effectiveness samples as defined in IP 71111.12-05.

b. Findings

No findings of significance were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- Work Week (10-18-06) - Unit 2 EDG logic testing, emergent 2B residual heat removal service water (RHRSW) leak repair, Unit 2 125 Vdc battery charger load limit calibration, Bus 24-1 to 14-1 cross tie;
- Work Week (10-19-04) - 1A residual heat removal (RHR) heat exchanger relief valve, 1B RHR suction motor-operated valve motor replacement, 1A RHR pump breaker, 1B RHRSW, Unit 1 125 Vdc battery charger load limit calibration, 1A 125 Vdc battery charger load test, switchyard work with the ring bus open; and
- Work Week (10-23-11) - emergent SSMP room cooler repairs, Unit 2 reactor core isolation cooling, Unit 2 EDG and 2B core spray breaker swaps.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

These maintenance risk assessments and emergent work control activities constituted three samples as defined in IP 71111.13-05.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Engineering Change (EC) 379372, Evaluate Required Action Limit Increase for Control Valve 2-0220-58B;
- Issue Report (IR) 1054019, Residual Air in Suction of 2A Core Spray;
- IR 1055791, Adjustable Speed Drive 2A 4 kV Input Breaker Reclosed After a Normal Trip;
- IR 1055989; 345 kV Predicted Post Loss of Cooling Accident Trip Voltage Low;
- IR 1066733; Replacement 2B Core Spray Room Cooler Service Water Supply Valve Does Not Meet ASME XI Documentation Requirements; and
- IR 1072775; Cracked Interrupter Bottle in Merlin Gerin 4kV Breaker 211.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the

appropriate sections of the TS and UFSAR to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

.1 Permanent Plant Modifications

a. Inspection Scope

The following engineering design package was reviewed, and selected aspects were discussed with engineering personnel:

- EC 374439, Install Cameron LEFM (Leading Edge Flow Monitor) CheckPlus System.

The modification installed ultrasonic feedwater flow instrumentation with improved accuracy for input to the unit heat balance for determination of plant thermal power. The new system includes a flow meter spool piece in each of the three feedwater pump discharge headers. Each spool piece contained 16 ultrasonic flow transducers, a pressure tap, and a temperature sensor. The pressure and temperature sensors in the spool piece provide for density compensation of the flow measurement. The sensors are divided into two channels powered from different electrical power supplies to provide redundancy and reliability.

This inspection began in the first quarter of 2010 and partial performance of this inspection module was documented in Inspection Report 05000254/2010002, 05000265/2010002 (available as a public document in ADAMS). Inspectors verified that the licensee had appropriately included lessons learned from other industry LEFM installations. The inspectors observed work activities and acceptance testing to verify that installation and performance was consistent with the design control documents. In addition, inspectors performed an independent comparison of data from existing feedwater flow venturies and the new LEFM. Documents reviewed in the course of this inspection are listed in the Attachment to this report.

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

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- WO 01-255053: Valve Disassembly and Overhaul (RCIC Steam Exhaust Swing Check Valve, 2-1301-41);
- WO 01-147438: EDG Largest Load Reject (Unit 2);
- QCOS 0250-04: MSIV Closure Timing (Unit 2 Inboard and Outboard MSIVs);
- QCOS 1000-04: RHR Service Water Pump Operability Test (2C and 2D RHRSW pump overhauls);
- QCOS 1000-04: RHR Service Water Pump Operability Test (2B RHRSW High Pressure Elbow Leak Repair);
- QCOS 1000-06: RHR Pump Loop Operability Test (2D RHR Pump Motor Replacement);
- QCOS 1300-17: RCIC Pump Test Slow Roll After Maintenance;
- QCTS 0600-16: RHR Injection (LPCI) Local Leak Rate Test (MO 1(2)-1001-29 A/B) (Post Thrust Adjustment Local Leak Rate Test (LLRT)); and
- WO 01-1347050; 2A RHR Pump Motor Bearing Replacement.

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

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

b. Findings

No findings of significance were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan (OSP) and contingency plans for the Unit 2 refueling outage (RFO), conducted March 15 - April 14, 2010, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below.

This inspection began in the first quarter of 2010 and partial performance of this inspection module was documented in Inspection Report 05000254/2010002, 05000265/2010002 (available as a public document in ADAMS). Documents reviewed during the inspection are listed in the Attachment to these two reports.

- Licensee configuration management, including maintenance of defense-in-depth commensurate with the OSP for key safety functions and compliance with the applicable TS when taking equipment out-of-service;
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- Controls over the status and configuration of electrical systems to ensure that TS and OSP requirements were met, and controls over switchyard activities;
- Monitoring of decay heat removal processes, systems, and components;
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system;
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- Controls over activities that could affect reactivity;
- Maintenance of secondary containment as required by TS;
- Refueling activities, including fuel handling and sipping to detect fuel assembly leakage;
- Startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the drywell (primary containment) to verify that debris had not been left which could block emergency core cooling system suction strainers, and reactor physics testing; and
- Licensee identification and resolution of problems related to RFO activities.

This inspection constituted one RFO sample as defined in IP 71111.20-05.

b. Findings

One Green finding related to management of shutdown risk during an operation with a potential to drain the reactor vessel was identified during this inspection and is documented in Section 4OA2.3 of this report. A second Green finding associated with an inadequate work instruction that resulted in a challenge to safety-related circuitry is documented in Section 4OA2.4 of this report. No other findings of significance were identified.

.2 Other Outage Activities

a. Inspection Scope

The inspectors evaluated outage activities for an unscheduled outage that began on April 15, 2010, and continued through April 18, 2010. The inspectors reviewed activities to ensure that the licensee considered risk in developing, planning, and implementing the outage schedule.

The inspectors observed or reviewed the reactor shutdown and cooldown, outage equipment configuration and risk management, electrical lineups, selected clearances, control and monitoring of decay heat removal, control of containment activities, startup and heatup activities, and identification and resolution of problems associated with the outage. This forced outage was to facilitate disassembly, repair and troubleshoot the turbine bearings for the low pressure turbines, as well as to perform maintenance on the recirculation pump adjustable speed drive system.

This inspection constituted one other outage sample as defined in IP 71111.20-05.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Surveillance Testing

a. Inspection Scope

The inspectors reviewed the test results for the following activities to determine whether risk-significant systems and equipment were capable of performing their intended safety function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- QCTS 0600-16, RHR Injection (LPCI) Local Leak Rate Test (MO 1(2)-1001-29 A/B) (CIV);
- QCOS 1300-01, Periodic RCIC Pump Operability (IST);
- QCOS 2300-01, Periodic HPCI Operability (IST);
- QCOS 2300-05, Quarterly HPCI Pump Operability Test (IST);
- QCOS 1000-25, RHR Loop Venting (Routine); and
- QCOS 1600-07, Reactor Coolant Leakage in the Drywell (RCS).

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

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

Documents reviewed are listed in the Attachment to this report.

This inspection constituted one routine surveillance testing sample, three inservice testing samples, one reactor coolant system leak detection inspection sample, and one containment isolation valve sample as defined in IP 71111.22, Sections -02 and -05.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on May 11, 2010, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the control room simulator and Technical Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the CAP. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment to this report.

This emergency preparedness drill inspection constituted one sample as defined in IP 71114.06-05.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

This inspection constitutes a partial sample as defined in IP 71124.01-5.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed all licensee data reported for the Occupational Exposure Cornerstone Performance Indicator (PI). The inspectors reviewed the results of radiation protection program audits (e.g., licensee's quality assurance audits or other independent audits). The inspectors reviewed any reports of operational occurrences related to occupational radiation safety since the last inspection. The inspectors reviewed the results of the audit and operational reports to gain insights into overall licensee performance.

b. Findings

No findings of significance were identified.

.2 Radiological Hazard Assessment (02.02)

a. Inspection Scope

The inspectors determined if there have been changes to plant operations since the last inspection that may result in a significant new radiological hazard for onsite workers or members of the public. The inspectors evaluated whether the licensee had assessed the potential impact of these changes and had implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard.

The inspectors reviewed radiological surveys from several selected plant areas. The inspectors determined whether the thoroughness and frequency of the surveys was appropriate for the given radiological hazard.

The inspectors selected the following air sample survey records performed primarily in March 2010 to assess whether the samples were collected and counted in accordance with licensee procedures:

- breach surveys of recirculation system and other primary system valves;
- drywell surveys during and following area decontamination; and
- surveys during reactor vessel head insulation and head removal, and during equipment movement in the dryer separator pit.

The inspectors observed work in potential airborne areas and evaluated whether air samples were representative of the breathing air zone. The inspectors evaluated whether continuous air monitors were located in areas with low background to minimize false alarms and were representative of actual work areas. The inspectors assessed whether the licensee had an adequate program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

b. Findings

No findings of significance were identified.

.3 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors reviewed several radiation work permits (RWPs) used to access high radiation areas (HRAs) and evaluated the specified work control instructions or control barriers. These RWPs included the following:

- RWP 10010896: Reactor Disassembly/Reassembly and Cavity Work;
- RWP 10010897: Replace Sump Pumps and Check Valves in Drywell;
- RWP 10010972: Refurbish 2-100-50 Valve;
- RWP 10010902: ERV/SRV/Target Rock Valve Activities; and
- RWP 10010913: Overhaul Inboard Main Steam Isolation Valves.

For these RWPs, the inspectors assessed whether allowable stay times or permissible dose (including from the intake of radioactive material) for radiologically significant work under each RWP was clearly identified. The inspectors evaluated whether electronic

personal dosimeter alarm setpoints were in conformance with survey indications and plant policy.

The inspectors selected two occurrences where a worker's electronic dosimetry had malfunctioned or alarmed to determine whether the workers responded appropriately to the off-normal condition. The inspectors reviewed the corrective action documents and dose evaluations associated with the occurrences to determine if they were completed appropriately.

b. Findings

No findings of significance were identified.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions (e.g., radiation levels) during walkdowns of the facility. The inspectors assessed whether the conditions were consistent with posted surveys, RWPs, and worker briefings.

During job performance observations, the inspectors evaluated the adequacy of radiological controls, such as required surveys (including system breach radiation, contamination, and airborne surveys), radiation protection job coverage (including audio and visual surveillance for remote job coverage), and contamination controls. The inspectors evaluated the licensee's use of electronic dosimetry in high noise areas for adequacy as monitoring devices given the conditions.

The inspectors assessed whether radiation monitoring devices were placed on an individual's body consistent with licensee procedures and industry standards. The inspectors evaluated whether the dosimeter was placed in the location of highest expected dose or that the licensee properly employed an NRC-approved method of determining effective dose equivalent.

The inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel in high-radiation work areas with significant dose rate gradients to determine whether the licensee's practices were adequate.

The inspectors reviewed several RWPs for work within areas with the potential for individual worker internal exposures from airborne radioactivity. For these selected RWPs, the inspectors evaluated airborne radioactive controls and monitoring, including potential for significant airborne levels (e.g., grinding, grit blasting, system breaches, entry into tanks, cubicles, reactor cavities), and assessed barrier integrity and ventilation system operation.

The inspectors evaluated the posting and physical controls for selected HRAs and very high radiation areas, to verify conformance with the occupational radiation safety PI.

b. Findings

No findings of significance were identified.

.5 Radiation Worker Performance (02.07)

a. Inspection Scope

During job performance observations, the inspectors evaluated radiation worker performance with respect to stated radiation protection work requirements. The inspectors assessed whether workers were aware of the significant radiological conditions in their workplace and if their performance reflected the level of radiological hazards present.

The inspectors reviewed radiological problem reports generated since the last refueling outage in May 2009, which identified the cause of the event to be human performance errors. The reports were reviewed to determine if there was an observable pattern traceable to a similar cause and to determine if the corrective action taken by the licensee addressed the causes.

b. Findings

No findings of significance were identified.

.6 Radiation Protection Technician Proficiency (02.08)

a. Inspection Scope

The inspectors observed the performance of the radiation protection technicians with respect to all radiation protection work requirements. The inspectors evaluated whether technicians were aware of the radiological conditions in their workplace and the RWP controls/limits and whether their performance was consistent with their training and qualifications with respect to the radiological hazards and work activities.

The inspectors reviewed radiological problem reports generated since the last refueling outage that identified the cause of the event to be associated with radiation protection technician error. The reports were reviewed to determine if there was an observable pattern traceable to a similar cause and to determine if the corrective action taken by the licensee resolved the problem.

b. Findings

No findings of significance were identified.

.7 Problem Identification and Resolution (02.09)

a. Inspection Scope

The inspectors assessed whether problems associated with radiation monitoring and exposure control were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee corrective action program. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involved radiation monitoring and exposure controls. The inspectors assessed the licensee's process for applying operating experience to their plant.

b. Findings

No findings of significance were identified.

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

This inspection constitutes a partial sample as defined in IP 71124.02-05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed pertinent information regarding plant collective exposure history, current exposure trends, and ongoing or planned activities in order to assess current performance and exposure challenges. The inspectors reviewed the Quad Cities Station 3-year rolling average collective exposure.

The inspectors reviewed the site-specific trends in collective exposures (using NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities," and plant historical data) and source term (average contact dose rate with reactor coolant piping) measurements (using Electric Power Research Institute TR-108737, "BWR Iron Control Monitoring Interim Report," issued December 1998).

The inspectors reviewed site-specific procedures associated with maintaining occupational exposures as-low-as-is reasonably-achievable (ALARA), which included a review of processes used to estimate and track exposures from specific work activities.

b. Findings

No findings of significance were identified.

.2 Radiological Work Planning (02.02)

a. Inspection Scope

The inspectors selected several ongoing Unit 2 refuel outage work activities of the highest exposure significance, each with actual or projected dose greater than 5 person-rem. The inspectors determined whether the licensee reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances. The inspectors reviewed the ALARA work activity evaluations, total effective dose equivalent ALARA evaluations (i.e., respiratory protection evaluations), exposure estimates, and exposure mitigation requirements.

The inspectors determined whether the licensee's planning identified appropriate dose mitigation features, considered alternate mitigation features, and defined reasonable dose goals. The inspectors also determined whether the licensee's ALARA assessment had taken into account decreased worker efficiency from use of respiratory protective devices and/or heat stress mitigation equipment (e.g., ice vests). Additionally, the inspectors determined whether the licensee's work planning considered the use of remote technologies (such as teledosimetry, remote visual monitoring, and robotics) as a means to reduce dose and the use of dose reduction insights from industry operating

experience and plant-specific lessons learned. The inspectors evaluated the integration of ALARA requirements into work procedures and RWP documents for adequacy.

The inspectors compared the dose results achieved during the Unit 2 refuel outage with the intended dose established in the licensee's ALARA planning for various work activities that accrued the greatest cumulative dose. The dose comparisons were made through approximately the first 3-weeks of the scheduled 5-week refueling outage, and focused on work activities that accrued doses greater than 5 person-rem. The inspectors reviewed the person hour estimates provided by maintenance planning and other work groups with the actual expenditures to assess the adequacy of the estimates. The inspectors explored the reasons for any inconsistencies between intended and actual work activity doses to determine whether the licensee adequately planned and executed the work.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors selected several outage related ALARA work packages and reviewed the assumptions and basis (including dose rate and man-hour estimates) for the collective exposure estimates to determine if they were accurate and established without unjustified conservatism. The inspectors reviewed applicable procedures and discussed processes with the licensee's ALARA staff to determine the methodology for estimating exposures from specific work activities.

The inspectors assessed whether the licensee had established measures to track, trend, and if necessary to reduce, occupational doses for ongoing work activities. The inspectors evaluated whether trigger points or other appropriate criteria were established to prompt additional reviews and/or additional ALARA planning and controls.

The inspectors evaluated the licensee's method of adjusting exposure estimates, or re-planning work, when unexpected changes in scope or emergent work were encountered. The inspectors assessed whether adjustments to exposure estimates (intended dose) were based on sound radiation protection and ALARA principles and were not adjusted to account for failures to control the work. The inspectors evaluated whether the frequency of these adjustments called into question the adequacy of the original ALARA planning.

b. Findings

No findings of significance were identified.

.4 Radiation Worker Performance (02.05)

a. Inspection Scope

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne

radioactivity areas, and HRAs. The inspectors evaluated whether workers demonstrated the ALARA philosophy in practice (e.g., workers are familiar with the work activity scope and tools to be used, workers used ALARA low-dose waiting areas) and whether there were any procedure compliance issues (e.g., workers not complying with work activity controls). The inspectors observed radiation worker performance to assess whether the training and skill level was sufficient with respect to the radiological hazards and the work involved.

b. Findings

No findings of significance were identified.

.5 Problem Identification and Resolution (02.06)

a. Inspection Scope

The inspectors reviewed corrective actions documents, self-assessments and audit reports generated since the last refueling outage in May 2009, to assess whether problems associated with ALARA planning and controls were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the corrective action program.

b. Findings

No findings of significance were identified.

2RS4 Occupational Dose Assessment (71124.04)

This inspection constituted a partial sample as defined in IP 71124.04-5.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the most recent National Laboratory Accreditation Program (NVLAP) report for the licensee's dosimetry vendor to determine the status of the accreditation and whether the accredited categories aligned with the licensee's program and needs.

The inspectors reviewed procedures associated with dosimetry operations, including use of external dosimetry such as multi-badging and extremity monitoring, and for the evaluation of dose associated with radiological incidents (distributed contamination, discrete particles and loss of dosimetry).

The inspectors determined whether the licensee established procedural guidance for determining when external and internal dosimetry was required.

b. Findings

No findings of significance were identified.

.2 External Dosimetry (02.02)

.01 National Voluntary Laboratory Accreditation Program Status

a. Inspection Scope

The inspectors evaluated the adequacy of the licensee's (or vendors) NVLAP accreditation for dosimeters that require processing and that are used to determine the dose of record. The inspectors assessed whether irradiation test categories for each type of personnel dosimeter used was consistent with the types and energies of the radiation present at the Quad Cities Power Station.

b. Findings

No findings of significance were identified.

.02 Passive Dosimeters

a. Inspection Scope

The inspectors evaluated the onsite storage of dosimeters before issuance, during use and before processing/reading to determine if adequate quality controls were implemented or otherwise guidance was provided to workers with respect to care and storage of the devices.

For non-NVLAP accredited dosimetry, the inspectors determined whether the licensee's process provided for periodic calibration, application of calibration factors, usage, reading, and zeroing.

b. Findings

No findings of significance were identified.

.03 Active Dosimeters

a. Inspection Scope

The inspectors assessed whether the licensee used adequate correction factors to address the differences in response between electronic dosimetry and dosimetry that was used to determine the dose of record should secondary dosimetry be used to assign dose. The inspectors evaluated whether the correction factors were based on sound technical principles.

The inspectors selected several dosimetry related occurrence reports and corrective action documents to determine if the licensee identified any trends and implemented appropriate corrective actions for electronic dosimetry related hardware problems (interference from electromagnetic frequency, physical handling, etc.).

b. Findings

No findings of significance were identified.

.3 Internal Dosimetry (02.03)

.01 Routine Bioassay (In-Vivo)

a. Inspection Scope

The inspectors reviewed procedures used to assess the dose from internally deposited nuclides using whole body counting equipment. The inspectors determined whether the procedures addressed methods for differentiating between internal and external contamination, the release of contaminated individuals, the route of intake and for the assignment of dose.

The inspectors reviewed the whole body count process to determine if the frequency of measurements was consistent with the biological half-life of the nuclides available for intake. The inspectors reviewed the licensee's evaluation for use of its portal radiation monitors as a passive monitoring system to determine if instrument minimum detectable activities were adequate to determine the potential for internally deposited radionuclides sufficient to prompt investigation, as provided in 10 CFR 20.1502.

The inspectors selected four recently performed whole body counts and evaluated whether the counting system was used appropriately and included the necessary sensitivity for the potential radionuclides of interest. The inspectors reviewed the radionuclide library used for the count system to determine its appropriateness. The inspector's reviewed the licensee's 10 CFR Part 61 data analyses to determine that the nuclide libraries included appropriate gamma-emitting nuclides and appropriate "marker" nuclides for alpha emitters indicative of fuel degradation. The inspectors also reviewed the licensee's methods for assessing internal dose contributions from hard-to-detect nuclides to determine whether those nuclides were properly evaluated in the intake mix.

b. Findings

No findings of significance were identified.

.02 Special Bioassay (In-Vitro)

a. Inspection Scope

The inspectors reviewed the licensee's in-vitro monitoring program (i.e., urine and fecal analysis) including methods for collection, preservation and analysis of samples. One urinalysis result was reviewed to determine if sample analyses achieved appropriate detection thresholds (lower limits of detection) and that dose was calculated accordingly.

The inspectors reviewed the vendor laboratory quality assurance program and verified that the laboratory participated in an industry recognized cross-check program including whether out-of-tolerance results were resolved appropriately.

b. Findings

No findings of significance were identified.

.03 Internal Dose Assessment - Airborne Monitoring

a. Inspection Scope

The inspectors reviewed the licensee's program for airborne radioactivity assessment and dose assessment, as applicable, based on airborne monitoring and calculations of derived air concentration. The inspectors determined whether flow rates and collection times for air sampling equipment were adequate to allow lower limits of detection to be obtained. The inspectors also reviewed the adequacy of procedural guidance to assess internal dose if respiratory protection was used. (The licensee had not performed dose assessments since the last inspection using airborne/derived air concentration monitoring.)

b. Findings

No findings of significance were identified.

.04 Internal Dose Assessments - Whole Body Count Analyses

a. Inspection Scope

The inspectors reviewed several recent dose assessments performed by the licensee using the results of whole body count analyses. The inspectors determined whether affected personnel were properly monitored with calibrated equipment and that internal exposures were assessed consistent with the licensee's procedures.

b. Findings

No findings of significance were identified.

.4 Special Dosimetric Situations (02.04)

.01 Dosimeter Placements and Assessment of Effective Dose Equivalent for External Exposures

a. Inspection Scope

The inspectors reviewed the licensee's methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the licensee's criteria for determining when alternate monitoring, such as use of multi-badging, was to be implemented. The inspectors reviewed the licensee's dose assessments when multi-badging was used to determine if they were consistent with procedures.

b. Findings

No findings of significance were identified.

.02 Declared Pregnant Workers

a. Inspection Scope

The inspectors reviewed the adequacy of the licensee's methods for informing workers of the risks of radiation exposure to the embryo/fetus. The inspectors reviewed the licensee's monitoring methods and procedures, radiation exposure controls, and the information provided to declared pregnant women to determine if an adequate program had been established to limit embryo/fetal dose. The inspectors reviewed dose records for women that declared between July 2008 and May 2010 to determine if exposure results and monitoring controls employed by the licensee complied with the requirements of 10 CFR 20.1208 and 20.2106.

b. Findings

No findings of significance were identified.

.03 Shallow Dose Equivalent

a. Inspection Scope

The inspectors evaluated the licensee's methods and procedures for determining shallow (skin) dose from distributed contamination and from discrete radioactive particles. The inspectors assessed whether the licensee's methods for calculating shallow dose were consistent with industry practices, and employed the use of VARSKIN or other acceptable codes for determining dose. The inspectors reviewed two recent shallow dose assessments to evaluate whether they were completed in a technically sound manner and were accurate.

b. Findings

No findings of significance were identified.

.5 Problem Identification and Resolution (02.05)

a. Inspection Scope

The inspectors reviewed corrective actions documents, self-assessments and audit reports generated during the 12-month period that preceded the inspection. The inspectors determined whether problems associated with internal dose assessment were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the corrective action program.

b. Findings

No findings of significance were identified.

Cornerstone: Public Radiation Safety

2RS7 Radiological Environmental Monitoring Program (71124.07)

This inspection constituted one sample as defined in IP 71124.07-5.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the annual radiological environmental operating reports and the results of any licensee assessments since the last inspection, to determine whether the radiological environmental monitoring program (REMP) was implemented in accordance with the licensee's technical specifications and the Offsite Dose Calculation Manual (ODCM). This review included changes to the ODCM with respect to environmental monitoring, commitments in terms of sampling locations, monitoring and measurement frequencies, land use census, inter-laboratory comparison program, and analysis of data.

The inspectors reviewed the ODCM to identify locations of environmental monitoring stations and the UFSAR for information regarding the environmental monitoring program and meteorological monitoring instrumentation.

The inspectors reviewed quality assurance audit results of the REMP to assist in choosing inspection samples. Additionally, the inspectors reviewed audit reports and technical evaluations performed of the two vendor laboratories utilized by the licensee to collect and analyze environmental samples.

The inspectors reviewed the annual effluent release reports and the 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," report, to determine if the licensee sampled, as appropriate, for the predominant and dose-causing radionuclides likely to be released in effluents.

b. Findings

No findings of significance were identified.

.2 Site Inspection (02.02)

a. Inspection Scope

The inspectors walked down five of the licensee's air sampling stations (over 50 percent) and six of the thermoluminescent dosimeter monitoring stations to determine whether they were located as described in the ODCM and to determine the equipment material condition. The air sampling stations were selected based on operability history and included those located in areas of highest effluent deposition based on historical meteorological conditions (X/Q, D/Q wind sectors). Dosimeter monitoring stations were selected based on the most risk-significant locations (e.g., those that have the highest potential for public dose impact). The inspectors reviewed the calibration and maintenance records of several environmental air samplers including those observed during the walk-down. The records were reviewed to determine whether the equipment was adequately maintained consistent with the licensee's procedures. The inspectors

determined whether the licensee initiated sampling of other appropriate media upon loss of a required sampling station, if applicable.

The inspectors observed the collection and preparation of two environmental samples from different environmental media (e.g., ground and surface water, milk, vegetation, sediment, and soil), as available, to verify that environmental sampling was representative of the release pathways as specified in the ODCM. The inspectors determined if sampling techniques were in accordance with procedure.

Based on direct observation and review of records, the inspectors evaluated whether meteorological instruments installed on the primary meteorological tower were functional, calibrated, and maintained in accordance with guidance contained in the UFSAR, NRC Regulatory Guide 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," and licensee procedures. The inspectors also determined if the meteorological data readout and recording instruments in the control room and, if applicable, at the tower were functional.

The inspectors determined whether missed and/or anomalous environmental samples were identified and reported in the annual environmental monitoring reports as required. The inspectors selected several examples in 2008 and 2009 that involved a missed sample, inoperable sampler, lost thermoluminescent dosimeter, or anomalous measurement to determine if the licensee identified the cause and had implemented corrective actions. The inspectors reviewed the licensee's assessment of any positive sample results (i.e., licensed radioactive material detected above the lower limits of detection) and reviewed the associated radioactive effluent release data that was the source of the released material.

Inspectors selected numerous SSCs that involve or could reasonably involve licensed material for which there is a credible mechanism for licensed material to reach ground water, and determined whether the licensee had implemented an adequate sampling and monitoring program sufficient to detect leakage of these SSCs to ground water.

The inspectors reviewed historical records required by 10 CFR 50.75(g) of leaks, spills, and remediation to assess the adequacy of the informational content and its retrievability.

The inspectors reviewed significant changes made by the licensee to the ODCM as the result of changes to the land census, revised deposition calculations and/or changes in assessed meteorological conditions or sampler stations since the last inspection. The inspectors reviewed technical justifications for any changed sampling locations to determine whether the licensee performed the required reviews to ensure that the changes did not affect its ability to monitor the impacts of radioactive effluent releases on the environment.

The inspectors determined if ODCM required detection sensitivities were met for various sample media (i.e., the samples meet required lower limits of detection). The inspectors reviewed the results of the vendor analytical laboratory quality control program, including the interlaboratory comparison program, to determine the adequacy of the environmental sample analyses provided by the vendor.

b. Findings

No findings of significance were identified.

.3 Identification and Resolution of Problems (02.03)

a. Inspection Scope

The inspectors reviewed various corrective action program documents to determine whether problems associated with the REMP were being identified by the licensee at an appropriate threshold. Additionally, the inspectors determined whether the corrective actions for a selected sample of REMP related problems documented by the licensee were adequately evaluated and resolved.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

40A1 Performance Indicator Verification (71151)

.1 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the reactor coolant system (RCS) leakage performance indicator for Quad Cities Unit 1 and Unit 2 for the period from the second quarter 2009 through the first quarter 2010. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, issue reports, event reports and NRC integrated inspection reports for the period of April 1, 2009 through March 31, 2010, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings of significance were identified.

.2 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Radiological Occurrences Performance Indicator for the period from the May 2009 through March 2010. To determine the accuracy of the PI data reported during those periods,

PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, were used. The inspectors reviewed the licensee's assessment of the PI for occupational radiation safety to determine if indicator related data was adequately assessed and reported. To assess the adequacy of the licensee's PI data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review, and the results of those reviews. The inspectors independently reviewed electronic dosimetry dose rate and accumulated dose alarm reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of locked HRA entrances to determine the adequacy of the controls in place for these areas. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one occupational radiological occurrences sample as defined in IP 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

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

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

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's CAP at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included: the complete and accurate identification of the problem; that timeliness was commensurate with the safety significance; that evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent-of-condition reviews, and previous occurrences reviews were proper and adequate; and that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's CAP as a result of the inspectors' observations are included in the attached List of Documents Reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished through inspection of the station's daily condition report packages.

These daily reviews were performed by procedure as part of the inspectors' daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings of significance were identified.

.3 Selected Issue Follow-Up Inspection: Issue Report 1047057, Q2R20 Lessons Learned - Freeze Seals, Operation with a Potential to Drain the Reactor Vessel, Power Swaps

a. Inspection Scope

During inspection activities supporting the Q2R20 refueling outage and the licensee's CAP on March 25, 2010, the inspectors recognized a corrective action item documenting loss of electrical power to one of two freeze seal machines providing the RCS barrier to drain down during an Operation with a Potential to Drain the Reactor Vessel (OPDRV).

This review constituted one annual selected issue follow-up problem identification and resolution sample as defined in IP 71152-05.

b. Findings

Introduction: A finding of very low safety significance (Green) and a NCV of 10 CFR Part 50.65(a)(4) was self-revealed on March 25, 2010, when operators turned off electrical power to one of the two electrical freeze seal machines being used to apply a reactor coolant system boundary freeze seal. While Operations was aware of the freeze seal providing the barrier to prevent draining the reactor vessel, the operators directing equipment manipulation were not aware that the freeze seal units were electrical and did not implement effective measures to manage the risk to the RCS barrier integrity during the OPDRV.

Description: On March 25, 2010, mechanical maintenance set a freeze seal to support overhaul of a Unit 2 control rod drive hydraulic control unit 46-35 withdrawal isolation valve 2-0305-101-46-35 using WO 1121680. The freeze seal was established as a maintenance activity using two "RIGID SuperFreeze Model SF-2500" machines in accordance with MA-AA-736-610, "Application of Freeze Seal to All Piping." These units were self-contained, recirculating refrigerant type units that operate on 115/230 Volts alternating current (Vac) electrical power. The freeze seal units were plugged into 120 Vac outlets in the reactor building (supplied by two different non-safety power panels) and clearance order tags were placed on the power switch for each machine. After the freeze seal had been set, but before the system was breached, operators

turned off power to one of the panels supporting the freeze seal while performing electrical switching for another job.

The mechanics immediately recognized the loss of one unit and stopped work. During ensuing conversations with inspectors, the shift manager agreed that the power supplies to the machines should be protected per OP-AA-108-117, "Protected Equipment Program," and the work was placed on hold pending identification of action needed to protect the evolution. The mechanical maintenance first line supervisor (FLS) later approached the shift manager to determine what barriers remained to resuming work. The shift manager requested that the FLS verify with the operating staff that no other electrical power switching was planned during the duration of the freeze seal. Later that same shift, the FLS was informed that no other switching was planned and he assumed he, therefore, had permission to begin work.

The freeze seal temperature was returned to the required range and valve disassembly began. The FLS then contacted the shift manager to inform him that work had started. The shift manager then told the FLS to wait until additional protective actions were identified. The FLS told the shift manager that since disassembly had already started, it would be just as timely to complete the valve repair as restoring to the original configuration. The valve repair was completed without further incident.

The use of these electrical freeze seal machines in place of nitrogen bottles was evaluated under Engineering Change Request (ECR) 380251, "Evaluate Use of Rigid SuperFreeze SF-2500 for Use in this Application (Freeze Seal for Overhaul of 1-0305-101-10-51 Valve)" for the specific application (i.e., for overhaul of hydraulic control unit 101 valves). The ECR evaluated the freeze seal method as a maintenance activity as defined in NEI 96-07, "Guidelines for 10 CFR 50.59 Implementation"; therefore, the risk assessment for the activities was to be performed in accordance with 10 CFR 50.65(a)(4).

MA-AA-736-610 required two SF-2500 units plugged into two diverse power supplies (different circuit breakers at a minimum) so if power is lost to one unit, the other unit would maintain the freeze seal. Neither the implementing procedure nor the ECR evaluated the reliability of the power supplies to be utilized or the potential impact to RPV inventory if a loss of offsite power were to occur while the OPDRV was in progress. Engineering Change Request 380251 identified specific exceptions to the guidelines of MA-AA-736-610 used to justify acceptability when the machines were used in this application. Per the ECR, these exceptions were designed to ensure the organization had a heightened level of awareness when using the electric machines for an OPDRV. Specifically, one of the stipulations in the ECR stated, "Ensure Operations is aware of the electrical feeds so that the power source will be protected." Neither MA-AA-736-610 nor the work order included guidance to "protect" the power sources as specified in the ECR.

The risk assessment performed for the outage schedule identified only the contingency actions required by OU-QC-104, "Shutdown Safety Management Program Quad Cities Annex," (i.e., must have two low pressure ECCS pumps available during the OPDRV's; this will be 2A and 2B core spray pumps). None of the schedule reviews identified a connection between the freeze seal and the electrical power transfer. The risk assessment performed to meet the 10 CFR 50.65 (a)(4) requirement did not take into account that the freeze seal was being maintained by electric machines instead of

nitrogen bottles. While it is clear that operators were aware of the OPDRV activity and the freeze seal, none of the individuals involved in authorizing or executing the power transfer were aware that the freeze seal was being maintained by an electrical machine plugged into a 120 Vac outlet, and they were not aware that their actions could impact the OPDRV activity.

Analysis: The inspectors determined that the act of turning off power supplying a required freeze seal machine without evaluating the risk to RCS integrity was a performance deficiency and a finding. The finding was determined to be more than minor because required risk management actions were not implemented. These risk management actions were associated with the Barrier Integrity Cornerstone attribute of Configuration Control and affected the cornerstone objective of providing reasonable assurance that the reactor coolant system boundary protects the public from radionuclide releases caused by accidents or events. This finding is similar to Example 7.f of IMC 0612, "Power Reactor Inspection Reports," Appendix E. Specifically, failure to manage the electrical power supplies to ensure the freeze seal machines were not inadvertently turned off during switching operations challenged the reactor coolant inventory key safety function and increased the potential for a reactor vessel drain down event to occur.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Appendix G, "Shutdown Operations - Significance Determination Process." Inspectors referred to Appendix G Attachment 1, "Shutdown Operations - Significance Determination Process: Phase 1 Operational Checklist for Both PWRs and BWRs," and determined that since key safety functions were maintained, the issue screened as Green, and no further analysis was required.

The inspectors identified a cross-cutting aspect associated with this finding in Human Performance - Resources, Procedures because although the engineering documentation recommended the power supplies be protected by Operations, this information did not get translated into the freeze seal procedure, MA-AA-736-610, or the applicable work package. (H.2(c))

Enforcement: Title 10 CFR 50.65(a)(4) requires, in part, that before performing maintenance activities, the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities.

Contrary to the above, on March 25, 2010, the licensee did not identify the interrelation between the mechanical freeze seal activity and the electrical power switching activity during risk assessment activities and as a result did not manage the work activities to prevent loss of power to the freeze seal machines providing the credited boundary to prevent draining the reactor vessel.

Because this finding is of very low safety significance, and this issue has been entered into the licensee's corrective action program as IRs 1047057, 1047813, and 1047963, this violation is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy (**NCV 05000265/2010003-01, Loss of Power to Freeze Seal Machine During OPDRV**).

Immediate corrective actions for this event included restoration of power to the freeze seal machine and restoration of freeze temperature. Additional actions included

changes to procedures requiring power supplies to be protected using robust barriers, additional diversity for power supplies to improve reliability, and verification prior to starting work that no planned activities will interrupt power to the machines.

.4 Selected Issue Follow-Up Inspection: Issue Report 1054342, Unplanned Reactor Water Cleanup Group III Isolation Resulting From a Broken Common Neutral

a. Inspection Scope

During inspection activities supporting the Q2R20 refueling outage and the licensee's CAP on April 8, 2010, the inspectors recognized a corrective action item documenting an unplanned reactor water cleanup (RWCU) containment isolation received during maintenance.

This review constituted one annual selected issue follow-up problem identification and resolution sample as defined in IP 71152-05.

b. Findings

Introduction: A self-revealed finding of very low safety significance (Green) and a NCV of TS 5.4.1 was identified on April 8, 2010, when a Unit 2 Group III Containment Isolation Signal was received during replacement of a primary containment isolation system (PCIS) relay as a result of a broken common neutral.

Description: On January 9, 2010, technicians from the electrical maintenance department (EMD) performed bench testing of a new General Electric relay as part of pre-outage work. In order to match the controlled wiring diagram, a change in the relay contact configuration was performed, and the final relay configuration was documented in the work package closure notes.

On January 23, 2010, this work package was transferred from EMD to a maintenance contractor. The work instructions were then rewritten by a contracted electrical planner to incorporate the specific requirements for contract electricians to perform the relay replacement. Installation guidance to account for the contact reconfiguration previously performed by EMD was not documented in the work package. On March 24, 2010, contract electricians replaced the PCIS relay as directed by the work instruction. As installed, the relay was in an incorrect configuration (due to the undetected reconfiguration performed in January). At the time, Unit 2 was in MODE 4 with no power to the relay control cabinet, and the RWCU system was shut down and isolated.

On April 7, 2010, with RWCU operating, the relay was returned to service and started to "chatter" when control power fuses were installed. The work was stopped and the control power fuses were removed, pending troubleshooting.

On April 8, 2010, the clearance order was re-hung and contract electricians determined that the relay was incorrectly configured. The contract electricians attempted to reconfigure the relay contact wiring. When the lead was lifted from terminal 10, electrical continuity provided by a common neutral was broken causing a different relay to de-energize. This resulted in a Group III PCIS signal which isolated RWCU.

Analysis: The inspectors determined that failure to identify and provide instructions to mitigate the impact of the common neutral during the work planning process was a

performance deficiency. The inspectors determined the finding was more than minor because the performance deficiency impacted the Mitigating Systems Cornerstone attribute of Configuration Control for Operating Equipment Lineup to ensure the availability, reliability and capability of safety systems to respond to initiating events to prevent undesirable consequences. The inspectors performed a Phase 1 SDP evaluation. Using Manual Chapter 0609, Attachment 4, Table 4a, Mitigating Systems Cornerstone, all questions were answered 'No,' and this finding screened as Green, or having a very low safety significance. The inspectors determined that this finding was cross-cutting in the area of Human Performance, Work Control, because the licensee failed to assess the impact of changes to the work scope and the operational impact of the work activity to the current plant conditions (H.3(b)).

Enforcement: Technical Specification 5.4.1 states, in part, that written procedures shall be established, implemented, and maintained for maintenance activities covered by Regulatory Guide 1.33.

Regulatory Guide 1.33, Appendix A, Section 9; "Procedures for Performing maintenance," Paragraph a, states, in part, "Maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances."

Contrary to the above, on April 8, 2010, the licensee failed to properly pre-plan a documented work instruction appropriate to the circumstances to reconfigure a safety-related PCIS relay. This resulted in a challenge to safety-related equipment in that a Group III PCIS signal resulted with a RWCU system isolation during the maintenance. Because this violation is of very low safety significance, and because the issue was entered into the corrective action program as IR 1054342, this issue is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy **(NCV 05000265/2010003-02, PCIS Relay Common Neutral Broken)**.

Corrective actions for this event included immediate restoration of the RWCU system and rewiring for the PCI relay to the proper configuration. Additional actions included changes to the model work orders for AC Relays to include a planner's note to verify the existence of common neutrals when using wiring diagrams and include steps to install and remove jumpers to prevent breaking the common neutral.

.5 Selected Issue Follow-Up Inspection: Issue Report 1079764, Leading Edge Flow Meter Not Inputting Valid Data Into Core Thermal Power

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized a corrective action item documenting the alarm condition of invalid data from the leading edge flow meter (LEFM) as an input to the calculation of core thermal power for Unit 2. A LEFM and a feedwater flow venturi were installed on the discharge of each reactor feed pump. Two pressure transmitters provide density compensation for the LEFM. The installed design required the two pressure transmitters to agree within 20 psig of each other, or an alarm is actuated to alert the control room operators of the instrument deviation. In this case, on June 11, 2010, the two pressure transmitters on the 2B reactor feed pump had a difference of 25 psig. Control room operators swapped

measured feedwater flow from the LEFM to the feedwater venturi. As a result, indicated thermal power dropped from 2955 Megawatts-thermal (MWth) to 2932 MWth with no change in electrical load. The licensee established an administrative thermal power limit of 2934 MWth until the uncertainties of feedwater flow had been corrected.

The licensee calibrated the pressure transmitters associated with the 2B reactor feed pump LEFM and found that one transmitter was found with a 'zero shift.' Following calibration of the instrument, the licensee maintained measured feedwater flow using the venturies to allow for a confidence run of the LEFM to ensure the pressure transmitter deviation had been corrected. On June 24, 2010, the licensee transferred measured feedwater flow to the LEFM and returned to full core thermal power of 2957 MWth. The issue was entered into the CAP as IR 1079764, "LEFM Not Inputting Valid Data into Core Thermal Power."

This review constituted one annual selected issue follow-up problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings of significance were identified.

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

.1 (Closed) Licensee Event Report (LER) 05000254/2010-001-00: Electromatic Relief Valve Main Disc Failure

This event, which was identified on January 28, 2010, documented an electromatic relief valve (ERV) that failed to open during testing after the valve had been removed from the plant. The ERV was purchased new in 2004 and had been tested prior to installation to verify the valve lifted as designed. The valve was in service on Unit 1 from April 2005 to April 2009. Investigation into why the valve failed to open revealed that the valve disc retainer was not fully inserted in the valve. The non-conforming assembly left a gap between the main disc guide and the disc retainer. This gap left the main disc guide loosely seated in the valve cavity and allowed the main disc seal rings to wear a groove in the disc guide as the valve vibrated with steam flow in the main steam lines. At some point during the period that the valve was installed, the fretting wear in the disc guide wall created a deep enough groove that the main disc was locked in place and the valve would not have operated in manual, automatic pressure relief, or automatic depressurization modes. This failure was reported as a past operation or condition prohibited by TS.

After additional discussion with the supplier, the licensee determined that the most likely reason the disc retainer was not fully inserted was because the valve had been insufficiently torqued during valve reassembly by the supplier's representative (Dressor/Enertech) prior to shipping the valve to Quad Cities. This reassembly occurred during the testing phase of the valve after the valve initially failed the steam testing. Dressor/Enertech personnel performed maintenance on the valve and the valve then passed the lift testing. The supplier then shipped the valve to Quad Cities as a new valve with certification that the valve was assembled and tested in accordance with the supplier's qualified quality assurance program and the purchase specification. The documentation provided to the licensee did not indicate that the valve had been refurbished.

Inspectors reviewed a similar failure in 2001 following onsite refurbishment of an ERV to evaluate adequacy the corrective actions put in place after that event. Similar valve condition was identified and the cause was determined to be inadequate torque of the retainer plug during valve refurbishment. Until the 2001 failure, the licensee had used the manufacturers' specification for valve torque. The licensee determined that while this value was sufficient for components with very little threading resistance (i.e., new valves), this torque was not sufficient to ensure that the disc guide was fully captured by the disc retainer for refurbished valves. Working with the vendor in 2001, the licensee established a nominal torque approximately ten times the new valve torque to ensure the disc retainer was fully inserted during valve refurbishment.

Corrective actions for the event described in the LER included repair of the affected component and modification of the purchase specification for replacement valves to include certification by the vendor that the retainer plug was torqued to the higher value before the seal weld was applied. Documents reviewed as part of this inspection are listed in the Attachment to this report. This LER is closed.

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

.2 Declaration of Notice of Unusual Event Leading to Evacuation of Access Facility due to a Freon Leak

a. Inspection Scope

The inspectors monitored the plant's response to an Unusual Event from a Freon leak in the Quad Cities access facility on May 19, 2010. At 1:30 p.m. technicians performing work on the ventilation refrigerant unit (HVAC) noted liquid refrigerant issuing from the packing gland of a valve in their work area and local atmosphere monitors began to alarm. The technicians exited the area, notified security and contacted operators in the main control room. Operators directed the evacuation of the building and declared an Unusual Event for a report of toxic gases that could affect normal plant operations in accordance with emergency action level HU7. Air samples taken in the building showed the maximum measured Freon concentration was 600 ppm. At no time did Freon concentration approach the regulatory 8 hour limit of 1000 ppm, or the 15 minute limit of 1250 ppm. Workers present at the time of release were examined and showed no signs of any health impacts. The licensee exited from the Unusual Event at 2:38 p.m.

Quad Cities Units 1 and 2 remained at full power for the duration of the event. There were no compensatory actions required or complications to safe operations as a result of the Unusual Event. Documents reviewed in this inspection are listed in the Attachment to this report.

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

b. Findings

Introduction: An NRC-identified finding of very low safety significance (Green) and associated NCV of 10 CFR 50.47(b)(9) was identified for the delayed corrective action without appropriate compensatory actions for a defective computer point that provided wind direction data to the plant parameter display system (PPDS). This defective computer point resulted in incorrect wind direction on a nuclear accident reporting

system (NARS) form transmitted to the State of Illinois as part of the declaration of an Unusual Event on May 19, 2010.

Description: On December 23, 2009, the licensee was investigating computer points that were in alarm as reported by the plant process computer. The licensee identified computer point R234 was not receiving good data and was not displaying a numerical value. This computer point is responsible for transmitting meteorological tower wind direction data for 296 foot elevation to the plant process computer. This condition was entered into the licensee's CAP as IR #1009116, and a work order was generated. Operations declared this computer point non-functional. Basic troubleshooting revealed that the meteorological tower was transmitting good data, but a terminating resistor at the plant process computer was corrupting the data stream.

The licensee attempted to validate that wind speed, and direction was available via PPDS. When the 15 minute average for wind direction was looked at from the PPDS screen, a numerical value was displayed in the information block. The individual performing the check expected to see a string of '#s' or '?s' if the data was invalid, based on their training and experience when using PPDS. Since a numerical value was displayed, the assumption was made that the PPDS data was good. No compensatory actions were put in place in December 2009.

During the licensee's post-event review on May 20, 2010, the licensee contacted the State of Illinois representative to ask if there were any questions regarding the Unusual Event at Quad Cities. The state representative informed the licensee that the wind direction on the NARS form from May 19, 2010, was incorrect as indicated by state instrumentation at the time of the event and the site instruments had been displaying the same numerical value for the past few weeks.

The licensee reviewed the 15 minute average on PPDS and noticed that the same numerical value was displayed from the previous day. When this box was selected in the graphical user interface, a trend box was displayed on screen. The trend screen showed a flat line and the value for wind direction had not changed for the duration of the available history. At this time the licensee declared wind direction from PPDS non-functional and placed compensatory measures in place on May 20, 2010, that directed emergency response personnel not to use PPDS data from the available methods to obtain wind direction as detailed in EP-MW-114-100.

Following the discovery of faulty wind direction from PPDS, the licensee made arrangements to validate that meteorological data from other sources could still be used as an onsite backup method of determining wind direction. On May 24, 2010, computer point R234 was restored and normal indication had returned for wind direction as read from the PPDS. The previously implemented compensatory actions were removed and users were directed to obtain wind direction data from the preferred source of the PPDS.

Analysis: The inspectors concluded the delay in implementing corrective actions for the deficient computer point without appropriate compensatory actions for an indication important for the assessment of a radioactive release was a performance deficiency and a finding. This finding is more than minor because the performance deficiency matches an example of a Green finding from IMC 0609, Appendix B, Section 4.9, page B-20, "Equipment or systems necessary for dose projection are not functional for longer than 24 hours from the TIME OF DISCOVERY without compensatory measures, or corrective actions are inadequate or delayed."

The inspectors determined that the performance deficiency met the SDP criteria for a failure to comply for the risk significant planning standard of having methods, systems and equipment for assessment of radioactive releases available and in use. The delay in corrective actions without appropriate compensatory actions was a result of the licensee's failure to recognize that wind direction as indicated on PPDS was invalid and to use an alternate method of obtaining correct wind direction data as detailed in EP-MW-114-100. This failure could have resulted in offsite authorities taking incorrect offsite measures based on erroneous wind direction. The program element of having methods, systems and equipment for assessment of radioactive releases available and in use was adequate as designed and did not result in a LOSS OF PS FUNCTION since other methods of obtaining meteorological data were available for use.

Using IMC 0609, Appendix B, Sheet 1, "Failure to Comply Flowchart," the performance deficiency was evaluated as a Risk Significant Planning Standard Problem but not a Planning Standard Functional Failure. As a result, this finding screened as Green, or very low safety significance. Inspectors identified this performance deficiency had a cross-cutting aspect in Problem Identification and Reporting. When the non-functional computer point, R234, was identified in December 2009, the licensee failed to thoroughly evaluate, classify and prioritize the condition of bad data from a computer point and determine how the condition affected PPDS (P.1(c)). Subsequent troubleshooting on May 20, 2010, indicated that the 15 minute wind direction data point in PPDS performed a calculation utilizing the last 15 minutes of data. If data was missing, the calculation would substitute the last good data available. Had this process been recognized in December 2009, ERO members could have been trained to identify invalid PPDS data trends and to utilize alternate data collection methods.

Enforcement: Title 10 CFR 50.47(q) requires, in part, a licensee authorized to possess and operate a nuclear power reactor shall follow and maintain in effect emergency plans which meet the standards in 10 CFR 50.47(b).

Title 10 CFR 50.47(b)(9) requires adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.

Contrary to the above, on December 23, 2009, the licensee did not have adequate methods for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition. This failure resulted in the reporting of inaccurate wind direction on the NARS form transmitted to state and local authorities during the declaration of the Notice of Unusual Event on May 19, 2010. State and local agencies rely on information provided by the licensee to formulate protective actions for the health and safety of the public. While this deficiency resulted in no actual consequence, the potential existed for state and local agencies to take incorrect offsite measures based on erroneous wind direction.

Because this issue is of very low safety significance, and this issue has been entered into the licensee's corrective action program as Issue Report 1071678, this issue is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy (**NCV 05000254/2010003-03, 05000265/2010003-03, Incorrect Wind Direction On NARS Form**).

Corrective actions included the restoration of the computer point for PPDS, verification of other methods of wind direction available for use, providing instructions for users to

recognize invalid data, and implementing software changes to alert users when invalid data has been received.

.3 (Closed) Licensee Event Report (LER) 05000265/2010-001-00: Main Condenser Low Vacuum Scram RPS Switch Inoperable Exceeded Technical Specifications

a. Inspection Scope

This event, which was identified on April 14, 2010, documented a RPS low vacuum pressure switch that was isolated and not identified as impacting Technical Specifications until after a MODE change. Although all of the required equipment was not operable, sufficient redundant equipment was available to maintain the main condenser low vacuum scram function. Additional discussion is provided in the associated finding. Documents reviewed as part of this inspection are listed in the Attachment to this report. This LER is closed.

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

b. Findings

Introduction: A self-revealed finding of very low safety significance (Green) and a NCV of TS 3.0.4 was identified on April 14, 2010, when operators changed operating modes from MODE 2 to MODE 1 without having all required channels of RPS Turbine Condenser Vacuum-Low Scram function available prior to entering MODE 1.

Description: During the morning of April 14, 2010, Unit 2 was in MODE 2 and in the process of power ascension after exiting a refueling outage. At 8:00 a.m., the operating crew identified the 2C main condenser vacuum indication changed more slowly than the other condenser vacuum indicators when plant conditions were changed. A work order was generated to troubleshoot the difference in indications and assigned to the instrument maintenance department (IMD). The operating crew continued with the power ascension.

At 11:11 a.m. on April 14, 2010, operators transitioned Unit 2 to MODE 1 with the degraded condenser vacuum indication. The licensee did not recognize the instrument sensing line was common between the RPS condenser vacuum pressure switch and the pressure transmitter driving the control room indication. Therefore, the licensee did not evaluate if all required RPS instrumentation was available for the Turbine Condenser Vacuum-Low Scram function. As a result, the licensee did not ensure that the provisions of LCO 3.0.4 were met prior to changing MODES.

At 5:54 p.m. that same day, IMD technicians contacted the control room for permission to install an RPS test box in order to perform an instrument surveillance on the instrument line for the 2C main condenser vacuum indication. The IMD intended to perform QCIS 0500-18, "Low Condenser Vacuum Scram Calibration and Functional Test." This procedure contains steps to ensure the instrument lines are clear of obstructions. A precaution in this procedure directed IMD to expect a half scram, or to install an RPS test box to prevent an RPS actuation if in MODE 1. Operators at this time recognized the instrument sensing line was common to the RPS pressure switch and to the pressure transmitter driving the control room indication. The unit supervisor granted permission for IMD to install the RPS test box and tracked the work appropriately.

At 6:30 p.m., the IMD technician reported insufficient flow to the pressure transmitter.

At 11:51 p.m., an instrument root valve was found partially closed on the common sensing line to the pressure transmitter for the 2C main condenser vacuum indication and the RPS pressure switch. After fully opening this root valve, condenser vacuum indications were matched. Surveillances were completed at 12:32 a.m., April 15, 2010, and the channel was declared operable.

The RPS Turbine Condenser Vacuum-Low Scram function consists of four channels, two channels per trip system, with each trip system arranged in a one-out-of-two logic. All four channels are required to be operable in MODE 1 such that no single channel failure will preclude a protective action resulting from a Low Condenser Vacuum condition.

Analysis: The inspectors determined that performing a MODE change from MODE 2 to MODE 1 without meeting the conditions of LCO 3.0.4 or ensuring all required channels of the RPS Turbine Condenser Vacuum-Low Scram function were available prior to entering MODE 1 was a performance deficiency. The inspectors determined the finding was more than minor because the performance deficiency impacted the Mitigating Systems Cornerstone attribute of Configuration Control for Operating Equipment Lineup to ensure the availability, reliability and capability of safety systems to respond to initiating events to prevent undesirable consequences. The inspectors performed a Phase 1 SDP evaluation. Using Manual Chapter 0609, Attachment 4, Table 4a, Mitigating Systems Cornerstone, all questions were answered 'No,' and this finding screened as Green, or having a very low safety significance. The inspectors determined that this finding was cross-cutting in the area of Problem Identification and Resolution: Evaluation, because the licensee failed to properly classify, prioritize and evaluate for operability with regards to the degraded condenser vacuum indication once the degraded indication was identified. (P.1(c))

Enforcement: Limiting Condition for Operation 3.3.1.1 specified that four channels of Turbine Condenser Vacuum-Low Scram function are required to be operable in MODE 1. If one channel is not operable, the TS required the channel or the associated trip system to be placed in trip.

Limiting Condition for Operation 3.0.4 specified the requirements that must be satisfied prior to making a MODE change if an LCO is not met. LCO 3.0.4 stated, in part, "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made:

- a. When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time;
- b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE, or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications, or
- c. When an allowance is stated in the individual value, parameter or other Specification."

Contrary to the above, on April 14, 2010 at 11:11 a.m., the provisions of LCO 3.0.4 were not met when operators transitioned from MODE 2 to MODE 1 and, therefore, the MODE change was a violation of the Technical Specification requirement.

- The associated ACTIONS for Technical Specification 3.3.1.1 Condition A to Place the channel in trip OR to place the associated trip system in trip were not performed prior to the MODE change. With the channel in trip, indefinite operation would be allowed by Technical Specifications. Since these ACTIONS were not taken prior to the MODE change, condition 'a' of LCO 3.0.4 was not met.
- No risk assessment was performed to address the risk associated with one channel of the RPS Turbine Condenser Vacuum-Low Scram function being unavailable prior to the MODE change. Therefore, condition 'b' of LCO 3.0.4 was not met.
- Condition 'c' of LCO 3.0.4 does not apply since there was no specific MODE change allowance stated in Technical Specification 3.3.1.1 if the LCO was not met.

Because this violation is of very low safety significance, and because the issue was entered into the corrective action program as IR 1056375, this issue is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy **(NCV 05000265/2010003-04, MODE Change Without Required RPS Instrumentation)**. Corrective actions for this event included immediate restoration of proper condenser vacuum indication. Additional corrective actions included changes to the licensee's Startup Checklist to review abnormal plant indications and verify no impact or proper resolution for Technical Specification equipment prior to entering MODE 1 or 2, and for Operations Department to review high traffic work areas each outage and determine appropriate valve lineups or component protection to assure proper configuration control.

40A5 Other Activities

.1 (Closed) NRC Temporary Instruction 2515/173 Review of the Industry Groundwater Protection Voluntary Initiative

a. Inspection Scope

A NRC assessment was performed of the licensee's implementation of the Nuclear Energy Institute - Ground Water Protection Initiative (NEI-GPI) (dated August 2007 (ML072610036)) at the Quad Cities Nuclear Power Station. Under the voluntary initiative, each site was to have developed an effective, technically sound ground water protection program that aligned with the NEI initiative by August 2008.

The inspectors assessed whether the licensee evaluated work practices that could lead to leaks and spills and performed an evaluation of systems, structures, and components that contain licensed radioactive material to determine potential leak or spill mechanisms.

The inspectors determined if the licensee completed a site characterization of geology and hydrology to identify the predominant ground water gradients and potential pathways for ground water migration from onsite locations to offsite locations.

The inspectors also determined if an onsite ground water monitoring program had been implemented to monitor for potential licensed radioactive leakage into groundwater and that the licensee had provisions for the reporting of its ground water monitoring results. (See <http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html>)

The inspectors reviewed the licensee's procedures for the decision making process for potential remediation of leaks and spills, including consideration of the long term decommissioning impacts. The inspectors reviewed records of leaks and spills that were recorded in the licensee's decommissioning files, to determine if the information was in accordance with 10 CFR 50.75(g).

The inspectors reviewed the licensee's notification protocols to determine whether they were consistent with the Groundwater Protection Initiative and/or State of Illinois statutes. The inspectors assessed whether the licensee identified the appropriate local and state officials and conducted briefings on its ground water protection initiative. The inspectors also determined whether protocols were established for notification of the applicable local and state officials regarding detection of leaks and spills.

b. Findings

No findings of significance were identified; however, as specified in Section 2515/173-05 of the Temporary Instruction (TI), the inspectors identified the following deviation from Nuclear Energy Institute - Ground Water Protection Initiative (NEI-GPI) protocol that was not implemented consistent with the licensee's procedures.

(1) GPI Objective 1.3 – Onsite Groundwater Monitoring

- c. *Establish an onsite groundwater monitoring program to ensure timely detection of inadvertent radiological releases to groundwater including analysis protocols/sensitivity requirements for groundwater monitoring consistent with the licensee's existing Radiological Environmental Monitoring Program (REMP), as described in its Offsite Dose Calculation Manual (ODCM).*

The licensee had not consistently implemented its onsite groundwater monitoring program to include analyses of all radionuclides at the associated analytical sensitivities provided in the NEI initiative (and the associated licensee procedures), to ensure the voluntary communication criteria in GPI objectives 2.2 and 2.3 could be met. Specifically, certain groundwater samples were not routinely analyzed in a sufficiently timely manner to ensure ODCM/REMP specified lower limits of detection (LLDs) were achieved. In particular, over 50 percent of samples analyzed for the presence of iodine-131 in 2008 and 2009, did not achieve procedure specified LLDs.

40A6 Management Meetings

.1 Exit Meeting Summary

On July 7, 2010, the inspectors presented the inspection results to M. Prospero, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The results of Radiological Hazard Assessment/Exposure Controls and ALARA program inspection with Mr. Tulon, Site Vice President, and other licensee staff on April 2, 2010.
- The results of Radiological Environmental Monitoring and Groundwater Protection Initiative inspection with Mr. R. Gideon, Site Vice President, and other licensee staff on June 17, 2010.

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

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Prospero, Plant Manager
R. Gideon, Site Vice President
W. Beck, Regulatory Assurance Manager
D. Bowman, Operations Services Manager
D. Collins, Radiation Protection Manager
D. Craddick, Maintenance Director
R. Dammann, Business Manager
S. Darin, Engineering Director
J. Garrity, Work Control Director
R. Gaylord, Training Support Manager
V. Neels, Chemistry/Environ/Radwaste Manager
P. Summers, Maintenance Director
D. Thompson, Security Manager
J. Wooldridge, Chemistry Programs Supervisor
G. Powell, Radiation Protection Technical Supervisor

Nuclear Regulatory Commission

M. Ring, Chief, Reactor Projects Branch 1

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

50-265/2010003-01	NCV	Loss of Power to Freeze Seal Machines During OPDRV
50-265/2010003-02	NCV	PCIS Relay Common Neutral Broken
50-254/2010003-03; 50-265/2010003-03	NCV	Incorrect Wind Direction on NARS Form
50-265/2010003-04	NCV	MODE Change without Required RPS Instrument

Closed

50-265/2010003-01	NCV	Loss of Power to Freeze Seal Machines During OPDRV
50-265/2010003-02	NCV	PCIS Relay Common Neutral Broken
50-254/2010003-03; 50-265/2010003-03	NCV	Incorrect Wind Direction on NARS Form
50-265/2010003-04	NCV	MODE Change without Required RPS Instrument
50-254/2010-001-00	LER	Electromatic Relief Valve Main Disc Failure
50-265/2010-001-00	LER	Main Condenser Low Vacuum Scram RPS Switch Inoperable Exceeded Technical Specifications
2515/173	TI	Review of the Industry Groundwater Protection Voluntary Initiative

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 or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

Section 1R01

- WC-AA-107; Seasonal Readiness; Revision 7
- QCOA 6000-03; Low Switchyard Voltage; Revision 10
- QCOA 0010-10; Tornado Watch-Warning, Severe Thunderstorm Warning or Severe Winds; Revision 21
- OP-AA-108-111-1001; Severe Weather and Natural Disaster Guidelines; Revision 03
- QCOS 0010-06; Key Phone Numbers and Checklists for Referenced 10 Block Procedures; Revision 12
- QCOA 6100-03; Loss of Offsite Power; Revision 25

Section 1R04

- QCOP 4100-03; Diesel Fire Pump Operation; Revision 18
- QCOP 0-4100-01; Unit 0 Fire Protection Valve Checklist; Revision 16
- QCOP 0-4100-02; Unit 0 Fire Protection Valve Checklist (Crib House & MISC); Revision 15
- QCOP 1-4100-01; Unit 1 Fire Protection Valve Checklist; Revision 7
- QCOP 2-4100-01; Unit 2 Fire Protection Valve Checklist; Revision 12
- Drawing M-27 Sheet 1; Diagram of Fire Protection Piping; Revision PY
- Drawing M-27 Sheet 2; Diagram of Fire Protection Piping; Revision WT
- Drawing M-27 Sheet 3; Diagram of Fire Protection Piping; Revision H
- Drawing M-27 Sheet 4; Diagram of Fire Protection Piping; Revision Q
- Drawing M-27 Sheet 5; Diagram of Fire Protection Piping; Revision C
- Drawing M-27 Sheet 6; Diagram of Fire Protection Piping; Revision A
- IR 10698611; Dirty Sight Glass on ½ A Fire Diesel; 5/12/2010
- IR 1005839; PIV ½-4199-166 External Leakage; 12/15/2009
- QCOP 6600-0198; Diesel Generator 1(2) Preparation for Standby Operation; Revision 38
- QCOP 2900-01; Safe Shutdown Makeup Pump System Preparation for Standby Operation; Revision 29

Section 1R05

- Fire Zone 11.2.1; Unit 1 Reactor Building 554'-0" Elevation Southwest Corner Room – 1A Core Spray
- Fire Zone 8.2.8.E; Unit 2 turbine Building 639'-0" Elevation Main Turbine Floor (Inside Shield Wall)
- Fire Zone 9.3; Unit ½ RB 595'-0" Elevation ½ Diesel Generator
- Fire Zone 11.2.4; Unit 1 RB 554'-0" Elevation NE Corner Room – 1A RHR Room
- IR 1069164; ELP 38 Does Not Have a Trickle Charge Light Lit; 5/13/2010
- IR 1068388; No Trickle Charge Light on ELP 15D; 5/12/2010
- IR 1068641; U2 EDG Light Pack 2-7900-27, Green Trickle Charge Light Out; 5/12/2010
- Fire Zone 19.1; SB 595'-0" Elevation New Computer Room
- Fire Drill Scenario 2010-5-25-10 2nd QTR Scenario #2; U-1 4KV Switch Gear Fire

- QCOA 0010-12 Fire Explosion; Rev 35
- Quad Cities Generating Station Pre-Fire Plan TB 75; FZ 8.2.6.A; Unit 1 TB 595'-0" Elev. 4KV Switchgear and U-1 Trackway

Section 1R11

- LOCT-1061 ECORE; RPV Water Level Instrument Failure/Loss of MCC 15-2/ ATWS/RPV Flooding
- EP-AA-1006; Radiological Emergency Plan Annex for Quad Cities Station; Revision 28
- IR 1078587; TRNG: LORT Crew Classified an EAL Not Described in the Guide; 06/09/2010

Section 1R12

- Evaluation of System Performance Report for the Z0281 Functions (Reactor Manual Control System) from 06/01/08 to 06/01/10
- Evaluation of System Performance Report for the Z0287 Functions (Automatic Depressurization System) from 01/01/08 to 01/01/10

Section 1R15

- EC 379372; Evaluated Required Action Limit Increase for CV 2-0220-58B
- EC 360321; Q2R18 Feedwater Check Valve LLRT Methodology
- QCTP 0130-01; Leak Rate Testing Program; Revision 20
- IR 1054019; Residual Air in Suction of 2A Core Spray Pump; 4/8/2010
- EC 371224; NRC GL 08-01 Venting and Gas Accumulation Evaluation for Core Spray ; Revision 0
- IR 1055791; ASD 2A 4 KV Input Breaker Reclosed after a Normal Trip
- EC 379711; Evaluate operation of the 4KV Power Feed Circuit Breaker for the ASD units with the fuses removed; Revision 1
- EC 366314; Rx Recirculation MG Set Replacement with ASD Units; Revision 5
- TS 3.3.4.1 (B3.3.4.1); Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation
- Drawing 4E-2422 Sheet 1; Schematic Diagram Recirculating Pump ASD 2A
- UFSAR Section 7.8; Anticipated Transient Without Scram Mitigation System
- UFSAR Section 15.8; Anticipated Transient Without Scram
- IR 1055989; 345 KV Predicted Post LOCA Trip Voltage Low; 4/13/10
- QCOA 6000-03; Low Switchyard Voltage; Revision 10
- IR 1066733; Like for Like Valve Doesn't Meet DOC Requirements of ASME XI; 5/7/10
- EC 378063; Carbon Steel Valve Required to Replace Cast Iron Cast Iron Valve 2-3999-93 to Meet ASME Section XI Requirements; Revision 0
- IR 1072775; Cracked Interrupter Bottle in Merlin Gerin 4KV Breaker 211; 5/24/2010
- IR 1028426; Dresden Station AMHG 4KV Bkr B Phase Bottle Cracked at NLI; 2/10/2010
- IR 1073178; (Dresden) Cracked Interrupter Bottle in Merlin Gerin 4KV Breaker; 5/25/2010
- EC 379729; (Dresden) Review of test results for instrumented testing of Merlin Gerin AMHG-5-350-12 Breaker; Revision 0

Section 1R18

- EC 374439; Install Cameron LEFM CheckPlus System; Revision 1
- TIC 2520; Quad Cities Unit 2 Power Ascension Procedure to Maximum Thermal Power Post Turbine Retrofit; Revision 0

Section 1R19

- WO 01-255053; Valve Disassembly and Overhaul
- QCTS 0600-09; RCIC Steam Exhaust Leak Rate Test CK-1(2)-1301-41 SCK-1(2)-1301-64; Revision 14
- QCTP 0130-01; Leak Rate Testing Program; Revision 20
- WO 01-147438; Emergency DG Largest Load Reject
- QCOS 6600-39; Unit Two Emergency Diesel Generator Largest Load Reject Surveillance; Revision 24
- QCOS 0250-04; MSIV Closure Timing; Revision 22
- QCOS 1000-04; RHR Service Water Pump Operability Test; Revision 49
- QCOS 1000-06; RHR Pump Loop Operability Test; Revision 48
- QCOS 1300-17; RCIC Pump Test Slow Roll After Maintenance; Revision 24
- WO 01-43968; RHR Injection (LPCI) LLRT (IST)
- QCTS 0600-16; RHR Injection (LPCI) Local Leak Rate Test (MO-1(2)-1001-29A/B); Revision 16
- QCTP 0130-01; Leak Rate Testing Program; Revision 20
- QCOP 1000-04; RHR Service Water System Operation; Revision 19
- WO #01-331563; MM Repair 2B RHRSW HP Pump Leak
- WO 01-347050; U2 A RHR (2-1002-A) Motor Bearing Frequencies are Elevated
- IR 1080950; U2 A RHR Motor Bearing Frequencies are Elevated; 6/16/2010

Section 1R20

- OP-AA-108-117; Protected Equipment Program; Revision 10
- MA-AA-738-610; Application of Freeze Seal to All Piping; Revision 5
- MA-AA-738-610; Application of Freeze Seal to All Piping; Revision 6

Section 1R22

- QCOS 1600-07; Reactor Coolant Leakage in the Drywell; Revision 27
- WO 01-43968; RHR Injection (LPCI) LLRT (IST)
- QCTS 0600-16; RHR Injection (LPCI) Local Leak Rate Test (MO-1(2)-1001-29A/B); Revision 16
- QCTP 0130-01; Leak Rate Testing Program; Revision 20
- QCOS 1300-01; Periodic RCIC Pump Operability; Revision 37
- QCOS 2300-01; Periodic HPCI Operability; Revision 49
- QCOS 2300-05; Quarterly HPCI Pump Operability Test; Revision 64
- WO 01-312061; 2A RHR Loop Venting
- QCOS 1000-25; RHR Loop Venting; Revision 16

Section 1EP6

- EP-AA-1006; Radiological Emergency Plan Annex for Quad Cities Station; Revision 27
- EP-AA-1006; Radiological Emergency Plan Annex for Quad Cities Station; Revision 29

Section 2RS1

- RP-AA-301; Radiological Air Sampling Program; Revision 2
- CR 00923354; Accumulated Dosimetry Alarm; dated May 21, 2009
- CR 01007408; Mechanical Maintenance Personnel Used Incorrect RWP; dated December 18, 2009

- RP-AA-203-1001; Personnel Exposure Investigation; Revision 6
- CR 00946284; Electronic Dosimetry Dose Rate Alarm; dated July 27, 2009
- CR 01027289; Individual Received Accumulated Dose Alarm; dated February 8, 2010
- CR 01041800; Poor Radiation Worker Practice; dated March 12, 2010
- Area radiological and air sample surveys for various locations and time periods (December 2009 - March 2010)
- Nuclear Oversight Assessment No. NOSA-QDC-09-06; Radiological Surveys, Frisking and Postings; dated August 3 - 13, 2009

Section 2RS2

- Self-Assessment Report No. 991049-01; Occupational ALARA Planning and Controls; dated February 26, 2010
- RP-AA-401; Operational ALARA Planning and Controls; Revision 10
- ALARA Plan and associated TEDE ALARA Evaluations for RWP 10010850; Scaffold Work; Revision 2
- ALARA Plan and associated TEDE ALARA Evaluations for RWP 10010886; Drywell Insulation Activities; Revision 1
- ALARA Plan and associated TEDE ALARA Evaluations for RWP 10010896; Reactor Disassembly/Reassembly and Cavity Work; Revision 0
- ALARA Plan and associated TEDE ALARA Evaluations for RWP 10010902; ERV/SRV and Target Rock Valve Maintenance; Revision 0
- ALARA Plan and associated TEDE ALARA Evaluations for RWP 10010913; Inboard MSIV Overhaul Contingency; Revision 0
- ALARA Plan and associated TEDE ALARA Evaluations for RWP 10010938; Turbine Replacement Project; Revision 3
- ALARA Work-In-Progress Reviews for RWP 10010902; dated March 20 and 24, 2010
- CR 01048435; ERV/SRV Replacement Lessons Learned; dated March 26, 2010
- ALARA Work-In-Progress Review for RWP 10010913; dated March 25, 2010
- ALARA Work-In-Progress Reviews for RWP 10010938; dated March 1 and 15, 2010
- ALARA Plan and Associated TEDE ALARA Evaluation for RWP 10010897; Replace Drywell Sump Pumps and Check Valves; Revision 0
- ALARA Plan for RWP 10010972; Refurbish 2-1001-50 Valve; Revision 0
- ALARA Work-In-Progress Review for RWP 10010972; dated March 28 and 30; 2010
- Unit 2 Recirculation System Historical Radiation Levels; undated

Section 2RS4

- RP-AA-210; Dosimetry Issue, Usage and Control; Revision 16
- CR 01047170; Level 2 Personnel Contamination Event; dated March 23, 2010
- CR 01047355; Unplanned Radiological Uptake; dated March 24, 2010
- Teledyne Brown Engineering, Inc. Report of Analysis No. L35762
- Prospective Evaluation of the Need for Internal Monitoring at Quad Cities Nuclear Power Station and Annual Bioassay Program Review; dated January 7, 2010
- RP-AA-221; Whole Body Count Data Review; Revision 1
- RP-AA-220; Bioassay Program; Revision 6
- RP-QC-200-1001; In-Vitro Bioassay Sample Collection; Revision 0
- RP-AA-222; Methods for Estimating Internal Exposure from In-Vivo and In-Vitro Bioassay Data; Revision 3
- RP-AA-270; Prenatal Radiation Exposure; Revision 6
- RP-AA-250; External Dose Assessments from Contamination; Revision 4

- NVLAP Accreditation Certificate for Mirion Technologies (Global Dosimetry Systems), Inc. dated August 3, 2009
- RP-AA-211; Personnel Dosimetry Performance Verification; Revision 7
- AR 00884070; TLDs/Neutron Measurements; dated February 13, 2009
- AR 00916217; ED Dose rate Alarm; dated May 5, 2009
- AR 00906645; ED Rate Alarm; dated April 9, 2009
- AR 00883209; Individual Received ED Rate Alarm; dated February 20, 2009
- AR 00894062; Individual Received ED Rate Alarm from Welding Machine; dated March 17, 2009

Section 2RS7

- CY-QC-170-301; Offsite Dose Calculation Manual; Revisions 8 and 9
- Self-Assessment Report; Radiological Environmental Monitoring Program; dated March 25, 2010
- Report of NUPIC Joint Audit of Teledyne Brown Engineering, Environmental Services; NUPIC Audit No. 20110; dated October 29, 2008
- Sampling Procedures Manual; Environmental Incorporated, Midwest Laboratory; Revision 13
- CY-AA-170-1000; Radiological Environmental Monitoring Program and Meteorological Program Implementation; Revision 5
- Murray and Trettel, Inc; Monthly Reports on the Meteorological Monitoring Program at the Quad Cities Station; January 2008 – March 2010
- RP-AA-228; 10 CFR 50.75(g) and 10 CFR 72.30(d) Documentation Requirements; Revision 1
- Quad Cities Nuclear Power Station; Annual Radiological Environmental Operating Report for 2008; dated May 12, 2009
- Quad Cities Nuclear Power Station; Annual Radiological Environmental Operating Report for 2009; dated May 12, 2010
- Rotameter Calibration Data and Certificates (serial numbers 3K620007433, 91W513308, 90W113974 and 91W505576); dated various periods in 2009 and 2010
- Records of Air Sample Pump Maintenance and Flow Checks; various units/dates in 2009 and 2010

Section 4OA1

- NEI 99-02; Regulatory Assessment Performance Indicator Guideline; Revision 5
- LS-AA-2100; Monthly Data Elements for NRC Reactor Coolant System (RCS) Leakage; Revision 5
- LS-AA-2140; Monthly PI Data Elements; April 2009 – April 2010
- Electronic Dosimetry Alarm Transaction Reports; May 2009 - March 2010
- LS-AA-2140; Monthly PI Data Elements; May 2009 - February 2010

Section 4OA2

- IR 1054114; NRC ID'D: Inadequate Chocking of Spare Breakers in SSMP Room; 4/8/2010
- IR 1047057; Q2R20 LL – Freeze Seals, OPDRVs, Power Swaps; 3/24/2010
- IR 1047813; NOS ID Work Resumed Without Electrical Source Protected; 3/25/2010
- IR 1047963; Organizational Learning for Freeze Seal Technology; 3/25/2010
- ECR 380251; Evaluate Use of Rigid SuperFreeze SF-2500 for Use in this Application (Freeze Seal for Overhaul of 1-0305-101-10-51 Valve); Revision 0
- EC 341517; Allow the Use of RIGID “SuperFreeze” Model SF-25—for 2” and under Freeze Seals; Revision 0

- OP-AA-108-117; Protected Equipment Program; Revision 0
- MA-AA-738-610; Application of Freeze Seal to All Piping; Revision 5
- MA-AA-738-610; Application of Freeze Seal to All Piping; Revision 6
- Shutdown Risk Evaluation performed for 3/23 – 3/25/2010
- OP-AB-117-101; Operations with the Potential to Drain the Reactor Vessel (OPDRV); Revision 0
- OU-AA-103; Shutdown Safety Management Program, Revision 10
- OU-AA-104; Shutdown Safety Management Program Quad Cities Annex; Revision 11

Section 4OA3

- IR 1009116; Met Tower Wind Direction 296' Elevation Reading ??????? Degrees; 12/23/09
- IR 1071797; Met Tower Points Notes Out-of-Calibration; 05/20/10
- IR 1071678; Inaccurate Wind Direction Reported During Unusual Event; 05/19/10
- IR 1050084; Wind Direction Indication Unreliable; 3/30/10
- IR 105389; Wind Speed Indication Reading Abnormally High; 4/8/10
- IR 1074145; Operators Were Not Proficient at Obtaining PPDS Data; 5/27/2010
- IR 1023400; Vendor Identified an ERV That Would Not Open; 1/29/2010
- IR 53678; Groove Found Worn into Disc Guide in ERV; 5/31/2001
- EP-MW-114-100; Offsite Notifications; Revision 9
- EP-MW-110-200; Dose Assessment
- Apparent Cause Evaluation; IR 1056375; 2C Condenser Backpressure Reads Higher Than Expected; 04/14/2010
- QCIS 0500-18; Unit 2 Division II Low Condenser Vacuum Scram Calibration and Functional Test; Revision 02
- Licensee Event Report 254/2010-001-00, "Electromatic Relief Valve Main Disc Failure;" 3/29/2010
- Quality Receipt Inspection Package; Receipt 133760 for Catalog ID 1392503-1 (ERV Serial No. BY94637; 4/9/2004
- Licensee Event Report 265/2010-001-00, "Main Condenser Low Vacuum Scram RPS Switch Inoperable Exceeded Technical Specifications"; June 11, 2010
- IR 1089941; Freeze Seal Compensation Actions – NRC Question; 07/12/2010

Section 4OA5

- Conestoga-Rovers & Associates; Hydrogeologic Investigation Report for Quad Cities Generating Station; September 2006
- Groundwater Protection Program Check-In Report; dated June 25, 2009
- NEI Peer Assessment Report; Groundwater Protection Initiative; dated February 19, 2010
- LS-AA-1120; Reportable Event – Corporate Reporting; Revision 11
- CY-QC-170-4160; Radiological Groundwater Protection Program Scheduling and Notification; Revision 3
- EN-AA-407; Response to Inadvertent Releases of Licensed Materials to Groundwater, Surface or Soil; Revision 3
- EN-AA-103; Environmental Review; Revision 3
- EN-AA-408-4000; Radiological Groundwater Protection Program; Revision 0
- CY-AA-170-4000; Radiological Groundwater Protection Program; Revision 4
- ER-AA-5400; Buried Piping and Raw Water Corrosion Program; Revision 2
- ER-AA-5400-1002; Buried Piping Examination Guide; Revision 2
- AR 1080745; Piping Not Documented in Buried Pipe Database; dated June 15, 2010

LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agencywide Document Access Management System
ALARA	As-Low-As-Is-Reasonably-Achievable
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CFR	Code of Federal Regulations
EC	Engineering Change
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
EMD	Electrical Maintenance Department
ERV	Electromatic Relief Valve
FLS	First Line Supervisor
HRA	High Radiation Area
HVAC	Heating, Venting, and Air Conditioning
IMC	Inspection Manual Chapter
IMD	Instrument Maintenance Department
IP	Inspection Procedure
IR	Issue Report
kV	Kilovolt
LCO	Limiting Condition for Operation
LEFM	Leading Edge Flow Meter
LER	Licensee Event Report
LLD	Lower Limits of Detection
LLRT	Local LeakRate Test
MWth	Megawatts-thermal
NARS	Nuclear Accident Reporting System
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NVLAP	National Laboratory Accreditation Program
ODCM	Offsite Dose Calculation Manual
OPDRV	Operation with a Potential to Drain the Reactor Vessel
OSP	Outage Safety Plan
PARS	Publicly Available Records System
PCIS	Primary Containment Isolation System
PI	Performance Indicator
PPDS	Plant Parameter Display System
RCS	Reactor Coolant System
REMP	Radiological Environmental Monitoring Program
RFO	Refueling Outage
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
RWCU	Reactor Water Cleanup
RWP	Radiation Work Permit
SDP	Significance Determination Process
SSC	Systems, Structures, and Components
SSMP	Safe Shutdown Makeup Pump
TI	Temporary Instruction

TS	Technical Specification
TSO	Transmission System Operator
UFSAR	Updated Final Safety Analysis Report
Vac	Volts alternating current
Vdc	Volts direct current
WO	Work Order

M. Pacilio

-2-

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website 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
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Letter to M. Pacilio from M. Ring dated August 5, 2010

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2010003;
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