July 26, 2006

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

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2006005;
05000265/2006005

Dear Mr. Crane:

On June 30, 2006, the U. S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. The enclosed report documents the inspection findings which were discussed on July 11, 2006, with Mr. Tulon and other members of your staff.

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

Based on the results of this inspection, the inspectors identified three issues of very low safety significance (Green). One of these issues involved a violation of NRC requirements. However, because this violation was of very low safety significance and because it was entered into the licensee's corrective program, the NRC is treating this finding as a Non-Cited Violation in accordance with Section V1.A.1 of the NRC's Enforcement Policy.

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

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Sincerely,

/RA/

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

Docket Nos. 50-254; 50-265; 72-035
License Nos. DPR-29; DPR-30

Enclosure: Inspection Report 05000254/2006005; 05000265/2006005
w/Attachment: Supplemental Information

cc w/encl: Site Vice President - Quad Cities Nuclear Power Station
Plant Manager - Quad Cities Nuclear Power Station
Regulatory Assurance Manager - Quad Cities Nuclear Power Station
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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos.:	50-254, 50-265, 72-035
License Nos.:	DPR-29, DPR-30
Report No.:	05000254/2006005 and 05000265/2006005
Licensee:	Exelon Nuclear
Facility:	Quad Cities Nuclear Power Station, Units 1 and 2
Location:	Cordova, Illinois
Dates:	April 1, 2006, through June 30, 2006
Inspectors:	K. Stoedter, Senior Resident Inspector M. Kurth, Resident Inspector S. Bakhsh, Health Physicist A. Barker, Project Engineer M. Gryglak, Reactor Inspector J. House, Senior Radiation Specialist D. Jones, Reactor Engineer D. Melendez-Colon, Reactor Engineer R. Ganser, Illinois Emergency Management Agency
Observer:	J. McGhee, Reactor Engineer
Approved by:	M. Ring, Chief Projects Branch 1 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000254/2006005, 05000265/2006005; 04/01/2006 - 06/30/2006; Quad Cities Nuclear Power Station, Units 1 & 2; Internal Flooding and Event Followup.

The report covered a 3-month period of inspection by resident inspectors, regional inspectors and announced inspections by a radiation protection specialist and dry cask storage inspectors. Three Green findings, one of which was a non-cited violation (NCV), were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Initiating Events

- Green. A self-revealing Green finding was identified on February 22, 2006, when the Unit 1 main turbine tripped causing a reactor scram. The licensee's post-scram efforts determined that the turbine trip was caused by degradation of the main power transformer protective relaying wiring which resulted in the actuation of a protective relay due to an electrical ground. The wiring insulation degradation was a result of electrical conduit bushings not being installed at various junction boxes as required by the main power transformer design specifications. The lack of bushings caused damage to the wire as it was pulled through the electrical conduit during transformer construction.

  The failure to follow design specifications when constructing the main power transformer was more than minor because it was a precursor to a significant event (a transient). The inspectors determined that this finding was of very low safety significance because it did not contribute to both the likelihood of a reactor scram and the likelihood that mitigation equipment would not be available. This finding was not considered a violation of regulatory requirements since the main power transformer is a non-safety related component. Corrective actions for this issue included installing new protective relaying wiring external to the transformer. The licensee planned to replace this transformer in the Spring of 2007. (Section 4OA3.2)

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green finding in June 2006 due to the licensee's failure to appreciate and address long-standing degradation of the residual heat removal service water (RHRSW) vault sump pumps.

This issue was determined to be more than minor because a degraded sump pump was left unrepaired for approximately 15 months and the common failure mechanism ultimately resulted in rendering both of the internal flooding protection check valves for the 1A RHRSW vault inoperable. This finding was determined to be of very low safety significance because an internal flood in the RHRSW area could not have rendered two or more trains of the RHRSW system inoperable concurrently. The inspectors also determined that this finding affected the cross-cutting area of problem identification and resolution because several departments had the opportunity to evaluate and address the degradation of the sump pumps prior to the loss of flood protection occurring. Corrective actions for this issue included performing a historical review of RHRSW vault sump pump maintenance and initiating work requests to inspect and replace all sump pumps not replaced in the last 2 years. This finding was not considered a violation of regulatory requirements since the equipment is non-safety related. (Section 1R06.1)

- Green. A self-revealing Green finding and a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," were identified on January 4, 2006, due to the Unit 1 "B" core spray system failing to start during testing. The pump failed to start because of misalignment between the pump breaker's secondary disconnect pins and the breaker cubicle's secondary disconnect slides. Procedural inadequacies contributed to this failure since neither the breaker installation procedure nor the breaker preventive maintenance procedure addressed the importance of properly aligning the breaker and cubicle components.

  The lack of procedural instructions was determined to be more than minor because if left uncorrected, the lack of instructions could lead to additional safety- related breakers being misaligned during installation. This finding was found to be of low safety significance because additional low pressure injection systems were available for use if needed. Corrective actions for this issue included properly installing a new breaker in the 1B core spray pump breaker cubicle and revising and implementing the appropriate preventive maintenance and breaker installation procedures. (Section 4OA3.1)

B. Licensee-Identified Violations

No findings of significance were identified.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period operating at reduced power levels pending the installation of newly designed electromatic relief valve (ERV) actuators and a modification to reduce the extended power uprate vibration levels. On May 5 the licensee shut down Unit 1 to allow installation of the above equipment. Unit 1 returned to power on May 21. Over the next several days the licensee conducted power ascension testing and gathered data to support long-term operation at extended power uprate power levels. During the final data gathering on May 24, Unit 1 operations personnel received an electrohydraulic control system low level alarm due to a leak on turbine control valve #1. Although the leak was repaired, operations personnel were required to conduct an unplanned power change of greater than 20 percent prior to returning the control valve to service. Unit 1 returned to extended power uprate power levels on May 25 and remained there through the end of the inspection period. Slight power reductions were performed during the inspection period to complete turbine testing, control rod maneuvers, and condenser flow reversals.

Unit 2 began the inspection period shut down due to ongoing refueling outage activities. Work completed during the outage included the replacement of the Unit 2 main power and reserve auxiliary transformers, installation of new ERV actuators and acoustic side branches, inspection of the steam dryer, refueling of the reactor, and multiple other work items. The licensee returned Unit 2 to power on April 18. Operations personnel increased reactor power to approximately 97 percent to allow the acoustic side branch post-modification testing to be completed. Following test completion, Unit 2 returned to pre-extended power uprate power levels pending an inspection of the Unit 1 steam dryer. This inspection was completed on May 11 (see Section 4OA5.2 for details). Unit 2 returned to extended power uprate power levels on the same day and remained there through the conclusion of the inspection period. Slight power reductions were conducted during the inspection period to complete turbine testing, control rod maneuvers, and condenser flow reversals.

1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope

The inspectors assessed the licensee's readiness for warm weather conditions by conducting detailed inspections on the following equipment:

- Unit 1 main power transformer
- Units 1 and 2 main steam isolation valve room coolers

The inspectors selected the Unit 1 main power transformer as an inspection sample due to recent issues regarding increased vibrations and the degradation of protective relay wiring. The main steam isolation valve room coolers were chosen for inspection due to their obsolescence and because they were degrading at an increasing rate. In addition, the failure of the room coolers to provide adequate cooling could result in the generation of a Group I containment isolation signal and a reactor scram.

The inspectors interviewed system engineers and reviewed the Updated Final Safety Analysis Report, the licensee's seasonal readiness procedures, previously initiated issue reports, cause determinations, and trending packages to assess the resolution of previously identified material condition issues. The inspectors also used this information to evaluate whether unresolved material condition issues could impact the ability of the equipment to perform its function during extreme weather conditions. Detailed information regarding the main steam isolation valve room coolers is provided in Section 4OA2.4 of this report.

This inspection represented the completion of two hot weather samples.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

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

- Unit 2 high pressure coolant injection
- Unit 1 residual heat removal service water system
- Battery charger #1A and the Unit 1 125 Volt direct current system

The inspectors utilized the associated valve and breaker checklists to verify that the components were properly positioned and that support systems were configured as required. The inspectors examined the material condition of the components by performing visual inspections in the field. The inspectors also compared the operating parameters for each piece of equipment to information contained in the system operating procedures to ensure that there were no obvious equipment deficiencies. The inspectors reviewed outstanding work orders and issue reports associated with each system or component to verify that those documents did not reveal issues that could affect the equipment inspected.

These inspections represented the completion of three quarterly samples.

b. Findings

No findings of significance were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors conducted one complete walkdown of the Unit 1 and Unit 2 main steam system as part of the extended power uprate extent of condition review. The inspectors used the licensee's procedures, inspection plans and other documents to verify that the system (and connected pipes or components) had not been adversely impacted by extended power uprate vibration levels. The walkdown was focused on evaluating the condition of system piping and supports against the following considerations:

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

A review of outstanding maintenance work orders and outage scope change requests was performed to verify that the deficiencies described in these documents did not significantly affect the main steam system's function. In addition, the inspectors reviewed the issue report database to verify that previously identified main steam system material condition issues and vibratory concerns were being identified and appropriately resolved.

These walkdowns represent completion of two samples.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Fire Protection - Tours

a. Inspection Scope

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

equipment were implemented in accordance with the licensee's fire plan. Documents reviewed are listed in the attachment.

- Fire Zone 1.1.1.2 - Unit 1 Reactor Building Ground Floor, 595 Feet Elevation
- Fire Zone 1.1.2.2 - Unit 2 Reactor Building Ground Floor, 595 Feet Elevation
- Fire Zone 1.1.2.3 - Unit 2 Reactor Building, 623 Feet Elevation, Mezzanine Level
- Fire Zone 8.2.6.D - Unit 2 Low Pressure Heater Bay
- Fire Zone 8.2.6.E - Unit 2 D Heater Bay, 595 Feet Elevation
- Fire Zone 8.2.7.D - Unit 2 Low Pressure Heater Bay West, 608 Feet Elevation
- No Fire Zone Listed - Unit 2 Main Steam Isolation Valve Room

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

.1 Internal Flooding

a. Inspection Scope

The inspectors reviewed licensee procedures, the internal flooding analysis, and the Updated Final Safety Analysis report to determine the equipment relied upon to protect plant equipment from internal flooding events. The inspectors also reviewed internal flooding related corrective action documents initiated since January 2005 to assess the adequacy of the licensee's corrective actions. Based upon the corrective action document review, the inspectors chose the following issue reports for an in-depth review:

- Issue Report 450695 - Replace or Add Caulk Around Flood Barriers
- Issue Report 482166 - Residual Heat Removal Service Water Check Valve Failed to Seat

As part of the review, the inspectors performed a historical search of the corrective action and maintenance work request databases to determine if the issue listed above had been a long-standing material condition issue. The inspectors also performed visual inspections of the flood barriers identified as needing caulk repairs to confirm that the barriers would continue to perform their function.

Performance of these inspections represented the completion of two internal flooding samples.

b. Findings

Introduction: The inspectors identified one Green finding due to the licensee's failure to recognize that the residual heat removal service water (RHRSW) vault flood protection

check valves were susceptible to common mode failure due to shedding of plastic from the RHRSW vault sump pump.

Description: Due to an internal flooding event in the 1970's, the licensee protected the RHRSW pumps from additional internal flooding events by housing the pumps in vaults with watertight doors. Each vault also contained a sump pump which discharged into a common header through three check valves (a discharge check valve and two flow-path check valves). The licensee credited the two flow-path check valves in each vault as internal flooding protection equipment.

On April 22, 2006, the licensee initiated Issue Report 482166 to document that RHRSW internal flooding protection check valve 1-3999-515C failed to seat. The licensee performed repairs under Work Order 755418 and found that pieces of the sump pump's plastic liner had lodged in the check valve's seat. The inspectors reviewed issue reports and maintenance work packages for the RHRSW vault sump pumps and check valves for the period from January 1, 2004, to May 31, 2006, to determine whether sump pump degradation had been a long-standing issue. Through this review, the inspectors evaluated the licensee's problem identification threshold and the adequacy of the licensee's corrective actions. The results of this review showed that the licensee's threshold for placing internal flooding issues into the corrective action program was adequate. However, the evaluation of the issues was poor. This resulted in the failure to implement appropriate corrective actions to address the sump pump issue. The inspectors' conclusions were based upon the information provided below.

On January 12, 2004, the licensee initiated Issue Report 194446 to document that one of the flood protection check valves for the 2D RHRSW vault had failed its leak test. Upon disassembly, the licensee identified that the check valve's failure was caused by plastic becoming lodged in the check valve's seat. The source of the plastic was unable to be immediately identified. The licensee flushed the sump pump discharge pipe and found two additional pieces of plastic. The short-term corrective actions for this issue included replacing the check valve, installing a new sump pump, and performing a post-mortem inspection on the old sump pump.

On January 21, 2004, the licensee completed the post-mortem inspection on the 2D RHRSW vault sump pump and identified that the sump pump's diffuser liner was the source of the plastic found in the sump pump's discharge line and the check valve on January 12. According to the corrective action documents reviewed as part of this inspection, the mechanical maintenance department was assigned an action to initiate additional work requests to inspect or replace the remaining sump pumps. However, this assignment was closed after Work Order 660763 was initiated to inspect and replace the 1D RHRSW vault sump pump (the oldest pump).

Thirteen months later, operations personnel initiated Issue Report 300877 due to the 1D RHRSW vault sump pump not pumping near capacity. Specifically, the issue report described that the sump pump was not able to keep up with drainage from the RHRSW system after reducing the drainage to approximately 1 gallon per minute (gpm). The inspectors reviewed operator logs, additional issue reports, and work requests to

determine whether the licensee had evaluated the continued operability of the sump pump. No documentation was found. The licensee closed this issue report to the work order that was written as part of the January 2004 corrective actions (Work Order 660763). This work order was scheduled to work on June 13, 2005, but work was subsequently postponed.

On February 9, 2006, operations personnel initiated Issue Report 451795 to document that the 1A RHRSW vault sump pump was not pumping. Maintenance personnel inspected the sump pump the following day and identified extensive damage to the sump pump suction chamber. Due to the amount of damage, the licensee performed the internal flooding protection check valve test to determine whether the check valves could perform their function. Both check valves failed. The licensee subsequently discovered that the check valves had failed due to the disks being held open by plastic from the sump pump internals. Corrective actions for this issue included replacing the sump pump and check valves, inspecting the sump pump discharge check valve and piping for additional plastic, and performing a maintenance rule functional failure review (see Section 1R12 for details).

As discussed above, Issue Report 482166 was written in April 2006 due to internal flooding protection check valve 1-3999-515C failing to seat. Operations personnel assessed the continued operability of the flood protection equipment and determined that the flooding protection function was maintained because one of the two flooding protection check valves passed its surveillance test. However, check valve 1-3999-515C was required to be repaired within 14 days in order for the licensee to remain in compliance with QCAP 0250-06, "Control of In-Plant Flood Barriers and Watertight 'Submarine' Doors." The inspectors reviewed the operability determination and found the conclusion to be questionable since it failed to consider that the 1D RHRSW vault sump pump was documented as degraded in February 2005, that the sump pump could be degrading due to degradation of the sump pump's plastic liner, and that the operability of both internal flooding check valves could be impacted by pieces of liner traveling through the sump pump discharge piping as flow passed through the pipe. Corrective actions for this issue included generating Work Request 207817. This work request became Work Order 915692. Work Order was subsequently cancelled to Work Order 755418.

On May 1, 2006, the licensee performed the work directed by Work Order 755148. Mechanical maintenance personnel discovered that valve 1-3999-515C had failed to seat due to pieces of the sump pump liner holding both of the disk's plates open. The check valve was replaced. After discovering the pieces of the sump pump liner in the check valve, the licensee also replaced the sump pump under Work Order 660763 (which was initiated in February 2005). No other problems with the remaining check valves in this vault were identified.

Analysis: The inspectors identified that the licensee's failure to recognize long-standing degradation of the RHRSW vault sump pumps was a performance deficiency which resulted in a common mode failure of the internal flooding protection for the 1A RHRSW vault. This issue was determined to be more than minor because a degraded sump

pump was left unrepaired and the common failure mechanism ultimately resulted in rendering both of the internal flooding protection check valves for the 1A RHRSW vault inoperable. In addition, degradation of other RHRSW vault sump pumps had resulted in rendering two additional check valves inoperable between January 2004 and April 2006.

The inspectors performed a Phase 1 significance determination in accordance with Inspection Manual Chapter 0609. The inspectors consulted the Seismic, Flooding, and Severe Weather Screening Criteria contained in the Phase 1 worksheet and determined that the finding involved the loss or degradation of equipment specifically designed to mitigate a flooding event (Question #1). In response to Question #2, the inspectors evaluated whether two or more trains of a multi-train safety system could be degraded due to complete inoperability or unavailability of the internal flooding check valves. To answer this question the inspectors reviewed the information provided above to determine whether the flood protection check valves for more than one RHRSW vault were inoperable concurrently. Since the exact date of inoperability could not be determined due to the exact location of the plastic pieces being unknown, the inspectors assumed a T/2 unavailability time for each documented check valve failure. Using this assumption, the inspectors determined that the internal flooding protection provided for the 1A and the 1D RHRSW vaults may have been inoperable concurrently. The inspectors then assumed that an internal flooding event occurred in the 1B/1C RHRSW vault. As the flooding event occurred, the accumulation of water in the 1B/1C RHRSW vault would cause the sump pump to operate. This would result in transferring 15 gpm to both the 1A and 1D RHRSW vaults due to the degraded check valves. The accumulation of water in the 1A and 1D RHRSW vaults would continue until the electrical outlet providing power to the 1B/1C RHRSW sump pump was shorted due to the accumulation of water in that vault. The inspectors conducted a field inspection of the 1B/1C RHRSW vault and determined that the electrical outlet was located such that the 1B/1C RHRSW vault sump pump would lose power prior to the safety-related equipment located in the 1A and 1D RHRSW vaults being rendered inoperable due to the accumulating flood water. As a result, this finding was determined to be of very low safety significance (Green) **(FIN 05000254/2006005-01; 05000265/2006005-01)**. This finding also affected the cross-cutting area of problem identification and resolution (evaluation) because individuals within engineering, operations, maintenance and work control failed to recognize the potential impact that the degrading sump pumps could have on the internal flooding equipment such that corrective actions were implemented in a timely manner. Corrective actions for this issue included performing a historical review of RHRSW vault sump pump maintenance and initiating work requests to inspect and replace all sump pumps not replaced in the last 2 years.

Enforcement: The inspectors determined that the licensee's failure to recognize the potential for common mode failure of the RHRSW internal flooding protection check valves due to sump pump degradation did not constitute a violation of NRC requirements due to the check valves being classified as non-safety related.

.2 External Flooding

a. Inspection Scope

The inspectors reviewed the flooding sections of the Updated Final Safety Analysis Report to determine the barriers required to mitigate the maximum probable flood. The inspectors also reviewed the abnormal operating procedures for mitigating this type of flood. The procedure included information describing how each unit would be shut down prior to the flood waters reaching the plant. Shutdown activities included the removal of both unit's reactor building shield plugs, both drywell heads, both reactor vessel heads, and flooding both reactor cavities. Due to the ongoing outage activities and the amount of equipment on the refuel floor, the inspectors interviewed licensee personnel, reviewed drawings, and compared the time needed to reconfigure the refueling floor against the time constraints listed in the flooding procedure to ensure that the external flooding mitigation strategies could be implemented during a refueling outage if needed.

This review represents completion of one external flooding sample.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification (71111.11Q)

a. Inspection Scope

On May 1, 2006, the inspectors observed an operations crew in the simulator during requalification training. The training scenario consisted of responding to a loss of reactor protection System B, a loss of condenser vacuum, and an anticipated transient without scram.

The inspectors evaluated crew performance in the areas of:

- clarity and formality of communications
- ability to make timely actions in the safe direction
- prioritization, interpretation, and verification of alarms
- procedure use
- control board manipulations
- oversight and direction from supervisors
- group dynamics

The inspectors verified that the crews completed the critical tasks listed in the above scenarios. If critical tasks were not met, the inspectors verified that crew and operator performance errors were detected and adequately addressed by the evaluators. The inspectors verified that the evaluators effectively identified crews requiring remediation and appropriately indicated when removal from shift activities was warranted. Lastly, the inspectors observed the licensee's critique to verify that weaknesses identified

during this observation were noted by the evaluators and discussed with the respective crews.

b. Findings

No findings of significance were identified.

1R12 Maintenance Implementation (71111.12)

a. Inspection Scope

The inspectors reviewed the two components listed below for items such as: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the maintenance rule; (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); and (8) appropriateness of performance criteria for structures, systems, and components (SSCs/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1)). Documents reviewed are listed in the Attachment.

- Reactor building overhead crane
- Turbine building (RHRSW) internal flood protection

b. Findings

As discussed in Section 1R06.1 of this report, the inspectors identified that degradation of the RHRSW vault sump pumps had resulted in a condition which rendered the internal flooding protection for the 1A RHRSW vault inoperable in February 2006.

The inspectors reviewed the licensee's maintenance rule database to determine performance criteria for the internal flooding protection check valves. The inspectors found that the licensee monitored performance of the check valves through the use of condition based monitoring. Specifically, the licensee's criteria stated that if two check valve failures per test (per unit) were experienced within 24 months the maintenance rule expert panel would need to consider placing the monitored equipment in a(1) status.

The inspectors constructed a time line of internal flooding protection check valve failures over the last 24 months. The inspectors found that Unit 1 had experienced four check valve failures since June 2004. The inspectors questioned the engineering staff to determine whether the turbine building internal flooding check valves had been evaluated for inclusion as a(1) equipment. The licensee stated that this equipment had not been evaluated because the criteria had not been met. Further review identified that the licensee's conclusions were based upon an unclear interpretation of the maintenance rule criteria. Specifically, the criteria specified the number of failures

allowed per test. However, the licensee did not routinely test all of the check valves at the same time.

At the conclusion of the inspection, the licensee was evaluating the appropriateness of their current maintenance rule criteria for the turbine building internal flooding equipment. Following this evaluation, the licensee planned to perform a retroactive 24 month review to determine whether the turbine building internal flooding equipment should have been considered for inclusion as a maintenance rule a(1) function. This issue will remain unresolved pending a review of the licensee's evaluation and additional actions **(URI 05000254/2006005-02; 05000265/2006005-02)**.

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

a. Inspection Scope

The inspectors reviewed the following 7 work weeks to verify that the appropriate risk assessments were performed prior to removing equipment for maintenance or testing. 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 verified the appropriate use of the licensee's risk assessment tool and risk categories in accordance with procedures.

- Work Week April 3-8 which included maintenance on switchyard components, Bus 24-1, the Unit 2 emergency diesel generator, and Transformer 22
- Work Week April 23-29 which included testing of the reactor core isolation cooling system, the emergency diesel generators, and the reactor building ventilation system
- Work Week May 8-13 which included Unit 1 emergency diesel generator maintenance and surveillance testing, Unit 2 station blackout diesel generator maintenance and surveillance testing, Unit 2A reactor building closed loop cooling water system maintenance, and Unit 1 maintenance outage Q1M19
- Work Week May 15-20 which included switchyard maintenance, Unit 2 high pressure coolant injection surveillance testing, Unit 1 residual heat removal service water system emergent maintenance, and Unit 1 maintenance outage Q1M19
- Work Week May 21-27 including emergent work on the 1C residual heat removal service water pump and Unit 1 turbine control valve #1
- Work Week May 28 - June 3 which included emergent work on the 1E traveling screen, a Unit 2 circulating water valve, the 2A service air compressor, and the independent spent fuel storage installation inverter
- Work Week June 19-24 which included planned maintenance on two Unit 1 125 Volt direct current battery chargers, the 1B instrument air compressor and the 2A residual heat removal service water pump, and emergent work on a Unit 2 main steam line flow transmitter and a Unit 2 service air compressor

Performance of the identified reviews represent seven inspection samples.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

For the non-routine events described below, the inspectors reviewed operator logs, plant computer data, strip charts, procedures, corrective action documents and prompt investigation reports to determine what occurred and if the licensee's response was in accordance with plant procedures.

- On April 16 the inspectors observed the licensee's response to an unexpected Unit 1 breaker trip while investigating the source of a Unit 2 125 Volt direct current ground. The licensee concluded that the breaker trip was likely caused by manipulating equipment and using ground identification equipment concurrently.

- On April 19 the inspectors observed the licensee's response to anomalous Unit 2 indications during the withdrawal of control rod D-7. The inspectors also observed the licensee's response to the unexpected drift of control rod D-7 from position 48 to position 38 during scram time testing of another control rod. Operations personnel inserted control rod D-7 to position 00 and took action to declare the control rod inoperable. During troubleshooting, engineering identified leaks on two of the directional control valves. These valves were replaced and the control rod was returned to service.

- On May 14 the Unit 1 emergency diesel generator auto started during activities to return the emergency diesel generator cooling water pump to service. The operators immediately shut down the emergency diesel generator and began investigating why the generator had auto started. The licensee's preliminary investigation determined that the auto start occurred due to weaknesses in reviewing the work schedule for conflicts and inconsistent application of the equipment status tag program. Following a review of the return to service documents, operations personnel used plant procedures to manipulate test switches which prevented the diesel generator from auto starting during the return to service activities. The emergency diesel generator was then returned to an operable condition.

The performance of these inspections represents the completion of three inspection samples.

b. Findings

No findings of significance were immediately identified. However, an in-depth review of all aspects which led to the Unit 1 emergency diesel generator auto start event will be performed following the issuance of the associated Licensee Event Report.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

For the six operability evaluations listed below, the inspectors evaluated the technical adequacy of the evaluations to ensure that Technical Specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors reviewed the Updated Final Safety Analysis Report to verify that the system or component remained available to perform its intended function. In addition, the inspectors reviewed compensatory measures implemented to verify that the compensatory measures worked as stated and the measures were adequately controlled. The inspectors also reviewed a sampling of issue reports to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations.

- Operability Evaluation 298438-06 - Electromatic Relief Valve Solenoid May Fail to De-energize When a Demand Signal is Removed due to Terminal Wetting
- Operability Evaluation 483299 - “A” Fire Diesel Check Valve Stuck Shut
- Operability Evaluation 483736 - 2B Core Spray Discharge Header Pressure Trending Higher
- Operability Evaluation 489747 - Foreign Material Found Inside the Unit 1 Reactor Water Cleanup Suction Primary Containment Isolation Valve
- Operability Evaluation 472356 - Potentially Unqualified Pressure Switch (Target Rock Safety Relief Valve Bellows Leakage Pressure Switch) Installed on Unit 1
- Engineering Change Evaluation 360978 - Diesel Generator Cooling Water Heat Exchanger Supply/Return Line Minimum Wall Evaluation, Revision 0

Performance of the identified reviews represent six inspection samples.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the six post-maintenance tests associated with the activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the licensee’s procedure to verify that the procedure adequately tested the safety function(s) that may have been affected by the

maintenance activity, that the acceptance criteria in the procedure were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also observed the maintenance, witnessed the test, and/or reviewed the test data, to verify that test results adequately demonstrated restoration of the affected safety function(s).

- Work Order 877673 - Troubleshoot Unit 2 125 Volt direct current Ground
- Work Order 868278 - Troubleshoot Electrical Bus 14-1, Cubicle 2 (Unit 1 “B” Core Spray 4 kilo Volt Breaker)
- Work Order 701816 - Replace 2-1001-3A, Residual Heat Removal Service Water High Pressure Pump Discharge Isolation Valve
- Work Order 913816 - Replace Directional Control Valves 121 and 122 on Hydraulic Control Unit 14-27
- MA-QC-773-246 - Unit 2 Reserve Auxiliary Transformer Three Phase Through Fault Testing
- Engineering Evaluation 360531 - Evaluation of Diesel Generator Governor and Voltage Regulator Operation During QCOS 6600-48

Performance of the identified reviews represent six inspection samples.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

.1 Unit 2 Refueling Outage

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan for the Unit 2 refueling outage, conducted from March 24 to April 18, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored the licensee’s controls over the following activities:

- Maintenance of defense-in-depth commensurate with the key safety functions and Technical Specifications
- Implementation of clearance activities including confirmation that tags were properly hung and equipment was appropriately configured to safely support the work or testing
- Installation and configuration of reactor coolant pressure, level, and temperature instruments
- Controls over the status and configuration of electrical systems to ensure that Technical Specification and outage safety plan requirements were met
- Monitoring of decay heat removal processes

- Controls to ensure that outage work was not impacting the ability of the operators to operate the fuel pool cooling system
- Reactor water inventory controls including flow paths, configurations, alternative means for inventory addition, and controls to prevent inventory loss
- Controls over activities that could affect reactivity
- Maintenance of secondary containment as required by Technical Specifications
- Refueling activities
- Startup and ascension to full power operation, tracking of startup prerequisites, and walkdown of the drywell (primary containment) to verify that debris had not been left which could block emergency core cooling system suction strainers
- Licensee identification and resolution of problems related to refueling outage activities

This inspection represents the completion of one refueling outage inspection sample.

b. Findings

No findings of significance were identified.

.2 Unit 1 Maintenance Outage

a. Inspection Scope

As discussed in the Summary of Plant Status Section of this report the licensee conducted a Unit 1 maintenance outage from May 5 to May 21 to address ERV actuator degradation concerns, replace the reserve auxiliary transformer, and install the acoustic side branch modification. During the outage, the inspectors performed the following activities daily:

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

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

- Shutdown and cooldown activities
- Troubleshooting efforts associated with the reactor building overhead crane
- Reactor startup and power ascension

This inspection represented the completion of one outage inspection sample.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

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

- QCTS 0600-07 - Feedwater Check Valve Local Leak Rate Test 2-220-58B and 2-220-62B
- QCTS 0600-07 - Feedwater Check Valve Local Leak Rate Test 2-220-58A and 2-220-62A
- QCOS 1000-04 - RHR Service Water Pump Operability Test
- QCOS 1600-32 - Drywell/Torus Closeout (Unit 2)
- QCTS 0600-05 - Main Steam Isolation Valve Local Leak Rate Test
- QCOS 6600-48 - Unit 2 Division II Emergency Core Cooling System Simulated Automatic Actuation and Diesel Generator Auto Start Surveillance

These inspections represented the completion of three containment isolation valve tests, one inservice test, and two routine tests.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope

The inspectors reviewed the two temporary modifications listed below and the associated 10 CFR 50.59 screenings, and compared each against the Updated Final Safety Analysis Report and Technical Specification to verify that the modification did not affect operability or availability of the affected system. The inspectors walked down each modification to ensure that it was installed in accordance with the modification documents and reviewed post-installation and removal testing to verify that the actual impact on permanent systems was adequately verified by the tests.

- Engineering Change 358763 - Temporary Instrument Air Supply to 2-0302-6A/B
- Engineering Change 359475 - Maintain Availability of Standby Gas Treatment 1A Heater Circuit During Analog Trip Panel Work

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

The resident inspectors evaluated the conduct of a routine emergency preparedness simulator-only drill on May 1, and a full-participation emergency drill on April 26, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. During the May 1 drill, the inspectors observed emergency response operations in the simulated control room. On April 26 the inspectors observed activities conducted in the Technical Support Center. In each case, the inspectors also attended the licensee's drill critique to compare any inspector-observed weakness with those identified by the licensee.

The performance of these inspections constitutes the completion of two samples (1 drill and 1 simulator).

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

.1 Review of Licensee Performance Indicators for the Occupational Exposure Cornerstone

a. Inspection Scope

The inspectors discussed performance indicators with the radiation protection (RP) staff and reviewed data from the licensee's corrective action program to determine if there were any performance indicators in the occupational exposure cornerstone that had not been identified and reviewed. This review represented one sample.

b. Findings

No findings of significance were identified.

.2 Plant Walkdowns and Radiation Work Permit Reviews

a. Inspection Scope

The inspectors identified three radiologically significant work areas within radiation areas, high radiation areas (HRAs), and airborne areas in the drywell and reactor buildings. Selected "As-Low-As-Is-Reasonably-Achievable" (ALARA) work packages and radiation work permits (RWPs) were reviewed to determine if radiological controls including surveys, postings, air sampling data, and barricades were acceptable. RWPs and ALARA work packages included:

- RWP 10006446 and ALARA Plan, Dryer Mod - Diving; Revision 0
- RWP 10006447 and ALARA Plan, U2 Steam Dryer Diver Support; Revision 0
- RWP 10006741 and ALARA Plan, ASB Modification; Revision 0
- RWP 10006067 and ALARA Plan, 2-1201-78 Valve Cut Out/Replace; Revision 0
- RWP 10006812 and ALARA Plan, U2 Drywell SRV X-Ray; Revision 0

This review represented one sample.

The identified radiologically significant work areas were walked down and surveyed to determine if the prescribed RWP, procedures, and engineering controls were in place, that licensee surveys and postings were complete and accurate, and that air samplers were properly located. This review represented one sample.

The inspectors reviewed selected RWPs and associated radiological controls used to access these and other radiologically significant areas. Work control instructions and specified control barriers were evaluated in order to determine if the controls and requirements provided adequate worker protection. Site Technical Specification requirements for HRAs and locked high radiation areas were used as standards for the necessary barriers. Electronic dosimeter alarm set points for both integrated dose and dose rate were evaluated for conformity with survey indications and plant policy. The inspectors attended pre-job briefings to determine if instructions to workers emphasized the actions required when their electronic dosimeters noticeably malfunctioned or alarmed. This review represented one sample.

The inspectors reviewed job planning records and interviewed licensee representatives to determine if there were airborne radioactivity areas in the plant with a potential for individual worker internal exposures of >50 millirem committed effective dose equivalent. Barrier integrity and engineering controls performance, such as high efficiency particulate filtration ventilation system operation, and the use of respiratory protection, were evaluated for worker protection. Work areas having a history of, or the potential for, airborne transuranic isotopes were reviewed to determine if the licensee had considered the potential for transuranic isotopes, and provided appropriate worker protection. This review represented one sample.

The adequacy of the licensee's internal dose assessment process for analyzing internal exposures >50 millirem committed effective dose equivalent was assessed to determine if affected personnel would be properly monitored utilizing calibrated equipment, that the data would be analyzed, and internal exposures would be properly assessed in accordance with licensee procedures. This review represented one sample.

The inspectors reviewed the licensee's physical and programmatic controls for highly activated and/or contaminated materials (non-fuel) stored within the spent fuel pool. This review represented one sample.

b. Findings

No findings of significance were identified.

.3 Problem Identification and Resolution

a. Inspection Scope

The inspectors reviewed the licensee's self-assessments, audits, and condition reports related to the access control program to determined if identified problems were entered into the corrective action program for resolution. This review represented one sample.

Corrective action reports related to access controls and HRA radiological incidents (non-performance indicator occurrences identified by the licensee in HRAs <1Rem/hr) were reviewed. Staff members were interviewed and corrective action documents were reviewed to determine if follow-up activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk based on the following:

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

This review represented one sample.

The inspectors evaluated the licensee's process for problem identification, characterization, prioritization, and determined if problems were entered into the corrective action program and resolved. For repetitive deficiencies and/or significant individual deficiencies identified in the problem identification and resolution process, the inspectors determined if the licensee's self-assessment activities also identified and addressed these deficiencies. This review represented one sample.

The inspectors discussed performance indicators with the RP staff and reviewed data from the licensee's corrective action program to determine if there were any performance indicators for the occupational exposure cornerstone that had not been reviewed. This review represented one sample.

b. Findings

No findings of significance were identified.

.4 Job-In-Progress Reviews

a. Inspection Scope

The inspectors evaluated selected jobs being performed in radiation areas, potential airborne radioactivity areas, and HRAs for observation of work activities that presented the greatest radiological risk to workers and included areas where radiological gradients were present. (Section 2OS1.2) This involved jobs that were estimated to result in higher collective doses, and included radiography preparations, safety relief valve work, diving, refueling operations, and other selected work areas in the drywell and reactor building.

The inspectors reviewed radiological job requirements contained in RWPs and work procedures, and attended ALARA pre-job briefings. Job performance was observed with respect to these requirements to determine if radiological conditions in the work areas were adequately communicated to workers through pre-job briefings and radiological condition postings. This review represented one sample.

The inspectors also evaluated the adequacy of radiological controls including required radiation, contamination and airborne surveys for system breaches and entry into HRAs. Radiation protection job coverage, including direct visual surveillance by RP technicians, along with the remote monitoring and teledosimetry systems and contamination control processes, was evaluated to determine if workers were adequately protected from radiological exposure. This review represented one sample.

Job preparation and execution in HRAs having significant dose rate gradients was observed to evaluate the application of dosimetry to effectively monitor exposure to personnel, and to determine if licensee controls were adequate. The inspectors observed RP coverage of diving operations and drywell work which involved controlling worker locations based on radiation survey data and real time monitoring using teledosimetry, in order to maintain personnel radiological exposure ALARA. This review represented one sample.

b. Findings

No findings of significance were identified.

.5 High Risk Significant, High Dose Rate High Radiation Area, and Very High Radiation Area Controls

a. Inspection Scope

The inspectors reviewed the licensee's procedures and practices for high risk, high dose rate HRAs, and for very high radiation area access, to determine if workers were adequately protected from radiological overexposure. Discussions were held with RP management concerning high dose rate HRA, and very high radiation area controls and procedures, including procedural changes that had occurred since the last inspection. This was done to determine if procedure modifications had substantially reduced the effectiveness and level of worker protection. This review represented one sample.

The inspectors evaluated the controls including procedures RP-AA-460, "Controls For High and Very High Radiation Areas," Revision 10 and RP-AA-460-1001, "Additional High Radiation Exposure Control," Revision 0, that were in place for special areas that had the potential to become very high radiation areas during certain plant operations. Discussions were held with RP supervisors to determine how the required communications between the RP group and other involved groups would occur beforehand in order to allow corresponding timely actions to properly post and control the radiation hazards. This review represented one sample.

During plant walkdowns, the posting and locking of entrances to high dose rate HRAs, and very high radiation areas were reviewed for adequacy. This review represented one sample.

b. Findings

No findings of significance were identified.

.6 Radiation Worker Performance

a. Inspection Scope

During job performance observations, the inspectors evaluated radiation worker performance with respect to stated radiation protection work requirements. The inspectors also evaluated whether workers were aware of the significant radiological conditions in their workplace, the RWP controls and limits in place, and that their performance had accounted for the level of radiological hazards present. This review represented one sample.

Radiological problem reports, which found that the cause of an event resulted from radiation worker errors, were reviewed to determine if there was an observable pattern traceable to a similar cause, and to determine if this perspective matched the corrective action approach taken by the licensee to resolve the reported problems. This review represented one sample.

b. Findings

No findings of significance were identified.

.7 Radiation Protection Technician Proficiency

a. Inspection Scope

The inspectors observed and evaluated RP technician performance with respect to RP work requirements. This was done to evaluate whether the technicians were aware of the radiological conditions in their workplace, the RWP controls and limits in place, and if their performance was consistent with their training and qualifications with respect to the radiological hazards and work activities. This review represented one sample.

Radiological problem reports, which found that the cause of an event was RP technician error, were reviewed to determine if there was an observable pattern traceable to a similar cause, and to determine if this perspective matched the corrective action approach taken by the licensee to resolve the reported problems. This review represented one sample.

b. Findings

No findings of significance were identified.

2OS2 As Low As Is Reasonably Achievable (ALARA) Planning And Controls (71121.02)

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed plant collective exposure history, current exposure trends along with ongoing and planned activities in order to assess current performance and exposure challenges. This included determining the plant's current 3-year rolling average collective exposure and comparing the site's radiological exposure on a yearly basis for the previous 3 years. This review represented one sample.

The inspectors reviewed the outage work scheduled during the inspection period along with associated work activity exposure estimates including the five work activities which were likely to result in the highest personnel collective exposures. This review represented one sample.

Site specific trends in collective exposures and source-term measurements including cobalt-60 levels in reactor coolant were reviewed. This review represented one sample.

Procedures associated with maintaining occupational exposures ALARA and processes used to estimate and track work activity specific exposures were reviewed. This review represented one sample.

b. Findings

No findings of significance were identified.

.2 Radiological Work Planning.

a. Inspection Scope

The inspectors evaluated the licensee's list of work activities, ranked by estimated exposure, that were in progress and selected the five work activities of highest exposure potential. This review represented one sample.

The inspectors reviewed the ALARA work activity evaluations, exposure estimates, and exposure mitigation requirements, in order to determine if the licensee had established procedures, along with engineering and work controls, that were based on sound radiation protection principles, in order to achieve occupational exposures that were ALARA. This also involved determining that the licensee had reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, or special circumstances. This review represented one sample.

The interfaces between operations, RP, maintenance, maintenance planning, scheduling, and engineering groups were evaluated to identify interface problems or missing program elements. This review represented one sample.

The integration of ALARA requirements into work procedures and RWP documents was evaluated to determine if the licensee's radiological job planning would reduce dose. This review represented one sample.

Shielding requests from the radiation protection group were evaluated with respect to dose rate reduction and reduced worker exposure, along with engineering shielding responses follow up. This review represented one sample.

The inspectors reviewed work activity planning to determine if there was consideration of the benefits of dose rate reduction activities such as shielding provided by water filled components and piping, job scheduling, along with shielding and scaffolding installation and removal activities. This review represented one sample.

b. Findings

No findings of significance were identified.

.3 Job Site Inspections and ALARA Controls

a. Inspection Scope

The inspectors selected three work activities in radiation areas, potential airborne radioactivity areas, and HRAs for observation, emphasizing work activities that presented the greatest radiological risk to workers. Jobs that were expected to result in

significant collective doses and involved potentially changing or deteriorating radiological conditions were observed. These included radiography preparations, safety relief valve work, diving, refueling floor operations, and other selected work areas. The licensee's use of ALARA controls for these work activities was evaluated using the following:

- The use of engineering controls to achieve dose reductions was evaluated to determine if procedures and controls were consistent with the ALARA reviews; that sufficient shielding of radiation sources was provided for, and that the dose expended to install/remove the shielding did not exceed the dose reduction benefits afforded by the shielding. This review represented one sample.

- Job sites were observed to determine if workers were utilizing the low dose waiting areas and were effective in maintaining their doses ALARA by moving to the low dose waiting area when subjected to temporary work delays. This review represented one sample.

- The inspectors attended ALARA pre-job briefings and observed ongoing work activities to determine if workers received appropriate on-the-job supervision to ensure the ALARA requirements were met. This included determining if the first-line job supervisor ensured that the work activity was conducted in a dose efficient manner by minimizing work crew size, ensuring that workers were properly trained, and that proper tools and equipment were available when the job started. This review represented one sample.

b. Findings

No findings of significance were identified.

.4 Source-Term Reduction and Control

a. Inspection Scope

The inspectors reviewed licensee records to determine the historical trends and current status of tracked plant source-terms and determined if the licensee was making allowances and had developed contingency plans for expected changes in the source-term due to changes in plant fuel performance issues or changes in plant primary chemistry. This review represented one sample.

The inspectors determine if the licensee had developed an understanding of the plant source-term, which included knowledge of input mechanisms in order to reduce the source-term. The licensee's source-term control strategy, which included a process for evaluating radionuclide distribution plus a shutdown and operating chemistry plan which can minimize the source-term external to the core, was evaluated. Other methods used by the licensee to control the source-term, including component/system decontamination, hotspot flushing and the use of shielding, were evaluated. This review represented one sample.

The licensee's process for identification of specific sources was reviewed along with exposure reduction actions and the priorities the licensee had established for implementation of those actions. Results achieved against these priorities since the last refueling cycle were reviewed. For the current assessment period, source-term reduction evaluations were reviewed and actions taken to reduce the overall source-term were compared to the previous year. This review represented one sample.

b. Findings

No findings of significance were identified.

.5 Radiation Worker Performance

a. Inspection Scope

Radiation worker and RP technician performance was observed during work activities being performed in radiation areas, airborne radioactivity areas, and HRAs that presented the greatest radiological risk to workers. The inspectors evaluated whether workers demonstrated the ALARA philosophy in practice by being familiar with the work activity scope and tools to be used, by utilizing ALARA low dose waiting areas and that work activity controls were being complied with. Also, radiation worker training and skill levels were reviewed to determine if they were sufficient relative to the radiological hazards and the work involved. This review represented one sample.

b. Findings

No findings of significance were identified.

.6 Problem Identification and Resolutions

a. Inspection Scope

The inspectors reviewed the licensee's self-assessments, audits, and Special Reports related to the ALARA program since the last inspection to determine if the licensee's overall audit program's scope and frequency for all applicable areas under the Occupational Cornerstone met the requirements of 10 CFR 20.1101c. This review represented one sample.

The inspectors determined if identified problems were entered into the corrective action program for resolution, and that they had been properly characterized, prioritized, and resolved. This included dose significant post-job (work activity) reviews and post-outage ALARA report critiques of exposure performance. This review represented one sample.

Corrective action reports related to the ALARA program were reviewed and staff members were interviewed to determine if follow-up activities had been conducted in an effective and timely manner commensurate with their importance to safety and risk using the following criteria:

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

This review represented one sample.

The inspectors also determined if the licensee's self-assessment program identified and addressed repetitive deficiencies and significant individual deficiencies that were identified in the licensee's problem identification and resolution process. This review represented one sample.

b. Findings

No findings of significance were identified.

Cornerstone: Public Radiation Safety

2PS1 Radioactive Gaseous And Liquid Effluent Treatment And Monitoring Systems (71122.01)

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed the Radiological Effluent Release Reports from 2004, and 2005, and current effluent release data to verify that the program was implemented as described in the Radiological Environmental Technical Specifications/Offsite Dose Calculation Manual (RETS/ODCM), and the Updated Final Safety Analysis Report (UFSAR). The effluent report was also evaluated to determine if there were any significant changes to the ODCM or to the radioactive waste system design and operation. The inspectors determined if changes to the ODCM were technically justified, documented, and made in accordance with Regulatory Guide 1.109 and NUREG-0133. There were no significant modifications made to the radioactive waste system design and operation since the last inspection in this area. The inspectors evaluated the effluent reports for anomalous results and determined if those results were entered into the corrective action program and resolved.

The RETS/ODCM and UFSAR were reviewed to identify the effluent radiation monitoring systems and associated flow measurement devices. Licensee records including condition reports (CR), self-assessments, audits, and licensee event reports, were reviewed to determine if there were any radiological effluent performance indicator occurrences or any unanticipated offsite releases of radioactive material for follow-up. The UFSAR description of all radioactive waste systems was reviewed.

b. Findings

No findings of significance were identified.

.2 On-site Inspection

a. Inspection Scope

The inspectors walked down the major components of the gaseous and liquid release systems, including radiation and flow monitors, demineralizers, filters, tanks, and vessels. This was done to observe current system configuration with respect to the description in the UFSAR, ongoing activities, and equipment material condition. This review represented one sample.

The inspectors reviewed system diagrams and observed accessible parts of the radioactive liquid waste processing and release systems to verify that appropriate treatment equipment was used, and that radioactive liquid waste was processed in accordance with procedural requirements. Liquid effluent release packages including projected doses to the public were reviewed to determine if any regulatory effluent release limits were exceeded. The inspectors walked down accessible portions of the radioactive gaseous effluent processing and release systems and observed the collection and analysis of a gaseous effluent sample to determine if appropriate treatment equipment was used and that the radioactive gaseous effluent was processed and released in accordance with RETS/ODCM requirements. Radioactive gaseous effluent release data including the projected doses to members of the public were evaluated to determine if any regulatory effluent release limits were exceeded. This review represented one sample.

The inspectors reviewed records of abnormal releases or releases made with inoperable effluent radiation monitors. The licensee's actions for these types of releases were evaluated to determine if adequate compensatory sampling and analyses were performed, and that an adequate defense-in-depth was maintained against an unmonitored, unanticipated release of radioactive material to the environment. This included projected radiological doses to members of the public. This review represented one sample.

The inspectors reviewed changes made to the ODCM as well as to the liquid or gaseous radioactive waste system design, procedures, or operation including impacts on effluent monitoring and release controls since the last inspection. This was done to determine whether the changes affected the licensee's ability to maintain effluents ALARA and whether changes made to monitoring instrumentation resulted in a non-representative monitoring of effluents. The inspectors also reviewed the licensee's annual reports for 2004 and 2005 for any significant changes in dose values and reviewed the licensee's verification of the offsite dose calculation software. This review represented one sample.

The inspectors evaluated a selection of monthly, quarterly, and annual dose calculations to ensure that the licensee properly calculated the offsite dose from radiological effluent

releases and to determine if any annual RETS/ODCM (i.e., Appendix I to 10 CFR Part 50) values were exceeded. This review represented one sample.

The inspectors reviewed air cleaning system surveillance test results to determine if the system was operating within the licensee's acceptance criteria. The inspectors reviewed surveillance test results for the stack and vent flow rates. The inspectors verified that the flow rates were consistent with RETS/ODCM or UFSAR values. This review represented one sample.

The inspectors reviewed records of instrument calibrations performed since the last inspection for each point of discharge effluent radiation monitor and flow measurement device. There were no significant radwaste system modifications, and the current effluent radiation monitor alarm set point values were reviewed for agreement with RETS/ODCM requirements. The inspectors also reviewed calibration records of radiation measurement, (i.e.,counting room), instrumentation associated with effluent monitoring, and release activities. Radiation measurement instrumentation quality assurance data including corrective actions were evaluated to determine if the instrumentation was operating under statistical control and that any problems observed were addressed in a timely manner. This review represented one sample.

The inspectors reviewed the results of the interlaboratory comparison program to determine if the quality of radioactive effluent sample analyses performed by the licensee was adequate. The inspectors reviewed the licensee's quality control evaluation of the interlaboratory comparison test results to determine if there were any deficiencies. In addition, the inspectors reviewed the results from the licensee's quality assurance audits to determine whether the licensee met the requirements of the RETS/ODCM. This review represented one sample.

b. Findings

No findings of significance were identified.

.3 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed the licensee's self-assessments, audits, and special reports related to the radioactive effluent treatment and monitoring program since the last inspection to determine if identified problems were entered into the corrective action program for resolution. The inspectors also determined if the licensee's self-assessment program identified and addressed repetitive deficiencies or significant individual deficiencies that were identified in problem identification and resolution.

The inspectors also reviewed corrective action reports from the radioactive effluent treatment and monitoring program, interviewed staff, and reviewed documents to determine if the following activities were being conducted in an effective and timely manner commensurate with their importance to safety and risk:

1. Initial problem identification, characterization, and tracking;
2. Disposition of operability/reportability issues;
3. Evaluation of safety significance/risk and priority for resolution;
4. Identification of repetitive problems;
5. Identification of contributing causes;
6. Identification and implementation of effective corrective actions;
7. Resolution of Non-Cited Violations tracked in the corrective action system; and
8. Implementation/consideration of risk significant operational experience feedback.

This review represented one sample.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope

Cornerstone: Mitigating Systems

The inspectors sampled licensee submittals for the two performance indicators listed below.

- Unit 1 Safety System Functional Failures
- Unit 2 Safety System Functional Failures

The inspectors reviewed licensee event reports initiated since January 2005 and discussed the methods for compiling and reporting the performance indicators with cognizant licensing and engineering personnel. The inspectors also performed an independent review of each licensee event report to ensure that the licensee's accounting of safety system functional failures was performed in accordance with the guidance contained in NEI 99-02, "Regulatory Assessment Indicator Guideline." The inspectors compared graphical representations from the most recent performance indicator report to the raw data to verify that the data was correctly reflected in the report.

Cornerstone: Barrier Integrity

- Reactor Coolant System Leakage

The inspectors reviewed the leakage spreadsheets prepared by the operations and engineering staffs to determine the maximum identified and unidentified monthly leakage rates for both units for the period of January 2005 through March 2006. Once the maximum monthly leakage rates were identified, the inspectors input the leakage rate into the formula provided in NEI 99-02, Revision 4, to calculate the value of the

reactor coolant system leakage performance indicator for both units. The inspectors compared their results to the performance indicator values reported by the licensee for each of the months listed above to ensure that the performance indicator was properly reported.

This inspection represented the completion of two performance indicator samples.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program

a. Inspection Scope

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

b. Findings

No findings of significance were identified.

.2 Semi-Annual Review to Identify Trends

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, the inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment and corrective maintenance issues but also considered the results of daily inspector corrective action program item screening discussed in Section 4OA2.1. The review also included issues documented outside the normal corrective action program in system health reports, corrective maintenance work orders, component status reports, site monthly meeting reports and maintenance rule assessments. The inspectors' review nominally considered the 6-month period of December 1, 2005, through May 31, 2006, although some examples expanded beyond those dates when the scope of the trend warranted. The inspectors compared and contrasted their results with the results contained in the licensee's various trending reports. Corrective actions associated with a sample of the issues identified in the licensee's reports were reviewed for adequacy.

b. Observations

No new trends were identified.

.3 Corrective Actions Associated with the 2-1001-22B Relief Valve

a. Inspection Scope

In April 2003, the licensee experienced unexpected flooding of the Unit 2 reactor building basement due to the inadvertent lift of residual heat removal relief valve 2-1001-22B while placing shutdown cooling in service. The inspector reviewed this event and concluded that weaknesses in control room panel monitoring resulted in the failure to identify this internal flooding event for more than 12 hours. During the Unit 2 refueling outage in March 2006, the inspectors found that relief valve 2-1001-22B unexpectedly lifted again when shutdown cooling was placed in operation. The inspectors interviewed operations and engineering personnel, reviewed corrective action documents, and examined the relief valve's maintenance work history to determine the actions that had been taken following the 2003 event.

b. Observations

Engineering personnel concluded that the relief valve had lifted in 2003 because the valve's setpoint (413 psig) was extremely close to the pressure developed when a residual heat removal pump was placed in shutdown cooling (approximately 400 psig). Corrective actions included revising QCOP 1000-05, "Shutdown Cooling Operations," to allow operations personnel to slightly open the residual heat removal pump's discharge valve to minimize the possibility of lifting the relief valve. The licensee also planned to install a relief valve with a higher setpoint.

Following the March 2006 relief valve lift, the inspectors interviewed engineering personnel to determine the status of the corrective actions developed in 2003. The inspectors were informed that the Plant Heath Sub-Committee had approved replacing relief valves 2-1001-22A, 2-1001-22B, and 2-1001-59 on November 6, 2003. Relief valve 2-1001-59 was replaced during the March 2006 refueling outage. However, the remaining two relief valves were not scheduled for replacement until 2008. The inspectors questioned several members of the engineering department to determine why it was acceptable to wait 5 years to replace a relief valve which was known to lift under certain conditions and had resulted in flooding the reactor building basement. Engineering personnel explained that the relief valves were not being replaced to correct a design deficiency or a degraded condition. Rather, the valves were being replaced to improve upon design margins. Based upon this rationale, engineering personnel believed that waiting to replace the relief valves in 2008 (as required by the inservice testing program) was appropriate.

The inspectors disagreed with the licensee's rationale for several reasons. First, the engineering department viewed potential flooding of the reactor building basement as acceptable. The inspectors noted that operations personnel immediately recognized the March 2006 relief valve event. However, this was due to annunciator response

procedural improvements made following the April 2003 event. Second, if the 2-1001-22B relief valve worked properly it should not actuate during a routine pump starting evolution. Third, flooding of the reactor building due to an equipment issue was a condition adverse to quality which was required to be promptly corrected. The inspectors concluded that waiting 5 years to install a relief valve with a higher setpoint was not prompt.

The inspectors also found that the operations department showed a similar lack of sensitivity to internal flooding contributors. In May 2006 the inspectors questioned members of the operations department to determine whether revising the shutdown cooling procedure to address the relief valve issue had been considered for inclusion in the operator workaround program. Operations department staff members informed the inspectors that the relief valve issue had not been considered for inclusion in the workaround program in 2003. However, operations management committed that the Operator Workaround Review Board would review this issue as part of their June 2006 meeting.

On June 28, 2006, the inspectors were presented with the minutes from the Operator Workaround Review Board meeting held on June 7, 2006. The review board concluded that the 2003 relief valve issue (and the associated procedure changes) was not an operator workaround because the issue did not have the potential to complicate the response to an emergency or contribute to the significance of a plant transient. The board also concluded that the relief valve issue was not an operator challenge because the changes made to the procedures used to place shutdown cooling in service were not deemed to be a significant compensatory action.

The inspectors reviewed the review board's decision against the criteria listed in OP-AA-102-103, "Operator Work-Around Program," and considered the decision to be short-sighted. The inspectors strongly disagreed with the review board's conclusion that the relief valve issue did not have the potential to complicate the response to an emergency or contribute to the significance of a plant transient. This position was based upon the fact that the 2003 relief valve issue occurred during a transient caused by a stuck open power operated relief valve which resulted in the declaration of an Alert. Had the 2003 relief valve actuation been recognized earlier during the Alert, it would have certainly had the potential to complicate the licensee's response. In addition, the inspectors viewed any equipment issue which resulted in an increased probability for an internal flooding event to be significant regardless of the actions taken to minimize the flooding event or the total amount of water which may have accumulated in the reactor building basement.

During this inspection, the inspectors became aware of Issue Report 490382. Maintenance personnel initiated this issue report to document that relief valve 2-1001-59 had lifted outside the expected setpoint band during testing. Due to the test failure, the licensee was required to remove the relief valves currently installed as valves 2-1001-22A and 22B during the next residual heat removal maintenance work window to perform testing. The licensee planned to replace the 22A and 22B relief valves with

relief valves which had a higher setpoint by the end of the year. The inspectors concluded that these actions should resolve the possibility of future reactor building basement flooding events due to lifting of this relief valve.

.4 Review of Actions Associated with Main Steam Isolation Valve Room Cooler Degradation

a. Inspection Scope

As required by Inspection Procedure 71152, the inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on Unit 1 and 2 main steam isolation valve (MSIV) room coolers. The review also included issues documented outside the normal corrective action program in system health reports, corrective maintenance work orders and component status reports. The inspectors review considered the 12-month period of May 2005 through May 2006. Specific documents reviewed are listed in the attachment.

b. Observations

The inspectors interviewed system engineering personnel and learned that the MSIV rooms were cooled by a combination of the MSIV room coolers and the reactor building ventilation system. In the last few years, the licensee took actions to begin addressing the obsolescence of the room coolers. However extensive time has been required to find an acceptable cooler replacement. Additional time will be needed complete the modification paperwork and install the new coolers. As a result, the number of room cooler tube leak repairs during the recent refueling outages has continued to increase. Some of these repairs have required permanently blocking flow through the leaking tubes.

Currently, there are six room coolers per unit. Each unit has twelve parallel cooling tubes. The inspectors questioned personnel regarding the number of tubes which could be plugged. The inspectors were informed that the licensee had recently discovered the existence of ABB Impell Calculation No. 0591-361-001, "MSIV Room Heat Loads," dated August 14, 1990. This calculation was prepared for both Dresden and Quad Cities, and not only calculated the design heat load of the MSIV rooms, but also estimated the cooling capacity for each of the MSIV room coolers. However, there were a number of outdated and inaccurate assumptions made in this calculation. Aside from not taking into account extended power uprate conditions, the calculation assumed a maximum river temperature of 80 degrees Fahrenheit (°F) even though incoming Mississippi River temperatures at Quad Cities exceeded 80°F during the summer. The calculation also failed to consider the heat generated by the continuously operating MSIV room cooler fan motors. The calculation assumed normal MSIV room temperature was 120°F, whereas it was not uncommon for the MSIV room temperatures to exceed 150°F during the summer. Lastly, the existing coolers were designed to be warehouse/area heaters with hot water flowing through the tubes, and were not designed to be room coolers with raw water flowing through them. It was not clear whether this calculation was ever used at Quad Cities as part of the MSIV room cooler

design or as justification for a previously identified material condition issue. As of May 24, 2006, six tubes were plugged/capped on Unit 1 and two tubes were plugged/capped on Unit 2.

Currently, the licensee was not experiencing problems with maintaining the MSIV room temperatures below the Group I containment isolation setpoint. However, the inspectors were concerned that continued degradation of the coolers could result in an unexpected equipment actuation or force operations personnel to lower reactor power in an effort to reduce the air temperatures within the MSIV rooms.

At the conclusion of the inspection, operations personnel were continuing to monitor MSIV room temperatures as outside air temperatures increased. In addition, the licensee had assigned activities to update the ABB/Impell calculation in preparation for replacing the existing coolers under a permanent plant modification. The permanent plant modification was currently in the approval process. The licensee planned to begin installing the new MSIV room coolers in 2008.

.5 Review of Operator Workaround Program

a. Inspection Scope

In accordance with Inspection Procedure 71152, the inspectors performed a comprehensive review of the operator workaround program by inspecting the items on the current operator workaround/challenge list, verifying that sufficient progress was being made to address the documented condition, and validating that the condition did not place undue stress on operations personnel during emergency and normal operating conditions. The inspectors also conducted a review of issue reports and current plant issues to determine whether previously identified material condition items had not been considered for inclusion as part of the operator workaround program.

b. Observations

The inspectors reviewed a list of open operator workarounds and challenges dated April 28, 2006, to determine the number of items in each category. The inspectors found that one operator workaround remained open on each unit regarding the resolution of degraded switchyard voltage and transformer loading concerns following a postulated loss of coolant accident. The licensee planned to resolve this issue for both units through the installation of new automatic load tap changing reserve auxiliary transformers in the spring of 2006. The inspectors validated that the transformers had been installed. However, the use of the automatic load tap changing capability had not been approved for use. It appeared that the use of a transformer with load tap changing capability would resolve this operator workaround.

In addition to the operator workaround discussed above, the April 2006 list also included the following four operator challenges:

- Challenge 05-003 - Off Gas Filter Building Ventilation Controller Will Not Properly Control

- Challenge 05-014 - Contaminated Condensate Storage Tank Heater Breakers Trip Repeatedly
- Challenge 05-011 - Unit 1 Relay Chatter During Startup and Shutdown
- Challenge 06-001 - 2B Control Rod Drive Pump Discharge Valve Leaks Requiring Manual Operation During Pump Start

Based upon the schedule dates in the workaround list, the inspectors determined that the licensee appeared to be taking timely actions to resolve these challenges. However, the inspectors were aware that previous actions taken to resolve Challenge 05-014 had not been successful. The licensee was pursuing alternate actions to address the increased operator burden caused by the repeated breaker tripping. The inspectors also noted that actions associated with resolving the relay chatter were not scheduled until the next Unit 1 refueling outage. This concerned the inspectors since the relay chatter placed Unit 1 at an increased risk of an equipment actuation during power ascension and shut down activities. During recent startup and shutdown observations, the inspectors verified that operations and nuclear engineering personnel were aware of the relay chatter issue. In addition, the nuclear engineers described the contingency actions implemented to reduce the time spent operating at power levels where the relays were known to chatter.

As part of their review, the inspectors noted that the relief valve issue discussed in Section 4OA2.3 of this report was not included as an operator workaround or challenge (see the specific section of this report for further details). The inspectors considered this a weakness in the licensee's operator workaround program.

4OA3 Event Followup (71153)

.1 (Closed) Licensee Event Report 05000254/06-001: Failure of the Unit 1 B Core Spray Pump Breaker to Operate due to Racking Deficiency.

Introduction: A self-revealed Green finding and a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," were identified for the Unit 1 "B" core spray system failing to start during testing. The pump failure to start was caused by the core spray pump breaker's secondary disconnect pins not being properly aligned with the breaker cubicle's secondary disconnect slides. This resulted in inadequate electrical contact and caused the failure of the breaker to close. The misalignment was caused by inadequate procedural instructions that failed to include information on the importance of properly aligning these components.

Description: On January 4, 2006, operations personnel attempted to start the Unit 1 "B" core spray pump during surveillance test QCOS 1400-01, "Quarterly Core Spray System Flow Test." The pump's electrical breaker failed to close. The licensee entered Technical Specification 3.5.1, Condition B, due to having one core spray system inoperable.

Electrical maintenance personnel performed a visual inspection and found the following conditions:

- The top of the breaker was protruding 1/2 inch outside the cubicle
- The breaker was found to lean slightly to one side allowing the breaker to contact the cubicle
- The breaker's secondary disconnect pins were not centered on the cubicle's metal disconnect slides in the final connect position
- The breaker's secondary disconnect pins raised 1/8 of an inch during the last one-half inch of travel in the final connect position
- The cubicle's secondary disconnect slides were positioned 1/16 inch lower than normal
- There was a slight vertical movement of the breaker when operated

The licensee determined that the culmination of the items listed above likely created a high resistance condition which prevented sufficient breaker control power voltage from reaching the breaker's closing coil.

Analysis: The inspectors determined that QCEMP 0200-11, "Inspection and Maintenance of Horizontal 4 kilo Volt Cubicles," lacked the appropriate procedural instruction for verifying the appropriate position of the adjustable secondary disconnect slides. In addition, QCOP 6500-07, "Racking in a 4160 Volt Horizontal Type AMHG or G26 Circuit Breaker," lacked appropriate procedural instructions to ensure that proper contact between the breaker and cubicle was made following the installation of a breaker into a cubicle. Based on the procedural inadequacies, the finding was considered to be more than minor because if left uncorrected, the misalignment between safety-related breakers and cubicles could continue to result in the inoperability of equipment important to safety. The inspectors reviewed Appendix B to Inspection Manual Chapter 0612 and determined that this finding was required to be evaluated by the Significance Determination Process as it impacted the operability, availability, reliability, or function of a system or train in a mitigating system. The inspectors performed a Phase 1 evaluation and determined that a Phase 2 assessment was required because the "B" core spray system was inoperable for 90 days; a time period that was greater than the Technical Specification allowed outage time of 7 days. Based on the Phase 2 review, this finding was of low safety significance (Green) because additional low pressure injection systems were available, such as an additional core spray system and the residual heat removal system.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires that activities affecting quality be prescribed by documented instructions, procedures, and drawings of a type appropriate to the circumstance. In addition, the activities affecting quality shall be accomplished in accordance with these instructions, procedures, and drawings. Contrary to the above, prior to October 6, 2005, procedures associated with the preventive maintenance and installation of 4 kilo Volt Merlin Gerin breakers were not appropriate to the circumstance. Specifically, the procedures failed to include instructions to ensure that the breaker cubicle's secondary disconnect slides and the breaker's secondary disconnect pins were properly aligned as part of normal preventive maintenance and breaker installation activities. Because this failure to comply with 10 CFR Part 50, Appendix B, Criterion V, is of very low safety significance and has been entered into the corrective action program as Issue Report 438650, the violation is being treated as a Non-Cited Violation consistent with

Section VI.A.1. of the NRC Enforcement Policy **(NCV 05000254/2006005-03)**. Corrective actions for this issue included revising and implementing the appropriate preventive maintenance and breaker installation procedures.

.2 (Closed) Licensee Event Report 05000254/06-002: Automatic Reactor Scram from Turbine/Generator Load Reject due to Degraded Current Transformer Wiring on the Main Power Transformer.

Introduction: A Green finding was self-revealed when the Unit 1 main turbine tripped causing a reactor scram. The turbine tripped due to the trip of the main power transformer "B" phase differential overcurrent relay. The relay trip was caused by degraded wiring insulation resulting in a ground in the current transformer "C" phase wiring. The finding was not considered a violation of regulatory requirements since the main power transformer differential overcurrent relays were non-safety related components.

Description: On February 22, 2006, Unit 1 received a main turbine trip and an automatic reactor scram due to a trip of the main power transformer "B" phase differential overcurrent relay. All control rods inserted and the plant responded as designed.

The licensee identified the main power transformer had a significant wiring insulation degradation problem. The wiring insulation degradation was a result of electrical conduit bushings not being installed at various junction boxes as required by design specifications. The lack of bushings caused damage to the wire as it was pulled through the electrical conduit. In addition the main power transformer and other associated components' were exposed to vibrations during plant operation that resulted in abnormal wear of the wire insulation. Small aluminum oxide particles were found in the electrical conduit which accelerated the degradation process. The main power transformer and related components were installed in March 2005 during refueling outage Q1R18.

Analysis: The inspectors determined that the failure to follow design specifications when constructing the main power transformer and related components was more than minor because it was a precursor to a significant event (a transient). The inspectors reviewed Appendix B to Inspection Manual Chapter 0612 and determined that this finding was required to be evaluated by the Significance Determination Process because the finding was associated with the increase in the likelihood of an initiating event. The inspectors conducted a Phase 1 Significance Determination Process screening and determined that the finding was of very low safety significance (Green) due to the finding not contributing to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available **(FIN 05000254/2006005-04)**.

Enforcement: This finding was not subject to NRC enforcement because the main power transformer protective relays were non-safety related components. The licensee initiated Issue Report 456929 to document the event and corrective actions. Corrective actions included main power transformer wiring modifications, enhancements to periodic main power transformer system walkdowns, and increased oversight of vendors constructing or repairing the main power transformers.

4OA5 Other Activities

.1 (Closed) Unresolved Item 05000254/2005003-01; 05000265/2005003-01: Appropriateness of Plant Health Committee Modification Ranking Process. The inspectors reviewed a list of modifications ranked by the Plant Health Committee dated February 17, 2006. Prior to performing the review, the inspectors separated the modifications needed to correct conditions adverse to quality from those not associated with conditions adverse to quality. After completing the sort, the inspectors reviewed the ranking associated with each Appendix B related modification. The inspectors found that the rankings appeared appropriate based upon the subject matter and the proposed completion date.

.2 Inspection of Extended Power Uprate Activites (71004)

a. Inspection Scope

From March to May 2006, the inspectors monitored the licensee's activities associated with inspecting the newly installed steam dryers after 1 year of operation, replacing the electromatic relief valve actuators with a newly designed actuator, and installing the acoustic side branch modifications. The inspectors observed workers inspecting both dryers and reviewed all of the issued Indication Notification Reports with licensee, regional, and headquarters personnel. Following the identification of a large crack in the Unit 2 steam dryer, the inspectors monitored the licensee's actions to repair the dryer and the efforts taken to determine the root cause. The licensee determined that the crack was caused by the actions taken to resolve difficulties experienced during the initial dryer installation in 2005. This was further supported by an inspection of the Unit 1 dryer in which no cracks were identified.

The inspectors also observed workers in the drywell installing the new electromatic relief valve actuators and the acoustic side branches. The inspectors performed field inspections to ensure that the components were installed as designed and that monitoring equipment was installed in the locations previously communicated to the NRC. The inspectors monitored the information provided by the licensee's vibration monitoring instrumentation during power ascension on both units. The inspectors compared this information to the licensee's acceptance criteria to ensure that the vibration levels of equipment, piping, and components had been significantly reduced due to installation of the acoustic side branches.

b. Findings

No findings of significance were identified.

.3 (Closed) Inspection Followup Item 05000254/96011-06; 05000265/96011-06: Concrete Expansion Anchor Safety Factor for High Energy Line Break Pipe Whip Restraints. TAC Nos. MB7297 through MB7300.

The inspectors were concerned that anchor bolts for high energy line break pipe whip restraints at the Dresden and Quad Cities stations were designed with a minimum safety

factor of 2.0, which was less than the safety factor of 4.0 they expected. (Reference Dresden Unresolved Item 05000237/97019-04; 05000249/97019-04). Subsequently, the licensee performed additional analysis and determined that there are five concrete expansion anchors at Quad Cities, and one concrete expansion anchor at Dresden, that have a designed factor of safety between 2.5 and 3.8. These concrete expansion anchors are used in pipe whip restraints provided for high energy line break mitigation. Concrete expansion anchors used to satisfy seismic design requirements must have a safety factor of 4.0 or greater. Concrete expansion anchors used for other applications, such these pipe whip restraints, are typically also designed with a safety factor of 4.0.

An Internal NRC Memorandum (R. Capra to J. Grobe) dated, July 23, 1997, responded to an NRC Region III Request for Technical Assistance (Task Interface Agreement 96-0325) (G. Grant to J. Roe) dated, September 20, 1996, and provided the NRC Office of Nuclear Reactor Regulation evaluation of the issue.

Additional discussions and correspondence between the licensee and NRC staff occurred with respect to this issue. Additional onsite inspection of this issue also occurred as indicated in NRC Integrated Inspection Report 05000254/03-02; 05000265/03-02.

Docketed correspondence between the NRC and the licensee included the following:

Letter from NRC to L. Pearce (ComEd) dated December 16, 1997;

Letter from J. Heffley (ComEd) to NRC dated January 9, 1998;

Exelon Response to Verbal Request for Additional Information (K. Jury (Exelon) to NRC Document Control Desk) dated, September 11, 2002;

NRC Request for Additional Information, M. Banerjee (NRC) to C. Crane (Exelon) dated, August 10, 2004; and

Exelon Response to Request for Additional Information (P. Simpson to NRC Document Control Desk) dated, September 30, 2004.

There is no specific regulatory requirement or commitment regarding the SF for these CEAs. Therefore, the staff did not identify any non-compliance with a specific regulatory requirement. However, in order to ensure that adequate protection exists given the smaller SFs, the staff requested the licensee to provide a bounding type of analysis to discuss the safety impact of these CEAS failing to perform their safety function upon a postulated failure of the pipe (a beyond design basis analysis).

The licensee provided the requested analysis in the letter dated, September 30, 2004 (available in the NRC agencywide document access and management system (ADAMS) under accession number ML042820219). The staff reviewed this analysis and performed a walkdown of the plant areas where some of the protected equipment is located. The following provides a summary of the licensee's response and the staff's observation during the walkdown regarding the safety impact of postulated failures of

the subject CEAs (for Quad Cities) to restrain the high energy line in the unlikely event of a total circumferential break:

Quad Cities High Energy Restraint (HER) No. 1 and HER No. 3

These CEAs hold down the pipe whip restraint for the reactor core isolation cooling (RCIC) steam supply line. In the unlikely event of a circumferential break of this line and the CEA failing to hold down the pipe, the whipping pipe could strike the torus. As the pipe is located above the torus, any torus break will be above the torus water level. The high steam flow out the ruptured pipe should isolate RCIC, thus terminating the flow. The operators would use symptom based EOPs to manually shutdown the reactor and use the EOP guidance for events that threaten the reactor containment. The main condenser should be available to remove decay heat, and if the main condenser is not available, the operators should be able to use the HPCI, and/or safety and relief valves for depressurization. Also, the motor driven high pressure safe shutdown makeup pump that takes suction from the condensate storage tank and the redundant core spray systems should be available for reactor water level maintenance. The hole in the upper level of the torus will probably increase the radiation levels in the reactor building, thus necessitating isolation of the normal heating, ventilating and air-conditioning (HVAC) system and initiation of the standby gas treatment system. Two trains of the shutdown cooling system should be available to remove shutdown decay heat.

Quad Cities HER JIES-1

These HERs are designed to restrain a turbine extraction steam line circumferential break in the heater bay area and protect certain electrical cables from ensuing pipe whip. These cables provide electrical feeds to the Unit 1 emergency diesel generator (EDG) cooling water pump. The operators can manually shut down the reactor if the reactor protection system (RPS) is not actuated by high steam flow. The other EDG and/or offsite power should be able to provide electrical power to a variety of systems to safely shut down the plant even if a single failure should occur.

Quad Cities HER JIES-2 and JIHD-1

These HERs are designed to protect certain electrical cables from a postulated circumferential break in the turbine extraction steam line or a feedwater drain line in the heater bay area. Upon a failure of the CEA with a postulated break in either of these lines, electrical feeds to the Unit 2 EDG cooling water pump, and the Unit 2 residual heat removal (RHR) service water (SW) pumps 2C and 2D will be disrupted. As stated in the paragraph above, adequate electrical power supply should be available from the other EDG or the offsite power system to a variety of systems to safely shut down the plant. One pump (2A or 2B) in the redundant RHR SW system is adequate to remove decay heat as stated in the Quad Cities Technical Specification Bases for RHR SW (B 3.7.1), if the other pump in the system fails to function. Procedural direction is provided to the operators to manually open any motor operated valve (MOV) in the RHR SW loop (located in the reactor building) if the MOV fails to open.

Conclusion

Based on a review of the information that was provided, the staff agrees that there is reasonable assurance that the plant can be safely shut down in the event of a circumferential pipe break and subsequent failure of its related CEA(s) as described above. Therefore, adequate protection exists for a postulated beyond design basis event when the subject CEAs with a SF of less than 4.0 are assumed to fail after a high energy line break. Hence, no further regulatory action is warranted relative to this issue. The TAC Nos. MB7297 through MB7300 are closed. This inspection followup item is also closed.

.4 Operation of an Independent Spent Fuel Storage Installation (60855.1)

a. Inspection Scope

The inspectors observed portions of the loading and transfer activities associated with cask number four to verify compliance with the Final Safety Analysis Report. The inspectors reviewed select loading procedures and radiation protection procedures to verify compliance with the applicable Certificate of Compliance conditions and associated Technical Specifications. In addition, the inspectors reviewed a number of condition reports associated with dry fuel storage and the corrective actions taken to address issues that were encountered during the loading campaign. The inspectors also reviewed results of a job critique session performed after the first dry fuel loading campaign was completed in December of 2005. The inspectors evaluated licensee's implementation of the lessons learned and their effectiveness.

The inspectors reviewed a number of 10 CFR 72.48 screenings and reference procedures to verify that changes made to the dry fuel storage process or the cask components did not adversely impact the design of the storage cask and its function.

The inspectors reviewed the licensee's fuel selection process to verify that the process incorporated all of the physical, thermal, and radiological fuel acceptance parameters specified in the current Certificate of Compliance and the Technical Specifications. The inspectors reviewed the fuel selection procedure and the qualification records for a number of assemblies to be loaded in six canisters during this loading campaign.

The inspectors reviewed the licensee's monitoring program to verify the monitoring of dry fuel storage was implemented. The inspectors reviewed select records to verify that the plant personnel made daily rounds to perform the necessary surveillance checks of the casks that were in operation. The inspectors assessed the physical condition of the pad and the casks to confirm the vent screens were free of debris and the pad was free of combustible materials.

b. Findings

No findings of significance were identified.

4OA6 Meetings

.1 Exit Meeting

The inspectors presented the inspection results to Mr. T. Tulon and other members of licensee management on July 11, 2006. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Interim Exit Meetings

Interim exits were conducted for:

- Dry Fuel Storage Inspection (Inspection Procedure 60855.1) with D. Barker on June 16, 2006
- Access control to radiologically significant areas, and the ALARA planning and controls program with Mr. T. Tulon on April 6, 2006.
- RETS/ODCM radiological effluents, with Mr. D. Craddick on June 30, 2006..

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

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

Nuclear Regulatory Commission personnel

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

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000254/2006005-01; 05000265/2006005-01	FIN	Failure to Evaluate and Address Long-Standing Degradation of RHRSW Sump Pumps Prior to Impacting Internal Flooding Protection Equipment (Section 1R06.1)
05000254/2006005-02; 05000265/2006005-02	URI	Evaluate Potential That Internal Flooding Protection Function Should Have Been Classified as a(1) (Section 1R12)
05000254/2006005-03	NCV	Failure of the 1B Core Spray Pump to Start due to Breaker Alignment Issues (Section 4OA3.1)
05000254/2006005-04	FIN	Turbine/Generator Load Reject and Reactor Scram due to Main Power Transformer Issues (Section 4OA3.2)

Closed

05000254/2006005-01; 05000265/2006005-01	FIN	Failure to Evaluate and Address Long-Standing Degradation of RHRSW Sump Pumps Prior to Impacting Internal Flooding Protection Equipment
05000254/2006005-03	NCV	Failure of the 1B Core Spray Pump to Start due to Breaker Alignment Issues
05000254/2006005-04	FIN	Turbine/Generator Load Reject and Reactor Scram due to Main Power Transformer Degradation Issues
05000254/06-001	LER	Failure of the 1B Core Spray Pump to Start due to Racking Deficiency
05000254/06-002	LER	Automatic Reactor Scram from Turbine/Generator Load Reject due to Degraded Wiring on the Main Power Transformer
05000254/2005003-01; 05000265/2005003-01	URI	Appropriateness of Plant Health Committee Modification Ranking Process
05000254/96011-06; 05000265/96011-06	IFI	Concrete Expansion Anchor Safety Factor for High Energy Line Break Pipe Whip Restraints TAC Nos. MB7297 through MB7300

Discussed

None.

LIST OF DOCUMENTS REVIEWED

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

1R04 Equipment Alignment

Issue Report 487992; Q1M19 Snubber Found Locked Up; dated May 8, 2006
Issue Report 488015; Q1M19 Snubber Found Acceptable but Degraded; dated May 8, 2006
Issue Report 487382; Bent Rod Hanger on Target Rock Downcomer; dated May 6, 2006
Issue Report 487430; Four Hangers for Turbine Control Valve Above/Below Seat Drains Degraded; dated May 5, 2006
Issue Report 487352; D Main Steam Line Insulation Loose; dated May 5, 2006
Issue Report 487348; Unit 1 Drywell Main Steam Spring Can has Loose Lock Nut; dated May 5, 2006
Issue Report 487358; Unit 1 B Main Steam Restraint Missing Nut; dated May 5, 2006
QOP 6900-02; 125 VDC Electrical System; Revision 25
QOM 1-6300-T03; Turbine Building 125 VDC Bus 1A; Revision 8
QOM 1-6300-T04; 125 VDC Bus 1B-1; Revision 11
QOM 1-6300-T05; 125 VDC Bus 1B-2; Revision 5
QOM 1-6300-T06; 125 VDC Reactor Building Distribution Panel 1; Revision 10
Figure 6900-25; 125 VDC Distribution; Revision 0

1R05 Fire Protection

Issue Report 478821; Fire Pre-plan RB-19 and TB-71 have Incorrect Info; dated April 14, 2006
Quad Cities Generating Station Pre-Fire Plans
Quad Cities Generating Station Fire Hazards Analysis

1R06 Flood Protection

QCOA 0010-16; Flood Emergency Procedure; Revision 8
Refueling Floor General Arrangement Drawing
QCTS 0810-10; Reactor Building Internal Flood Barrier Surveillance; Revision 3
QCAP 0250-06; Control of In-Plant Flood Barriers and Water Tight Doors; Revision 10
QCOS 0010-11; RHR Service Water Vault Sump Discharge Check Valve and Area High Level Alarm Test; Revision 3
Issue Report 194711; Check Valve 2-3999-517C Failed QCOS 0010-11; dated January 2004
Issue Report 194711; FME - Unit 2 RHRSW Vault Sump discharge Check Valve
Issue Report 196687; Pump Failure - 2C RHRSW Vault Sump Pump - FME in Check Valves

Issue Report 300877; Unit 1 Residual Heat Removal Service Water Pump C not Pumping Near Capacity; dated February 13, 2005
Issue Report 440695; 2B RHRSW Discharge Isolation Valve Bound in Open Position; dated January 10, 2006
Issue Report 451795; RHRSW Pump A Not Pumping; dated February 10, 2006
Issue Report 452716; Failed RHRSW Check Valve During QCOS 0010-11
Issue Report 482166; RHRSW Vault Sump Discharge Check Valve Failed to Seat
Issue Report 485375; RHRSW Vault Sump Pump 1-3908-C Degraded
Issue Report 487314; Check Valve 1-3999-515B Will Not Pass Flow; dated May 2006
Predefine Database Service Request 29449; Predefined Change - Change to an Existing Predefine; completed July 7, 2004
Work Order 654822; Repair/Replace 2-3999-517C; "C" RHRSW Vault Sump Flood Protection Discharge Check Valve
Work Order 656351; Disassemble/Inspect Pump Removed from 2C RHRSW Vault Sump
Work Order 660763; Inspect/Repair/Replace Unit 1C RHRSW Pump 1C (1-3908-C)
Work Order 755418; Inspect/Repair/Replace 1-3999-515C
Work Order 890934; Repair/Replace 1-3999-515A and 1-3999-516A

1R12 Maintenance Effectiveness

Issue Report 194446; 2-3999-517C Failed QCOS 0010-11
Issue Report 196687; Pump Failure - 2C RHRSW Vault Sump Pump - FME in Check Valves
Issue Report 236750; Unit 1 Turbine Crane-Bridge Brake Fire; dated July 16, 2004
Issue Report 241239; Reactor Building Overhead Crane Does Not Operate in the Restricted Mode of Operation; dated August 2, 2004
Issue Report 251721; Reactor Building Overhead Crane Emergency Shut Down Switch Surveillance; dated September 9, 2004
Issue Report 256590; Vendor Identified Deficiency in Auxiliary Hoist Cable; dated September 23, 2004
Issue Report 278022; Replace Relay in Unit 1 Turbine Building Crane; dated November 29, 2004
Issue Report 300877; Unit 1 Residual Heat Removal Service Water Pump C not Pumping Near Capacity; dated February 13, 2005
Issue Report 306202; Auxiliary Hoist Runs Erratic Speed in Up and Down Motion; dated February 28, 2005
Issue Report 339421; Reactor Building Overhead Crane Sporadic Shutdown; dated May 29, 2005
Issue Report 352209; Reactor Building Crane Lost Power During Lift; dated July 9, 2005
Issue Report 451795; RHRSW Pump A Not Pumping; dated February 10, 2006
Issue Report 452716; Failed RHRSW Check Valve During QCOS 0010-11
Issue Report 482166; RHRSW Vault Sump Discharge Check Valve Failed to Seat
Issue Report 485375; RHRSW Vault Sump Pump 1-3908-C Degraded
Issue Report 487386; Reactor Building Overhead Crane Hoist Motor Generator Sparking/Burning Smell; dated May 5, 2006
Issue Report 489896; Z5800 Maintenance Rule System at Risk; dated May 14, 2006
Issue Report 500774; Maintenance Rule Z0012 CBM Definition Needs Clarification

System Z0012-02; Internal Flood Protection for the Turbine Building, Maintenance Rule performance Criteria; last revised October 4, 2002
Work Order 654822; Repair/Replace 2-3999-517C; "C" RHRSW Vault Sump Flood Protection Discharge Check Valve
Work Order 755418; Inspect/Repair/Replace 1-3999-515C
Work Order 890934; Repair/Replace 1-3999-515A and 1-3999-516A
ER-AA-310; Implementation of the Maintenance Rule; Revision 5
ER-AA-310-1004; Maintenance Rule - Performance Monitoring; Revision 4
ER-AA-310-1005; Maintenance Rule - Dispositioning Between (a)(1) and (a)(2), Revision 3

1R13 Maintenance Risk and Emergent Work Evaluation

Work Week Safety Profiles
Daily Production Schedules
Maintenance Rule Guideline Book; dated February 2004
OU-QC-104; Shutdown Safety Management program Quad Cities Annex; Attachment 1; Completed Risk Factor Charts for specified periods

1R14 Non-Routine Evolutions

Prompt Investigation Report 480621; dated April 20, 2006
Issue Report 480621; Rod D-7 Drifted When D-5 was Scrammed; dated April 19, 2006
Issue Report 480613; Anomalous Indications When Withdrawing Rod D-7; dated April 18, 2006
Prompt Investigation Report 479335; dated April 17, 2006
Issue Report 479335; Unexpected Breaker Trip During QOP 6900-07; dated April 16, 2003
Prompt Investigation Report 489921; Unexpected Unit 1 Emergency Diesel Generator Auto Start; dated May 15, 2006
Unit 1 Control Room Logs dated May 24, 2006
Issue Report 492119; Eight Drop per Minute Leak on Control Valve #1; dated May 21, 2006
Issue Report 493063; EHC Leak at Control Valve #1; dated May 24, 2006
Prompt Investigation Report 493063; EHC Leak on Turbine Control Valve One Accumulator; dated May 25, 2006

1R15 Operability Evaluations

Issue Report 483299 - "A" Fire Diesel Check Valve Stuck Shut; dated April 26, 2006
Issue Report 483736 - 2B Core Spray Discharge Header Pressure trending higher; dated April 27, 2006
Issue Report 489747 - Foreign Material Found Inside the Unit 1 Reactor Water Cleanup Suction Primary Containment Isolation Valve; dated May 13, 2006
MA-AA-716-008; Foreign Material Exclusion Program; Revision 2
Piping and Instrumentation Diagram M29; Diagram of Diesel Generator Fuel Oil Piping; Sheet No.1; Revision J

Piping and Instrumentation Diagram M29; Diagram of Diesel Generator Fuel Oil Piping; Sheet No.2; Revision AA
Issue Report 472356; Potentially Unqualified Pressure Switch (Target Rock Safety Relief Valve Bellows Leakage Pressure Switch) Installed on Unit 1; dated March 29, 2006
Engineering Change Document No. 360305; Evaluate the Component Classification of the Unit 1 and Unit 2 Target Rock Valve Pressure Switch (PS-1(2)-0203-3AA) and Its Installation Requirements; Revisions 0 and 2

1R19 Post Maintenance Testing

Issue Report 478940; Level II 125 VDC Ground Unit 2; dated April 14, 2006
Issue Report 479114; Unit 2 Ground is Now a Level III; dated April 15, 2006
Issue Report 479340; Unit 2 Level 3 Ground 125 VDC Battery; dated April 16, 2006
QCOS 1000-04; RHR Service Water Pump Operability Test; dated April 11, 2006; Revision 43
Issue Report 446610; Inspect Bus 14-1 Cubicle 2 for Potential Misalignment; dated January 27, 2006
Issue Report 438650; 1B Core Spray Pump Breaker Tripped Immediately When Starting; dated January 4, 2006
QCOS 1400-01; Quaterly Core Spray System Flow Rate Test; dated January 4, 2006; Revision 29

1R20 Refueling and Outage Activities

Daily Shutdown Safety Assessments
Control Room Logs
Outage Scope Change Request Forms
Work Order 841733; Complex Troubleshooting Package to Investigate Reactor Building Overhead Crane Problems; dated May 9, 2006
QCGP 1-1; Normal Unit Startup; Revision 65

1R22 Surveillance Testing

EC 360321; Q2R18 Feedwater Check Valve Local Leak Rate Testing Methodology; dated April 5, 2006
Risk Management Position for “A” Feedwater Injection Check Valves; dated April 4, 2006
Equipment Apparent Cause Evaluation Report 130847; Inadequate Local Leak Rate Testing Procedure Led to Feedwater Check Valve Failures During Q2R17; dated April 10, 2003
ANSI/ANS-56.8-1994; Containment System Leakage Testing Requirements
QCOS 1000-04; RHR Service Water Pump Operability Test; dated April 11, 2006; Revision 43
Piping and Instrumentation Diagram —79; Diagram of RHR Service Water Piping Revision AX
QCOS 1600-32 - Drywell/Torus Closeout (Unit 2); dated April 16, 2006; Revision 11
Apparent Cause Report 472980; Procedure Changes Made to Address Check Valve

Soft Seating were Ineffective Resulting in Operations Declaring Local Leak Rate Testing Failures; dated June 21, 2006

1EP6 Drill Evaluation

Licensed Operator Requalification Training Scenario; Power Change/Circulating Water Rupture/Loss of Feedwater/Loss of all High Pressure Feed/Emergency Depressurization; Revision 11
Quad Cities Station 2006 Pre-Exercise Manual; dated April 26, 2006

2OS1 Access Control to Radiologically Significant Areas; and

2OS2 ALARA Planning And Controls

NOSA-QDC-05-06; Health Physics Functional Area Audit; dated July 27, 2005
NOSPA-QC-06-1Q; Observations: Understanding ALARA and Industrial Safety; dated March 24, 2006
NOSPA-QC-05-4Q; Observations: Q1R18 ALARA and Survey Issues Corrective Actions; dated December 30, 2005
NOSPA-QC-05-4Q; Observations: Radiation Workers Understand and Comply With RWP; dated December 5, 2005
NOSPA-QC-05-4Q; Observations: Assessment Of Outage Dose Estimation Process; dated December 16, 2005
NOSPA-QC-05-3Q; Observations: Personnel Exposure Controls; dated September 22, 2005
NOSPA-QC-05-3Q; Observations: RP Self Evaluation and Corrective Actions; dated September 20, 2005
00387833; Focus Area Self Assessment-ALARA Planning And Controls; dated March 13, 2006
AR-00387607; U1 RWCU Valve Gallery Door Is Hard To Open And Close; dated October 19, 2005
AR-00392492; HPCI Suction Relief Line Hot Spot, Replace Pipe To Eliminate; dated October 31, 2005
AR-00396349; Increased Dose Rates Due To New Steam Dryers; dated May 13, 2005
AR-00432411; Q2R18 Dose Saving Opportunity; dated December 9, 2005
AR-00434540; Q2R18 Dose Gap" ERV/SRV/Target Rock Remove/Replace; dated December 16, 2005
AR-00436118; Annual Shielding Package Deficiencies; December 21, 2005
AR-00434975; Near Miss Posting Issue For Dry Cask Project; dated December 16, 2005
AR-00440059; High Dose Source, Replace Valve and Pipe To Remove Source; dated January 9, 2006
AR-00464818; Worker Received ED Rate Alarm; dated March 9, 2006
AR-00470953; U2 TIP Room ARM Is Reading Too high; dated March 26, 2006
AR-00471021; Q2R18 Initial Drywell Surveys; dated March 26, 2006
RWP 10006446; RWP and ALARA Plan, Dryer Mod - Diving; Revision 0
RWP 10006447; RWP and ALARA Plan, U2 Steam Dryer Diver Support, Revision 0
RWP 10006741; RWP and ALARA Plan, ASB Modification; Revision 0

RWP 10006067; RWP and ALARA Plan, 2-1201-78 Valve Cut Out/Replace; Revision 0
RWP 10006812; RWP and ALARA Plan, U2 Drywell SRV X-Ray; Revision 0
RP-AA-460; Controls For High And Very High Radiation Areas; Revision 10
RP-AA-400; ALARA Program; Revision 4
RP-AA-270; Prenatal Radiation Exposure; Revision 3
RP-AA-401; Operational ALARA Planning and Controls; Revision 6
Units 1 and 2 Source-term Trends
Q2R18 Dose Estimates
NF-AA-390; QC Station Fuel Pool Material Log; dated April 5, 2006

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

Radioactive Effluent Reports For 2004 and 2005
QCCP 0300-07; Radwaste Liquid Effluent Monitor Calibration; dated March 4, 2005
QCCP 0300-07; Service Water Effluent Monitor Calibration U1; dated January 14, 2005
QCCP 0300-07; Service Water Effluent Monitor Calibration U 2; dated August 18, 2005
CY-QC-130-402; Main Chimney SPING LR Noble Gas Calibration; dated June 21, 2006
Main Chimney SPING Mid Range Noble Gas Calibration; dated June 22, 2006
Main Chimney SPING High Range Noble Gas Calibration; dated June 22, 2006
QCIS-5700-07; Chimney Flow Rate Indication Calibration; dated August 8, 2005
QCIS-2000-01; Radwaste River Discharge Flow Indicator Calibration; dated July 20, 2004
QOP-2000-25 Liquid Batch Release 7310; dated August 17, 2005
QOP-2000-25 Liquid Batch Release 7313; dated May 24, 2006
CY-QC-110-606; Main Chimney Particulate and Halogen Sample Collection and Analysis; dated June 27, 2006
QCTS 0430-03; SGTS In-Place Charcoal Adsorber Leak Test; dated April 26, 2005
QCTS 0430-02; SGTS In-Place DOP Leak Test Of HEPA Filters; dated April 26, 2005
QCTS 0430-05; SGTS Removal Of Charcoal Adsorber Canister; dated May 12, 2005
Chemistry Interlaboratory Cross Check Results; 1st, 2nd, 3rd, and 4th Quarters; 2005
Effluent Lower Limit Of Detection Determinations; dated January 5, 2004
QCCP-0800-05; Germanium Detector Calibrations: ATP-131, BTP-368, CTP-477, DTP-787; dated July 29, 2005
CY-AA-160-100; Liquid Scintillation Counter Efficiency Quench Curve; dated October 28, 2005
AT-449732-02; Radioactive Effluents Self-Assessment; dated June 6, 2006
NOSPA-QC-06-2Q; Reporting Of Alpha Activity In A Liquid Release; dated June 20, 2006
NOSPA-QC-04-4Q; U1 Off Gas Sample; dated October 14, 2005
NOSPA-QC-05-2Q; Liquid Radwaste Program Controls; dated May 20, 2005
AR-399469; Rx Vent SPING Battery Backup Failed Functional Test; dated November 16, 2005
AR-388629; U2 SWRM Low Flow Alarm In Control Room Did Not Actuate; dated October 21, 2005
AR-499450; Greater Than 50 percent Increase In Off Gas Radiation; dated June 13, 2006
AR-461294; Increased Activity On U1 Rx Bldg Ventilation CAM; dated March 2, 2006
AR-367248; U1 SWRM 1-3999-542 Valve Leak By Worsening; dated August 26, 2005

AR-463897; Abnormal Release During WCF Change Out; dated March 1, 2006
AR-431323; U2 SW Rad Monitor Eductor Valve Will Not Close; dated December 7, 2005

4OA2 Problem Identification and Resolution

Issue Report 478247; QCOP 1000-42 Used to Initiate Shutdown Cooling did not get Revised; dated April 13, 2006
Issue Report 470560; Q2R18 2B Low Pressure Coolant Injection Relief Valve Lifting; dated March 24, 2006
Issue Report 00293681; Replace 1B MSIV room cooler stop PB cover during outage
Issue Report 00293712; Unexpected trip of MSIV room cooler 1-3906-A
Issue Report 00315230; 1E MSIV room cooler fan found not running
Issue Report 00315527; U1F MSIV room cooler high vibration issue
Issue Report 00316255; PSU 1E MSIV room cooler tube leak
Issue Report 00316262; PSU possible tube leak on 1B MSIV room cooler
Issue Report 00316270; PSU possible tube leak on 1D MSIV room cooler
Issue Report 00321045; PSU pinhole tube leaks in the 1B MSIV room cooler
Issue Report 00323131; PSU tube leaks in the 1B MSIV room cooler
Issue Report 00335182; PSU 2B MSIV room cooler service water leak
Issue Report 00368251; Q2R18 contingency for replacement MSIV room cooler
Issue Report 00457349; Apparent tube leak on 1C MSIV room cooler
Issue Report 00471360; PSU Q2R18 service water leak from 2F MSIV room cooler
Issue Report 00478412; PSU Q2R18 MSIV room cooler unable to repair
Issue Report 00488453; PSU Q1M19 tube leak 1A MSIV room cooler
Issue Report 00493323; 1990 ABB calc found to be outdated & inaccurate for Quad Quad Cities Updated Final Safety Analysis Report (UFSAR)
ABB Impell Calculation No. 0591-361-001; MSIV Room Heat Loads

4OA3 Event Followup

Issue Report 456929; Unit 1 Main Generator Trip and Reactor Scram on Differential Overcurrent Trip Due to Degraded Main Power Transformer CT Wiring; dated February 22, 2006
QCEMP 0200-11; Inspection and Maintenance of Horizontal 4KV Cubicles; Revisions 16 and 17
QCOP 6500-07; Racking in a 4160 Volt Horizontal Type AMHG or G26 Circuit Breaker; Revision 20
Issue Report 438650; 1B Core Spray Pump Breaker Failure to Close; dated January 4, 2006
Work Order 900152; Complex Troubleshooter Created to Provide General Guidance for Troubleshooting Failure of 4KV Merlin Gerin Breakers to Close at GE AMH Switchgear; dated May 6, 2006
Issue Report 489887; Slight Misalignment of 4KV Breaker in Cubicle 2 at Bus 14-1; dated May 13, 2006
QCOP 6500-04; Racking Out a 4160 Volt Horizontal Type AMHG or G26 Circuit Breaker; Revision 22

QCEMP 0200-21; Preventive Maintenance and Receipt Inspection of Merlin Gerin SF6 4KV Type AMHG Circuit Breakers; Revision 16
QCOP 1400-01; Quarterly Core Spray System Flow Test; Revision 30

4OA5 Other Activities

Issue Report 334383; New Dryer Lower Support Ring Bent During Removal; dated May 12, 2005
Issue Report 472321; Steam Dryer Related Concerns; dated March 29, 2006
Issue Report 480587; Main Steam Line Strain Gauge S33A Has Failed; dated April 18, 2006
Issue Report 493302; Level 2 Criteria Exceeded During Power Ascension Test; dated May 24, 2006
Issue Report 479661; GE Report on Dryer Skirt Weld Trans-Granular Stress Corrosion Cracking Observation; dated April 17, 2006
Issue Report 460450; Questions Regarding the Unit 2 Turbine Stop Valve Transient Calculation; dated February 28, 2006
TIC-1402; Quad Cities Unit 2 Power Ascension Test Procedure for the Acoustic Side Branch Installation; various revisions
Engineering Change Evaluation 360947; Review of Q1M19 Critical Dryer Inspections to Meet NRC Commitment; Revision 0
Engineering Change Evaluation 360536; Exelon Review of GENE Report on TGSCC Observed on Unit 2 Steam Dryer; Revision 0
AR 00435103; Dry Cask Storage AOV Control Box Equipment Operation; dated December 19, 2005
AR 00435745; General Condition of Facility After Inclement Weather; dated February 14, 2006
AR 00443213; Relocate Restricted Mode Switch Into RB Crane Cab; dated January 18, 2006
AR 00446840; Implementation of HU-AA-1212 Needs Improvement; dated January 27, 2006
AR 00449637; Human Performance Issues During DCS Training/Campaign; dated February 3, 2006
AR 00452083; Hi-Trac Trunnions Found Contaminated; dated February 9, 2006
AR 00454567; DCS Procedures Require 72.48/50.59 Reviews by Engineering; dated February 16, 2006
AR 00463531; ISFSI PIDS Zones Performance Issues; dated March 8, 2006
AR 00485698; Engineering Support required for 72.48 Preparation/Review; dated May 2, 2006
AR 00499303; Additional Dose Taken for Helium Backfill Regulator Failure; dated June 13, 2006
CAP00499916; FME Between Hi-Track and MPC 134; dated June 14, 2006
CAP00499736; Quad Cities 72.48s Refer to incorrect Holtec 72.48(typo); dated June 14, 2006
ECO 95; Hi-Storm Lid Stud and Lid Closure Bolt; dated October 6, 2005
ECO 103, Hi-Storm Lid Stud and Lid Closure Bolt; dated October 17, 2005
IR445150; Lessons Learned from Campaign 1 (November 2005 through January 2006)

Procedure HU-AA-1212; Technical Task Risk/Rigor Assessment, Pre-Job Brief, Independent Third Party Review, and Post-Job Brief; Revision 0
Procedure QCFHP 0800-63; Hi-Storm Final Inspection; Revision 2
Procedure QCFHP 0800-64; Transporter Operations; Revision 2
Procedure QCFHP 0800-65; Spent Fuel Cask Site Transportation; Revision 6
Procedure QCFHP 0800-68; Hi-Track Preparation; Revision 4
Procedure QCFHP 0800-70; Hi-Track Loading Operations; Revision 5
Procedure QCFHP 0800-71; MPC Processing; Revision 5
Procedure QCFHP 0800-72; Hi-Storm Processing; Revision 2
Procedure QCFHP 0800-75; MPC Receipt Inspection; Revision 1
Procedure QCFHP 0800-76; Transporter Undocumented Visual Inspection; Revision 2
Procedure QCTP 0950-03; Fuel Selection and Documentation for Fuel Cask Loading; Revision 1
Procedure QOS 0005-01; Operations Department Weekly Summary of Daily Surveillance; Revision 120
Procedure RP-QC-303; Hi-Track Radiation Survey; Revision 1
Procedure RP-QC-304; Hi-Storm Radiation Survey; Revision 1
Procedure RP-QC-305; Independent Spent Fuel Storage Installation Radiation Survey; Revision 10
Screening 736; Hi-Storm Lid Stud and Lid Closure Bolt; dated December 17, 2005
Screening 72.48-0003; Hi-Storm Final Inspection; dated March 27, 2006
Screening 72.48-0004; Transporter Operations, Spent Fuel Cask Site Transportation, Transporter Undocumented Visual Inspection; dated May 2, 2006
Screening 72.48-0005; Hi-Storm Processing; dated June 14, 2006
Screening 72.48-0006; Hi-Track Preparation, HI-Track Loading Operations; dated May 2, 2006
Screening 72.48-0007; MPC Receipt Inspection; dated March 31, 2006
Screening 72.48-0008; Hi-Track Movement within the Reactor Building; dated May 26, 2006
Screening 72.48-0009; Vacuum Drying System (VDS); dated May 17, 2006
Screening 72.48-0010; MPC Processing; dated May 15, 2006
Screening 72.48-0011; Transporter Preventive Maintenance; dated May 12, 2006
Screening 72.48-0012; DSC Equipment Lay-up; dated June 13, 2006
Screening 72.48-0013; Multi-Purpose Canister (MPC) Engineering Change Orders (ECOs) and Supplier Manufacturing Deviation Reports (SMDRs) affecting MPC-68 Serial Numbers 134, 135, 136, 137 & 138; dated June 9, 2006
Screening 72.48-0014; Optional Lid Closure Bolt Assembly; dated June 9, 2006
Surveillance Logs; January 1, 2006 through June 5, 2006

LIST OF ACRONYMS USED

ALARA	As Low As Is Reasonably Achievable
ERV	Electromatic Relief Valve
gpm	Gallons Per Minute
HRA	High Radiation Area
MSIV	main steam isolation valve
ODCM	Offsite Dose Calculation Manual
RETS	Radiological Environmental Technical Specifications
RHRSW	residual heat removal service water
RP	Radiation Protection
RWP	Radiation Work Permit
UFSAR	Updated Final Safety Analysis Report