



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

May 1, 2008

EA 08-097

Mr. Charles G. Pardee
Chief Nuclear Officer and
Senior Vice President
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2008002;
05000265/2008002

Dear Mr. Pardee:

On March 31, 2008, the U. S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. The enclosed report documents the inspection findings which were discussed on April 1, 2008, with Mr. Tulon and other members of your staff.

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

Based on the results of this inspection, the inspectors identified four findings of very low safety significance (Green). These issues involved violations of NRC requirements. However, because these violations were of very low safety significance and because the issues were entered into your corrective action program, the NRC is treating these findings as Non-Cited Violations (NCVs) in accordance with Section V1.A.1 of the NRC's Enforcement Policy. In addition, the results of a recent Office of Investigations investigation identified a willful violation of a station procedure. However, because the violation had no actual and minimal potential radiological significance, the violation was licensee-identified, involved the acts of a low-level individual resulting from an isolated action without management involvement, and because adequate remedial action was taken, the NRC is also treating this issue as a NCV, in accordance with Sections IV.A.1 and VI.A.1 of the NRC's Enforcement Policy.

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

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

Sincerely,

/RA/

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

Docket Nos. 50-254; 50-265; 72-053
License Nos. DPR-29; DPR-30

Enclosure: Inspection Report 05000254/2008002; 05000265/2008002
w/Attachment: Supplemental Information

cc w/encl: Site Vice President - Quad Cities Nuclear Power Station
Plant Manager - Quad Cities Nuclear Power Station
Regulatory Assurance Manager -
Quad Cities Nuclear Power Station
Chief Operating Officer and Senior Vice President
Senior Vice President - Midwest Operations
Senior Vice President - Operations Support
Vice President - Licensing and Regulatory Affairs
Director Licensing - Licensing and Regulatory Affairs
Manager Licensing - Clinton, Dresden and Quad Cities
Associate General Counsel
Document Control Desk - Licensing
Assistant Attorney General
J. Klinger, State Liaison Officer,
Illinois Emergency Management Agency
M. Rasmusson, State Liaison Officer, State of Iowa
Chairman, Illinois Commerce Commission
Vice President - Law and Regulatory Affairs
Chief Radiological Emergency Preparedness Section,
Dept. Of Homeland Security
D. Tubbs, Manager of Nuclear
Illinois Emergency Management Agency

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Letter to C. Pardee from M. Ring dated May 1, 2008

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INTEGRATED INSPECTION REPORT 05000254/2008002;
05000265/2008002

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-254, 50-265; 72-053
License Nos: DPR-29, DPR-30

Report No: 05000254/2008002 and 05000265/2008002

Licensee: Exelon Nuclear

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

Location: Cordova, Illinois

Dates: January 1 through March 31, 2008

Inspectors: K. Stoedter, Senior Resident Inspector
J. McGhee, Senior Resident Inspector
R. Jones, Acting Resident Inspector
A. Barker, Project Engineer
B. Cushman, Reactor Engineer
D. Jones, Reactor Inspector
W. Slawinski, Senior Health Physicist
C. Mathews, Illinois Emergency Management Agency

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

Enclosure

TABLE OF CONTENTS

SUMMARY OF FINDINGS	1
REPORT DETAILS.....	4
Summary of Plant Status.....	4
1. REACTOR SAFETY	4
1R04 Equipment Alignment (71111.04).....	4
1R05 Fire Protection (71111.05)	5
1R07 Annual Heat Sink Performance (71111.07).....	6
1R08 Inservice Inspection Activities (71111.08G)	7
1R12 Maintenance Effectiveness (71111.12).....	8
1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)..	9
1R15 Operability Evaluations (71111.15)	15
1R18 Plant Modifications (71111.18).....	16
1R19 Post Maintenance Testing (71111.19)	17
1R20 Outage Activities (71111.20).....	18
1R22 Surveillance Testing (71111.22)	19
1EP6 Drill Evaluation (71114.06).....	22
2OS1 Access Control to Radiologically Significant Areas (71121.01)	23
2OS2 As Low As Is Reasonably Achievable (ALARA) Planning And Controls (71121.02)	26
4. OTHER ACTIVITIES.....	31
4OA1 Performance Indicator Verification (71151).....	31
4OA2 Identification and Resolution of Problems (71152).....	33
4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153).....	35
4OA5 Other	40
4OA6 Management Meetings	41
4OA7 Licensee-Identified Violations	41
SUPPLEMENTAL INFORMATION	1
KEY POINTS OF CONTACT	1
LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED.....	1
LIST OF DOCUMENTS REVIEWED.....	3
LIST OF ACRONYMS USED	11

SUMMARY OF FINDINGS

IR 05000254/2008002, 05000265/2008002; 01/01/2008 – 03/31/2008; Quad Station, Units 1 & 2; Maintenance Risk Assessment; Radiation Protection; Other Activities.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional engineering and health physics inspectors. Four Green findings were identified by the inspectors. These findings were considered Non-Cited Violations (NCVs) of NRC regulations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Barrier Integrity

- Green. A self-revealing finding of very low safety significance and a NCV of Technical Specification (TS) 5.4.1 was identified on March 14, 2008, when operators transferring power using procedure QCOP 6800-03, "Essential Service System," caused an unplanned isolation of the reactor building ventilation system and automatically started the standby gas treatment system. QOP 6800-03, "Essential Service System," implements the TS 5.4.1 procedure requirements as provided in Regulatory Guide 1.33. Procedural steps in QOP 6800-03 did not include adequate instruction to transfer power without impacting the safety systems, in that, the procedural instructions directed the operators to take the bypass switch for radiation instruments out of the bypass position, but did not direct them to verify that there was no isolation signal present. Corrective actions included revising the affected procedure and briefing operating crews on the circumstances surrounding the event.

The failure to implement adequate procedural directions for transferring electrical power without challenging safety-related equipment was more than minor because it impacts the Barrier Integrity Cornerstone attribute of Structures, Systems and Components and Barrier Performance for reliability of Containment Isolation Structures, Systems, and Components. If the condition were to go uncorrected, the Containment Isolation function could be impacted. This finding was determined to be of very low safety significance because the finding impacted only the radiological barrier function of the control room and standby gas treatment systems, and the systems functioned as designed. The inspectors also determined that the operators implementing the procedure had the opportunity to identify the procedural deficiency either during the job preparation activities or while executing the procedural steps, if they had verified the trip signals were cleared prior to moving the switch. Properly executed self-checking and peer-checking would have identified the possible action and provided the operators with the opportunity to prevent the challenge to the safety-related system components. The inspectors identified the deficient use of Human Performance tools as a contributor to the event and therefore determined that the event was cross-cutting in Human Performance, Work Practices, Prevention (H.4(a)). (Section 4A03)

Cornerstone: Mitigating Systems

- Green: A self-revealing finding of very low safety significance and a NCV of 10 CFR 50, Appendix B, Criterion V, was identified on December 17, 2007, for an inadequate pump fill and vent procedure that resulted in pump degradation to the safe shutdown makeup pump. QCOP 2900-01, "Safe Shutdown Makeup Pump System Preparation for Standby Lineup," was used to fill and vent the safe shutdown makeup pump following maintenance and, although the system passed surveillance testing, air was later identified in the system. Air migration within the system was later identified as the cause of safe shutdown makeup pump degradation, which resulted in the subsequent failure to meet TS flow requirements. Corrective actions for this event included the installation of additional vents on the suction piping, an aggressive extent of condition evaluation of other susceptible systems, refurbishment of the safe shutdown makeup pump, briefing personnel on the trending failure, and a review of inservice test alert setpoints to ensure triggers are set appropriately to allow corrective actions to be planned for program components.

The inspectors determined that the failure to provide procedural direction that ensured adequate venting was more than minor because it impacted the Mitigating Systems Cornerstone attribute of Equipment Performance and affected the availability and reliability of the system. This finding was determined to be of very low safety significance because although operability of the pump was impacted, the credited safety function was maintained. Contributing to the performance deficiency was that the monitoring program in place was not effective in identifying the gradual degradation before pump operability was impacted. Additionally, the alert threshold for the pump parameter in the monitoring program, which would trigger additional actions such as pump overhaul, was set below the TS allowable value and was thus an ineffective barrier to prevent loss of operability or function. The inspectors determined this failure to be cross-cutting in the area of Problem Identification and Resolution, Corrective Action Program, Corrective Actions due to the failure of the licensee to address the adverse trend in pump performance in a timely manner, commensurate with the safety significance of the components (P.1(b)). (Section 1R13)

- Green: A self-revealing finding of very low safety significance and a NCV of TS 5.4.1 was identified due to the failure to establish, implement, and maintain procedures associated with the fire protection program. Work instructions, Work Order 787787-01, performed on the 1/2 "A" diesel fire pump in September 2007 did not specify the thread sealant to be used in the work activity and the mechanics used a material that subsequently resulted in an oil leak and subsequent fire on December 22, 2007, caused by oil-contaminated insulation. Corrective actions included revision of model work orders for the pump to include guidance for using high temperature thread sealant and performance expectations for work planners to include identification of thread sealant for similar tasks. Additionally, maintenance personnel were briefed on the issue of workers failing to identify and/or replace the oil-contaminated insulation pad while replacing the turbocharger oil supply hose during a corrective maintenance activity.

Inspectors determined the issue was more than minor because the procedural deficiencies were a precursor to an oil leak and subsequent insulation fire that impacted the reliability and availability of the 1/2 "A" fire pump. The finding was determined to be of very low safety significance because the 100 percent capacity "B" pump was not impacted and the operator actions after removing the combustibles could have made the

“A” pump available shortly after the event. The inspectors determined this failure to be cross-cutting in the area of Problem Identification and Resolution due to the failure of multiple individuals to investigate the condition of the insulation that was near the oil leak and thereby failing to identify the oil contamination of that insulation in time to prevent the impact to the diesel fire pump (P.1(a)). (Section 4A03)

- Green. A self-revealing finding of very low safety significance and NCV of 10 CFR Part 50.65(a)(4) was identified on January 15, 2008, due to the licensee’s failure to properly assess and manage the risk associated with the emergent failure of the Unit 1 reactor core isolation cooling flow controller. The risk assessment incorrectly credited manual local operation of the reactor core isolation cooling for maintaining system availability. The inaccurate risk assessment also resulted in the failure to implement the additional risk management actions required by the licensee’s procedures. Corrective actions for this issue included implementation of performance management corrective actions for the procedure usage and training for Work Control and Operating personnel on the risk management procedure.

The inspectors determined that the inadequate risk assessment was more than minor because the elevated plant risk associated with the Unit 1 reactor core isolation cooling system being unavailable would have required the implementation of additional risk management actions (i.e., additional risk significant equipment would have been required to be protected and other maintenance performed on January 15, 2008, would have been rescheduled). The inspectors also reviewed IMC 0612, Appendix B, Section 3 and determined that this issue was more than minor because the licensee’s risk assessment had known errors which changed the outcome of the assessment. Using input from the licensee’s risk assessment engineer, the inspectors determined that the actual risk deficit for this event was less than 1E-6 and the finding was determined to be of very low safety significance. The inspectors determined that this issue was cross-cutting in the area of Human Performance, Work Practices, Procedural Adherence because the individual assessing risk did not follow the procedural guidance for crediting manual operation and for crediting a dedicated operator (H.4(b)). (Section 1R13)

B. Licensee-Identified Violations

Two violations of very low significance which were identified by the licensee have been reviewed by the inspectors. One of these violations was the subject of an investigation by the NRC Office of Investigations. Corrective actions taken or planned by the licensee have been entered into the corrective action program. These are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as NCVs and are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1

2/13 Unit 1 reduced power to 780 megawatts electric (MWe) at the request of the system operator for grid stabilization considerations. Power was restored to normal levels approximately 10 hours later.

3/22 Unit 1 lowered power to 840 MWe for a control rod pattern adjustment. Power was restored to normal levels approximately 2-1/2 hours later.

Unit 2

2/13 Unit 2 reduced power to 825 MWe at the request of the system operator for grid stabilization considerations. Power was restored to normal levels approximately 9 hours later.

3/2 Unit 2 reduced power to begin refueling outage 2QR19. The unit was taken offline on 3/3/2008 at 0000 hours. The outage ended with the unit synchronizing to the grid on 3/30/2008. Power was restored to 100 percent on 4/3/2008 following completion of online testing required to support installation of a digital electro-hydraulic control system for the main turbine.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity [R]

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- Unit 1 and Unit 2 Emergency Diesel Generators,
- Unit 1 High Pressure Coolant Injection,
- Unit 1 Reactor Core Isolation Cooling, and
- Unit 1/2 "B" Standby Gas Treatment System.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, Updated Final Safety Analysis Report (UFSAR), Technical Specification (TS) requirements, Administrative TS, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components and support equipment were

aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Documents reviewed are listed in the Attachment.

These activities constituted four partial system walkdown samples as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings of significance were identified.

.2 Semi-Annual Complete System Walkdown

a. Inspection Scope

On March 25, 2008, the inspectors performed a complete system alignment inspection of the 2A Core Spray System to verify the functional capability of the system. This system was selected because it was considered both safety-significant and risk-significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment lineups; electrical power availability; system pressure and temperature indications, as appropriate; component labeling; component lubrication; component and equipment cooling; hangers and supports; operability of support system; and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of past and current condition reports was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the corrective action program database to ensure that system equipment alignment problems were being identified and appropriately resolved. The documents used for the walkdown and issue review are listed in the Attachment.

These activities constituted one complete system walkdown sample as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Unit 1 Reactor Building Ground Floor, Elevation 595'-0", Fire Zone 1.1.1.2;
- Unit 1 Turbine Building, Elevation 595'-0", 4kV Switchgear & U-1 Trackway Fire Zone 8.2.6.A;
- Unit 1 Turbine Building, Elevation 595'-0", Diesel Generator Fire Zone 9.1;
- Unit 1 Turbine Building, Elevation 595'-0", Hallway Fire Zone 8.2.6.A;
- Unit 2 Turbine Building, Elevation 595'-0", Safe Shutdown Pump Room Fire Zone 5.0; and
- Unit 2 Turbine Building, Elevation 595'-0", 4kV Switchgear & Trackway Fire Zone 8.2.6E.

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

These activities constituted six quarterly fire protection inspection samples as defined in Inspection Procedure 71111.05-05.

b. Findings

No findings of significance were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

The inspectors observed the licensee's inspection and testing of the Unit 1/2 emergency diesel generator heat exchangers. The inspectors verified, through direct observations, that the condition of the heat exchangers did not adversely impact heat removal during accident conditions.

This inspection constitutes one sample as defined in Inspection Procedure 71111.07-05.

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection Activities (71111.08G)

From February 25, 2008, through February 28, 2008, the inspectors conducted a review of the implementation of the licensee's inservice program for monitoring degradation of the reactor coolant system, risk significant piping and components and containment systems.

The inspections described in Sections 1R08.1 and 1R08.2 represent one boiling water reactor outage inspection sample as defined in Inspection Procedure 71111.08-05.

.1 Piping Systems Inservice Inspection

a. Inspection Scope

The inspectors observed the following nondestructive examinations mandated by the American Society of Mechanical Engineers (ASME) Section XI Code to evaluate compliance with the ASME Code Section XI and Section V requirements and, if any indications and defects were detected, to determine if these were dispositioned in accordance with the ASME Code or an NRC approved alternative requirement.

- Ultrasonic Examination of the residual heat removal (RHR) "A" heat exchanger, pipe to elbow weld, 1009A-4, Report No. 2QR19-037;
- Ultrasonic Examination of the RHRA, elbow to pipe weld, 1009-6, Report No. 2QR19-036;
- Ultrasonic Examination of the RHRA, pipe to elbow weld, 1016A-2, Report No. 2QR19-060;
- Magnetic Particle Examination of the core spray Pump B, pump to base plate weld, 1402-W-204A, Report No. 2QR19-045; and
- Magnetic Particle Examination of core spray pump B, variable spring can with 4 lugs welded to pipe, 2306-W-206A, Report No. 2QR19-048.

The inspectors performed a record review of the following examination:

- Visual Examination (VT) of the core spray Pump B, pump to base plate weld, 1402-W-204A, Report No. 2QR19-135.

During the prior outage non-destructive surface and volumetric examinations, the licensee did not identify any relevant/recordable indications. Therefore, no NRC review was completed for this inspection procedure attribute.

The licensee had not performed pressure boundary welding since the beginning of the preceding outage for Unit 2. Therefore, no NRC review was completed for this inspection procedure attribute.

b. Findings

No findings of significance were identified.

.2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of inservice inspection related problems entered into the licensee's corrective action program and conducted interviews with licensee staff to determine if:

- the licensee had established an appropriate threshold for identifying inservice inspection related problems;
- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and
- the licensee had evaluated operating experience and industry generic issues related to inservice inspection and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report. In addition, the inspectors verified that the licensee correctly assessed operating experience for applicability to the inservice inspection group.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- System Z4100: Fire Protection System, and
- System Z5795: Control Room Emergency Ventilation System.

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

- implementing appropriate work practices;
- identifying and addressing common cause failures;
- scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;

- characterizing system reliability issues for performance;
- charging unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, and components/functions classified as (a)(2) or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

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

This inspection constitutes two quarterly maintenance effectiveness samples as defined in Inspection Procedure 71111.12-05.

b. Findings

No findings of significance were identified.

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

.1 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

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

- Emergent work due to failure of the Unit 1 Reactor Core Isolation Cooling flow controller;
- Emergent failure of the U1 Emergency Diesel Generator Cooling Water Pump;
- Safe Shutdown Makeup Pump Emergent Outage and Outage Extension;
- Unit 1 Online Risk Profile during Work Week 11(March 2 - 8, 2008) for Impact and Consideration of Unit 2 Outage Activities (Bus 23, 23-1, 24-1 and 28-1 outages, and Unit 2 Emergency Diesel Generator outage);
- Unit 1 Online Risk Profile during Work Week 11(March 9 - 15, 2008) for Impact and Consideration of Unit 2 Outage Activities (Delays in restoration of Bus 23, Bus 23-1 outage, Unit 2 Emergency Diesel Generator outage, and Unit 2 125 Vdc battery charger breaker maintenance); and
- Unit 2 Transition from Shutdown Risk to Online Risk Evaluation from March 28 to March 31.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's

probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

These activities constituted six samples as defined in Inspection Procedure 71111.13-05.

b. Findings

Two findings were identified:

(1) Risk Assessment of Reactor Core Isolation Cooling Flow Controller Failure

Introduction: Inspectors identified a Green finding and Non-Cited Violation (NCV) of 10 CFR Part 50.65(a)(4) on January 15, 2008, due to the licensee's failure to properly assess and manage the risk associated with the emergent failure of the Unit 1 reactor core isolation cooling flow controller. The incorrect risk assessment also resulted in the failure to implement the additional risk management actions required by the licensee's procedures.

Description: While performing routine control room panel monitoring, a licensed reactor operator identified that the Unit 1 reactor core isolation cooling flow controller had failed. Operations personnel declared the Unit 1 reactor core isolation cooling system inoperable and unavailable at 9:25 a.m.

The inspectors reviewed the Unit 1 control room operating logs and noticed that Operations personnel declared the reactor core isolation cooling system available approximately one hour later based upon the following:

- Written instructions existed for operating the reactor core isolation cooling system manually from within the plant, and
- A dedicated operator had been briefed regarding the actions to be taken if the Unit 1 reactor core isolation cooling system needed to be operated manually.

Appendix B of NUMARC 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," stated that credit for a dedicated operator could be given if the function could be promptly restored either by an operator in the control room or by a dedicated operator stationed locally for that purpose. The restoration actions had to be contained in a written procedure, be uncomplicated (a single action or few simple actions), and must not require diagnosis or repair. Credit for a dedicated operator could only be taken if the operator was positioned at the proper location. Lastly, credit for a dedicated operator was to only be taken if the restoration actions were virtually certain to be successful during accident conditions.

The inspectors reviewed QCOP 1300-09, "Reactor Core Isolation Cooling Local Manual Operation," Revision 21 and determined that operating reactor core isolation cooling manually from within the plant required the completion of approximately 20 different steps. In addition, the completion of these steps required the use of three non-licensed operators in the plant or the use of one non-licensed operator and one control room operator. The inspectors questioned Operations personnel to determine whether the

dedicated operator was positioned in the Unit 1 reactor core isolation cooling room. The inspectors were informed that the dedicated operator was not in the reactor core isolation room, but had been assigned tasks which could be quickly stopped so that the operator could respond. Based upon this information, the inspectors questioned the appropriateness of crediting the actions of the dedicated operator.

The inspectors also held discussions with the shift manager to determine the most limiting time that the reactor core isolation cooling system would be needed in response to an event or transient. The shift manager stated that the reactor core isolation cooling system was needed 30 minutes following an Appendix R fire event. However, no other events or transients were considered. The inspectors reviewed the Mitigating Systems Performance Index bases document and determined that the reactor core isolation cooling system was used following a loss of feedwater event in which the reactor was isolated. The bases document indicated that the reactor core isolation cooling system was required to inject into the reactor vessel within 30 seconds following initiation. In addition, injection using the reactor core isolation cooling system was required prior to the reactor vessel water level reaching the top of active fuel. The inspectors contacted a member of the Operations training staff to determine the amount of time it would take for reactor vessel water level to reach the top of active fuel following a loss of feedwater event. The Operations training staff member estimated that the reactor vessel water level would reach the top of active fuel in approximately two minutes. Based upon this information, the inspectors determined that the decision to declare the Unit 1 reactor core isolation cooling system available was inappropriate since the actions contained within QCOP 1300-09 would be unable to be performed within this time period.

Analysis: The inspectors reviewed Inspection Manual Chapter (IMC) 0612, Appendix E and determined that the incorrect risk assessment was more than minor because the elevated plant risk associated with the Unit 1 reactor core isolation cooling system being unavailable would have required the implementation of additional risk management actions (i.e., additional risk significant equipment would have been required to be protected and other maintenance performed on January 15, 2008, would have been rescheduled). The inspectors also reviewed IMC 0612, Appendix B, Section 3 and determined that this issue was more than minor because the licensee's risk assessment had known errors which changed the outcome of the assessment.

The inspectors assessed the safety significance of this finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process (SDP)." Using input from the licensee's risk assessment engineer, the inspectors determined that the actual risk deficit was $1.75E-8$. Because the actual risk deficit was determined to be less than $1E-6$, the finding was determined to be of very low safety significance (Green). The inspectors determined that this issue was cross-cutting in the area of Human Performance, Work Practices, Procedural Adherence because the individual assessing risk did not follow the procedural guidance in WC-AA-101, "On-line Work Control Process," Attachment 6, for crediting manual operation of the system or for crediting a dedicated operator (H.4(b)).

Enforcement: Title 10 CFR Part 50.65(a)(4) requires, in part, that the licensee shall assess and manage the increase in risk that may be associated with performing maintenance activities prior to performing the maintenance. Contrary to the above, on January 15, 2008, the licensee failed to properly assess and manage the increase in risk associated with the unexpected failure of the Unit 1 reactor core isolation cooling flow

controller prior to performing maintenance. As a result, the risk management actions required by the licensee's procedures were not implemented. Because this violation was of very low safety significance and the issue was entered into the corrective action program as Issue Report 723781, the issue is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000254/2008002-01)**. Corrective actions for this issue included implementation of performance management corrective actions for the procedure usage and training for Work Control and Operating personnel on the risk management procedure.

(2) Safe Shutdown Makeup Pump Low Discharge Pressure

Introduction: A self-revealing Green finding of very low safety significance and a NCV of 10 CFR 50, Appendix B, Criterion V, was identified for an inadequate pump fill and vent procedure that resulted in pump degradation to the safe shutdown makeup pump on December 17, 2007.

Description: On December 10, 2007, the safe shutdown makeup pump had been removed from service for preventive maintenance on check valves, flanges, and instrument calibrations. This work window was also used to drain the shared safe shutdown makeup pump suction piping for tritium leak detection. Individuals involved in the work raised questions concerning pump venting during the pre-work walkdowns and pre-start briefings. In response to these concerns, a new high point vent was installed on the suction of the pump, the operating procedure was revised, and an Ultrasonic Transducer (UT) test was performed to verify fill of the suction piping as the pump was filled. In spite of these precautions, restoration of the safe shutdown makeup pump to service on December 15 required several actions to provide an adequate system vent and fill. In addition to performing the system fill and vent using QCOP 900-01, "Safe Shutdown Makeup Pump System Preparation for Standby Lineup," two flow testing runs using QCOS 2900-01, "Safe Shutdown Makeup Pump Flow Rate Test," were aborted due to indications of fluctuating suction and discharge pressure that indicated air in the pump. QCOS 2900-01 was completed satisfactorily on December 16 after extended system venting and more extensive UT testing. The measured pump discharge pressure for the successful surveillance test was 1215 psig, just 1.02 psig above the calculated minimum required pressure for the TS surveillance requirement of 1213.98 psig with the required 400 gallons per minute flow rate.

Based on the low margin to acceptance limits in the previous comprehensive test and the difficulties in system venting, QCOS 2900-01 was repeated on December 17 as a conservative measure implemented by the licensee staff. During this run, the measured discharge pressure was 1210 psig at 400 gallons per minute, which was less than the required TS acceptance criteria and the safe shutdown makeup pump was declared inoperable.

A pump overhaul was performed from December 17 to December 21, 2007. At the same time, licensee engineering staff revised the supporting calculation for the pump discharge head needed for the TS to 1196.3 psig. When the pump was disassembled, significant degradation was identified in the pump impeller wear rings which contributed to the failed confidence run. The damaged pump rotating element was replaced with a refurbished rotating element during the maintenance outage. Testing of the repaired pump was completed on December 21 with performance of the pump fill and vent, QCOS 2900-01, and QCOS 2900-08, "Safe Shutdown Makeup Pump Performance

Test.” The measured discharge pressure was 1198.94 psig, just 2.34 psig above the new TS value. This value met the TS requirements, but with less margin than expected for a newly rebuilt pump. QCOS 2900-01 was repeated with all acceptance criteria met, and all parameters similar to the results obtained earlier on this same date. Based on duplicated performance with comparable results, the system was declared operable and placed in standby while the lower than expected performance results were analyzed.

A licensee team of utility and vendor personnel concluded that the reduced capacity of the overhauled pump was due to the new impeller vanes not being under-filed, as compared with the removed impeller (that was installed in 1999). Based on this low performance margin and the analysis results, the site initiated procurement of a new rotating element to include impellers to be under-filed to match the originally installed impeller. In addition, due to the wear ring damage identified on December 17, the wear ring material specification was changed.

On January 31, 2008, QCOS 2900-01 was performed using both the local and remote flow controllers, and the measured pressure was 1196 psig at 400 gpm which again did not meet the TS requirements. A decision was made to disassemble the pump and install the new upgraded rotating element. The safe shutdown makeup pump rebuild using the enhanced rotating element was completed on February 4, 2008, with a pressure of 1279.7 psig, well above the TS requirement of 1196.3 psig. The pump was declared operable and placed in a standby condition.

Licensee inspections of the failed rotating element completed in December 2007 identified the cause of the performance degradation to be fracturing and eventual separation of the impeller wear rings. Wear ring cracking appears to have initiated at the set screw locations. Though the mounting of the setscrews was changed from radial to axial in 1999, the observed cracking appears to be a repeat condition for this installation.

An offsite laboratory (Power Labs Report QDC-79349) performed evaluations of the cracked/fractured wear rings from the suction side of the second and third stage impellers. The cracking mechanism for both samples was determined to be overloading. Both rings contained visible evidence of overheating and spinning on the impeller (these components are normally press fit with no movement expected) which would have generated high thermal stresses and caused the overload failures. The cracks and fractures occurred at the setscrew holes, which are inherent high stress locations. Lab evaluations were also performed on a cracked wear ring from the hub side of the second stage impeller. The cracking mechanism was overloading, which was caused by excessive material loss due to rubbing/galling wear on the outer diameter of the ring. The inner diameter of the wear ring also contained evidence of local overheating from spinning on the impeller. The report acknowledges that the presence of air in the pump, as reported by the site, would have increased pump operating temperatures, reduced lift, and reduced wear ring clearances. The report concludes that since the cracked wear rings exhibited evidence of overheating and severe galling, the gas void (in this case air) was considered a primary cause of the cracks and fractures. Portions of several fractures were covered with dark oxide, which indicated that cracking may have been present for a long time. The metallurgical evaluations performed by the lab indicated the failure mechanism for the dark fracture areas was reportedly consistent with the overload mechanism that occurred in the clean fracture regions. Although it is possible that some crack areas may have been present for a long time, the dark fracture regions may also have been initiated during one of the initial pump runs in December 2007. The

crack surfaces would have oxidized quickly if there were high operating temperatures. There was no evidence that corrosion or stress corrosion cracking played a role in the impeller wear ring cracking.

In response to the December 17 surveillance failure and discovery of wear ring damage, additional venting lines were installed in the suction line supplying the safe shutdown makeup pump and two reactor core isolation cooling trains (in the cable tunnel), and further downstream in the piping located in the Unit 1 high pressure core injection room. When these new vent valves were initially used (around December 20, 2007), several minutes of rushing airflow was vented from the suction piping. This represents a significant amount of air. This was especially notable in the largest supply line in the Unit 1 cable tunnel. The suction header draining completed in late 2007 for the tritium investigation is believed to have been the first full drain since safe shutdown makeup system installation. The licensee's analysis concluded that it is possible that pockets of air have remained in the safe shutdown makeup pump suction piping since installation, and this residual air migrates through the suction piping over time to form small air voids in the pump casing.

The Work Order completion notes from the 1999 safe shutdown makeup pump overhaul, documented venting actions followed the rebuild. This venting was limited to the pump casing vents and the individual pump stage plugs. As noted above, the 2007 vent and safe shutdown makeup pump run sequence clearly identifies that air from upstream locations of the suction piping can be transported to the pump during system operation, even after a complete pump and casing vent.

The licensee explained the pump performance curve drops and plateaus as a result of continuous air intrusion resulting in breakage and displacement of impeller wear rings. This degradation of the wear ring occurs when the pump is started with a small amount of air located in the pump casing. When the pump is started, air that is not swept away by the impellers is forced down along the shaft (low pressure zone of the pump casing). Metal-to-metal surfaces of the impeller wear rings and casing rings rub together in a potentially dry (air void) environment which allows significant heat generation. This heated surface is quickly quenched with cool water flow when the air voids are swept away. This can result in cracking of the wear ring material. A cracked wear ring alone would not result in a notable change in measured discharge pressure. Subsequent starts with air present would result in similar heat generation, and a previously cracked wear ring may degrade further and become displaced from its installed location. Once the wear ring relocates, the associated pump stage no longer efficiently increases the discharge pressure of the fluid, and results in a drop in discharge pressure compared to the previous surveillance. A plateau would occur during starts where some cracking might occur, but no new wear ring displacement occurs.

Analysis: The inspectors determined that the procedures employed to fill and vent the system, principally QCOP 2900-01, were not effective in eliminating air entrained on the suction side of the shutdown makeup pump. Over an extended time, migration of this air caused the pump wear rings to degrade and thus the pump differential pressure to degrade outside of the acceptable range impacting operability, availability, and reliability of the safe shutdown makeup pump. The inspectors determined that the failure to provide procedural direction that ensured adequate venting was more than minor because it impacted the Mitigating Systems Cornerstone attribute of Equipment Performance and affected the availability and reliability of the system.

The inspectors performed a Phase 1 SDP evaluation and determined that all questions on Table 4A of Manual Chapter 0609 Attachment 0609.04 were answered “No” since the pump remained capable of meeting the safety function credited in the safety analysis and the issue is Green, or of very low safety significance. Contributing to the performance deficiency was that the monitoring program in place was not effective in identifying the gradual degradation before pump operability was impacted. Additionally, the alert threshold for the pump parameter in the monitoring program, which would trigger additional actions such as pump overhaul, was set below the TS allowable value and was thus an ineffective barrier to prevent loss of operability or function. Although a total drop in discharge pressure of 40 to 65 psig from the 1999 overhaul to the December 2007 failure had occurred, the system or component trending applied during this time did not identify this degradation as requiring action. The inspectors determined this failure to be cross-cutting in the area of Problem Identification and Resolution, Corrective Action Program, Trending due the failure of the licensee to identify and address the adverse trend in pump performance in a timely manner, commensurate with the safety significance of the components (P.1(b)).

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, requires that activities affecting quality be prescribed by documented instructions, procedures, and drawings appropriate to the circumstances.

Contrary to the above, on December 17, 2007, instructions and procedures for filling and venting the safe shutdown makeup pump following maintenance were not appropriate to the circumstance. Specifically, QCOP 2900-01 failed to provide adequate instruction and acceptance criteria to ensure the suction piping was properly filled and vented before the pump was run, resulting in pump damage. Because this violation was of very low safety significance, and because the issue was entered into the corrective action program as Issue Reports 711934, 712059, 712670, 713041, 713915, 714901, and 731013, the issue is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy (**NCV 005000254/2008-02; 05000265/2008-02**). Corrective actions for this event included the installation of additional vents on the suction piping, an aggressive extent of condition evaluation of other susceptible systems, refurbishment of the safe shutdown makeup pump, briefing personnel on the trending failure, and a review of inservice test alert setpoints to ensure triggers are set appropriately to allow corrective actions to be planned for program components.

1R15 Operability Evaluations (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- Three Inboard Main Steam Isolations Failed Local Leak Rate Tests during Unit 2 Refueling Outage,
- Unit 1 Turbine 1st Stage Pressure Switches Out-of-Tolerance,
- Unit 1 125 Vdc Level III Ground,
- U1 Combined High Pressure Coolant Injection/Reactor Core Isolation Cooling Suction Swapped to Torus,

- U1 High Pressure Coolant Injection Restricting Orifice Flanges Underrated, and
- 2A Core Spray Discharge Check Failed to Close.

The inspectors selected these potential operability issues based on the risk-significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

This inspection constitutes six samples as defined in Inspection Procedure 71111.15-05.

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

.1 Permanent Modifications

a. Inspection Scope

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

- "Remove GL 96-06 Relief Valve," 2-1099-167.

This document and related documentation were reviewed for adequacy of the associated 10 CFR 50.59 safety evaluation screening; consideration of design parameters; implementation of the modification; post-modification testing; and relevant procedures, designs, and licensing documents were properly updated. The inspectors observed ongoing and completed work activities to verify that installation was consistent with the design control documents. The modification removed relief valve 2-1099-167, which had been installed in response to NRC Generic Letter 96-06.

This inspection constitutes one permanent modification sample as defined in Inspection Procedure 71111.18-05.

b. Findings

No findings of significance were identified.

.2 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed the following temporary modification(s):

- Temporary Configuration Change to Relieve Vacuum in the Unit 1 Reactor Feedwater Pump Ventilation Ductwork, and
- Unit 2 Heater Drain Modification.

The inspectors compared the temporary configuration changes and associated 10 CFR 50.59 screening and evaluation information against the design basis, the UFSAR, and the TS, as applicable, to verify that the modification did not affect the operability or availability of the affected system(s). The inspectors also compared the licensee's information to operating experience information to ensure that lessons learned from other utilities had been incorporated into the licensee's decision to implement the temporary modification. The inspectors, as applicable, performed field verifications to ensure that the modifications were installed as directed; the modifications operated as expected; modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modifications did not impact the operability of any interfacing systems. Lastly, the inspectors discussed the temporary modification with Operations, Engineering, and Training personnel to ensure that the individuals were aware of how extended operation with the temporary modification in place could impact overall plant performance.

This inspection constitutes two temporary modification samples as defined in Inspection Procedure 71111.18-05.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

.1 Post-Maintenance Testing

a. Inspection Scope

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

- Unit 1/2 Emergency Diesel Generator Post-Maintenance Testing following Preventative Maintenance activities,
- Unit 1/2 Emergency Diesel Generator Post-Maintenance Testing following a contactor failure that resulted in a high temperature trip,
- Unit 1 RCIC flow controller post maintenance test following replacement of the controller,
- Repair of Safe Shutdown Makeup Pump Local Controller, and
- Unit 2 Inboard Main Steam Isolation Valve testing after valve repair.

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

This inspection constitutes five samples as defined in Inspection Procedure 71111.19.

b. Findings

No findings of significance were identified

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan and contingency plans for the Unit 2 refueling outage conducted March 3 – 30, 2008, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below. Documents reviewed during the inspection are listed in the Attachment.

- Licensee configuration management, including maintenance of defense-in-depth commensurate with the Outage Safety Plan for key safety functions and compliance with the applicable TS when taking equipment out-of-service.
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error.
- Controls over the status and configuration of electrical systems to ensure that TS and outage safety plan requirements were met, and controls over switchyard activities.
- Monitoring of decay heat removal processes, systems, and components.

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

This inspection constitutes one refueling outage sample as defined in Inspection Procedure 71111.20-05.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Routine Surveillance Testing

a. Inspection Scope

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

- 1/2 Emergency Diesel Generator load test.

The inspectors observed in-plant activities and reviewed procedures and associated records to determine whether: any preconditioning occurred; effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing; acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis; plant equipment calibration was correct, accurate, and properly documented; as left setpoints were within required ranges; the calibration frequency was in accordance with TS, the UFSAR, procedures, and applicable commitments; measuring and test equipment calibration was current; test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used; test data and results were accurate, complete, within limits, and valid; test equipment was removed after testing; where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared

inoperable; where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure; where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished; prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test; equipment was returned to a position or status required to support the performance of the safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the Attachment.

This inspection constitutes one routine surveillance testing sample as defined in Inspection Procedure 71111.22.

b. Findings

No findings of significance were identified.

.2 Inservice Testing Surveillance

a. Inspection Scope

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

- 1/2 Emergency Diesel Generator Cooling Water Pump Comprehensive Testing, and
- Unit 1 Emergency Diesel Generator Cooling Water Pump failure during flow test.

The inspectors observed in-plant activities and reviewed procedures and associated records to determine whether: any preconditioning occurred; effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing; acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis; plant equipment calibration was correct, accurate, and properly documented; as left setpoints were within required ranges; and the calibration frequency were in accordance with TS, the UFSAR, procedures, and applicable commitments; measuring and test equipment calibration was current; test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used; test data and results were accurate, complete, within limits, and valid; test equipment was removed after testing; where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, ASME Code, and reference values were consistent with the system design basis; where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable; where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure; where applicable, actual conditions encountering high resistance

electrical contacts were such that the intended safety function could still be accomplished; prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test; equipment was returned to a position or status required to support the performance of its safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the Attachment.

This inspection constitutes two inservice inspection samples as defined in Inspection Procedure 71111.22.

b. Findings

No findings of significance were identified.

.3 Unidentified Leakage Detection Surveillance

The inspectors reviewed the test results for the following activities to determine whether the unidentified leakage instrumentation was capable of performing its intended safety function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- Unit 1 and 2 unidentified leakage surveillances.

The inspectors observed control room activities and reviewed procedures and associated records to determine whether acceptance criteria were clearly stated and consistent with the system design basis, plant equipment calibration was correct, applicable prerequisites described in the test procedures were satisfied, test frequencies met TS requirements to demonstrate operability and reliability, tests were performed in accordance with the test procedures and other applicable procedures, and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program.

This inspection constitutes one leakage detection inspection sample as defined in Inspection Procedure 71111.22.

b. Findings

No findings of significance were identified.

.4 Containment Isolation Valve Testing

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

- Local Leak Rate Testing of the High Pressure Coolant Injection Steam Supply Valves, and
- Local Leak Rate Testing of the Residual Heat Removal Shutdown Cooling Suction Valves.

The inspectors observed in-plant activities and reviewed procedures and associated records to determine whether: any preconditioning occurred; effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing; acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis; plant equipment calibration was correct, accurate, and properly documented; as left setpoints were within required ranges; and the calibration frequency were in accordance with TS, the UFSAR, procedures, and applicable commitments; measuring and test equipment calibration was current; test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied; test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used; test data and results were accurate, complete, within limits, and valid; test equipment was removed after testing; where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable; where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure; where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished; prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test; equipment was returned to a position or status required to support the performance of its safety functions; and all problems identified during the testing were appropriately documented and dispositioned in the corrective action program. Documents reviewed are listed in the Attachment.

This inspection constitutes two containment isolation valve inspection samples as defined in Inspection Procedure 71111.22.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness [EP]

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of two routine licensee emergency drills on February 7 and February 21, 2008, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the control room simulator and in the Technical Support Center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the

inspection, the inspectors reviewed the drill package and other documents listed in the Attachment.

This inspection constitutes two samples as defined in Inspection Procedure 71114.06-05.

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 reviewed the licensee's occupational exposure control cornerstone performance indicators to determine whether the conditions resulting in any performance indicators occurrences had been evaluated and whether identified problems had been entered into the corrective action program for resolution.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

b. Findings

No findings of significance were identified.

.2 Plant Walkdowns/Boundary Verification and Radiation Work Permit Reviews

a. Inspection Scope

The inspectors reviewed licensee controls and surveys in the following radiologically significant work areas within radiation areas, high radiation areas and airborne radioactivity areas in the plant to determine if radiological controls including surveys, postings and barricades were acceptable:

- Unit 2 Torus;
- Various Areas Within the Unit 2 Drywell;
- Unit 2 Reactor Cavity; and
- Unit 2 Turbine Deck.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

The inspectors reviewed the radiation work permits and work packages used to access these areas and other high radiation work areas to identify the work control instructions and control barriers that had been specified. Electronic dosimeter alarm setpoints for both integrated dose and dose rate were evaluated for conformity with survey indications

and plant policy. Workers were interviewed to verify that they were aware of the actions required when their electronic dosimeters noticeably malfunctioned or alarmed.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

The inspectors walked down and surveyed (using an NRC survey meter) portions of the areas listed above and several other areas throughout the Unit 1 and 2 turbine, reactor and radwaste buildings to verify that the prescribed radiation work permit, procedure, and engineering controls were in place, that licensee surveys and postings were complete and accurate, and that air samplers were properly located, as applicable.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

The adequacy of the licensee's internal dose assessment process for internal exposures was assessed. No internal exposures in excess of 50 millirem committed effective dose equivalent occurred since previously reviewed in November 2007. However, the inspectors evaluated internal dose assessment results and associated calculations for those workers that had positive whole body counts during the current Unit 2 outage through March 13, 2008.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

b. Findings

No findings of significance were identified.

.3 Problem Identification and Resolution

a. Inspection Scope

The inspectors reviewed corrective action reports related to access controls and high radiation area radiological incidents (issues that did not count as performance indicator occurrences identified by the licensee in high radiation areas <1R/hr). Staff members were interviewed and corrective action documents were reviewed to verify that 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 NCVs tracked in the corrective action system; and
- Implementation/consideration of risk significant operational experience feedback.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

The inspectors reviewed licensee documentation packages for all performance indicator events occurring since the last inspection, if applicable, to determine if any of these performance indicator events involved dose rates >25 R/hr at 30 centimeters or >500 R/hr at 1 meter. Barriers were evaluated for failure and to determine if there were any barriers left to prevent personnel access. Unintended exposures >100 millirem total effective dose equivalent (or >5 rem shallow dose equivalent or >1.5 rem lens dose equivalent) were evaluated to determine if there were any regulatory overexposures or if there was a substantial potential for an overexposure.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

b. Findings

No findings of significance were identified.

.4 Job-In-Progress Reviews and Work Practices in Radiologically Significant Areas

a. Inspection Scope

As described in Section 2OS2.4, the inspectors observed several refueling outage work activities that were being performed in radiation areas, airborne radioactivity areas, or high radiation areas for observation of work activities that presented the greatest radiological risk to workers. The inspectors reviewed radiological job requirements for these activities, including radiation work permit requirements and work procedure requirements, and attended As Low as Reasonably Achievable (ALARA) job briefings.

No sample was accredited under Inspection Procedure 71121.01 for this effort.

Job performance was observed to assess whether radiological conditions in the work area were adequately communicated to workers through pre-job briefings and postings. The inspectors also evaluated the adequacy of radiological controls including required radiation, contamination, and airborne surveys for system breaches; radiation protection job coverage, including any applicable audio and visual surveillance for remote job coverage; and contamination controls.

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

b. Findings

No findings of significance were identified.

.5 Radiation Worker Performance

a. Inspection Scope

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

This inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

b. Findings

No findings of significance were identified.

.6 Radiation Protection Technician Proficiency

a. Inspection Scope

During job performance observations, the inspectors evaluated radiation protection technician performance with respect to radiation protection work requirements and evaluated whether they were aware of the radiological conditions in their workplace, the radiation work permit 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 inspection constitutes one sample as defined in Inspection Procedure 71121.01-5.

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, ongoing and planned activities in order to assess current performance and exposure challenges. This included determining the plant's current 3-year rolling average for collective exposure in order to help establish resource allocations and to provide a perspective of significance for any resulting inspection finding assessment.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The inspectors reviewed the Unit 2 refueling (Q2R19) outage work that was taking place during the inspection and the associated work activity exposure estimates for the following eight work activities which were likely to result in the highest personnel collective exposures:

- Reactor Disassembly/Reassembly and Cavity Work;
- Torus Diving Activities;
- Drywell Insulation Activities;
- Electromatic, Safety, and Target Rock Valve Removal/Replacement;
- Under Vessel Instrumentation Work;
- Drywell Penetration Test Plate Welding;
- Drywell In-Service-Inspection Preparation; and
- Drywell 2A and 2B Recirculation Pump Seal Replacement.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The inspectors reviewed documents to determine if there were site-specific trends in collective exposures and source-term measurements.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The inspectors reviewed procedures associated with maintaining occupational exposures ALARA and processes used to estimate and track work activity specific exposures.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

b. Findings

No findings of significance were identified.

.2 Radiological Work Planning.

a. Inspection Scope

The inspectors evaluated the licensee's list of Q2R19 refueling outage work activities ranked by estimated exposure that were in progress and reviewed the following nine work activities of highest exposure significance that were projected to expend cumulative radiation doses of approximately 5 rem or greater:

- 2A and 2B Recirculation Motor Seal Replacement (RWP 10008637);
- Undervessel Instrumentation Work (RWP 10008602);
- Drywell In-Service-Inspection Preparation (RWP 10008604);
- Electromatic, Safety & Target Rock Valve Replacement (RWP 10008600);
- Drywell Penetration Test Plate Welding (RWP 10009088);
- Torus Diving and Support (RWP 10008565);
- Reactor Disassembly, Reassembly and Cavity Work (RWP 10008563);
- Drywell MOV Motor Replacement (RWP 10008635); and
- Drywell Insulation Activities (RWP 10008595).

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

For these nine activities, the inspectors reviewed the ALARA work activity evaluations, exposure estimates, total effective dose equivalent ALARA evaluations (i.e., respirator use evaluations), and exposure mitigation requirements in order to verify that the licensee had established procedures and 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, and/or special circumstances.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The inspectors compared the results achieved through approximately one-half of the scheduled 20 day refueling outage including dose rate reductions and person-rem

accrued with the intended dose established in the licensee's ALARA planning for these and other selected work activities. Reasons for inconsistencies between intended and actual work activity doses were reviewed.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The integration of ALARA requirements into work procedure and RWP documents was evaluated to determine if the licensee's radiological job planning would reduce dose.

This inspection constitutes one optional sample as defined by Inspection Procedure 71121.02-5.

The inspectors compared the person-hour estimates, provided by maintenance planning and other groups to the radiation protection group, with the actual work activity time requirements in order to evaluate the accuracy of these time estimates.

This inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

The inspectors evaluated if work activity planning included consideration of the benefits of dose rate reduction activities such as shielding provided by water filled components/piping, job scheduling, and shielding and scaffolding installation and removal activities.

This inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

The licensee's post-job reviews for the previous Unit 1 refueling outage and work-in-progress reviews for the current Unit 2 outage were evaluated to determine whether identified problems were entered into the licensee's corrective action program.

This inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

b. Findings

No findings of significance were identified.

.3 Verification of Dose Estimates and Exposure Tracking Systems

a. Inspection Scope

The inspectors reviewed the assumptions and bases for the Q2R19 collective exposure estimate including procedures, in order to evaluate the licensee's methodology for estimating work activity-specific exposures and the intended dose outcome. Dose rate and man-hour estimates were evaluated for reasonable accuracy.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The licensee's process for adjusting exposure estimates or re-planning work when unexpected changes in scope, emergent work or higher than anticipated radiation levels were encountered, was evaluated. This included determining that adjustments to

estimated exposure (intended dose) were based on sound radiation protection and ALARA principles and not adjusted to account for failures to control the work. The frequency of these adjustments was reviewed to evaluate the adequacy of the original ALARA planning process.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

The licensee's exposure tracking system was evaluated to determine whether the level of exposure tracking detail, exposure report timeliness, and exposure report distribution was sufficient to support control of collective exposures. Radiation work permits were reviewed to determine if they covered too many work activities to allow work activity specific exposure trends to be detected and controlled. During the conduct of exposure significant work, the inspectors evaluated if licensee management was aware of the exposure status of the work and would intervene if exposure trends increased beyond exposure estimates.

This inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

b. Findings

No findings of significance were identified.

.4 Job Site Inspections and ALARA Control

a. Inspection Scope

The inspectors observed the following four jobs that were being performed in radiation areas, airborne radioactivity areas, or high/locked high radiation areas for observation of work activities that presented the greatest radiological risk to workers:

- Reactor In-Vessel-Visual Inspections;
- Drywell Cooler Fan Motor Replacement;
- Torus Diving; and
- Drywell 2B Recirculation Motor Seal Removal.

The licensee's use of ALARA controls for these work activities and the use of engineering controls were evaluated to determine whether procedures and controls were consistent with the licensee's 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 inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

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 inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

b. Findings

No findings of significance were identified.

.5 Radiation Worker and Radiation Protection Technician Performance

a. Inspection Scope

Radiation worker and radiation protection technician performance was observed during work activities being performed in radiation areas, airborne radioactivity areas, and high radiation areas 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 observed to determine if they were sufficient relative to the radiological hazards and the work involved.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

b. Findings

No findings of significance were identified.

.6 Problem Identification and Resolution

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 20.1101(c).

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

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 inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

Corrective action reports related to the ALARA program were reviewed and staff members were interviewed to verify that 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 NCVs tracked in the corrective action system; and
- Implementation/consideration of risk significant operational experience feedback.

This inspection constitutes one optional sample as defined in Inspection Procedure 71121.02-5.

The licensee's corrective action program was also reviewed to determine if repetitive deficiencies and/or significant individual deficiencies in problem identification and resolution had been addressed.

This inspection constitutes one sample as defined in Inspection Procedure 71121.02-5.

b. Findings

No findings of significance were identified

4. OTHER ACTIVITIES [OA]

4OA1 Performance Indicator Verification (71151)

.1 Data Submission Issue

a. Inspection Scope

The inspectors performed a review of the data submitted by the licensee for the 4th Quarter 2007 performance indicators for any obvious inconsistencies prior to its public release in accordance with IMC 0608, "Performance Indicator Program."

This review was performed as part of the inspectors' normal plant status activities and, as such, did not constitute a separate inspection sample.

b. Findings

No findings of significance were identified.

.2 Unplanned Scrams per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams per 7000 Critical Hours performance indicator for Units 1 and 2 for the period from the 1st Quarter 2007 through the 4th Quarter 2007. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in Revision 5 of the Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC inspection reports for the period of January 1, 2007 through December 31, 2007, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the

performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the Attachment to this report.

This inspection constitutes two samples for unplanned scrams per 7000 critical hours as defined in Inspection Procedure 71151.

b. Findings

No findings of significance were identified.

.3 Unplanned Scrams with Complications

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications performance indicator for Units 1 and 2 for the period from the 1st Quarter 2007 through the 4th Quarter 2007. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in Revision 5 of the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC integrated inspection reports for the period of January 1, 2007 through December 31, 2007, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the Attachment to this report.

This inspection constitutes two samples for unplanned scrams with complications as defined in Inspection Procedure 71151.

b. Findings

No findings of significance were identified.

.4 Unplanned Transients per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Transients per 7000 Critical Hours performance indicator for Units 1 and 2 for the period from the 1st Quarter 2007 through the 4th Quarter. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in Revision 5 of the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC integrated inspection reports for the period of January 1, 2007 through December 31, 2007, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the Attachment to this report.

This inspection constitutes two samples for unplanned transients per 7000 critical hours as defined in Inspection Procedure 71151.

b. Findings

No findings of significance were identified.

Cornerstone: Occupational Radiation Safety

.5 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Radiological Occurrences performance indicator for the period from the fourth quarter 2007 through mid-March 2008. To determine the accuracy of the performance indicator data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's assessment of the performance indicator for occupational radiation safety to determine if indicator related data was adequately assessed and reported. To assess the adequacy of the licensee's performance indicator data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review, and the results of those reviews. The inspectors independently reviewed electronic dosimetry dose rate and accumulated dose alarm reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of numerous locked high radiation area entrances to determine the adequacy of the controls in place for these areas. Specific documents reviewed are described in the Attachment to this report.

This inspection constitutes one occupational radiological occurrence sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

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

.1 Routine Review of Items Entered Into the Corrective Action Program

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being

given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included: the complete and accurate identification of the problem; that timeliness was commensurate with the safety significance; that evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews were proper and adequate; and that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's corrective action program as a result of the inspectors' observations are included in the attached List of Documents Reviewed.

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

b. Findings

No findings of significance were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

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

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

b. Findings

No findings of significance were identified.

.3 Annual Sample: Review of Operator Workarounds

a. Inspection Scope

The inspectors evaluated the licensee's implementation of their process used to identify, document, track, and resolve operational challenges. Inspection activities included, but were not limited to, a review of the cumulative effects of the operator workarounds on system availability and the potential for improper operation of the system, for potential impacts on multiple systems, and on the ability of operators to respond to plant transients or accidents.

The inspectors performed a review of the cumulative effects of operator workarounds. The documents listed in the Attachment were reviewed to accomplish the objectives of the inspection procedure. The inspectors reviewed both current and historical

operational challenge records to determine whether the licensee was identifying operator challenges at an appropriate threshold, had entered them into their corrective action program and proposed or implemented appropriate and timely corrective actions which addressed each issue. Reviews were conducted to determine if any operator challenge could increase the possibility of an Initiating Event, if the challenge was contrary to training, required a change from long-standing operational practices, or created the potential for inappropriate compensatory actions. Additionally, all temporary modifications were reviewed to identify any potential effect on the functionality of Mitigating Systems, impaired access to equipment, or required equipment uses for which the equipment was not designed. Daily plant and equipment status logs, degraded instrument logs, and operator aids or tools being used to compensate for material deficiencies were also assessed to identify any potential sources of unidentified operator workarounds.

The above constitutes completion of one operator workarounds annual inspection sample.

b. Findings

No findings of significance were identified.

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

.1 Unit 2 Isolation of Reactor Building Ventilation and Auto Start of Standby Gas Treatment

a. Inspection Scope

The inspectors reviewed the plant's response to a reactor building ventilation system isolation and automatic initiation of the standby gas treatment system during power supply manipulations by the operators in the main control room on March 14, 2008. Documents reviewed in this inspection are listed in the Attachment.

This inspection constitutes one sample as defined in Inspection Procedure 71153-05.

b. Findings

Introduction: A self-revealing Green Finding and a NCV of TS 5.4.1, was identified for an inadequate procedure, QOP 6800-03, "Essential Service System," that resulted in an unplanned isolation of reactor building ventilation, and actuation of the control room ventilation and standby gas treatment systems.

Description: On March 14, 2008, the Unit 2 essential service system power supply was being transferred back to its normal power supply, the uninterruptible power supply, using QOP 6800-03 following preventative maintenance when an unplanned actuation of reactor building ventilation and standby gas treatment systems occurred. Operators were executing step F.7 of QOP 6800-03, "Essential Service System," while transferring power from the reserve alternating current supply, MCC 28-2, to the uninterruptible power supply. Step F.7.c stated, "If conditions of step D.5 are met, THEN bypass the 2-1705-16B Fuel Pool Radiation Monitor Channel B and the 2-1705-8B, Reactor Building Vent Channel B Radiation Monitor." Step D.5 is a procedure precaution that allows the operators to bypass radiation monitors for one unit if both the instruments on the other

unit are operable. The operators took this action to avoid an isolation of the reactor building ventilation system and standby gas treatment system auto-start during the transfer. Step D.5 goes on to state that if the bypass operation is not used, then equipment should be reset when power was restored. It provides this guidance because the instruments fail upscale on loss of power.

After the essential service system power supply was returned to the uninterruptible power supply, step F.7.f. directs the operator to return the bypass switches for both radiation monitors to the NORMAL position, if they were bypassed in step F.7c. When this switch was placed in NORMAL with instruments upscale, a reactor building ventilation isolation, and control room ventilation and standby gas treatment system actuations occurred. Procedural steps in QOP 6800-03 did not include direction to reset the instruments or verify that no trip signal was present. Precaution D.5 incorrectly directs the radiation monitors should be reset, if they are NOT bypassed. In reality, the radiation monitors should be reset in any case after a power supply transfer from the uninterruptible power supply to the emergency supply occurs.

Reactor building and standby gas treatment ventilation systems were restored to the normal lineups and Issue Report 749659 was generated.

Analysis: The inspectors determined that the failure to implement adequate procedural directions for transferring electrical power without challenging safety-related equipment was more than minor because it impacts the Barrier Integrity Cornerstone attribute of Structures, Systems and Components and Barrier Performance for reliability of Containment Isolation Structures, Systems and Components. If the condition were to go uncorrected the Containment Isolation function could be impacted. The inspectors performed a Phase 1 SDP evaluation and determined that the answer to Containment Barrier Cornerstone Question 1 of Table 4A of Manual Chapter 0609, Attachment 0609.04, was “Yes” and the issue is Green, or of very low safety significance.

The inspectors also determined that the operators implementing the procedure had the opportunity to identify the procedural deficiency either during the job preparation activities or while executing the procedural steps, if they had verified the trip signals were cleared prior to moving the switch. Properly executed self-checking and peer-checking would have identified the possible action and provided the operators with the opportunity to prevent the challenge to the safety-related system components. The inspectors identified the deficient use of Human Performance tools as a contributor to the event and therefore determined that the event was cross-cutting in Human Performance, Work Practices, Prevention (H.4(a)).

Enforcement: Technical Specification 5.4.1 requires that written procedures be established, implemented, and maintained for the items specified in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, Section 3.s requires, in part, that instructions for energizing should be prepared for the onsite electrical systems.

QOP 6800-03, “Essential Service System, Revision 30,” implements the TS 5.4.1 procedure requirements as provided in Regulatory Guide 1.33. Procedural steps in QOP 6800-03 did not include adequate instruction to transfer power without impacting the safety systems. To prevent inadvertent initiation and realignment of safety systems, the procedure should direct the reset of the signals or verification that no trip signal is

present prior to taking the switch to NORMAL. In essence, the radiation monitors should be reset after any transfer of the power supply occurs.

Contrary to the above, on March 14, 2008, the procedure did not contain instructions to reset the monitors prior to moving the bypass switch and operators implementing the procedure as written transferred the radiation monitor bypass switches to NORMAL causing the reactor building ventilation to isolate, and control room ventilation and standby gas systems initiate. Because this violation was of very low safety significance, and because the issue was entered into the corrective action program as Issue Report 749659, the issue is being treated as a NCV consistent with Section VI.A.1 of the NRC Enforcement Policy (**NCV 05000265/2008-03**). Corrective actions for this event included realignment of the affected systems, human performance and supervisory briefings with the operating staff, and a procedure revision. The procedure change was submitted to add a step requiring the affected radiation monitors to be reset prior to returning the bypass switch to the NORMAL position.

.2 1/2 "A" Diesel Fire Pump Insulation Fire

a. Inspection Scope

The inspectors reviewed the plant's response to an oil leak on the 1/2 "A" Diesel-Driven Fire Pump and a subsequent fire on December 22, 2007, of oil contaminated insulation material on the turbocharger section of the machine. Documents reviewed in this inspection are listed in the Attachment.

This inspection constitutes one sample as defined in Inspection Procedure 71153-05.

b. Findings

Introduction: A self-revealing finding of very low safety significance and a NCV of TS on 5.4.1 was identified due to the failure to establish, implement, and maintain procedures associated with the implementation of the fire protection program.

Description: On Tuesday, December 18, 2007, the 1/2 "A" Diesel-Driven Fire Pump was inadvertently auto-started due to an activity in the fire water system. Following the engine start, an active oil leak was identified in the turbocharger area of the engine. A non-licensed operator stopped the engine and the pump was declared inoperable. Approximately three gallons of oil had reportedly leaked from the engine, and the station hazardous materials coordinator declared the event "incidental." Issue Reports 713137 and 713521 were both initiated for this event on December 18. On December 20, Work Order Task 1077689-14 was implemented and contained steps to replace the turbocharger oil supply hose, the two adapter fittings mounted between the hose ends and the engine itself, and to replace the lost lubricant. There was no direction relating to the turbocharger insulation in this work order task. Additionally, there was no specific thread sealant for the pipe-threaded fittings discussed in the work instructions or reserved for the work.

The pre-job briefing was conducted using the Operating Experience (OPEX) provided by Maintenance Planning (OE17437 - Slippage on Oily Substance Causes Personnel Injury). During the brief, the supervisor discussed the potential slipping hazard created by the oil leak and directed the two mechanics assigned to the work to clean up any oil

prior to commencing work. There was no discussion relating to the condition of the nearby turbocharger insulation at the pre-job brief. The lead mechanic stated that the nearby insulation was not disturbed as it was already loosened prior to the crew's arrival and did not interfere with the hose replacement. When specifically questioned about the possibility of oil contamination of the insulation he stated that it never occurred to the worker to examine the insulation at all. The mechanics identified that Teflon tape had been used previously to seal pipe threads. A review of the engine's maintenance history established that the last time this fitting was likely installed was in August 2007 as a part of the 6-year preventative maintenance performed under Work Order Task 787787-01.

On Saturday, December 22, the 1/2 "A" Diesel-Driven Fire Pump was started using procedure QCOS 4100-01 as a post-maintenance test for the leak repair performed under Work Order 01077689-14. Approximately 14 minutes into the test run a small flame was reported in the area of the exhaust piping insulation. Per the operating logs, the operating crew "referenced" QCOA 0010-12 (TIC 1945) titled "Fire/Explosion." The burning insulation was removed by the responders on the scene and the test was suspended. The engine was considered unavailable pending the resolution of Issue Report 15013 written by Operations.

The on-call mechanical maintenance supervisor examined the 1/2 "A" diesel driven fire pump to determine if there had been any damage and removed the remaining exhaust manifold insulation. He reported that there was no visible damage and remained at the engine during the subsequent operability test run. Minor smoke emanating from the then exposed exhaust manifold was attributed to residual oil on the manifold. This ceased after approximately 10 minutes of running. The maintenance supervisor inspected the scorched insulation staged near the engine and determined that there was oil contamination on the piece that is normally installed over the turbocharger.

Analysis: Inspectors determined that the failure to provide adequate written procedures or work instructions to ensure maintenance activities on the 1/2 "A" diesel fire pump were correctly performed to maintain availability was more than minor because the procedural deficiencies were a precursor to an oil leak and subsequent insulation fire that impacted the reliability and availability of the 1/2 "A" fire pump. The inspectors determined this failure to be cross-cutting in the area of Problem Identification and Resolution due to the failure of multiple individuals to investigate the condition of the insulation that was near the oil leak and thereby failing to identify the oil contamination of that insulation in time to prevent the impact to the diesel fire pump. (P.1(a))

The inspectors performed a Phase 1 SDP evaluation using Appendix F of IMC 0609, "Fire Protection SDP." The finding was assigned a LOW degradation rating because the system was expected to display nearly the same level of effectiveness and reliability as it would have if the degradation had not been present. Specifically, the finding was determined to be of very low safety significance because the 100 percent capacity "B" pump was not impacted and the operator actions after removing the combustibles could have made the "A" pump available shortly after the event.

Enforcement: Technical Specification 5.4.1.c requires, in part, that written procedures be established, implemented, and maintained for the fire protection program implementation.

Contrary to the above, work instructions included in Work Order 787787-01 on September 2007 did not specify the thread sealing compound to be used when assembling the flexible hose connection for the oil system resulting in an oil leak and subsequent fire. Because this violation was determined to be of very low safety significance, and because the issue was entered into the corrective action program in Issue Reports 715013 and 713137, it is being treated as a NCV, consistent with Section VI.A.1 of the Enforcement Policy (**NCV 05000254/2008002-04, 05000265/2008002-04**). Corrective actions for this issue included revision of model work orders for the pump to include guidance for using high temperature thread sealant and performance expectations for work planners to include identification of thread sealant for similar tasks. Additionally, maintenance personnel were briefed on the issue of workers failing to identify and/or replace the oil-contaminated insulation pad while replacing the turbocharger oil supply hose during a corrective maintenance activity.

.3 (Closed) Licensee Event Report (LER) 05000254/2007-003-00: Safety Function Not Met Due to Control Room Emergency Ventilation System Air Filtration Unit Heater Flow Switch Failure

This event, which occurred on November 20, 2007, was a failure of an air flow switch in the control room ventilation air filtration train unit heater control circuit to operate during surveillance testing. This was a new switch that was bench tested before installation, installed on October 23, 2007, and successfully tested the following day on October 24 before the system was returned to service. The switch failed after being in service for one month. The licensee's initial post-failure analysis indicated a problem with the open switch contact which would not close when it reached its operating setpoint. The troubleshooting was completed, a new switch was installed, and the TS surveillance was completed later that same day. Corrective actions included replacement of the switch with a new component and external laboratory analysis and testing of the failed switch. The external testing confirmed that the switch failed to operate on several different occasions in the lab and the resultant failure was attributed to infant mortality. Documents reviewed as part of this inspection are listed in the Attachment. This licensee event report is closed.

.4 (Closed) Unresolved Item (URI) 05000254/2007004-02/05000265/2007004-02: Review of Ultimate Heat Sink Surveillance Requirements and Emergency Action Levels

Inspectors performing a follow-up inspection of an industry event at a similar facility identified several concerns with the ultimate heat sink that could not be readily resolved and opened this tracking item until the licensee could resolve the questions. The inspectors identified the following concerns:

- Technical Specification 3.7.3 required the ultimate heat sink to be operable in Modes 1, 2, and 3. To maintain operability, operations personnel recorded the water level at the intake bay and the ultimate heat sink temperature every 24 hours. The inspectors determined that the licensee's current Technical Specification surveillance requirement for water level may be non-conservative under a postulated intrusion event because the water level at the suction of the safety-related cooling water pumps could be significantly lower than the water level at the intake bay. This would result in the safety-related cooling water pumps and the ultimate heat sink being inoperable.

- The licensee’s approved emergency action levels were also based on water level at the intake bay. The inspectors determined that the approved emergency action levels were adequate to address ultimate heat sink inoperability due to a lock and dam failure. However, they did not appear to address ultimate heat sink inoperability due to a biological or ice intrusion event.
- No procedural guidance existed regarding the measuring of water level at the intake of the safety-related pumps.

The licensee provided the technical bases for taking the measurements at the identified locations and the bounding assumptions in determining the TS surveillance requirements. Additional discussion with the licensee resolved the questions regarding where and when water levels are measured, the differential pressure expected across the traveling screens, and operator actions to be taken in response to screen differential pressure or river water level. The licensee revised QCAN 901(2)-7 C-15, “Traveling Screens High DP,” to include information regarding minimum levels for pump operability to help operators assess the screen differential pressure condition. Additionally, the licensee elected to install an electronic depth gauge to ensure the measurements could be taken consistently and accurately. Operations subsequently revised QCOP 4400-04, “Traversing Trash Rake,” to provide procedural guidance for taking the measurement. QCAN 901(2)-7 C-15 was also revised to reference this procedure for instructions on how to take the measurement.

The licensee provided bases to support the current emergency action levels. The emergency action levels are based on failure of the downstream Mississippi River dam and are not intended to address ice or biological intrusion events. The licensee discussed other emergency action levels which would be expected to trigger activation of the emergency response organization if the intrusion type events adversely impacted safe operation of the plant. The inspectors reviewed station procedures and various scenarios to verify expected actions would be triggered by the intake structure indicators and concurred with the licensee’s evaluation.

4OA5 Other

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted the following observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

- Multiple tours of operations within the Central and Secondary Security Alarm Stations;
- Tours of selected security towers/security officer response posts;
- Direct observation of personnel entry screening operations within the plant’s Main Access Facility;
- Security force shift turnover activities; and
- Compensatory actions for activities requiring perimeter breach during outage.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On April 1, 2008, the inspectors presented the inspection results to Mr. T. Tulon and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Interim Exit Meetings

Interim exit meetings were conducted for:

- On February 28, 2008, the inspectors presented the results of the Inservice Inspection program inspection to the plant manager, Mr. R. Gideon, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.
- Radiation Protection ALARA and radiological access control inspection with Mr. T. Tulon and other members of the licensee's staff on March 14, 2008.

4OA7 Licensee-Identified Violations

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

Cornerstone: Barrier Integrity

.1 Foreign Material In The Reactor Building Isolation Damper Solenoid Valve

On November 11, 2007, while performing the weekly stroking of the Unit 1 reactor building ventilation isolation dampers per Work Order 1077792-01 and QCOP 5750-02, "Reactor Building Ventilation System," the isolation damper 1-5742-B took approximately 10 minutes to close. The acceptance criterion for the damper's closing time is less than 60 seconds. The apparent cause of the delay was binding due to improper application of thread sealing compound to the reactor building ventilation exhaust damper actuator solenoid valve resulting in the introduction of sealant into the solenoid internals as foreign material. Specifically, the licensee found that the electrician performing the work applied excessive sealing compound to the threads contrary to the procedural requirements.

The inspectors determined that the failure to follow the procedural directions for application of the sealing compound during maintenance on the valve was a violation of TS 5.4.1 and was more than minor because it affected the Barrier Integrity Cornerstone attribute of Structures, Systems and Components and Barrier Performance for Containment Isolation Structures, Systems and Components reliability and if the condition were to go uncorrected the Containment isolation function could be impacted. This finding was determined to be of very low safety significance because the finding impacted only a single valve of the double valve isolation of the radiological barrier function of the reactor building ventilation system, and the valve did close after the time delay. Corrective actions included performance management for the individual involved in application of the sealant material and procedure revisions to provide additional detail.

Cornerstone: Occupational Radiation Safety

.2 Failure To Comply With Radiation Protection Program Procedural Requirements

Quad Cities TS 5.4, "Procedures," requires that written procedures be established, implemented and maintained covering the activities provided in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Procedures specified in Regulatory Guide 1.33 include radiation protection procedures for access control to radiation areas including a radiation work permit system.

Quad Cities procedure RP-AA-460-1004, "Unescorted Access to and Conduct in Radiologically Controlled Areas," implements Technical Specification 5.4 as provided in Regulatory Guide 1.33, in that it provides the methods by which personnel access into radiologically controlled areas is allowed.

Section 4.2.10 of procedure RP-AA-460-1004 requires that workers immediately exit the area if receiving a dose rate alarm on their electronic dosimetry and notify radiation protection. Section 4.2.2 of that procedure requires that workers promptly obey stop work instructions from the radiation protection staff.

Contrary to the above, on May 13, 2007, a contract worker failed to immediately exit the area and notify Radiation Protection upon receiving an electronic dosimetry dose rate alarm. Later that same day, the worker again failed to notify Radiation Protection after a computerized access control system "Red Error Screen" was obtained upon the worker's attempt to log into the radiologically controlled area, which provided a stop work instruction for the worker to contact Radiation Protection.

Based on an Office of Investigations (OI) investigation (OI Case No. 3-2007-024) completed on December 17, 2007, the NRC staff concluded that the worker willfully failed to follow Radiation Protection procedures and report the electronic dosimetry alarm and the "Red Error Screen" to the Radiation Protection organization. However, because the violation had no actual radiological significance and minimal potential significance, the violation involved the acts of a low-level individual resulting from an isolated action without management involvement, there was no economic or other advantage gained as a result of the violation, and adequate remedial action was taken, the violation was categorized at Severity Level IV. Since the violation is of very low safety significance, it meets the additional criteria in Section VI.A.1 of the NRC Enforcement Policy, and has been entered into the corrective action system (IR 628980), it is being treated as an NCV.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

T. Tulon, Site Vice President
R. Gideon, Plant Manager
R. Svaeson, Operations Manager
H. Madronero, Engineering Manager
D. Barker, Work Control Manager
W. Beck, Regulatory Assurance Manager
D. Craddick, Maintenance Manager
J. Burkhead, Nuclear Oversight Manager
K. Moser, Training Manager
V. Neels, Chemistry/Environ/Radwaste Manager
K. Ohr, Radiation Protection Manager

Nuclear Regulatory Commission

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

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000254/2008002-01	NCV	Risk Assessment of Reactor Core Isolation Cooling Flow Controller Failure
05000254/2008002-02; 05000265/2008002-02	NCV	Safe Shutdown Makeup Pump Low Discharge Pressure
05000265/2008002-03	NCV	Unit 2 Isolation of Reactor Building Ventilation and Auto Start of Standby Gas Treatment
05000254/2008002-04; 05000265/2008002-04	NCV	½ "A" Diesel Fire Pump Oil Leak and Fire

Closed

05000254/2008002-01	NCV	Risk Assessment of Reactor Core Isolation Cooling Flow Controller Failure
05000254/2008002-02; 05000265/2008002-02	NCV	Safe Shutdown Makeup Pump Low Discharge Pressure
05000265/2008002-03	NCV	Unit 2 Isolation of Reactor Building Ventilation and Auto Start of Standby Gas Treatment
05000254/2008002-04; 05000265/2008002-04	NCV	½ "A" Diesel Fire Pump Oil Leak and Fire

05000254/2007-003-00	LER	Safety Function Not Met Due to Control Room Emergency Ventilation System Air Filtration Unit Heater Flow Switch Failure
05000254/2007004-02; 05000265/2007004-02	URI	Review of Ultimate Heat Sink Surveillance Requirements and Emergency Action Levels

LIST OF DOCUMENTS REVIEWED

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

1R04 Equipment Alignment

Issue Reports:

- 754428; Unable to Maintain 2A Core Spray fill following pump run; 3/25/2008

Procedures:

- QCOS 1300-11; RCIC Valve Position Verification; Revision 10
- QCOP 7500-01; Standby Gas Treatment System Standby Operation and Startup
- QCOS 1400-10; Core Spray Operability Verification
- QCOP 1400-01; Core Spray System Preparation for Standby Operation
- QCOP 1400-03; ECCS Fill System

Drawings:

- M-50, Sheet 1, Revision BL; Diagram of Reactor Core Isolation Cooling Piping
- Piping and Instrument Diagram, M-78, Diagram of Core Spray Piping

UFSAR:

- Section 5.4.6, Reactor Core Isolation Cooling System

1R05 Fire Protection

- Drawing F-3-1, Detection and Suppression Reactor Building Floor Elevation 595 FT 0 IN
- Turbine/Radwaste and LTD Building Fire Inspection Check Sheet
- Reactor Building Fire Inspection Check Sheet
- Drawing F-12-1 Detection and Suppression Turbine Building Ground Floor
- Drawing F-13-1 Detection and Suppression Turbine Building Ground Floor

1R07 Heat Sink Performance

- Eddy Current Result: 2008-01 Project DGHX DGJW CLR "A" SN: 282690 Final Result Map
- Eddy Current Result: 2008-01 Project DGHX DGJW CLR "B" SN: 282691 Final Result Map
- QTPC 0820-10, revision 5, Heat Exchanger and Room Cooler Inspection
- Engineering Change 333328, For the Diesel Generator Hxs: Provide a tube plugging limit, tube plugging criteria (% thru-wall), and retubing methodology
- Engineering Change 362215, Determine tube fouling limit for diesel generator heat exchangers
- Drawing M-22, Sheet 3, Diagram of Service Water Piping Diesel Generator Cooling Water

1R08 Inservice Inspection Activities

Issue Reports:

- 588370, Drawing (M-994D-609) References Incorrect ISI Support Number, 02/07/07
- 621604, OLL Q1R19 for Pre-Outage Scheduling of ISI Inspections, 04/25/07
- 585042, ISI Drawing Needs Correction, 01/30/07

Other:

- GE-ADM-1062; Procedure for Determining and Documenting Examination Requirements for Risk-Informed Inservice Inspections; Revision 0
- GE-PDI-UT-1; PDI Generic Procedure for the Ultrasonic Examination of Ferritic Pipe Welds; Revision 5
- GE-MT-100; Procedure for Magnetic Particle Examination (Dry Particle, Color Contrast or Wet Particle, Fluorescent); Revision 7

1R12 Maintenance Effectiveness

- Fire Protection System (System Z4100) Failure Report for the period from 18 Jan 2006 to 18 Jan 2008
- Fire Protection Functional Performance Evaluation for the period from 18 Jan 2006 to 18 Jan 2008
- Control Room Emergency Ventilation System (System 5795) Failure Report for the period from 1 Feb 2006 to 31 Jan 2008
- Control Room Emergency Ventilation System Functional Performance Evaluation for the period from 1 Feb 2006 to 31 Jan 2008

Issue Reports:

- 451683; 1/2 B Fire Diesel Loss of Coolant/Overheated; 02/08/2006
- 713260; Fire DG Started During TMod Installation; 12/18/2007
- 713137; 1/2 A Fire Auto Start and Oil Leak; 12/18/2007
- 715013; 1/2 A Fire Diesel – Small Exhaust Insulation Fire; 12/22/2007
- 574227; A CR HVAC AHU Fan Tripped; 1/1/2007
- 584384; 1/2A CR HVAC Chiller Compressor Trips; 1/28/2007
- 695866; Train B CR HVAC Started Because of Train A CR HVAC Trouble; 11/7/2007
- 701733; AFU Heater Not Operating As Required; 11/20/2007

Work Orders:

- 01077689-14; Repair Fire Diesel Turbo Charger Oil Flex Hose; 12/20/2007
- 00787787-01; Engine Inspection; 08/10/2007

1R13 Maintenance Risk Assessments and Emergent Work Control

Issue Reports:

- 723781; Question on Basis for Unit 1 RCIC PRA Availability; 1/17/2008
- 729984; Safe Shutdown Makeup Pump Failed Operability Test per TIC-1982; 2/1/2008
- 731013; Safe Shutdown Makeup Pump Sparking on Startup; 2/4/2008
- 714901; Safe Shutdown Makeup Pump Performance; 12/21/2007
- 713041; Safe Shutdown Makeup Pump Fails to Meet Discharge Pressure Requirements; 12/18/2007
- 712670; Safe Shutdown Makeup Pump Failed Surveillance; 12/17/2007
- 711934; Safe Shutdown Makeup Pump Suction Line Did Not Fill During Fill; 12/14/2007

- 712059; Safe Shutdown Makeup Pump Fails to Sustain Pressure and Flow; 12/15/2007
- 700457; Nuclear Event Report NC-06-009 Supp 1 – Air Voids in Safety-Related Systems; 11/16/2007

Procedures:

- QCOP 1300-09; RCIC Local Manual Operation; Revision 21
- WC-AA-101, Attachment 6; Unavailability Guidelines; Revision 14
- QCOP 2900-01, Safe Shutdown Makeup Pump System Preparation for Standby Operation; Revision 25
- QCOS 2900-01; Safe Shutdown Makeup Pump Flow Rate Test; Revision 26
- QCOS 2900-01; Safe Shutdown Makeup Pump Flow Rate Test; Temporary/Interim Change 1968; 12/20/2007
- QCOS 2900-01; Safe Shutdown Makeup Pump Flow Rate Test; Temporary/Interim Change 1982; 1/31/2008
- QCOS 2900-08; Safe Shutdown Makeup Pump Performance Test; Revision 6

Work Orders:

- 01076215-33; Inspect UT Safe Shutdown Makeup Pump Suction; 12/17/2007
- 01076215-34; Tap Line 1/2-2901-6-L (Install vent for Safe Shutdown Makeup Pump Suction), 12/15/2007
- 01076215-38; Replace Mechanical Seals (included pump overhaul); 12/20

Other:

- Updated Final Safety Analysis Report; Section 5.4.6; Revision 5
- Updated Final Safety Analysis Report; Section 15.2.7; Revision 7
- Work Week Safety Profile; dated January 18, 2008
- SA-1654, Revision 0; Safe Shutdown Makeup Pump Flow Rate Required to Avoid Core Damage; 4/1/2008
- Gould Pumps Model 3300, Centrifugal Pump Characteristics Curve for the Safe Shutdown Makeup Pump; Revision 2, 11/21/1983

1R15 Operability Evaluations

Issue Reports:

- 744252; Q2R19 LLRT of 203-1A Exceeded Technical Specification Limit <34 SCFH; 3/4/2008
- 744257; Q2R19 LLRT of 203-1D Exceeded Technical Specification Limit <34 SCFH; 3/4/2008
- 744258; Q2R19 LLRT of 203-1C Exceeded Technical Specification Limit <34 SCFH; 3/4/2008
- 747216; U1 125VDC Level III Ground; 3/10/2008
- 749132; U1 HPCI Under Rated Piping Flange and Gasket Installed; 3/13/2008
- 749118; U1 HPCI Under Rated Piping Flange and Gasket Installed; 3/13/2008
- 754428; Unable to Maintain 2A Core Spray Fill Following Pump Run; 3/25/2008
- 755926; Improper Disposition of Failed Check Valve by Operations; 3/28/2008

Procedures:

- ER-AA-380; Primary Containment Leak Rate Testing Program; Revision 5
- QCTS 0600-05; Main Steam Isolation Valve Local Leak Rate Test (AO-1(2)-203-1A/B/C/D, AO-1(2)-203-2A/B/C/D); Revision 15
- QCTP 0130-01; Leak Rate Testing Program; Revision 19
- QOP 6900-06; U1 125 Volt DC Ground Detection; Revision 41
- QCOP 6900-19; Documenting 125-250 VDC Grounds; Revision 9

Work Orders:

- 997355-05; Local Leak Rate Test – Main Steam Isolation Valves (IST) ; 3/4/2008

Other:

- Technical Specification 3.6.1.1 and associated bases; Primary Containment Operability; Amendment no. 199/195
- Technical Specification 3.6.1.3 and associated bases; Primary Containment Isolation Valves; Amendment no. 199/195
- Engineering Change 369936; Op Eval for U1 HPCI Restricting Orifice Flanges IRs 749118 and 749132
- Engineering Change 369958; Engineering Evaluation of 150# Flanges Found Installed on Unit 1 HPCI Steam Supply Piping – Supporting OPEV Engineering Change 369936

1R18 Modifications

Engineering Change:

- 345769, Rev 0; Remove GL 96-06 Relief Valve 2-1099-167

Procedures:

- QCTS 600-14, Temporary/Interim Change Approval Form 2043; RHR Shutdown cooling Suction Local Leak Rate Test
- CC-AA-112; Temporary Configuration Changes; Revision 12
- CC-AA-201; Plant Barrier Control Program; Revision 6

Work Orders:

- 01003056-11, Remove GL 96-06 RV 2-1099-167 and install welded cap

1R19 Post Maintenance Testing

Procedures:

- QCMM 6600-03: Overhaul of Emergency Diesel Generator Engine Driven Cooling Water Pumps; Revision 2
- QCMMS 6600-02; Emergency Diesel Generator Preventive Maintenance Quarterly Inspection; Revision 18
- QCMMS-6600-03; Emergency Diesel Generator Periodic Preventive Maintenance Inspection; Revision 24
- QCMMS 6600-04; Emergency Diesel Generator Alternate Refuel Cycle Preventive ;Maintenance Inspection; Revision 7
- QCMMS-6600-06; Emergency Diesel Generator Twelve Year Preventive Maintenance Inspection; Revision 7
- QCMPM 6600-01; Diesel Generator Cylinder Head and Power Pac Inspection; Revision 3
- QCMPM 6600-02; Diesel Engine Thermostatic Valve Inspection; Revision 7
- QCOS 6600-43; Unit 1/2 Emergency Diesel Generator Load Test; Revision 27
- QCOS 6600-46; Unit 1/2 Diesel Generator Timed Start Test; Revision 13
- QCOP 1300-01; RCIC System Preparation for Standby Operation; Revision 21
- QCOS 1300-01; Periodic RCIC Pump Operability Test; Revision 34
- QCOS 2900-08; Safe Shutdown Makeup Pump Performance Test; Revision 6
- QCOS 2900-01, Temporary/Interim Change 1982; Safe Shutdown Makeup Pump Flow Rate Test; 1/31/2008
- QCOS 0600-05; Main Steam Isolation Valve Local Leak Rate Test (AO-1(2)-203-1A/B/C/D, AO-1(2)-203-2A/B/C/D; Revision 15

Work Orders:

- 854342; EDG Inspection 12 Yr; 12/14/2007
- 1097497-01; RCIC Flow Controller Failed; 1/15/2008
- 1096708-01, Safe Shutdown Makeup Pump Local Flow Indicating Controller Shows 200 GPM Process Flow with Pump Shutdown; 1/14/2008

Other:

- Drawing M-22, Sheet 3, Revision 4, Diagram of Service Water Piping Diesel Generator Cooling Water.
- Temporary/Interim Change Approval Form (TIC) # 1937,
- Drawing M-50, Revision "BL," Diagram of Reactor Core Isolation Cooling RCIC Piping

1R20 Outage Activities

Procedures:

- QCGP 1-1; Normal Unit Shutdown; Revision 59
- QCGP 2-1; Normal Unit Startup; Revision 73
- QCGP 4-1; Control Rod Movements and Control Rod Sequence; Revision 31

Other:

- Daily Shutdown Risk analysis

1R22 Surveillance Testing

Issue Reports:

- 723954; Unit 1 Diesel Generator Cooling Water Pump Failure; 1/18/2008
- 723296; Failed QCOS 6600-06 IST Differential Pressure Portion; 1/16/2008
- 718140; Unit 1 Diesel Generator Cooling Water Pump Flow Trend Investigation; 1/3/2008
- 702073; Flush Unit 1 EDG Cooling Water Pump Flow Indicator; 11/20/2007
- 715870; Failure to Back Flush Flow Element Prior to Unit 1 EDG Run; 12/27/2007

Procedures:

- QCOP 6600-15; 1/2 Diesel Generator Cooling Water Pump Cross Connect Alignment; Revision 9
- QCOP 6600-14; Emergency Diesel Generator Cooling Water Pump Manual Operation; Revision 9
- WC-AA-106; Work Screening and Processing; Revision 7
- Temporary/Interim Change Approval Form (TIC) 2043, Procedure QCTS 600-14, RHR Shutdown Cooling Suction Local Leak Rate Test

Work Orders:

- 01003056-11; Remove GL 96-06 RV 2-1099-167 and install welded cap

Other:

- Control Room Operating Logs; 1/18/2008

1EP6 Drill Evaluation

Procedures:

- EP-AA-1006; Radiological Emergency Plan Annex for Quad Cities Station (EAL Manual); Revision 25

Other:

- Team "C" Drill Scenario and Timeline; 2/7/2008
- Team "A" Drill Scenario and Timeline; 2/21/2008

2OS1 Access Control to Radiologically Significant Areas

Issue Reports:

- 704465; Worker Received Dose Rate Alarm; 11/28/2007
- 747751; Accumulated Dose Alarm; 3/11/2008

Procedures:

- RP-AA-460; Controls for High and Very High radiation Areas; Revision 13

2OS2 As Low As Reasonably Achievable Planning And Controls

Issue Reports:

- 747070; Zero Tolerance – RP Human Performance; 3/9/2008
- 713522; 2-2001-702B Valve Exceeded Dose Goal Due to Rework; 12/19/2007
- 748270; Personnel Contamination Event; 3/11/2008
- 748274; Personnel Contamination Event; 3/11/2008
- 747983; Facial Contamination on the Refuel Floor; 3/11/2008

Procedures:

- RP-AA-400; ALARA Program; Revision 4
- RP-AA-401; Operational ALARA Planning and Controls; Revision 8
- RP-AA-441; Evaluation and Selection Process for Radiological Respirator Use; Revision 4
- RP-AA-461; Radiological Controls for Contaminated Water Diving Operations; Revision 1

Other Documents:

- Personnel Contamination Data Sheets, Intake Investigation Forms and Whole Body Count Results for Several Workers; 3/2008 (various dates)
- Job Specific and Cumulative Outage Daily Dose Reports and "Earn versus Burn" Dose Data; 3/2008 (various dates)
- ALARA Work-In-Progress Reviews for RWPs 10008564, 10008569, 10008571, 10008594, 10008598, 10008600, 10008604, 10008609, 10008611, 10008637, 10008638, and 10009088
- Q1R19 Refueling Outage Report; 5/2007
- RWP 10008563; Reactor Disassembly/Reassembly and Cavity Work; Revision 0 and associated ALARA Plan; 1/29/2008
- RWP 10008565; Torus Diving Activities; Revision 1 and associated ALARA Plan; 1/30/2008
- RWP 10008600; ERV/SRV/Target Rock Valves – Removal and Replacement; Revision 0 and associated ALARA Plan; 2/26/2008
- RWP 10008602; Under Vessel Instrumentation Work; Revision 0 and associated ALARA Plan; 2/12/2008
- RWP 10008604; ISI Preparation; Revision 0 and associated ALARA Plan; 2/18/2008
- RWP 10008635; Drywell 2-1001-50 MOV Motor Replacement; Revision 0 and associated ALARA Plan; 2/26/2008
- RWP 10009088; Drywell Penetration LLRT Test Plate Welding; Revision 0 and associated ALARA Plan; 2/26/2008
- RWP 10008637; Recirculation System Motor Seal Replacement; Revision 0 and associated ALARA Plan; 2/24/2008

- Focused Area Self-Assessment Report; Radiation Protection - ALARA Planning and Controls; 2/14/2008
- Radiation Protection Audit Report; Audit NOSA-QDC-07-06; 8/22/2007
- Nuclear Oversight Quarterly Reports; NOSPA-QC-07-1Q thru 4Q; Various Dates in 2007

4OA1 Performance Indicator Verification

- Electronic Dosimetry Alarm Transaction Reports; November 2007 – Mid-March 2008
- LS-AA-2140; Monthly PI Data Elements; November 2007 – February 2008

4OA2 Problem Identification and Resolution

Other Documents;

- Operator Workaround Board Minutes dated February 20, 2008
- Operator Workarounds/Challenges reported in Site Plan of the Day Report for February 4, 2008 and March 3, 2008
- Operational and Technical Decision-Making Evaluations active on February 28, 2008

Issue Reports:

- 684630; Add U2-CAM System to Operator Workaround List; 10/14/2007
- 734803; 2-3401 Noise on Position Indication Causing Alarm in Control Room; 2/12/2008
- 737241; 1-1904-50B Found in Mid-Position; 2/16/2008

Procedures:

- OP-AA-102-103; Operator Work-around Program; Revision 1

Work Orders:

- WO 953594; Overhaul 2 A/B Feedwater Regulating Valves; 3/28/2007

4OA3 Follow-up of Events and Notices of Enforcement Discretion

Issue Reports:

- 749659; SBGTS Auto Start During Performance of QOP 6800-03; 3/14/2008

Procedures:

- QOP 6800-03; Essential Service System; Revision 30
- QCAN 901(2)-7 C-15; Traveling Screens High DP; Revision 03
- QCOP 4400-04; Traversing Trash Rake; Revision 13
- QCOP 4400-04; Traversing Trash Rake; Revision 15
- QCOA 0010-14; Lock and Dam #14 Failure; Revision 10
- QCOA 0010-12; Fire Explosion; Revision 30

Work Orders:

- 1077689-14; Repair Fire Diesel Turbo Charger Oil Flex Hose; February 12, 2008
- 0787787-01; Diesel fire Pump Engine "A" Inspection; August 10, 2007

4OA7 Licensee-Identified Violations

Issue Reports:

- 697457; Unit 1 Reactor Building Vent Isolation Damper Inop; September 14, 2007
- 628980 and Associated Quick Human Performance Investigation; Poor Radiation Worker Practices; 5/13/2007

Procedures:

- QCOP 5750-02; Reactor Building Ventilation System; Revision 19
- QCEM 0600-04; Maintaining Series V Versa Solenoid Valves; Revision 07
- RP-AA-460-1004; Unescorted Access to and Conduct in Radiologically Controlled Areas; Revision 0

Work Orders:

- 1077792-01; Stroke Rx Bldg Vent Isolation Dampers; Revision 07

Other Documents:

- RWP 10007813; U1 Feedwater Heater Shell/Nozzle FAC Repairs and Inspections; Revision 0
- RWP 10007696; U1 Condenser Steam Repair; Revision 0

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ASME	American Society of Mechanical Engineers
Bldg	Building
CFR	Code of Federal Regulations
dc	Direct Current
DRP	Division of Reactor Projects
kV	Kilovolt
LER	Licensee Event Report
MT	Magnetic Particle Examination
MWe	Megawatts Electric
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NUMARC	Nuclear Management and Resources Council
OI	Office of Investigations
OPEX	Operating Experience
psig	Pounds Per Square Inch Gauge
RHR	Residual Heat Removal
Rx	Reactor
SDP	Significance Determination Process
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
UT	Ultrasonic Examination
Vdc	Volts Direct Current
VT	Visual Examination