UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

April 30, 2008

Mr. David A. Baxter
Site Vice President
Duke Power Company, LLC
d/b/a Duke Energy Carolinas, LLC
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION - INTEGRATED INSPECTION REPORT 05000269/2008002, 05000270/2008002, 05000287/2008002

Dear Mr. Baxter:

On March 31, 2008, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Oconee Nuclear Station. The enclosed report documents the inspection results which were discussed on April 2, 2008, with you and members of your staff.

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

Based on the results of this inspection, three self-revealing findings of very low safety significance (Green) were identified; two of which were determined to be violations of NRC requirements. However, because of their very low safety significance and because the issues were entered into your corrective action program, the NRC is treating the two findings determined to be violations of NRC requirements as non-cited violations (NCVs), consistent with Section VI.A of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Oconee facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's

document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Kathy D. Weaver, Acting Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos.: 50-269, 50-270, 50-287
License Nos.: DPR-38, DPR-47, DPR-55

Enclosure: NRC Integrated Inspection Report 05000269/2008002, 05000270/2008002, 05000287/2008002 w/Attachment: Supplemental Information

cc w\encl.: (See page 3)

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Letter to David A. Baxter from Kathy D. Weaver, dated April 30, 2008

SUBJECT: OCONEE NUCLEAR STATION - INTEGRATED INSPECTION REPORT 05000269/2008002, 05000270/2008002, 05000287/2008002

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U. S NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-269, 50-270, 50-287
License Nos:	DPR-38, DPR-47, DPR-55
Report Nos:	05000269/2008002, 05000270/2008002, 05000287/2008002
Licensee:	Duke Power Company, LLC
Facility:	Oconee Nuclear Station, Units 1, 2, and 3
Location:	7800 Rochester Highway Seneca, SC 29672
Dates:	January 1, 2008 - March 31, 2008
Inspectors:	D. Rich, Senior Resident Inspector A. Hutto, Senior Resident Inspector E. Riggs, Resident Inspector R. Moore, Senior Reactor Inspector (Section 4OA5)
Approved by:	Kathy D. Weaver, Acting Chief Reactor Projects Branch 1 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000269/2008002, 05000270/2008002, 05000287/2008002; 01/01/2008 - 03/31/2008; Oconee Nuclear Station, Units 1, 2, and 3; Post Maintenance Testing and Event Follow-up.

The report covered a three-month period of inspection by the onsite resident inspectors and one regional reactor inspector. Three Green findings (two of which were non-cited violations) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using 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: Initiating Events

- Green. A self-revealing non-cited violation (NCV) of Technical Specification (TS) 5.4.1 was identified for failure to adequately implement the procedure to stroke reactor building spray (RBS) valves, which resulted in a loss of Reactor Coolant System (RCS) inventory while in Mode 5.

  The inspectors determined that the loss of RCS inventory while in Mode 5 was a performance deficiency. The finding was considered to be more than minor because it affected the Configuration Control attribute of the Reactor Safety/Initiating Events Cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown, as well as power operations. The finding was determined to be of very low safety significance. This was based initially on a determination that the event did not meet the loss of control criteria in MC 0609, Appendix G, and also on the Phase 1 screening criteria found in Manual Chapter (MC) 0609, Appendix G, Shutdown Operations Significance Determination Process, Attachment 1, Checklist 2. This finding has a cross-cutting aspect of appropriate coordination of work activities [H.3.b], including incorporating actions to address interdepartmental coordination, the need to keep personnel apprised of work status, the operations impact of work activities, and plant conditions that may affect work activities, as described in the work control component of the human performance cross-cutting area. (Section 1R22)

- Green. A self-revealing NCV of TS 5.4.1 was identified for the failure to properly implement the procedural requirements of OP/3/A/1104/006C, Spent Fuel Pool (SFP) Makeup, which led to an over dilution of the Unit 3 RCS.

  The failure to properly implement the procedural requirements of OP/3/A/1104/006C was considered to be a performance deficiency. The finding was determined to be

more than minor because it was associated with the Initiating Event Cornerstone attribute of configuration control; thereby, impacting the associated cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors reviewed this finding in accordance with MC 0609, Significance Determination Process. Although the unintentional dilution was a transient initiator, it did not increase the likelihood of a reactor trip, nor did it increase the likelihood that mitigation equipment or functions will not be available. Consequently, the finding was determined to be of very low safety significance. This finding has a cross-cutting aspect of procedural compliance for a failure to follow procedures [H.4.b] as described in the work practices component of the human performance cross-cutting area. (Section 4OA3)

Cornerstone: Mitigating Systems

- Green. A self-revealing finding (FIN) was identified for failure to implement self-checking during Standby Shutdown Facility (SSF) diesel generator (DG) field flash relay cover reinstallation, resulting in a failure of the relay during post maintenance testing and subsequent loss of the electronic governor.

  The inspectors determined that the licensee's failure to correctly install the SSF DG field flash relay cover was a performance deficiency. The finding was considered to be more than minor because it affected the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events. The finding was determined to be of very low safety significance (Green), based on the Phase 1 screening criteria found in MC 0609, Appendix A, Attachment 1, in that the additional 15.6 hours of SSF unavailability resulting from the deficiency was less than the TS allowed outage time. Additionally, the Oconee Phase 2 pre-solved table for exposure times of less than three days yields a Green result for the SSF DG. This finding has a cross-cutting aspect of human error prevention techniques [H.4.a], as described in the work practices component of the human performance cross-cutting area. (Section1R19)

B. Licensee-Identified Violations

None

Report Details

Summary of Plant Status

Unit 1 began the report period at 100 percent rated thermal power (RTP). On January 19, 2008, the unit was reduced to approximately 88 percent RTP for turbine valve movement testing and was returned to 100 percent RTP on the same day. On February 29, 2008, the unit was reduced to approximately 68 percent RTP and the 1A1 Reactor Coolant Pump (RCP) was secured due to a service water leak into one of the pump's oil reservoirs. On March 1, 2008, unit output was increased to approximately 73 percent RTP, where it remained until the end of the inspection period.

Unit 2 began the report period at 100 percent RTP. On February 6, 2008, the unit was reduced to approximately 95 percent RTP to repair the 2A main feedwater pump's automatic speed control circuit. Following repair efforts, the unit was returned to 100 percent RTP on February 7, 2008. On February 16, 2008, the unit was reduced to approximately 88 percent RTP for turbine valve movement testing. The unit was returned to 100 percent RTP on the same day, where it remained until it tripped due to a loss of vacuum turbine trip on March 31, 2008.

Unit 3 began the report period at 100 percent RTP. On March 8, 2008, the unit was reduced to approximately 88 percent RTP for turbine valve movement testing. The unit was returned to 100 percent RTP on the same day, where it remained until the end of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

Actual Cold Weather Conditions

a. Inspection Scope

The inspectors walked down cold weather protection features related to the protection of the Borated Water Storage Tanks (BWSTs) and the Essential Siphon Vacuum system during a period of cold weather (<20F) that occurred on January 25, 2008. The inspectors observed the freeze protection circuit panels associated with Units 1, 2 and 3 BWSTs to verify that the circuits were functioning properly with no circuits in the trip position. The inspectors also utilized an infrared temperature measuring instrument to determine whether the external insulation surface for the BWST level instrument piping and emergency core cooling system (ECCS) piping read above ambient temperatures as a quantitative measure that the freeze protection circuits were performing their function. The inspectors reviewed various operations and maintenance procedures listed in the Attachment to this report to verify that the freeze protection circuits, instrument enclosures, and insulation were operating correctly and appropriately maintained.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

.1 Partial Walkdown

a. Inspection Scope

The inspectors conducted partial equipment alignment walkdowns to evaluate the operability of selected redundant trains or backup systems while the other train or system was inoperable or out of service. The walkdowns included, as appropriate, reviews of plant procedures and other documents to determine correct system lineups, and verification of critical components to identify any discrepancies which could affect operability of the redundant train or backup system. Documents reviewed are listed in the Attachment to this report. The following three systems were included in this review:

- 3B Motor Driven Emergency Feedwater Pump (MDEFWP) and Turbine Driven Emergency Feedwater Pump (TDEFWP) with 3A MDEFWP out-of-service (OOS) for lubrication and breaker maintenance
- Keowee Hydro-electric Unit (KHU) -1 with KHU-2 OOS for maintenance
- Unit 3 Standby Bus 2 and its supply breaker to Main Feeder Bus 2 (B2T-7) with Unit 3 Standby Bus 1 to Main Feeder Bus 1 supply breaker (B1T-7) OOS for preventive maintenance (PM)

b. Findings

No findings of significance were identified.

.2 Complete Walkdown of the Unit 1 High Pressure Injection (HPI) System

a. Inspection Scope

The inspectors performed a system walkdown on accessible portions of the Unit 1 HPI system. The inspectors focused on verifying proper valve and breaker positioning, power availability, no damage to piping or cable tray structural supports, and material condition.

A review of Problem Investigation Process reports (PIPs) and open maintenance work orders was performed to assess whether material condition deficiencies significantly affected the HPI system's ability to perform its design functions and appropriate corrective action was being taken by the licensee.

The inspectors conducted a review of the system engineer's trending data and system health reports to determine if appropriate trending parameters were being monitored and that no adverse trends were noted. Documents and drawings reviewed for this semi-annual inspection sample are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

.1 Fire Area Walkdowns

a. Inspection Scope

The inspectors conducted tours in selected areas of the plant to assess whether combustibles and ignition sources were properly controlled, and that fire detection and suppression capabilities were intact. The inspectors selected the areas based on a review of the licensee's safe shutdown analysis and the probabilistic risk assessment based sensitivity studies for fire-related core damage sequences. Documents reviewed are listed in the Attachment to this report. The following areas were inspected during this inspection period:

- Unit 3 Control Room (1)
- Unit 1, 2, 3 Equipment Rooms (3)
- Standby Shutdown Facility (SSF) (1)
- Unit 3 Cable Spread Room with penetration 3CF-41 breached for cable pulling in support of modification work (1)
- Unit 1 and 2 Cable Spread Rooms (2)
- Turbine Building Basement (1)

b. Findings

No findings of significance were identified.

.2 Fire Drill Observations

a. Inspection Scope

The inspectors evaluated fire brigade performance by observing two fire drills. The first drill, which was conducted on January 11, 2008, simulated a fire in a failed section of diesel fuel oil supply piping for the diesel service air compressors. The second drill, which was conducted on February 8, 2008, involved a simulated fire in a Unit 3 lube oil purifier. The inspectors evaluated the drills for the following attributes:

- command and control of the affected control room personnel
- protective clothing/self-contained breathing apparatus properly worn
- adequacy/appropriateness of fire extinguishing methods
- controlled access to the fire area by the fire brigade members
- adequacy of fire fighting equipment

- command and control effectiveness of the fire brigade leader
- adequate communications
- effectiveness of smoke removal gear

The inspectors also evaluated the self-contained breathing apparatus (SCBA) program by reviewing training records and associated course content summaries for initial and refresher training, the SCBA maintenance program and procedures, and determined whether SCBAs were available and properly stored.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

Internal Flooding - Aux Building

a. Inspection Scope

The inspectors reviewed PIP O-07-7649, which documented a potential Auxiliary Building flooding concern associated with exterior surface corrosion on sections of Low Pressure Service Water (LPSW) and Recirculated Cooling Water (RCW) piping. These sections of piping are located adjacent to the Unit 3 ECCS pump rooms. This deficiency was previously identified and documented in PIP O-04-1172. In response to both PIPs, Engineering performed visual examinations of the piping, noted the previously identified surface corrosion, and requested ultrasonic examinations (UT) of the piping. Based on the visual inspections and the UTs, the piping was deemed to be structurally sound. The inspectors reviewed the results of UTs of the piping conducted in 2006, which indicated that no wall thinning had occurred. As a precautionary measure, future UTs are planned to ensure that wall thinning has not begun. During the 2007 visual examination of the piping, it was noted that insulation was missing from several sections of the LPSW piping. Work requests associated with planned UTs and insulation replacements were reviewed. Additionally, the inspectors also walked down the Unit 3 ECCS pump rooms to verify that internal flood protection features were consistent with the licensee's design requirements, risk analysis assumptions, and ONDS-0340, Oconee Nuclear Station Auxiliary Building Internal Flood Study.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance

The inspectors observed portions of the 1A Component Cooling (CC) heat exchanger cleaning and inspection and reviewed documentation of results. The inspectors observed photographs of the as found condition of LPSW tube side of the cooler to verify that their was no significant biological or corrosion fouling of the heat exchange surfaces

or tube blockage, and that excessive corrosion of the cooler water boxes did not exist. The inspectors also assessed the appropriateness of the heat exchanger cleaning/inspection interval based on the as found condition.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

Simulator Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on March 5, 2008. The simulator scenario began with an integrated control system controlling Tave instrument failure followed by anticipated transient without SCRAM, which resulted in a site area emergency. Subsequently, a steam line break on the 1A steam line occurred requiring entry into the excessive heat transfer tab of the emergency procedure. The inspectors observed crew performance in terms of: communications; ability to take timely and proper actions; prioritizing, interpreting, and verifying alarms; correct use and implementation of procedures, including the alarm response procedures; timely control board operation and manipulation, including high-risk operator actions; and oversight and direction provided by the shift supervisor, including the ability to identify and implement appropriate TS actions and properly classify the simulated event.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the licensee's effectiveness in performing routine maintenance activities. This review included an assessment of the licensee's practices pertaining to the identification, scoping, and handling of degraded equipment conditions, as well as common cause failure evaluations. For each item selected, the inspectors performed a detailed review of the problem history and surrounding circumstances, evaluated the extent of condition reviews as required, and reviewed the generic implications of the equipment and/or work practice problem. For those structures, systems, and components (SSCs) scoped in the Maintenance Rule per 10 CFR 50.65, the inspectors verified that reliability and unavailability were properly monitored and that 10 CFR 50.65 (a)(1) and (a)(2) classifications were justified in light of the reviewed degraded equipment condition. Documents reviewed are listed in the Attachment to this report. The inspectors reviewed the following items:

- PIP O-07-7324, Three Control Rod Drive (CRD) Closure Inserts Not Full Tensioned
- PIP O-08-0707, Connections on KHU-2 Excitation Transformers Secondary Differential Current Transformers are Discolored

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessment and Emergent Work Evaluations

a. Inspection Scope

The inspectors evaluated the following attributes for the selected SSCs and activities listed below: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved.

- Critical Activity Plan for Keowee Sluice Gate Valve , K0-SW-01, Replacement, (Mod OD 501837)
- Critical Activity Plan for Radwaste Facility Liquid Waste Disposal Piping Hydrostatic Testing
- Risk Management Actions taken for an SSF maintenance outage
- SSF DG scaffold build with Turbine Building flood risk associated with 2B condensate cooler cleaning Critical Activity Plan for KHU-2 Battery Bank #2 Test and Recharge
- Critical Activity Plan for 3LP-21 Mechanical /Electrical PM and 3EL-BK-3XS1F5D inspection followed by stroke of 3LP-21 by PT/3/A/0152/012
- Critical Activity Plan for CT-4 Outage for Major PMs
- Critical Activity Plan for 0SF-15 and 0SF-21 Valve Repairs

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed selected operability evaluations affecting risk significant systems, to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered; (4) if compensatory measures were involved, whether the compensatory measures were in place, would work as intended, and were

appropriately controlled; and (5) where continued operability was considered unjustified, the impact on TS limiting condition for operations. Documents reviewed are listed in the Attachment to this report. The inspectors reviewed the following operability evaluations:

- PIP O-08-0447, Defect Found in the Volute Wall of the SSF Diesel Engine Service Water Pump
- PIP O-08-0472, SSF Service Water Strainer Swapping Valves Leaking Around the Stem
- PIP O-08-0164, Pinhole Leaks Downstream of 1LPSW-21
- PIP O-08-0293, 2A LPI Discharge Pressure Increased During 2C LPIP Test to the 2B LPI Recirculation Header
- PIP O-08-0883 and PIP O-08-1222, Additional Hydrants Required to Opened During A HPSW Pump Test
- PIP O-08-1278, KHU-1 Generator Field Brush Pigtails Appear to Have Been Overheated
- PIP O-08-1529, Stem Leak on CCW-266, SSF Service Water Isolation Valve

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (PMT)

a. Inspection Scope

The inspectors reviewed PMT procedures and/or test activities, as appropriate, for selected risk significant systems to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) tests were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform its safety function. Documents reviewed are listed in the Attachment to this report. The inspectors observed testing and/or reviewed the results of the following tests:

- PT/3/A/0202/011, 3C High Pressure Injection Pump Test, following pump lubrication and pump mechanical seal cleaning
- PT/0/A/0400/011, SSF Diesel Generator Test, following replacement of the generator's field flash relay
- OP/0/A/2000/041, KHS – Modes of Operation, KHU-2 maintenance run following replacement of the exciter current transformer (CT)
- PT/0/A/0250/025, High Pressure Service Water (HPSW) Pump and Fire Protection Flow Test, following pump PMs

- WO 01775594, A chiller PMT following annual PMs and motor testing
- PT/1/A/0600/013, 1A MDEFWP Test, following breaker replacement

b. Findings

Introduction: A Green self-revealing finding (FIN) was identified for failure to implement self-checking during SSF diesel generator (DG) field flash relay cover reinstallation, resulting in a failure of the relay during post maintenance testing and subsequent loss of the electronic governor.

Description: On January 30, 2008, while the licensee was performing a maintenance run on the SSF DG following annual maintenance, a fuse blew in the SSF DG voltage regulator/electronic governor circuit moments after diesel speed was increased to 900 rpm and the exciter field was flashed. The diesel was not yet loaded and the engine speed increased to approximately 930 rpm (the speed setting of the SSF DG mechanical governor stop). The diesel was stopped using the emergency stop and the licensee commenced troubleshooting. The blown fuse was determined to be the result of a problem with the field flash relay (contactor), which was inspected during the annual SSF maintenance outage. The licensee's investigation determined that the relay cover, which had been removed to perform the inspection, was not properly reinstalled, as one of the two tabs that hold the cover in place was not latched. The relay was designed such that when the cover is not fully latched, the contact carrier is physically blocked from moving, even when energized. Therefore, when the SSF DG speed increased to the field flash set point, the relay energized and the contact carrier could not change state. This caused the relay to remain energized at full amperage until the relay overheated and shorted out, causing the fuse to blow. Subsequent troubleshooting and repairs resulted in an additional 15.6 hours of unavailability for the SSF.

The licensee's maintenance technicians performed the relay inspection as skill of the craft, including the simple task of reinstalling the relay cover. It is the licensee's standard and expectation per the Duke Energy Human Performance Functional Area Manual that personnel use the human error prevention technique of self-checking to ensure that simple tasks are performed correctly. The maintenance technician that reinstalled the field flash relay cover did not perform an adequate self-check of the task to ensure that the cover was fully secured with both tabs latched, resulting in the failure of the relay as described above. The licensee has initiated a corrective action to add a task to the work order to functionally check the contact carrier movement following relay cover replacement.

Analysis: The inspectors determined that the licensee's failure to correctly install the SSF DG field flash relay cover was a performance deficiency. The finding was considered to be more than minor because it affected the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events. The finding was determined to be of very low safety significance (Green), based on the Phase 1 screening criteria found in MC 0609, Appendix A, Attachment 1, in that the additional 15.6 hours of SSF unavailability resulting from the deficiency was less than the TS allowed outage time. Additionally, the Oconee Phase 2 pre-solved table for exposure times of less than three days yields a

Green result for the SSF DG. This finding has a cross-cutting aspect of human error prevention techniques [H.4.a], as described in the work practices component of the human performance cross-cutting area.

Enforcement: Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. This issue has been entered into the licensee's corrective action program as PIP O-08-0526. This finding is identified as: FIN 05000269,270,287/2008002-01, Inadequate Installation of SSF DG Field Flash Relay Cover.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed surveillance tests and/or reviewed test data of the risk-significant SSCs listed below, to assess, as appropriate, whether the SSCs met TS, Updated Final Safety Analysis Report (UFSAR), and licensee procedure requirements. In addition, the inspectors determined if the testing effectively demonstrated that the SSCs were ready and capable of performing their intended safety functions.

- PT/1/A/0600/012, TDEFW Pump Test (IST)
- PT/1/A/0400/007, SSF RC Makeup Pump Test (IST)
- PT/2/A/0600/015, Control Rod Movement
- PT/1,2,3/A/0600/010, RCS leakage (RCS Leakage Detection)
- PT/0/A/0150/009, RB Personnel Hatch Outer Door O-Ring Leak Rate Test
- CP/1/A/2002/001 Unit 1 Primary Sampling System (RCS Dose Equivalent Iodine)
- PT/3/A/0152/002, Building Spray System Valve Stroke Test

b. Findings

Introduction: A Green self-revealing NCV of TS 5.4.1 was identified for failure to adequately implement the procedure to stroke reactor building spray (RBS) valves which resulted in a loss of RCS inventory while in Mode 5.

Description: On December 11, 2007, Unit 3 was in Mode 5, restoring from its end-of-cycle (EOC) 23 refueling outage (RFO). The RCS was filled and a nitrogen bubble in the pressurizer was maintaining RCS pressure at 39 psig. RCS temperature was 85 degrees F and decay heat removal was in service. The RBS system had been drained for maintenance and not yet refilled. Venting of the control rod drive mechanisms was in progress. Operators began stroking of the RBS system valves as scheduled, in accordance with procedure PT/3/A/0152/002, Building Spray System Valve Stroke Test. When operators stroked valve 3BS-3, then valve 3BS-4, pressurizer level dropped from approximately 98 inches to 78 inches. The operators referenced loss of inventory procedures, reviewed plant conditions, tank levels, and containment conditions, and consulted the primary system coordinator in outage management. The primary system coordinator confirmed that the

RBS system had been drained for maintenance, and operators concluded that voids in the RBS system had been filled by approximately 600 gallons from the RCS, via the decay heat removal system.

The prerequisite to conduct RBS valve cycling, as stated in PT/3/A/0152/002, was "ensure system conditions allow valve cycling". Operations staff interpreted this to mean ensure the system was intact, filled, and could otherwise support valve cycling. Operations personnel were not aware the system was drained. They assumed the system was filled, and after reviewing other aspects of system status, preceded with the test. Outage control staff were aware the system was still drained, but did not recognize that the activity for restoration and refill of the RBS system was incorrectly scheduled for later in the outage, after the stroke test of the RBS valves. Likewise, outage control staff were apparently not aware of the conflict between the valve cycling test prerequisites and the system status. Therefore, poor work activity coordination and lack of awareness of plant conditions was the cause of the event.

Analysis: The inspectors determined that the loss of RCS inventory while in Mode 5 was a performance deficiency. The finding was considered to be more than minor because it affected the Configuration Control attribute of the Reactor Safety/Initiating Events cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown, as well as power operations. The finding was determined to be of very low safety significance (Green). This was based initially on a determination that the event did not meet the loss of control criteria in MC 0609, Appendix G, and also on the Phase 1 screening criteria found in Manual Chapter (MC) 0609, Appendix G, Shutdown Operations Significance Determination Process, Attachment 1, Checklist 2.

This finding has a cross-cutting aspect of appropriate coordination of work activities [H.3.b], including incorporating actions to address interdepartmental coordination, the need to keep personnel apprised of work status, the operations impact of work activities, and plant conditions that may affect work activities, as described in the work control component of the human performance cross-cutting area.

Enforcement: TS 5.4.1 requires that procedures shall be established, implemented and maintained covering the applicable procedures recommended in Regulatory Guide 1.33. Regulatory Guide 1.33, Appendix A, Section 3, requires procedures for operation of safety-related systems. PT/3/A/0152/002, step 1.11.1 states, "ensure system conditions allow 3BS-3 to be opened." Contrary to the above, the licensee failed to ensure that system conditions allowed 3BS-3 to be opened, in that the system was drained. Because the finding was determined to be of very low safety significance and has been entered into the licensee's corrective action program (PIP O-07-7374), this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000287/2008002-02, Failure to Implement the Procedure to Stroke RBS Valves.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed and evaluated a simulator/plant based emergency preparedness drill held on February 5, 2008. The drill scenario involved a plant transient without an immediate reactor trip and a steam leak on the 1B main header, which resulted in an Alert declaration. The scenario progressed to Site Area Emergency declaration due to a simulated steam generator tube rupture; consequently, two fission product barriers had been lost, specifically containment and the RCS. The scenario continued to a General Emergency based on elevated auxiliary and reactor building radiation monitor indications that were indicative of significant fuel and cladding damage. The operators were observed to determine if they properly classified the event and made the appropriate notifications for both the alert and site area emergency conditions. Notification sheets were reviewed for accuracy and to determine if protective action recommendations were made in accordance with the licensee's emergency plan procedures. The inspectors observed the post drill critique to assess whether the licensee appropriately captured drill deficiencies and/or weaknesses.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

.1 Initiating Events and Barrier Integrity Cornerstones

a. Inspection Scope

The inspectors reviewed the PIs listed in the tables below (for all three Units), to determine their accuracy and completeness against requirements in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 5.

Cornerstone: Initiating Events		
Performance Indicator	*Verification Period*	*Records Reviewed*
Unplanned Scrams	2nd, 3rd, and 4th quarters of 2007	• Licensee Event Reports • NRC Inspection Reports • Monthly Operating Reports • operator logs • licensee power history curves • PIPs
Unplanned Scrams with Complications	3rd and 4th quarters of 2007	
Unplanned Power Changes	2nd, 3rd, and 4th quarters of 2007	

Cornerstone: Barrier Integrity		
Performance Indicator	*Verification Period*	*Records Reviewed*
Reactor Coolant System Specific Activity	2nd, 3rd, and 4th quarters of 2007	• daily plant chemistry data • daily status reports • operator logs • PIPs
Reactor Coolant System Leakage	1st, 2nd, 3rd, and 4th quarters of 2007	• RCS leakage surveillances • daily status reports • operator logs • PIPs

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

.1 Daily Screening of Corrective Action Reports

In accordance with Inspection Procedure (IP) 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed daily screening of items entered into the licensee's corrective action program. This review was accomplished by reviewing copies of PIPs, attending daily screening meetings, and accessing the licensee's computerized database.

.2 Focused Review

a. Inspection Scope

The inspectors performed an in-depth review of one issue entered into the licensee's corrective action program, and also performed an in-depth review of existing plant operator workarounds. The samples were within the Mitigating Systems cornerstone and involved risk significant systems. The inspectors reviewed the actions taken to determine if the licensee had adequately addressed the following attributes:

- Complete, accurate and timely identification of the problem
- Evaluation and disposition of operability and reportability issues
- Consideration of previous failures, extent of condition, generic or common cause implications
- Prioritization and resolution of the issue commensurate with safety significance

- Identification of the root cause and contributing causes of the problem
- Identification and implementation of corrective actions commensurate with the safety significance of the issue.

The following issue and corrective actions were reviewed:

- Evaluation of ultra-low sulfur diesel fuel (ULSDF) suitability for SSF operation, PIPs O-06-4401, and O-05-8459. The licensee evaluated various differences between low sulfur diesel fuel and ULSDF, including review of energy content of ULSDF, on-site inventory, stability during storage, and chemical compatibility with existing systems. The licensee adequately evaluated and addressed the various concerns of using ULSDF. The licensee noted a need to update calculation OSC-2218 to address the potential for increased SSF diesel fuel consumption, but noted the current minimum storage volume of 25,000 gallons was adequate to meet the 72 hour SSF mission time.

4OA3 Event Follow-up

a. Inspection Scope

The inspectors evaluated the events listed below to assess the overall impact on the plant and mitigating actions. As appropriate, the inspectors: (1) observed plant parameters and status, including mitigating systems/trains; (2) determined alarms/conditions preceding or indicating the event; (3) evaluated performance of mitigating systems and licensee actions; and (4) confirmed that the licensee properly classified, if applicable, the event in accordance with emergency action level procedures and made timely notifications to NRC and state/county governments as required.

- PIP O-07-7674, During an RCS Makeup From the 3B Bleed Hold Up Tank, the Incorrect Volume was Added
- PIP O-08-1080, 1A1 RCP Motor Upper Oil Pot Level Increasing

b. Findings

Introduction: A Green self-revealing NCV of TS 5.4.1 was identified for the failure to properly implement the procedural requirements of OP/3/A/1104/006C, Spent Fuel Pool (SFP) Makeup, which led to an over dilution of the Unit 3 RCS.

Description: On December 27, 2007, with Unit 3 in Mode 1, operators planned two separate evolutions; an RCS dilution and an addition of makeup water to the Unit's SFP. The operating crew performed a pre-job brief for both, including a review of each procedure needed to perform the RCS dilution and makeup to the Unit's SFP.

As planned, the control room operating crew commenced the RCS dilution and a non-licensed operator (NLO) was stationed to align the unit's SFP for makeup. A prerequisite of OP/3/A/1104/006C, SFP Makeup, Revision 10, is that RCS dilution cannot be in progress; therefore, the NLO was not granted permission to begin the SFP makeup procedure. However, the NLO performed the lineup to add to the SFP while the dilution to the RCS was in progress. When the transfer pump was secured after adding the planned 35 gallons of makeup water to the Unit 3 letdown storage tank (LDST), the control room operators immediately noted that flow to the LDST had not stopped, as indicated on 3HP-15 (LDST makeup control valve), and LDST level continued to increase. Operators shut valve 3HP-16 (LDST Makeup Isolation), and the flow of water into the LDST ceased.

A licensee investigation concluded that simultaneously lining up to add to the Unit 3 SFP and to the Unit 3 LDST, created a flowpath from the SFP to the LDST which allowed the static head of the SFP to inject residual demineralized water contained in the coolant storage system piping to the LDST. As a direct result of this lineup, an extra 19 gallons of demineralized water was added to the Unit 3 RCS, which caused approximately a one ppm change in RCS boron concentration and 0.39 percent control rod insertion on the controlling rod group.

Analysis: The failure to properly implement the procedural requirements of OP/3/A/1104/006C was considered to be a performance deficiency. The finding was determined to be more than minor because it was associated with the Initiating Event Cornerstone attribute of Configuration Control; thereby, impacting the associated cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown, as well as power operations. The inspectors reviewed this finding in accordance with IMC 0609, Significance Determination Process. Although the unintentional dilution was a transient initiator, it did not increase the likelihood of a reactor trip, nor did it increase the likelihood that mitigation equipment or functions would not be available. Consequently, the finding was determined to be of very low safety significance (Green). This finding has a cross-cutting aspect of procedural compliance for a failure to follow procedures [H.4.b] as described in the work practices component of the human performance cross-cutting area.

Enforcement: TS 5.4.1 requires that written procedures shall be established, implemented, and maintained covering activities related to procedures recommended in Regulatory Guide 1.33. Regulatory Guide 1.33, Appendix A, Section 3, requires procedures for startup, operation and shutdown of safety-related Pressurized Water Reactor (PWR) systems. Contrary to the above, the licensee failed to properly implement the Unit 3 SFP Makeup procedure. Because the finding was determined to be of very low safety significance and has been entered into the licensee's corrective action program (PIP O-07-7674), this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 050000287/2008002-03, Dilution of the RCS While Lining Up for SFP Makeup.

4OA5 Other Activities

(Closed) Temporary Instruction (TI) 2515/166, Pressurized Water Reactor Containment Sump Blockage (NRC Generic Letter 2004-02) - Units 1, 2, and 3

a. Inspection Scope

The inspector verified implementation of the licensee's commitments documented in their September 1, 2005, and supplemental responses to Generic Letter (GL) 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactor for Units 1, 2, and 3. The commitments included permanent modifications and program and procedure changes. Previous inspections of the station's response were performed in 2006 and 2007 and documented in NRC Inspection Reports 05000269,270,287/2006003 and 05000269,270,287/ 2006005. The TI was open pending completion or accepted extension of modification schedules, completion of chemical effects analysis, downstream effects analysis, final head loss testing for the modified sump screens and completion of program changes.

b. Findings and Observations

No findings of significance were identified. The licensee's modification and procedure change commitments to GL 2004-02 were completed prior to December 31, 2007, with the exception of the following commitments for which an extension request was approved, (NRC letter to Duke-Energy, NRC Generic Letter 2004-02 Supplemental Response, dated December 28, 2007):

- Replace seal orifices and cyclone separators on LPI, HPI and RBS pumps: extension approved for Unit 1 – 1/31/09; Unit 2 – Fall 2008 RFO; Unit 3 – Spring 2009 RFO. [On schedule]

- Replace wear rings and impeller hubs on HPI pumps. Complete on all pumps except pump 3A. Extension approved to Spring 2009 RFO or first forced outage of sufficient duration. [On Schedule]

- Review procedural guidance for operator recognition of and response to LPI, HPI, or RBS seal failures or HPI pump 3A wear-related failure. Provide additional guidance as needed. [Complete]

Completion date extension was requested for the following GL 2004-02 commitments related to design and licensing documentation (Duke-Energy letter to NRC, NRC Generic Letter 2004-02 Supplemental Response, dated February 29, 2008):

- Evaluate and respond to NRC conditions and Limitations on WCAP 16793-NP, Rev. 0 due 90 days after receipt of final NRC conditions and limitations. [On schedule]

- Revise SD 1.3.9 to ensure evaluation of metal scaffolding left in RB due prior to Unit 1 spring refueling outage. [Complete]

- Update UFSAR to capture new licensing basis due one year after completion of station modifications. [On schedule]

4OA6 Management Meetings (Including Exit Meeting)

Exit Meeting Summary

The inspectors presented the inspection results to Mr. David Baxter, Site Vice President, and other members of licensee management at the conclusion of the inspection on April 2, 2008. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

K. Alter, Mechanical Balance of Plant Engineering Supervisor
E. Anderson, Superintendent of Operations
M. Glover, Station Manager
S. Batson, Engineering Manager
D. Baxter, Site Vice President
D. Brewer, Safety Assessments Manager
R. Brown, Emergency Preparedness Manager
E. Burchfield, Reactor and Electrical Systems Manager
C. Curry, Mechanical/Civil Engineering Manager
P. Culbertson, Maintenance Manager
G. Davenport, Compliance Manager
B. Edge, I & C Engineering Supervisor
R. Fruedenberger, Safety Assurance Manager
M. Glover, Station Manager
D. Hubbard, Training Manager
T. King, Security Manager
B. Meixell, Technical Specialist
P. North, Shift Operations Manager
J. Smith, Technical Specialist
J. Steely, Continuing Training Supervisor
P. Stovall, SRG Manager
S. Thomas, Safety Analysis Engineering Supervisor
J. Twiggs, Radiation Protection Manager
J. Weast, Regulatory Compliance
D. Williams, Modification Engineering Manager

NRC

J. Moorman, III, Chief, Reactor Projects Branch 1
L. Olshan, Project Manager, NRR

Attachment

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000269,270,287/2008002-01	FIN	Inadequate Installation of SSF DG Field Flash Relay Cover (Section 1R19)
05000287/2008002-02	NCV	Failure to Implement the Procedure to Stroke RBS Valves (Section 1R22)
05000287/2008002-03	NCV	Dilution of the RCS While Lining Up for SFP Makeup (Section 4OA3)

Closed

2515/166	TI	Pressurized Water Reactor Containment Sump Blockage (NRC Generic Letter 2004-02) - Units 1, 2, and 3 (Section 4OA5)

DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

IP/0/A/1606/009, Preventive Maintenance and Operational Check of QA-1 Freeze Protection
OP/1/A/1102/020, Control Room Rounds Enclosure 5.5, Cold Weather Checklist
OP/1/A/1102/020A, Primary Rounds
OP/1/A/1102/020C, Turbine building Third and Fifth Floor Rounds
OP/2/A/1102/020D, SSF and Outside Rounds

Section 1R04: Equipment Alignment

Partial Walkdown
Drawing OFD-121D-1.1, Unit 1 Flow Diagram of Emergency Feedwater System
Drawing OFD-121D-3.1, Unit 3 Flow Diagram of Emergency Feedwater System
OSS-0254.00-00-1000, Design Basis Specification for Emergency Feedwater and the Auxiliary Service Water Systems
OSS-0254.00-00-2000, Design Basis Specification for 4KV Essential Auxiliary Power System
OP/0/A/2000/041, KHS - Modes of Operation

Complete Walkdown
Drawing OFD-101A-2.1, Unit 1 Flow Diagram of High Pressure Injection System (Letdown Section)
Drawing OFD-101A-2.2, Unit 1 Flow Diagram of High Pressure Injection System (Storage Section)
Drawing OFD-101A-2.3, 2.4, Unit 1 Flow Diagram of High Pressure Injection System (Charging Section)

OSS-0254.00-00-1001, Design Basis Specification for High Pressure Injection and Purification & Deborating Demineralizer Systems
High Pressure Injection System Health Report, 2007Q4
PIPs O-07-0396, O-07-1131, O-07-1261, O-07-1955, O-07-2895, O-07-4006, O-07-4727, O-07-5671, O-08-0107

Section 1R05: Fire Protection

Fire Area Walkdown
UFSAR Section 9.5.1, Fire Protection System
Design Basis Specification OSS-0254.00-00-4008, Fire Protection

Section 1R06: Flood Protection Measures

WO 01631880, Perform UT Inspection of RCW Piping in Room 153
WR 00942222, 3 LPSW VA 0711 Corrosion on Surrounding Piping, Needs UT Inspection and Insulation Reinstalled
WO 01789394, Inspect Wall Thickness on RCW Piping
PIP O-04-1172, RCW piping is corroded

Section 1R07: Heat Sink Performance

MP/0/A/1800/137, Cooler – Component Cooling – Disassembly, Cleaning, and Assembly
Service Water System Visual Inspection Checklist
PIP O-08-0497, Tubes Identified for Plugging for 1A Component Cooler

Section 1R12: Maintenance Effectiveness

MP/0/A/1140/019, CRD – Closure Insert – Hydraulically Tensioned
PIP O-07-7324, Closure Inserts Not Fully Tensioned
WO 1796678, K2, GEN PL EX2100, Repair/Replace CT1 and CT2 CT's in 2EC1

Section 1R15: Operability Evaluations

OSS-0254.00-00-00-1008, Design Basis Specification for Standby Shutdown Facility Diesel Support System
UFSAR Section 9.6, Standby Shutdown Facility
TS 3.10 and bases, Standby Shutdown Facility

PT/0/A/0250/025, HPSW Pump and Fire Protection Flow Test
OSS-0254.00-00-00-1002, Design Basis Specification for High Pressure Service Water System
UFSAR Section 9.2.2.2.2, High Pressure Service Water System
UFSAR Section 9.5.1, fire Protection System

LIST OF ACRONYMS

ADAMS	-	Agency Wide Documents Access and Management System
ANSI	-	American National Standards Institute
ASME	-	American Society of Mechanical Engineers
BWST	-	Borated Water Storage Tank
CC	-	Component Cooling
CFR	-	Code of Federal Regulations
CRD	-	Control Rod Drive
CT	-	Current Transformer
DEC	-	Duke Energy Corporation
DG	-	Diesel Generator
DPC	-	Duke Power Company
ECCS	-	Emergency Core Cooling System
EOC	-	End-Of-Cycle
FIN	-	Self-Revealing Finding
GL		Generic Letter
HPI	-	High Pressure Injection
HPSW	-	High Pressure Service Water
IP	-	Inspection Procedure
IR	-	Inspection Report
IST	-	Inservice Testing
KHU	-	Keowee Hydro-electric Unit
LDST	-	Letdown Storage tank
LPI	-	Low Pressure Injection
LPSW	-	Low Pressure Service Water
MC	-	Manual Chapter
MDEFWP	-	Motor Driven Emergency Feedwater Pump
NCV	-	Non-Cited Violation
NEI	-	Nuclear Energy Institute
NLO	-	Non-Licensed Operator
NRC	-	Nuclear Regulatory Commission
OOS	-	Out-of-Service
PARS	-	Publicly Available Records
PI	-	Performance Indicator
PIP	-	Problem Investigation Process report
PM	-	Preventive Maintenance
PMT	-	Post-Maintenance Testing
QA	-	Quality Assurance
RBS	-	Reactor Building Spray
RCP	-	Reactor Coolant Pump
RCS	-	Reactor Coolant System
RCW	-	Recirulating Cooling Water
Rev.	-	Revision
RFO		Refueling Outage
RTP	-	Rated Thermal Power
SCBA	-	Self-Contained Breathing Apparatus
SDP	-	Significance Determination Process

Attachment

SFP	-	Spent Fuel Pool
SSC	-	Systems, Structures and Components
SSF	-	Standby Shutdown Facility
TB	-	Turbine Building
TDEFWP	-	Turbine Driven Emergency Feedwater Pump
TS	-	Technical Specification
UFSAR	-	Updated Final Safety Analysis Report
ULSDF		Ultra-Low Sulfur Diesel Fuel
UT	-	Ultrasonic Examination