



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931

October 25, 2004

Duke Energy Corporation (DEC)  
ATTN.: Mr. R. A. Jones  
Site Vice President  
Oconee Nuclear Station  
7800 Rochester Highway  
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION - INTEGRATED INSPECTION REPORT  
05000269/2004004, 05000270/2004004, 05000287/2004004 AND  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION INSPECTION  
REPORT 72-04/2004001

Dear Mr. Jones:

On September 25, 2004, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Oconee Nuclear Station. The enclosed report documents the inspection findings which were discussed on **September 30, 2004**, with Mr. Bruce Hamilton and other 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.

This report documents three self-revealing findings, 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 two of these findings as non-cited violations (NCVs) consistent with Section VI.A of the NRC Enforcement Policy. Additionally, a licensee-identified violation, which was determined to be of very low safety significance, is listed in Section 4OA7 of this report. 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

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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/**

Robert Haag, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

Docket Nos.: 50-269, 50-270, 50-287, 72-04  
License Nos.: DPR-38, DPR-47, DPR-55

Enclosure: NRC Integrated Inspection Report 05000269/2004004, 05000270/2004004, 05000287/2004004, and 72-04/2004001 w/Attachment - (Supplemental Information)

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-269, 50-270, 50-287, 72-04

License Nos: DPR-38, DPR-47, DPR-55

Report No: 50-269/2004004, 50-270/2004004, 50-287/2004004  
72-04/2004001

Licensee: Duke Energy Corporation

Facility: Oconee Nuclear Station, Units 1, 2, and 3

Location: 7800 Rochester Highway  
Seneca, SC 29672

Dates: June 27, 2004 - September 25, 2004

Inspectors: M. Shannon, Senior Resident Inspector  
A. Hutto, Resident Inspector  
E. Riggs, Resident Inspector  
M. Scott, Senior Reactor Inspector (Section 1R07.2)  
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J. Kreh, Radiation Specialist (Sections 2PS3 and 4OA1.2)

Approved by: R. Haag, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000269/2004004, IR 05000270/2004004, IR 05000287/2004004, 72-04/2004001; 06/27/2004 - 09/25/2004; Oconee Nuclear Station, Units 1, 2, and 3; Maintenance Effectiveness, and Identification and Resolution of Problems.

The report covered a three-month period of inspection by the onsite resident inspectors and announced regional-based inspections by: three reactor inspectors, two health physicists, and one radiation specialist. Three Green findings were identified, two of which were non-cited violations (NCVs). 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 3, dated July 2000.

### A. NRC Identified and Self-Revealing Findings

#### Cornerstone: Mitigating Systems

- Green. A self-revealing finding was identified for the inadequate maintenance and oversight of the 5C Lee Combustion Turbine (LCT), which resulted in a condition that caused the turbine to trip off-line while being relied upon as the standby source of emergency power during the Keowee dual unit outage.

The finding was considered to be more than minor because it affected the mitigating systems cornerstone objectives for ensuring availability, reliability and capability of systems that are in place to respond to initiating events, in that the 5C LCT was being operated as the standby source of emergency power during the initial Keowee dual unit outage when it failed. The issue was determined to be of very low safety significance based on the Phase 1 SDP screening results that the finding "did not" represent a loss of safety function of a non-Technical Specification train of equipment designated as risk significant, in that the 6C LCT and dedicated power path from Lee Station to Oconee remained operable and in service (Section 1R12b.(1)).

- Green. A self-revealing non-cited violation of 10 CFR 50 Appendix B, Criterion VIII, was identified for inadequate control of materials, parts, and components associated with an improperly fabricated connecting rod in Keowee hydroelectric unit (KHU) -2 output breaker ACB-2. This resulted in the connecting rod pulling apart and KHU-2 failing to load on July 29, 2004.

The finding was considered to be more than minor because it affected the mitigating systems cornerstone objectives for ensuring availability, reliability and capability of systems that are in place to respond to events, in that following the rod failure in ACB-2, the Keowee overhead emergency power path became inoperable. Although the finding represented an actual loss of the safety

function of a single train, it was determined to be of very low safety significance because it did not exceed the allowed Technical Specification outage time (Section 4OA2.2b.(2)).

#### Cornerstone: Initiating Events

- Green. A self-revealing non-cited violation of 10 CFR 50 Appendix B, Criterion XVI, was identified for a failure to correct water intrusion problems in the 525kV switchyard load centers, which resulted in the loss of the 525kV and 230kV switchyard auxiliary power supply during a period of heavy rain.

The finding was considered to be more than minor because it affected the initiating events cornerstone objective by increasing the likelihood of events that upset plant stability, in that the loss of the auxiliary power to the switchyards would eventually lead to a loss of offsite power or a loss of the safety-related overhead power path from the Keowee hydroelectric units. In addition, the loss of offsite power could lead to a plant trip. In the SDP Phase 1 screening, the finding was determined to be of very low safety significance. Specifically, because the units were in the process of reducing power and would have been shut down before the switchyard batteries were actually depleted, the issue did not increase both the likelihood of a reactor trip and the likelihood that mitigation equipment (Keowee overhead path) would be lost. This finding has cross-cutting aspects related to PI&R (Section 1R12b.(2)).

#### B. Licensee-Identified Violations

A violation of very low safety significance identified by the licensee was reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective actions are listed in Section 4OA7 of this report.

- 10 CFR 20.1501(a)(1) states that surveys shall be performed in accordance with 10 CFR 20.1801 which requires that licensees ensure licensed materials is stored in controlled or unrestricted areas and secured from unauthorized removal or access. Contrary to the above, the licensee failed to make adequate surveys to ensure that licensed materials was properly stored. On five separate occasions in 2004 during routine surveys the licensee found eighteen contaminated items in clean areas. The levels of contamination ranged from 200 - 7000 corrected counts per minute (ccpm) fixed and 11 - 2000 dpm/100 cm<sup>2</sup> removable. These issues were entered into the licensee corrective action program as PIP numbers O-04-00426, O-04-02342, O-04-02502, O-04-02580, and O-04-02657. This finding is of very low safety significance because the potential exposure to a member of the public was less than 5 mrem.

## REPORT DETAILS

### Summary of Plant Status:

Unit 1 began the report period at approximately 100 percent rated thermal power (RTP). The unit was temporarily reduced to approximately 88 percent RTP on July 17, 2004, to perform turbine valve movement testing. On July 28, 2004, both 125VDC power sources to the 230 KV switchyard became inoperable, requiring a Technical Specification (TS) limiting condition of operation (LCO) 3.0.3 action statement entry and a unit shutdown. A unit shutdown was commenced, and the unit was reduced to approximately 80 percent RTP, at which time, 125 VDC power was restored. The TS LCO action statement was subsequently exited, and the unit was returned to 100 percent RTP on the same day. The unit was reduced to approximately 18 percent RTP on September 4, 2004, and the turbine generator was taken off-line to inspect heater drain piping for erosion/corrosion concerns. The unit was returned to 100 percent RTP on September 8, 2004, but was reduced to approximately 86 percent RTP on September 9, 2004, due to the loss of a heater drain pump. The unit was returned to 100 percent RTP on the same day, where it operated for the remainder of the inspection period.

Unit 2 began the report period off-line at approximately 18 percent RTP for main turbine lube oil troubleshooting. The unit was placed on-line June 27, 2004, and taken to 100 percent RTP on June 28, 2004. On July 28, 2004, both 125VDC power sources to the 230 KV switchyard became inoperable, requiring a TS LCO 3.0.3 action statement entry and a unit shutdown. A unit shutdown was commenced, and the unit was reduced to approximately 85 percent RTP, at which time, 125 VDC power was restored. The TS LCO action statement was subsequently exited, and the unit was returned to 100 percent RTP on the same day. For the remainder of the inspection period, the unit operated at or near 100 percent RTP.

Unit 3 began the report period at approximately 100 percent RTP. On July 28, 2004, both 125VDC power sources to the 230 KV switchyard became inoperable, requiring a TS LCO 3.0.3 action statement entry and a unit shutdown. A unit shutdown was commenced, and the unit was reduced to approximately 89 percent RTP, at which time, 125 VDC power was restored. The TS LCO action statement was subsequently exited, and the unit was returned to 100 percent RTP on the same day. The unit was reduced to approximately 87 percent RTP on August 7, 2004, to perform turbine valve movement testing. The unit was returned to 100 percent RTP on the same day, where it operated for the remainder of the inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### a. Inspection Scope

The inspectors assessed the licensees preparations for adverse winds and rain associated with Hurricanes Frances and Ivan, which included verification of the following: (1) the licensee entered abnormal procedure (AP) 0/A/1700/006, Natural Disaster, Tornado/High Wind Watch; (2) the licensee entered RP/0/B/1000/035, Severe



Weather Preparations; (3) there were no ongoing maintenance activities on systems that required restoration by AP/0/A/1700/006; (4) control room personnel had completed steps 4.27 - 4.37, as required by AP/0/A/1700/006; and (5) all cranes were lowered and debris on the site was secured or removed.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

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. The following three systems were included in this review:

- 1A Reactor Building Spray (RBS) Train while the 1B Train was out of service (OOS) for scheduled maintenance
- Keowee Hydroelectric Unit (KHU)-2 while KHU-1 was OOS during a maintenance outage
- 2A RBS Train while the 2B Trains was OOS for testing

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors conducted tours in thirteen areas of the plant to verify that 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. Inspections of the following areas were conducted during this inspection period:

- Turbine Building (TB) Basement (1)
- TB 3<sup>rd</sup> Floor (1)
- Units 1 and 2 Cable Spreading Room (2)

- Units 1, 2, and 3 Low Pressure Injection (LPI) and RBS Pump Rooms (5)
- Units 1, 2, and 3 Control Rooms (2)
- Keowee Hydro Station (2)

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

.1 External Flooding

a. Inspection Scope

The inspectors performed a site-wide walkdown to verify adequate preparations for external flooding prior to heavy rains and flooding from Hurricane Frances. The inspectors verified flood doors associated with the standby shutdown facility (SSF) and Auxiliary Building were properly closed and storm drains were clear of debris. During the storm, the inspectors verified cable trenches were being pumped as necessary and building cable and piping penetrations were not leaking excessively.

b. Findings

No findings of significance were identified.

.2 Internal Flooding

a. Inspection Scope

The inspectors reviewed the circumstances surrounding the inadvertent application of coal-tar epoxy, a corrosion inhibitor, over the condenser water box outlet expansion joints of all three units. The rayon reinforced rubber expansion joints have been in-service for approximately thirty years, and the coal tar epoxy was believed to possess the potential to degrade these expansion joints. Engineering was contacted about this concern, as was the expansion joint manufacturer and a technical representative of the Fluid Sealing Association. The inspectors also reviewed a new internal sealing expansion joint modification for both the inlet and outlet water box expansion joints. This modification has been installed in Units 1 and 2, and is scheduled to be installed in Unit 3 during the fall 2004 refueling outage.

b. Findings

No findings of significance were identified.

## 1R07 Heat Sink Performance

### .1 Annual Review

#### a. Inspection Scope

The inspectors reviewed the results of the KHU-1 generator air cooler cleaning and inspection [work order (WO) 986858888] and the associated inspection results documented in Problem Investigation Process report (PIP) O-04-5317. The inspectors walked down the tube bundles and the cast carbon steel cooler covers to verify the results of the inspection that there was no significant fouling of the heat exchange surfaces and that excessive corrosion of the cooler covers did not exist. The inspectors also observed the epoxy coating applied to the cooler covers for additional corrosion resistance prior to reinstallation of the coolers in the generator housing.

#### b. Findings

No findings of significance were identified.

### .2 Biennial Review

#### a. Inspection Scope

The inspectors reviewed inspection records, work documents, preventive maintenance procedures, and other documentation to ensure that heat exchanger (HX) and heat sink related equipment deficiencies that could mask or degrade performance were identified. Inspection records for risk significant HXs which included the two HXs on high pressure injection (HPI) pumps (motor coolers), LPI/ decay heat removal HXs, and spent fuel pool cooling HXs were reviewed. The inspectors also reviewed the general condition of the low pressure service water (LPSW) system and condenser circulating water (CCW) system; the dams that ensure water source for the plant via review of inspection/test results; review of general chemistry activities; review of corrective maintenance history; review of current system health reports; and discussions with the system engineer. Selected PIPs were reviewed for potential common cause problems and problems which could affect system performance to confirm the licensee was entering problems into the corrective action program and initiating appropriate corrective actions. In addition, the inspectors conducted a walk down of most of the CCW intake structure and Keowee dam. Documents reviewed are listed in the report attachment.

#### b. Findings

No findings of significance were identified.

## 1R11 Licensed Operator Requalification

#### a. Inspection Scope

The inspectors observed licensed operator simulator training on September 15, 2004. The scenarios involved a main feedwater line break with a subsequent loss of all AC

power in addition to recovery of high pressure injection forced cool down. The simulator scenario also included training on remote KHU-1 operation with the governor replacement modifications in place. 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.

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 systems, structures, 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. The inspectors reviewed the following items:

- Lee Combustion Turbines (LCTs), which included the following PIPs: O-04-5837, LCT 5C manually tripped due to smoke and alarms; O-04-5907, LCT 5C supercharger breaker failed to close; O-04-5099, LCT 5C tripped due to ground; and O-04-5107, LCT 4C tripped due to a loss of control air.
- 230 kV and 525 kV Switchyard Load Center Fault which included: PIP O-04-4878, loss of 525 kV and 230 kV switchyard auxiliaries; PIP O-01-1107, load center door falling off and re-attaching of doors will not prevent further water damage to this compartment; PIP O-02-1520, doors on load center are defective; PIP O-04-0849, internals of load centers are extremely rusty; PIP O-04-5901, water intrusion into 525 switchyard cabinets; WO 98065677, bolts on load centers in poor condition (rejected); WO 98065680, load center door unsecured due to rusted bolts (voided); WO 98488483, enclosure door rusted off; WO 98488484, disconnect door rusted off; WO 98570091, replace load centers (rejected); WO 98570093, replace load centers (rejected); WO 98596641, station feeder disconnect kirk key could not be turned (voided); and WO 98289817, power panel board failed to swap to alternate supply (left as is).

a. Findings

(1) Lee Combustion Turbine (LCT) Failure During Heightened Risk Conditions

Introduction: A self-revealing Green finding was identified for the inadequate maintenance and oversight of the 5C LCT. Specifically, while the LCTs were operating as a standby emergency power source during the initial dual unit Keowee outage, improperly mounted low voltage wiring fell onto the high voltage wiring and caused a ground fault that tripped the 5C LCT off line.

Description: At 4:10 p.m., on August 8, 2004, the 5C LCT tripped due to a ground fault on the high voltage terminal of the excitation transformer. The licensee subsequently identified that a low voltage lead in the exciter cabinet had fallen onto the excitation transformer high voltage terminal. The licensee identified that the low voltage lead had not been mounted properly in the cabinet, in that it had been routed through the cabinet directly above the high voltage connectors and had been mounted using adhesive backed tie raps. Based on the potential failure of the adhesive backed tie raps due to equipment vibration, cleanliness in the cabinet, aging of the adhesive, and warmer temperature in the cabinet, the inspectors concluded that adhesive backed tie raps should not have been used or, if used, the low voltage leads should have been routed in the cabinet such that a failure of the tie raps would not have resulted in the leads making contact with the high voltage terminals in the cabinet. Based on the conditions within the cabinet, including the use of the adhesive backed tie raps and the recognition that the LCTs were the Oconee emergency power supply during the Keowee dual unit outage, the inspectors concluded that inadequate maintenance and oversight had been applied to the 5C LCT.

Analysis: The finding was considered to be more than minor because it affected the mitigating systems cornerstone objectives for ensuring availability, reliability and capability of systems that are in place to respond to initiating events, in that the 5C LCT was being operated as the standby source of emergency power during the initial Keowee dual unit outage when it failed. The issue was determined to be of very low safety significance (Green) based on the Phase 1 SDP screening results that the finding "did not" represent a loss of safety function of a non-Technical Specification train of equipment designated as risk significant, in that the 6C LCT and dedicated power path from Lee Station to Oconee remained operable and in service.

Enforcement: This finding was not a violation of regulatory requirements because the LCTs are not considered to be safety-related, and therefore not under the requirements of 10 CFR 50, Appendix B. This finding is identified as FIN 05000269,270, 287/2004004-01, Inadequate Maintenance and Oversight of the 5C Lee Combustion Turbine. This issue is in the licensee's corrective action program as PIP O-04-05099.

(2) 230kV and 525 kV Switchyard Load Center Fault Resulting from Inadequate Corrective Actions

Introduction: A self-revealing non-cited violation (NCV) was identified for the inadequate corrective actions in repairing the 525kV load centers. Water intrusion into the load

center cabinets had been previously noted, in addition to internal rusting and corrosion, which was not repaired or resolved prior to the load center failure on July 28, 2004.

Description: At 1:29 a.m., on July 28, 2004, both 4160 volt switchyard auxiliary load center cabinets' feeder breakers tripped. These breakers and load center cabinets provide power to both the 525 kV and 230 kV switchyard auxiliaries, which include breaker compressors, heaters, battery chargers, and lighting. The failure was due to water intrusion into the STD load center cabinet in the 525 kV switchyard during a rain storm. Because of the physical layout in the load center cabinet, the resulting fault from the water intrusion caused a loss of both trains of 4160 volt power to the switchyards. This condition placed all three Oconee units in TS LCO 3.0.3 which requires a shutdown if the condition is not resolved quickly. A controlled shutdown of all three units was started and Unit 1 reached approximately 80% before the 4160 volt auxiliary power was restored.

As noted above, multiple PIPs and WOs had been written to resolve the water intrusion and degraded condition of the load center cabinets. However, many of the WOs had been rejected or voided. PIP O-01-01107, dated June 7, 1999, stated that "reattaching the doors will not prevent further water damage to this compartment nor will this solve the rust/corrosion problem that is apparent over the entire load center." This PIP also stated that "Preliminary inspection, in my opinion, indicates the need for complete rework of this equipment." PIP O-04-00849, dated February 19, 2004, stated that "The material condition inside the panel is extremely rusty and operation of the switches could cause a rust cloud to develop inside the switch and result in an electrical short circuit potentially leading to personal injury/or a loss of all auxiliary power to the 230 kV and 525 kV switchyards."

Subsequently, on July 28, 2004, water intrusion onto the rusted disconnect switch and insulators caused a short circuit and the resulting arc cloud caused a loss of both trains of 4160 auxiliary power. Although identified as far back as 1999, the degraded material condition of the load center cabinets was not adequately pursued.

Analysis: The failure to correct the water intrusion problem into the load center cabinets was considered to be more than minor, because it affected the initiating events cornerstone objective by increasing the likelihood of events that upset plant stability, in that the loss of the auxiliary power to the switchyards would eventually lead to a loss of offsite power or a loss of the safety-related overhead power path from the Keowee hydroelectric units. In addition, the loss of offsite power could lead to a plant trip. In the SDP Phase 1 screening, the finding was determined to be of very low safety significance (Green). Specifically, because the units were in the process of reducing power and would have been shut down before the switchyard batteries were actually depleted, the issue did not increase both the likelihood of a reactor trip and the likelihood that mitigation equipment (Keowee overhead path) would be lost. This finding has a cross-cutting aspect related to PI&R in that the failure to take appropriate corrective actions for the degraded condition of water intrusion in the load centers directly affected the switchyard reliability.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified

and corrected. Multiple WOs and PIPs (1999-2004) noted the degraded condition of the load center cabinets. However, adequate corrective actions to resolve the water intrusion and the degrading material condition in the load center cabinets were not initiated. Contrary to 10 CFR 50 Appendix B, Criterion XVI, the failure to correct the degraded condition of the load center cabinets is considered to be a violation. This inadequate corrective action issue is being treated as an NCV, consistent with Section VI.A.1 of the enforcement policy: NCV 05000269,270,287/2004004-02, Failure to Correct the Degraded Condition of the 525 kV Switchyard Load Center Cabinets. This issue is in the licensee's corrective action program as PIP O-04-04878.

### 1R13 Maintenance Risk Assessment and Emergent Work Evaluations

#### a. Inspection Scope

The inspectors evaluated the following attributes for the seven 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.

- 1C LPSW and 1B motor driven emergency feedwater (MDEFW) pumps OOS for maintenance
- SSF/CCW outage
- KHU underground power path OOS [air circuit breaker (ACBs) 3 and 4 - "Orange risk"]
- First KHU Dual Unit Outage
- SSF Surveillance with KHU-1 OOS ("Red" risk)
- Second KHU Dual Unit Outage
- PIP O-04-5929, TS LCO 3.0.3 Entry due to Engineered Safeguards (ES) Analog Channel "A" DC power failure and subsequent removal of the "B" Train of RBS

#### b. Findings

No findings of significance were identified.

### 1R14 Personnel Performance During Nonroutine Plant Evolutions

#### a. Inspection Scope

The inspectors reviewed, the operating crew's performance during selected non-routine events and/or transient operations to determine if the response was appropriate to the event. As appropriate, the inspectors: (1) reviewed operator logs, plant computer data,



or strip charts to determine what occurred and how the operators responded; (2) determined if operator responses were in accordance with the response required by procedures and training; (3) evaluated the occurrence and subsequent personnel response using the SDP; and (4) confirmed that personnel performance deficiencies were captured in the licensee's corrective action program. The non-routine evolutions reviewed during this inspection period included the following:

- PIP O-04-5929, TS LCO 3.0.3 Entry due to ES Analog Channel "A" DC power failure and subsequent removal of the "B" Train of RBS
- PIP O-04-4878, Loss of Auxiliaries in the 230 kV and 525 kV switchyards due to a fault in a 4160 volt load center cabinet
- PIP O-04-4896, KHU-2 Overhead Power Path Breaker (ACB-2) failed to close
- The inspectors reviewed the following PIPs associated with ongoing problems with the backup emergency power sources, Lee Station Combustion Turbines. During the KHU dual unit outages, these three combustion turbines provided the nuclear station's emergency power via a dedicated power path through CT-5.
  - PIP O-04-5907, LCT 5C supercharger breaker failed to close
  - PIP O-04-5837, LCT 5C clutch failed
  - PIP O-04-5107, LCT 4C tripped offline while in standby
  - PIP O-04-5099, LCT 5C tripped due to a ground on the high voltage terminal of the excitation transformer

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 LCOs. The inspectors reviewed the following six items for operability evaluations:

- PIP O-04-4395. SSF electrical conduit holding water
- PIP O-04-4108, 2CCW-268 failed to operate during a valve stroke test



- PIP O-04-4896, KHU-1 following ACB-2 failure
- PIP O-04-6126, 2C reactor building cooling unit (RBCU) damper remained closed when the fan was started
- PIP O-04-6181, KHU-2 speed switch for 180 RPM did not provide normal lockout
- PIP O-04-1588, Inadequate 50.59 evaluation for the extension of the allowable time to restore HPI and emergency feedwater following a high energy line break

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

Due to imbalanced air flows through the running RBCU fans, the fan blades had experienced premature failure. This prompted a modification to open the dropout panels during normal operation to eliminate the imbalanced flows. The inspectors reviewed: the RBCU dropout panel modification package ONOE-18696; the associated 10CFR50.59 evaluation; Oconee calculation OSC-6901, Determination of Average Reactor Building Temperature, Revision 3; Oconee calculation OSC-8598, RBCU Operation Without Fusible Patches Installed, Rev 1; the related TSs; and discussed the issue with various station design engineers. The inspectors reviewed the calculations and temperature profiles back to 2001 to ensure that the calculated temperature conditions would remain below the 140 degree F limit specified in TSs. The inspectors also monitored the implementation of the modification in the Unit 1 containment. The inspectors, assessed whether the containment temperatures would remain below the accident analysis limit of 140 degrees F during the worst case (summer and fall) periods of operation.

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. The inspectors observed testing and/or reviewed the results of the following seven tests:

- PT/0/A/0600/021, SSF Diesel-Generator Operation, following maintenance
- IP/0/A/3000/11D, 230KV Switchyard Battery Quarterly Surveillance, following restoration of TS battery parameters as a result of a loss of switchyard power supplies
- CP - 057021-1, KHU-1 Exciter Replacement Functional Testing, following exciter/ voltage regulator replacement modification
- TT/0/A/53080/001, KHU-1 Governor Functional Testing, Enclosure 13.13, Manual and Automatic Synchronizer Circuit Test, following KHU-1 governor replacement
- TT/0/A/53080/001, KHU-1 Governor Functional Testing, Enclosure 13.20, Emergency Start Test (No Loading), following KHU-1 governor replacement
- TT/0/A/53080/001, KHU-1 Governor Functional Testing, Enclosure 13.21, Emergency Start test (Loaded), following KHU-1 governor replacement
- TT/0/A/53080/001, KHU-1 Governor Functional Testing, Enclosure 13.27, 79 MW Dual Load Reject Test with Load Addition, following KHU-1 governor replacement

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors reviewed the licensee's outage plan and commitments for the KHU-1 maintenance outage, conducted during the period of August 7 - September 25, 2004. The inspectors conducted reviews and observations for selected outage activities to ensure that: (1) the licensee considered risk in developing the outage plan; (2) the licensee adhered to the outage plan to control plant configuration based on risk; (3) that mitigation strategies were in place for losses of key safety functions; and (4) the licensee adhered to operating license and TS requirements. During the outage, the inspectors monitored licensee controls over the outage activities listed below.

- Outage Risk Management Plan/Assessment
- Control of Outage Activities
- Clearance Activities

- Unit 1, 2 and 3 Emergency Electrical Power Availability
- Identification and Resolution of Problems
- Outage Configuration Management
- Emergent Work

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed surveillance tests and/or reviewed test data of the seven 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/0600/013, 1A MDEFW Pump Test
- PT/1/A/0204/007, 1A RBS Pump Test
- PT/0/A/0620/016, Keowee Hydro Emergency Start Test
- PIP O-04-4896, KHU-1 underground operability following the loss of the overhead power path
- PT/0/A/0600/021, SSF Diesel-Generator Operation
- PT/0/A/0610/019, 100KV Power Supply Verification
- PT/0/A/0610/023, LCT Operation to Grid Verification

b. Findings

No findings of significance were identified.

1R23 Temporary Modifications

a. Inspection Scope

The inspectors reviewed documents, drawings and observed portions of the implementation of temporary modification, Engineering Instruction: Contingency Plan to Provide Backup Control Power Hookup to Turbine Driven Emergency Feedwater Pump (TDEFWP) Instrumentation and Controls During Keowee Outage. The inspectors

observed, as appropriate, that the planned installation was consistent with the modification documents, was in accordance with the configuration control process and adequate procedures and changes were made. The inspectors walked down areas of the turbine building to verify that the required temporary power supplies (generators) were staged according to the plan. The inspectors reviewed system drawings to verify that the appropriate valve control power and instrumentation was covered by the temporary modification.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

.1 Simulator Based Evolution

a. Inspection Scope

The inspectors observed and evaluated a simulator based emergency preparedness drill held on September 23, 2004. The drill scenario involved a loss of coolant accident (small break loss of coolant accident). This required the operators to identify that the event caused the plant to be in an "Alert" condition. The operators were observed to determine if they properly classified the event and made the appropriate notifications and if the counties, state and NRC were promptly notified of the drill condition.

b. Findings

No findings of significance were identified.

.2 Emergency Preparedness Drill

a. Inspection Scope

The inspectors observed and evaluated the emergency preparedness drill held on June 30, 2004. The scenario began with the simulated unit operating at 100 percent RTP with the TDEFW pump OOS. Site security was notified of a credible security threat by the FBI; consequently, an Unusual Event was declared and a site assembly was initiated. During the site assembly, painters working in the unit's Equipment Room failed to properly store their flammable paint, resulting in a fire. The Equipment Room fire was responsible for the loss of various pumps and equipment, including a unit trip. The SSF was manned, and an Alert was declared. The "A" and "B" MDEFW pumps failed due to cable damage suffered in the Equipment Room fire, resulting in the SSF auxiliary service water (ASW) pump providing feedwater to the unit's steam generators and the declaration of a Site Area Emergency. The simulated events of the drill were properly

classified, and appropriate notifications were promptly made to the local authorities, the state and the NRC.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety and Public Radiation Safety

2OS3 Radiation Monitoring Instrumentation and Protective Equipment

a. Inspection Scope

Area Radiation Monitoring and Post-Accident Sampling Systems The operability, availability, and reliability of selected direct area radiation monitor (ARM) and continuous air monitor (CAM) equipment used for routine and accident monitoring activities were reviewed and evaluated. During the week of September 20, 2004, the inspectors directly observed ARM equipment material condition, installed configurations (where accessible), and conduct and/or results of performance checks for selected monitors. Procedurally established alarm set-points were corroborated and performance check details were reviewed for selected ARM equipment through discussions and direct observation of Control Room instrumentation panel operations, settings, and monitor response readouts. Current calibration data for selected radiation monitoring equipment listed in section 2OS3 of the report attachment were reviewed and discussed with responsible staff.

The inspectors evaluated Post Accident Sampling System (PASS) program activities. The evaluation included review of current program guidance, observation of material condition of PASS equipment/instrumentation, and review of surveillance results.

Program guidance, performance activities, and equipment material condition for the direct radiation detection instrumentation and continuous air sampling equipment were reviewed against details documented in TS 5.4.1, 10 CFR Parts 20 and 50, UFSAR Section 11, and associated procedures. Radiation detection and sampling equipment required for use in accident monitoring also was reviewed against applicable sections of NUREG 0737, Clarification of TMI Action Plan Requirements, and RG 1.97, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, Rev. 3. Licensee guidance documents, records, and data reviewed within this inspection area are listed in section 2OS3 of the Attachment to this report.

Personnel Survey Instrumentation Current program guidance, including calibration and operation procedures, and its implementation to maintain operability and accuracy of selected portable survey instruments was reviewed and evaluated. During the week of September 20, 2004, the inspectors reviewed current calibration data for selected personnel survey instruments and assessed operability of various portable survey instruments staged or in use by the Health Physics (HP) staff. The inspectors observed

the daily source checks for an RO-20, Teletector survey meter, and RM-14 friskers and compared the results to specified tolerances. Responsible staff's knowledge and proficiency regarding portable survey instrumentation calibration activities were evaluated through interviews and record reviews. The accuracy and operability determinations for instrumentation used to perform surveys in high radiation or greater areas were assessed.

Operability and analysis capabilities of the whole body counting (WBC) equipment for monitoring internally deposited radionuclides and Personnel Contamination Monitor (PCM) equipment utilized for surveys of individuals exiting the radiologically controlled area (RCA) were evaluated. For both WBC and PCM equipment, the inspectors examined current calibration and selected performance check data, and directly observed PCM weekly source checks. The sensitivity of PCM equipment and alarm set points were evaluated. The WBC library data and calibrations were reviewed by the inspectors and discussed with cognizant licensee personnel.

Licensee activities associated personnel radiation monitoring instrumentation were reviewed against TS 5.4.1, UFSAR, 10 CFR 20.1204 and 20.1501, and applicable licensee procedures listed in section 2OS3 in the report Attachment.

Respiratory Protection - Self-Contained Breathing Apparatus (SCBA) The licensee's respiratory protection program guidance and its implementation for SCBA equipment use was evaluated. During the week of September 20, 2004, the number of staged SCBA units and their general material and operating condition were observed during tours of the Unit 1 and Unit 2 Control Room common area, the Unit 3 Control Room area, and Turbine Building. The inspectors reviewed and evaluated current records associated with supplied air quality and maintenance of staged SCBA equipment. Proficiency and knowledge of staff responsible for maintaining SCBA equipment were evaluated through discussions and demonstration of a SCBA monthly functional test. The inspectors reviewed records and evaluated status of medical qualification determinations, fit test results, and training status for SCBA qualified individuals. In addition, staff members were interviewed to determine their level of knowledge of available SCBA equipment locations, proper use, and availability of prescription lens inserts, if required. Training for performing an SCBA bottle change-out was discussed with SCBA qualified individuals. The licensee's capability for refilling and transporting air bottles to and from the control room during emergency situations was discussed with cognizant licensee personnel.

Licensee activities associated with maintenance and use of SCBA equipment were reviewed against TS 5.4.1, 10 CFR Part 20.1703; UFSAR section 12; RG 8.15, Acceptable Programs for Respiratory Protection, Rev. 1; ANSI-Z88.2-1992, American National Standard Practices for Respiratory Protection; and applicable procedures as listed in section 2OS3 of the Attachment to this report.

Problem Identification and Resolution The inspectors reviewed an internal assessment of radiation protection activities, focusing on findings related to radiation monitoring instrumentation. Selected licensee Problem Identification Program (PIP) documents associated with area radiation monitoring equipment, portable radiation detection instrumentation, and respiratory protective program activities were reviewed and

assessed. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues. Specific corrective action program documents reviewed and evaluated are listed in section 2OS3 of the Attachment to this report. Reviews of internal exposures exceeding 50 mrem were evaluated and discussed with cognizant licensee personnel.

b. Findings

No findings of significance were identified.

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

a. Inspection Scope

Radioactive Effluent Treatment and Monitoring Systems The operability, availability, and reliability of selected effluent process sampling and detection equipment were reviewed and evaluated. Inspection activities included record reviews and direct observation of equipment installation and operation. Current calibration data were reviewed for the selected process monitors.

The inspectors reviewed the most current Radioactive Effluent Report to assess report content and program implementation for consistency with TS and Offsite Dose Calculation Manual (ODCM) requirements. Changes to the current ODCM were also evaluated.

The accessible major components of the gaseous and liquid effluent processing and release systems were observed for material condition and for system configuration with respect to descriptions in the UFSAR and ODCM. Material condition, operability, and alarm set points were assessed for four effluent radiation monitoring systems. The inspectors assessed whether compensatory sampling and analyses were performed as required for three effluent radiation monitors which had been declared inoperable at various times during calendar year 2004. Calibration records for four effluent radiation monitors and one count room gamma spectroscopic instrument were reviewed to assess whether required surveillances were current and whether procedurally established acceptance criteria were met. The selected process monitors were associated with liquid radwaste, Unit 3 Turbine Building sump, Unit 3 Waste Gas disposal, and Unit 3 Unit Vent gas. The inspectors also compared current exhaust flow rates for Units 1, 2, and 3 Unit Vents and Interim Radwaste Building Vent to the values specified in the ODCM for calculating projected doses to members of the public. The inspectors reviewed the licensee's quality control (QC) evaluations of interlaboratory comparison analytical results for samples typical of plant effluents. The inspectors observed sample collection and analysis of liquid radwaste released from Waste Monitor Tank B and assessed those activities for procedure adherence.

Equipment configuration, material condition, and operation for the effluent processing, sampling, and monitoring equipment were reviewed against details documented in TS; 10 CFR Part 20; UFSAR Sections 11 and 16; ODCM, Rev. 44; American Nuclear Standards Institute (ANSI)-N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities; ANSI-N13.10-1974, Specification and Performance of



On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents; and approved procedures listed in Section 2PS1 of the report Attachment.

Effluent sampling task evolutions and offsite dose results were evaluated against 10 CFR Part 20 requirements, Appendix I to 10 CFR Part 50 design criteria, TS, UFSAR details, ODCM, and applicable procedures listed in Section 2PS1 of the report Attachment. Laboratory QC activities were evaluated against RG 1.21, Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials In Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plant, June 1974; and RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment, December 1977.

Problem Identification and Resolution. Four PIPs and one audit associated with effluent processing and monitoring activities were reviewed and discussed with Health Physics personnel. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure Nuclear System Directive: 208, Problem Investigation Process (PIP), Revision 27. Specific documents reviewed are listed in the report Attachment.

b. Findings

Two unresolved items which require additional NRC review were identified.

(1) Configuration of Sample Piping for Unit Vent Effluent Radiation Monitors does not Industry Standard

Introduction. An Unresolved Item (URI) was identified regarding the Unit 1, 2 and 3 Vent Effluent Radiation Monitors and whether the inlet piping is adequate to ensure representative sampling of airborne effluent particulates being released from the vents.

Description. The inspectors identified that the inlet sample lines to the Unit Vent Effluent Radiation Monitors (1,2, & 3-RIA-45) have 90 degree bends rather than bends with radii that are five times the diameter of the sample line which is established as an acceptable means in ANSI N13.1-1969 for ensuring that representative samples from a duct or exhaust stack are obtained. The Unit Vents are required to be continuously monitored for particulates by Selected Licensee Commitment (SLC) Table 16.11.3-2. The inspectors questioned whether the current configuration of the inlet sample lines would support representative sampling. Applicable sampling guidance provided in RG 1.21, Measuring, Evaluating, and Reporting Radioactivity in Solid Waste and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water Nuclear Power Plants references ANSI N13.1-1969 for general principles and guidance for sampling airborne radioactive material. Figure A.2 of ANSI N13.1-1969 depicts a curved sample probe line which specifies that the radius of the curved should be greater than or equal to five times the diameter of the sample line. Section B.5 of Appendix B to ANSI N13.1-1969 specifies that " Elbows in sampling lines should be avoided if at all possible, but when they are required, the bend radius so the elbow should be as long as practical, and design flow rates through any line containing an elbow should be kept low." The issue of having 90 degree bends in the inlet sample lines to the Unit Vent Effluent Radiation Monitors was identified during a licensee self-assessment performed during



April 2004 (Assessment No. RES-04-009) and has been entered into the licensee's corrective action program as PIP O-04-07084.

Analysis/Enforcement. 10 CFR 20.1302(b)(2) requires, in part, that each licensee shall show compliance with the annual dose limit in 10 CFR 20.1301 by demonstrating that the annual average concentrations of radioactive material released in gaseous and liquid effluents at the site boundary of the unrestricted area do not exceed the values specified in table 2 of appendix B to 10 CFR 20. SLC Table 16.11.3-2 requires that the unit vents be continuously monitored for particulates. Based on the ability of the Vent Effluent Radiation Monitor inlet sample line configuration to support representative sampling, compliance with the above requirements is in question. This issue is deemed to be an Unresolved Item (URI) pending demonstration by the licensee that representative sampling can be achieved through the use of the unit vent particulate sampling equipment, as currently configured, or whether changing the inlet sample lines to conform with the general principles for obtaining valid samples delineated in ANSI N13.1-1969 is needed: URI 05000269,270,287/2004004-03, Adequacy of Unit Vent Gaseous Effluent Sampling.

(2) Unable to Verify the Accuracy of Sources for Effluent Monitor Calibrations

Introduction. A URI was identified regarding the adequacy of effluent monitor calibrations due to the licensee being unable to verify the accuracy of the sources used for the calibration.

Description. Selected Licensee Commitment (SLC) Radioactive Effluent Monitoring Instrumentation Surveillance Requirement 16.11.3.9 requires the initial channel calibration to be performed using one or more of the reference standards certified by the National Bureau of Standards or using standards that have been obtained from suppliers that participate in measurement assurance activities with the National Institute of Standards and Technology (NIST). The standards shall permit calibrating the system over its intended range of energy and measurement. For subsequent channel calibration, sources that have been related to the initial calibration shall be used. To ensure that channel calibrations were being properly performed, the inspectors requested documentation which demonstrate that effluent monitor calibrations were accurate and traceable to national measurement standards as discussed in SLC 16.11.3.9. The licensee stated that those records, i.e., Quality Assurance (QA) data packages, were not available at the site, but indicated they could be obtained from the effluent monitor vendor.

Analysis/Enforcement. The ability to accurately perform a channel calibration of the radioactive effluent monitoring instrumentation can adversely impact licensee's radiological effluent monitoring program and compliance with NRC regulations. This issue is unresolved pending the licensee's acquisition of QA data packages for channel calibrations of SLC required effluent monitors and NRC review of the information: URI 50-269,270,287/2004004-04, Acquisition and Review of QA Data Packages for Effluent Monitor Calibrations.

## 2PS3 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program

### a. Inspection Scope

REMP Implementation. The licensee's 2003 Annual Radiological Environmental Operating Report was reviewed and discussed with licensee representatives. The inspectors assessed data analyses, surveillance results, and land-use census information. Report details were evaluated for required sample types, sampling locations, and monitoring frequencies.

The inspectors toured and evaluated selected sampling stations for location and material condition of REMP equipment. Collection of air particulate filters and charcoal cartridges and determinations of flow rates were inspected at air sampling stations 77, 78, and 81. Collection of dairy samples was reviewed at sampling location 71. The proficiency and knowledge of technicians collecting the samples and the adequacy of collection techniques were assessed. The placement and material condition of thermoluminescent dosimeters (TLDs) were evaluated at monitoring locations 24, 43, 55, 56, and 81. Using Global Positioning System equipment, the inspectors independently determined the locations of the eight REMP sites listed above and compared the results to the locations documented by the licensee in the Annual Radiological Environmental Operating Report.

Program guidance, procedural implementation, and environmental monitoring results were reviewed against Section 16.11.6 of the Selected Licensee Commitments (SLC) Manual; 10 CFR Parts 20 and Appendix I to 10 CFR Part 50 design criteria requirements; and the ODCM. Licensee procedures, records, data, and other documents reviewed within this inspection area are listed in Section 2PS3 of the Attachment to this report.

Meteorological Monitoring Program. Licensee program activities to assure accuracy and availability of meteorological data were evaluated. The inspectors toured primary and backup onsite meteorological facilities, assessed equipment material condition and instrument operability, and evaluated records of data obtained from the meteorological system. The inspectors performed real-time comparisons of current meteorological data between the local displays at both the primary and backup meteorological tower and the in-plant data from the Operational Aid Computer. Meteorological data recovery reports for 2002 and 2003 were evaluated. In addition, the inspectors compared 2003 meteorological monitoring data against licensee assumptions used for effluent releases and assessments.

Meteorological program implementation and activities were reviewed against 10 CFR Part 20, UFSAR Section 2.3, the ODCM, and applicable procedures. Licensee procedures, records, data, and other documents reviewed within this inspection area are listed in Section 2PS3 of the Attachment to this report.

Unrestricted Release of Materials from the Radiologically Controlled Area (RCA). For selected material release monitors located at the single point access (SAP) to the RCA and the Steam Generator Team RCA exit, the inspectors directly observed equipment

responses to check sources and mixed-nuclide, plant-specific sources (all sources approximately 5000 disintegrations per minute) positioned at various orientations and distances from the individual detectors to simulate potentially contaminated material. The inspectors verified that radiation detection sensitivities of the material release monitors were consistent with NRC guidance in IE Circular 81-07 and IE Information Notice 85-92. Procedures and records reviewed within this inspection area are listed in Section 2PS3 of the Attachment to this report.

Problem Identification and Resolution. Licensee PIPs related to the REMP, meteorological monitoring, and release of materials from the RCA were reviewed and discussed with cognizant licensee personnel. The inspectors assessed the licensee’s ability to characterize, prioritize, and resolve the identified issues in accordance with its procedures. Specific PIPs and other documents that were reviewed and evaluated in detail for the referenced program areas are identified in Section 2PS3 of the Attachment to this report.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

.1 Initiating Events, Mitigating Systems, and Barrier Integrity Cornerstones

a. Inspection Scope

The inspectors verified the PIs and corresponding records listed in the tables below (for all three units), to determine their accuracy and completeness using the guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2.

Cornerstone: Initiating Events		
<i>Performance Indicator</i>	<i>Verification Period</i>	<i>Records Reviewed</i>
Unplanned Scrams	2 <sup>nd</sup> , 3 <sup>rd</sup> and 4 <sup>th</sup> quarter, 2003, and 1 <sup>st</sup> and 2 <sup>nd</sup> quarter, 2004	<ul style="list-style-type: none"> <li>• Licensee Event Reports</li> <li>• NRC Inspection Reports</li> <li>• Monthly Operating Reports</li> <li>• Operator logs</li> <li>• Licensee power history curves</li> </ul>
Scrams with Loss of Normal Heat Removal		
Unplanned Power Changes		

Cornerstone: Mitigating Systems		
<i>Performance Indicator</i>	<i>Verification Period</i>	<i>Records Reviewed</i>
Safety System Functional Failures	3 <sup>rd</sup> and 4 <sup>th</sup> quarter, 2003, and 1 <sup>st</sup> and 2 <sup>nd</sup> quarter, 2004	<ul style="list-style-type: none"> <li>• LERs</li> <li>• Monthly operating reports</li> <li>• TSAIL entries</li> <li>• Operator logs</li> <li>• PIPs</li> </ul>

Cornerstone: Barrier Integrity		
<i>Performance Indicator</i>	<i>Verification Period</i>	<i>Records Reviewed</i>
Reactor Coolant System Specific Activity	2 <sup>nd</sup> , 3 <sup>rd</sup> and 4 <sup>th</sup> quarter, 2003, and 1 <sup>st</sup> and 2 <sup>nd</sup> quarter, 2004	<ul style="list-style-type: none"> <li>• Daily plant chemistry data</li> </ul>
Reactor Coolant System Leakage		<ul style="list-style-type: none"> <li>• Daily status reports</li> <li>• Operator logs</li> <li>• PIPs</li> </ul>

b. Findings

No findings of significance were identified.

.2 Occupational Radiation Safety and Public Radiation Safety Cornerstone

a. Inspection Scope

The inspectors sampled licensee submittals relative to the Performance Indicators (PIs) listed below for the period July 1, 2003 through June 30, 2004. To verify the accuracy of the PI data reported during that period, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline", Revision 2, were used to confirm the reporting basis for each data element.

- Occupational Exposure Control Effectiveness
- RETS/ODCM Radiological Effluent Occurrences

For the specified review period, the inspectors evaluated data reported to the NRC, and sampled and assessed applicable corrective action program issues and selected Radiation Protection program records. The inspectors examined in detail the documentation of the licensee's monthly review for PI occurrences as performed for July 2003, October 2003, and March 2004 in accordance with procedure SRPMP 10-1. The inspectors also interviewed the licensee personnel who were responsible for collecting and evaluating the PI data. Licensee procedures, records, and other documents reviewed within this inspection area are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

.1 Daily Screening of Corrective Action Reports

As required by 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 PIPs, attending daily screening meetings, and accessing the licensee's computerized database.

.2 Annual Sample Review

a. Inspection Scope

The inspectors performed an in-depth review of two issues entered into the licensee's corrective action program. The samples, which involved risk significant systems within the mitigating systems cornerstone, concerned: (1) the July 28, 2004, loss of switchyard auxiliary power; and (2) the July 29, 2004, KHU-2 output breaker ACB-2 failure. In response to these events, a Region II based electrical inspector performed an inspection, on September 13 - 16, 2004, to supplement the inspection efforts of the resident inspectors. The region based inspector reviewed modifications the licensee made after the power loss event and assessed the consequences of faults at various locations with the new arrangement in terms of how switchyard circuit breaker control, line protection, battery chargers, sequence of events recorders, air conditioning, etc. would be affected. The design of the switchyard cable trench system, the cable trench which contains cables for the Lee Station incoming power, and the trench which contains SSF related cables were reviewed. Drawings were reviewed to determine the provisions for removing rain water that may enter the trench such as natural drainage, connection to site drain system or sump pumps. The trenches themselves were inspected (without removing trench covers) to determine if any adverse conditions existed. A historical search of PIPs was made using the search words "cable" and "switchyard" in an effort to determine whether any cables had failed due to being submerged in water. In addition, PIP O-03-4464, dealing with cable trench drainage concerns, and PIP O-04-4896, concerning the KHU-2 output breaker ACB-2 failure, were reviewed. The inspectors also reviewed the licensee's overall actions to determine if they 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

b. Observations and Findings

(1) Loss of Switchyard Auxiliary Power and Water Accumulation in Cable Trenches

On July 28, 2004, a short-circuit occurred at a 4.16 kV transfer switch located in the 525 kV switchyard. The short-circuit affected both the normal and alternate supply at the transfer switch, resulting in tripping of two supply circuit breakers and loss of all AC auxiliary power to both the 230 kV and 525 kV switchyards. (Additional documentation of this issue and a NCV regarding past corrective action to preclude water intrusion is contained in Section 1R12b.(2) of this report.) The modifications made almost immediately after the power loss event to restore switchyard auxiliary power consisted of disconnecting cables from transfer switches and making one splice in the cable trench to electrically and physically separate the two power sources. The two transfer switches at the 525 kV switchyard effectively became two simple disconnect switches.

The fault that initiated the event was caused by moisture intrusion into the 4.16 kV transfer switch compartment. Moisture intrusion was at least partially a consequence of the transfer switch cabinet design. The cabinet had an open bottom and was located above a trench which contained water after heavy rains. According to the problem report documentation, this situation was temporarily corrected by installation of a barrier that would be changed to a more suitable design in the short-term future. The resident inspectors noted that standing water in various cable trenches had been identified during previous recent inspections, which is why the region based inspector expanded the inspection scope to include a review of cable trench design at various locations throughout the site.

Based on the inspectors' review, no findings of significance were identified.

(2) KHU-2 Output Breaker ACB-2 Failure

Introduction: A self-revealing NCV was identified for the use of incorrect material and improper fabrication of a connecting rod in the KHU-2 output breaker ACB-2. This resulted in the connecting rod pulling apart and KHU-2 failing to load on July 29, 2004.

Description: At 1:52 a.m., on July 29, 2004, during the performance of operability test PT/0/A/0610/017, Operability Test of 4160 Volt Breaker, the Keowee output breaker to the overhead path (ACB-2) failed to indicate closed when positioned closed from the Keowee control room. In addition, the operator was unable to load KHU-2 and was unable to reopen ACB-2 from the control room. The licensee subsequently identified that the failure of the breaker was due to the failure of a connecting rod for the auxiliary contacts within the breaker. The licensee noted that the connecting rod had been fabricated on site using improper bar stock material and did not have proper fabrication



quality. A vendor supplied replacement connecting rod was subsequently installed in the breaker and the other Keowee breakers were inspected to ensure that the proper connecting rods were installed.

Analysis: The installation of the improper connecting rod into the Keowee output breaker was considered more than minor. This is because it affected the mitigating systems cornerstone objectives for ensuring availability, reliability and capability of systems that are in place to respond to events, in that following the rod failure in ACB-2, the Keowee overhead emergency power path became inoperable. The Phase 1 screening concluded that the finding represented an actual loss of a safety function of a single train; however, the loss did not exceed the allowed TS outage time. Therefore, the finding was screened as very low safety significance (Green).

Enforcement: 10 CFR 50, Appendix B, Criterion VIII, Identification and Control of Materials, Parts and Components, requires that measures shall be designed to prevent the use of incorrect or defective material, parts and components. Contrary to this requirement, during September 1999, the licensee inadequately fabricated a connecting rod (using an incorrect material) and subsequently installed that rod in KHU-2 output breaker ACB-2. This inadequate control of materials and parts issue is being treated as an NCV, consistent with Section VI.A.1 of the enforcement policy: NCV 05000269.270, 287/2004004-05, Improperly Fabricated Connecting Rod in Keowee Output Breaker ACB-2. This issue is in the licensee's corrective action program as PIP O-04-04896.

(3) Cross-Reference to PI&R Findings Documented Elsewhere

Section 1R12.b(2) describes a finding for inadequate corrective action of degraded conditions involving water intrusion in the 525 kV switchyard load centers that resulted in a loss of electrical feeders for auxiliaries loads.

4OA3 Event Followup

a. Inspection Scope

The inspectors evaluated the event 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 the event in accordance with emergency action level procedures and made timely notifications to NRC and state/county governments as required. The following events were reviewed:

- PIP O-04-04896, KHU-2 Output Breaker ACB-2 Failure - (This event was discussed in Section 4OA2.2b.(2) of this report.)
- PIP O-04-04878, Loss of Switchyard 4160 Volt Auxiliary Power - (This event was discussed in Sections 1R12b.(2) and 4OA2.2b.(1) of this report.)

b. Findings

No findings of significance were identified

4OA5 Other Activities

Operation of an Independent Spent Fuel Storage Installation (ISFSI)

a. Inspection Scope

Under the guidance of Inspection Procedure 60855.1, the inspectors reviewed the licensee's procedure for loading spent fuel shipments to the ISFSI (MP/0/A/1500/016) and observed loading operations for shipment DSC-082 to verify that the ISFSI shipment activities were performed in a safe manner and in compliance with the approved procedure.

The inspectors reviewed Oconee Nuclear Engineering Instruction (ONEI-400) for Dry Storage Certification for ISFSI shipment DSC-082 and discussed spent fuel documentation with the cognizant reactor engineer to verify that the licensee has identified each fuel assembly, recorded the parameters and characteristics of each fuel assembly, and has maintained a record of each fuel assembly as a controlled document.

The inspectors reviewed selected completed procedures for physical inspection and inventory of the ISFSI (IP/0/A/0750/003, Physical Inventory of Reportable Special Nuclear Material) and completed ONEI-400s to verify that records have been established for all spent fuel in storage in the ISFSI, that duplicate records are maintained by the licensee, and that a physical inventory has been conducted on all spent fuel stored in the ISFSI at least every 12 months.

b. Findings

No findings of significance were identified.

4OA6 Management Meetings (Including Exit Meeting)

.1 Exit Meeting Summary

The inspectors presented the inspection results to Mr. Bruce Hamilton, Plant Manager, and other members of licensee management at the conclusion of the inspection on September 30, 2004. 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.

.2 Regulatory Performance Meeting

On October 4, 2004, NRC Region II (RII) held an Oconee regulatory performance meeting with Duke Energy to discuss the results of a supplemental inspection (Inspection Report 05000269,270,287/2004011) conducted on August 9 - 13, 2004.



That inspection assessed the licensee's problem identification, root cause evaluation, extent of condition determination, and corrective actions associated with two White findings in the Mitigating Systems Cornerstone, which placed the performance of Oconee Unit 3 in the Degraded Cornerstone Column of the NRC's Action Matrix for the third quarter 2003. The two findings involved: (1) the inadequate installation of electrical connectors on the Unit 3 HPI pump emergency power supply cable from the ASW switchgear; and (2) pressurizer ambient heat losses in all three Oconee units exceeding the capacity of the pressurizer heaters powered from the SSF. The meeting focused on the corrective actions associated with these White findings, as well as with the supplemental inspection, in order to arrive at a shared understanding of the performance issues, underlying causes, and planned licensee actions.

This meeting was opened to the public. Attendees included: Oconee site management and staff (indicated on Attachment to this report); NRC Region 2 management (indicated on Attachment to this report); the resident inspectors; and members of the public and local news media. The presentation material used for the discussion is available from the NRC's document system (ADAMS) as Accession Number 042940123. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

#### 4OA7 Licensee Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which met the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being disposition as a non-cited violation (NCV).

- 10 CFR 20.1501(a)(1) states that surveys shall be performed in accordance with 10 CFR 20.1801 which requires that licensees ensure licensed materials are stored in controlled or unrestricted areas and secured from unauthorized removal or access. Contrary to the above, the licensee failed to make adequate surveys to ensure that licensed materials were properly stored. Specifically, (1) on January 27, 2004, during a routine survey of the clean tool room, three items were found with fixed and removable contamination (an air grinder with 200 corrected counts per minute (ccpm) fixed and 2000 dpm/100 cm<sup>2</sup> removable, a screw driver with 2000 ccpm fixed and 11 dpm/100 cm<sup>2</sup> removable, and an eye bolt with 7000 ccpm fixed and 1097 dpm/100 cm<sup>2</sup> removable); (2) on April 14, 2004, during a routine survey of the clean machine shop, a radioactive valve was located with fixed contamination of 600 ccpm on external surfaces and 2800 ccpm on internal surfaces; (3) on April 20, 2004, a contaminated feedwater pump seal header was found in the Welding Fab shop during a routine survey with 6000 ccpm fixed contamination; (4) on April 22, 2004, during a routine survey of the clean machine shop, four bolts and eight nuts were located with fixed contamination between 100 and 600 ccpm; and (5) on April 25, 2004, during a routine survey of the clean machine shop, a radioactive upper pump casing was located with 350 ccpm fixed contamination. Each of the occurrences were determined to be Green in that they each involved the failure to control radioactive material within the RCA, but the potential exposure to a member of the public was less than 5 mrem. These issues are in the licensee corrective action program as PIP

numbers O-04-00426, O-04-02342, O-04-02502, O-04-02580, and O-04-02657 respectively. In addition, PIP O-04-00426 has been written to address the emergent trend, specifying corrective actions implemented and to be implemented.

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee

N. Alchaar, Civil Engineering  
S. Batson, Mechanical/Civil Engineering Manager  
D. Baxter, Engineering Manager\*  
R. Brown, Emergency Preparedness Manager  
T. Bryant, Engineering Support\*  
A. Burns, Civil Engineer, Reactor & Electrical Systems  
N. Constance, Operations Training Manager  
D. Covar, Training Instructor  
C. Curry, Maintenance Manager  
T. Curtis, Reactor & Electrical Systems Manager  
G. Davenport, Compliance Manager\*  
C. Eflin, Requalification Supervisor  
P. Fowler, Access Services Manager, Duke Power  
T. Gillespie, Operations Manager  
T. Grant, Engineering Supervisor, Reactor & Electrical Systems  
R. Griffith, QA Manager  
B. Hamilton, Station Manager\*  
R. Hester, Civil Engineer  
B. Jones, Training Manager  
R. Jones, Site Vice President\*  
T. King, Security Manager  
T. Ledford, Engineering Supervisor, Reactor & Electrical Systems  
B. Lowrey, Steam Generator Engineer  
B. Millsaps, SGT Maintenance Manager  
R. Murphy, Engineering Support\*  
S. Neuman, Regulatory Compliance Group\*  
L. Nicholson, Safety Assurance Manager\*  
R. Repko, Superintendent of Operations  
J. Rowell, Engineer, Reactor & Electrical Systems  
R. Sharpe, Lead Licensing Engineer, Steam Generator Replacement  
J. Smith, Regulatory Affairs  
B. Spear, Engineer, Reactor & Electrical Systems  
J. Steeley, Training Supervisor  
J. Stinson, Engineer, Reactor & Electrical Systems  
F. Suchar, QC Supervisor  
S. Townsend, Keowee Operations  
T. Tucker, NDE Level III Examiner  
J. Twiggs, Manager, Radiation Protection  
J. Weast, Regulatory Compliance\*

NRC

M. Ernstes, Chief of Reactor Projects Branch 1\*  
 R. Haag, Chief of Plant Support Branch 1\*  
 L. Olshan, Project Manager, NRR  
 L. Plisco, Deputy Regional Administrator, RII  
 L. Wert, Deputy Division Director, RII\*

(\*Note: Personnel indicated with an asterisk attended the regulatory performance meeting on October 4, 2004. See Section 4OA6.2 for further details.)

**ITEMS OPENED, CLOSED, AND DISCUSSED**Opened

050000269,270,287/2004004-03	URI	Adequacy of Unit Vent Gaseous Effluent Sampling (Section 2PS1b.(1))
050000269,270,287/2004004-04	URI	Acquisition and Review of QA Data Packages for Effluent Monitor Calibrations (Section 2PS1b.(2))

Opened and Closed

050000269,270,287/2004004-01	FIN	Inadequate Maintenance and Oversight of the 5C Lee Combustion Turbine (Section 1R12b.(1))
050000269,270,287/2004004-02	NCV	Failure to Correct the Degraded Condition of the 525 kV Switchyard Load Center Cabinets (Section 1R12b.(2))
050000269,270,287/2004004-05	NCV	Improperly Fabricated Connecting Rod in Keowee Output Breaker ACB-2 (Section 4OA2.2b.(2))

Previous Items Closed

None

Items Discussed

None

## DOCUMENTS REVIEWED

### (1R07: Heat Sink Performance)

#### Maintenance Work Order Documents

98665520, Siphon Leak 2C CCW Pump  
98466502, Eddy Current Testing on LPI Cooler  
98668466, 2LPS-311, Remove/Test/Replace/Re-install  
98603295, 2LPSW-51 Inspect for Damage  
98316917, Inspect 3A CCW Pump Flange  
98666762, Re-Torque Unit 2B CCW Pump Flange  
97102211, Clean and Eddy Current RCW on a 3 year Frequency (TYPICAL)

#### Completed Procedures

MP/0/A/1100/003, Decay Heat Removal (LPI) Cooler - flange Removal and Installation - Flange Torquing and Re-torquing (10/27/04)  
PT/2/A/0160/003, Component Test of ES Channels 5 & 6, Rev. 46 (5/30/04)  
PT/3/A/0160/003, Component Test of ES Channel 5 & 6, Rev. 11 ((6/2/03)  
PT/2/A/0261/020, ECCW System Test, Rev. 6 (4/30/04 and 5/14/04)  
PT/0/A/0251/029, Siphon Seal Water System Test, Rev. 17 (5/4/04)  
PT/1&2/A/0251/002, Spent Fuel Pool Cooling Pump Test, Enclosure 13.5 "A" Spent Fuel Cooling Pump Data Sheet, Rev. 45 (6/9/04)  
PT/1/A/0230/015, High Pressure Injection Motor Cooler Flow Test, Rev. 20 (8/7/03)  
PT/2/A/0251/023, LPSW System Flow Test, Rev. 17 (5/17/04)  
PT/2/A/0152/013, Low Pressure Service Water System Valve Stroke Test, Rev. 20 (1/15/04)

#### Procedures

PT/2/A/0251/069, Rev. 1, LPI Cooler Test - Series Mode

#### PIPs

04-04382, GL-8913 Commitment to Inspect LPSW Cross-Over Header  
04-02828, ECCW Test Failure 2B CCW Inlet  
03-07385, Structural Integrity Associates LPSW Inspection Report Recommendations  
03-04695, Clam Monitoring  
96-01045, Corrective Action of Fuel Storage and Handling Systems

#### Calculations

OSC-4156, Oconee Unit 2 DHR Cooler Performance Calculation, Rev. 11, Attachment 46  
OSC-2042, HPI Pump Motor Upper Bearing Cooling Report, Rev. 5  
OSC-7380, CCW Intake and Discharge Piping Units 1, 2, and 3; 5 year Civil/Coating Inspection Report, Rev. 5  
OSC-7019, CCW Intake and Discharge Structures 5 Year Civil/Structural Inspection, Rev. 1  
OSC-6073, Spent Fuel Cooling System Heat Load Limits, Rev. 0  
OSC-8037, Units 1 & 2 Spent Fuel Cooling System "A" Heat Exchanger Temperature

Effectiveness Determination, Rev. 0  
OSC-5975, Intake Basin and Canal Area - Volume Calculation Rev. 0

Miscellaneous

1999 Underwater Inspection Keowee Hydro Station, Hydropower & Water Resources, December 1999  
2001 Repair of Intake Structure Bridge Concrete Pier - Keowee Hydro Station, Hydropower & Water Resources, October 2001  
HPI Cooler Heat Transfer Testing Final Report, Westinghouse, Revised 7/28/99  
Service Water Piping Inspection Program, Engineering Support Document, 3/23/04  
Keowee Project - FERC Project No. 2403-SC, Sixth Five-Year Safety Inspection - Findlay Engineering, March 2001  
SFP Temperature Trend Data for Last 3 Refueling from Plant Computer Monitor System  
LPSW/HPSW Flow data to HPI Coolers over Last 3 Refueling

**(Section 2OS3 Radiation Monitoring Instrumentation and Protective Equipment)**

Procedures, Manuals, and Reports

NPA Assessment GO-04-007(NPA)(RP)(ALL), Radiation Protection Functional Area Evaluation, 4/14/04  
PT/0/A/0230/001, Revision (Rev.) 135, Radiation Monitor Check,  
CP/1/A/2002/004 C, Rev. 22, Operating Procedure for the Post Accident Liquid Sampling System (PALSS),

Records, Worksheets, Data, and Calibration Reports

Body Burden Analyzer Library, printed 9/2/04  
10 CFR 50/61 Analysis Reports: Smears, 2/7/02; Demin Resin, 3/11/03; Powdex Resin, 3/11/03; Primary Resin, 3/11/03; Filter Media, 3/11/03  
HP/0/B/1003/021, Rev. 4, Procedure for Calibration of the Wholebody Counting System: People Mover, 3/8/04; Chair Thyroid, 4/1/04; Chair Lung, 2/27/04; Chair Torso, 2/22/04; full calibrations of chair (3/02) and People Mover (3/02)  
HP/0/B/1003/016, Rev. 17, Calibration of Automated Personnel Monitors, PCM-1B, s/n 967, 2/9/04  
SH/0/B/2008/001, Rev. 1, Calibration and Quality Assurance of Canberra Argos-4AB Contamination Monitors, s/n 0307-035, 3/11/04  
HP/1/A/1009/017, Rev. 17, Operating Procedure for Post-Accident Containment Air Sampling System, 1/15/04  
HP/2/A/1009/017, Rev. 17, Operating Procedure for Post-Accident Containment Air Sampling System, 1/21/04  
HP/3/A/1009/017, Rev. 17, Operating Procedure for Post-Accident Containment Air Sampling System, 5/26/04  
CP/2/A/2002/004 D, Rev. 031, Test Procedure for Operation of the Post Accident Liquid Sampling System (PALSS), 2/10/04  
HP/0/B/1010/002 Enclosure 5.1, SCBA Units, Spare Cylinders, and Respirators Monthly or Initial Inspection and Inventory, performed July 2004, August 2004.

## A-5

IP/0/B/0360/038, Rev. 015, Sorrento RIA-32 Auxiliary Building Gas Monitor, 8/6/03  
IP/0/B/0360/041, Rev. 09, Sorrento RIA-32 Auxiliary Building Gas Monitor Flow and Flow Control Tests, 7/12/04  
IP/0/B/0361/010, Sorrento High Range Gas Area Monitor Calibration (RIA-56 Vent Stack), (Unit 1, 9/21/03; Unit 2, 3/18/04; Unit 3, 4/16/03)  
IP/0/B/0361/006, Sorrento Multichannel Area Radiation Monitors Calibration (RIA-1, 5, 7, 8, 10, 11, 12, 13), RIA-1, 1/29/01 and 2/26/01  
IP/0/B/0361/007, Sorrento Extended Range Area Radiation Monitors Calibration, 1RIA-6, 1/20/04; 3RIA-16, 4/21/03  
Certificates of Calibration: Eberline RO-7, s/n 160, 2/3/04; Automess 6112B (Teletector), s/n 50776, 4/21/04; Eberline RM-14, s/n 5481, 5/5/04; Eberline ASP-1/NRD, s/n 1693, 5/6/04.  
Records of Internal Dose Assessments for individuals receiving > 50 mrem CEDE including SH/0/B/2001/001 Enclosure 5.1 and HP/0/B/1000/063 Enclosure 5.6, dated 7/8/04.  
Breathing Air Certificates of Compliance: Mako Compressor (2/23/04, 6/21/04), Bauer Compressor (2/24/04, 6/22/04)  
MSA certification of training for MSA BMR Certified C.A.R.E. Technicians, specifying authorized individuals to perform test and repairs on MSA BMR SCBA, 2.28/04.  
Calibration certificate for Posicheck respirator test device from Biosystems, 8/7/03  
ProCheck3 (SCBA Regulator) Test Results: May 2004, June 2004, July 2004  
Hydrostatic Test Results from Anderson Fire and Safety, (s/n 5396, 5463, 5468, 5438, 45861, 5466, 5302, 46473, 5415, 5393), 5/04.

### Problem Identification Program (PIP) Documents

O-04-01721, 1RIA-58 (High Range Containment) OOS, 3/27/04  
O-04-02131, 1 RIA-58 PAM instrument OOS - does not respond, 4/7/04  
O-04-04681, 3RIA-16 lost signal, 7/17/04  
O-03-08036, Model 89 JL Shepherd Calibrator Source Interlock is not functioning, 12/10/03  
O-04-05149, Worker could not perform self-monitoring for contamination using ARGOS whole body monitor (worker too short to be detected by position sensor on monitor), 8/10/04  
O-04-02800, ARGOS Contamination Monitors at SPA under responded to smears prepared with plant contaminants, 4/29/04

### **(Section 2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems)**

#### Procedures, Guidance Documents, and Operating Manuals

Offsite Dose Calculation Manual, Rev. 44  
CP/0/B/5200/045, Rev. 67, Liquid Waste Release from RWF  
HP/0/B/1001/026, Rev. 3, Operation of the Count Room Analysis System  
HP/0/B/1000/091, Rev. 4, Evaluation of Germanium Detector Gamma Spectroscopic Results  
IP/0/B/0398/019, Rev. 15, Radwaste Facility Liquid Radiation Monitor - (RIA-33)  
IP/0/B/0360/039, Rev. 27, Sorrento Liquid Monitor Calibration  
IP/0/B/0360/043, Rev. 16, Sorrento On-Line Dual Range Gas Monitor  
IP/0/B/0360/031, Rev. 28, Sorrento Process Radiation Monitor Skid Calibration  
HP/0/B/1003/019, Rev. 8, Calibration and Setup of HPGE Detectors Using the Count Room Acquisition System (CAS) Software



Effluent Monitoring Program Records

Effluent monitor RIA-33 calibration data, 7/6/04  
Effluent monitor 3RIA-54 calibration data, 6/10/04  
Effluent monitor 3RIA-37 calibration data, 4/13/04  
Effluent monitor 3RIA-45 calibration data, 2/16/04  
Liquid Waste Release # 2004-187, conducted 9/21/04  
Interlaboratory Cross Check Program for 2<sup>nd</sup> Qtr. 03 through 3<sup>rd</sup> Qtr. 04

Audits, Self Assessments, and PIP Documents

NPA Assessment GO-04-007(NPA)(RP)(ALL), Radiation Protection Functional Area Evaluation, 04/14/2004  
O-03-05195, 3RIA-37 alarmed while no gas tank release was in progress on unit 3, 8/17/03  
O-03-05712, Unexpecter alarms on 3RIA-37, 9/12/03  
O-04-03892, No liquid scintillation counting equipment in service, 6/8/04  
O-04-04043, Momentary spike on 3RIA-50, 6/15/04

Annual Reports

Oconee 2003 Annual Effluent Release Report, dated April 28, 2004

**(Section 2PS3 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program)**

Plant Procedures and Documents

Offsite Dose Calculation Manual, Rev. 44  
Procedure 317, Low Volume Air Sampler Calibration Procedure, Rev. 2  
Procedure 701, Milk Sampling at Oconee Nuclear Station, Rev. 2  
Procedure 702, Airborne Radioiodine and Airborne Particulate Sampling at Oconee Nuclear Station, Rev. 4  
Procedure 708, Direct Radiation Measurement (TLDs) at Oconee Nuclear Station, Rev. 2  
HP/0/B/1003/016, Calibration of Automated Personnel Monitors, Rev. 17  
IP/0/B/1601/003, Meteorological Equipment Checks, Rev. 36  
SH/0/B/2000/006, Removal of Items from RCA/RCZs and Use of Release/Radioactive Material Tags, Rev. 1  
NSD-208, Problem Investigation Process (PIP), Rev. 27

Records

Semiannual calibration of primary and backup meteorological monitoring instrumentation, completed 05/04/2004 (included performance of procedures IP/0/B/1601/003, /004, /006, /008, 011, /012, and /014)  
REMP air-sampling equipment annual calibrations (per Procedure 317): S/N 00291, calibrated 08/24/2004; S/N 00317, calibrated 04/12/2004; S/N 00339, calibrated 08/23/2004  
Calibration of SAM-11 Small Articles Monitor, performed 10/02/2003 (per HP/0/B/1003/016)  
Oconee Nuclear Station: Meteorological Data Recovery Reports for 2002 and 2003



Oconee Nuclear Station: Joint Frequency Distribution of Wind Speed and Direction at 10 meters and 60 meters for 2003

PIP Documents

PIP O-02-06264, All environmental sampling locations should be assessed using GPS equipment, 11/05/2002

PIP O-03-04093, Intermittent problems with temperature and wind readings suggest potential failure of signal connector cable assembly at ONS 60-meter meteorological tower, 06/23/2003

PIP O-03-05739, Datalogger is not storing meteorological data, 09/15/2003

PIP G-04-00039, Investigate activity overestimation—cross-check E3677A-37 [gamma air particulate], 01/26/2004

PIP O-04-00855, Northwest site 60-meter wind direction has been “straight lining” since approximately 1300 hours on 02/17/2004, 02/20/2004

PIP O-04-01347, Intermittent problem with wind parameters result in loss of meteorological data, 03/15/2004

PIP O-04-01373, Northwest meteorological tower intermittent operability, 03/16/2004

PIP G-04-00039, Investigate activity overestimation—cross-check Q033LIW2 [I-131 in water], 03/31/2004

PIP O-04-02314, 60-meter wind direction providing invalid data, 04/13/2004

PIP O-04-05855, Keowee meteorological tower is approximately one foot underwater, 09/08/2004

PIP O-04-06162, Meteorological equipment calibrations not performed in accordance with UFSAR, 09/21/2004

PIP O-04-04956, RPM at North Anna Nuclear station notified ONS RPT that during in-processing an individual was found with radioactive material on his boot, 07/29/2004

PIP O-04-02712, An emerging trend has been noted in the number of events where radioactive material is found outside the RCA/RCZ, 04/27/2004

PIP O-04-00426, Radioactive material found in unauthorized area, 01/27/2004

PIP O-04-02190, Radioactive material outside of RCA/RCZ not labelled/tagged or contained, 04/08/2004

PIP O-04-02342, Radioactive material, unlabeled, uncontrolled in clean area, 04/14/2004

PIP O-04-02356, Radioactive material found outside RCA/RCZ, 04/20/2004

PIP O-04-02502, Radioactive material found outside RCA/RCZ, 04/20/2004

PIP O-04-02580, Radioactive material found outside RCA/RCZ, 04/22/2004

PIP O-04-02657, Radioactive material found outside RCA/RCZ not tagged/labeled, 04/25/2004

PIP O-04-02699, Radioactive material found in the Clean Machine Shop, Scrap metal bin, 04/27/2004

Audits and Self-Assessments

NPA Assessment GO-04-007(NPA)(RP)(ALL), Radiation Protection Functional Area Evaluation, 04/14/2004

Annual Reports

Oconee Nuclear Station - Annual Radiological Environmental Operating Report for 2003, submitted 05/05/2004

**(Section 40A1 Performance Indicator Verification)**

Procedures

SRPMP 10-1, NRC Performance Indicator Data Collection, Validation, Review, and Approval, Rev. 1

Records

Memorandum to File: NRC Performance Indicator Data Review for July 2003, 08/12/2003

Memorandum to File: NRC Performance Indicator Data Review for October 2003, 11/11/2003

Memorandum to File: NRC Performance Indicator Data Review for March 2004, 04/12/2004

**(Section 40A2: Problem Identification and Resolution)**

Root Cause Analysis Report of Loss of AC Auxiliary Power to Oconee Switchyards, PIP O-04-04878

Periodic Test Procedure PT/1/A/04000/007, SSF RC Makeup Pump Test, Rev. 37

Periodic Test Procedure PT/O/A/0610/019, 100 kV Power Supply Verification, Rev. 5

Drawings

Westinghouse Electric Co. drawing 621F296, Keowee Station Cubicle SWGR Schematic & Connection Diagram Detail A, Rev. 12

KEE-214, Elementary Diagram Generator Controls ACB-2 Control Circuit, Rev. 25

KEE-214-A, Elementary Diagram Generator Controls ACB-2 Control Circuit Contact Development, Rev. 3

KEE-214-1, Elementary Diagram Generator Controls ACB-4 Control Circuit, Rev. 18A

OEE-214, Elementary Diagram Keowee - Oconee Interposing Relays, Rev. 7

OEE-214-1, Elementary Diagram Keowee - Oconee Interposing Relays, Rev. 7

KEE-213, Elementary Diagram Master Control System Startup Controls, Rev. 20

KEE-213-5, Elementary Diagram Master Control System Turbine Miscellaneous Relaying, Rev. 15

KEE-214-5, Elementary Diagram Generator Control Synchronizing Circuit, rev. 4

O-801, One Line Diagram 230 kV SWYD 480/240/120 VAC, Rev. 26

O-811, One Line Diagram 525 kV SWYD 480/240/120 VAC, Rev. 25

O-812, 525 KV Switchyard 125 VDC One Line Diagram, Rev. 26

OEE-50, Elementary Diagram 230 kV Switchyard Control PCB No. 20 Trip Coil No. 1, Rev. 16

OEE-50A, Elementary Diagram 230 kV Switchyard Control PCB No. 20 Trip Coil No. 2, Rev. 15

OEE-50B, Elementary Diagram 230 kV Switchyard Control PCB No. 20 Close Coil, Rev. 0

**LIST OF ACRONYMS**

ACB	-	Air Circuit Breaker
ADAMS	-	Agency wide Documents Access and Management System
ANSI	-	American National Standards Institute
ARM	-	Area Radiation Monitor
AP	-	Abnormal Procedure
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
ASW	-	Auxiliary Service Water
BMV	-	Bare Metal Visual
CAM	-	Continuous Airborne Monitor
CAP	-	Corrective Action Program
CCW	-	Condenser Circulating Water
CFR	-	Code of Federal Regulations
DEC	-	Duke Energy Corporation
ECCS	-	Emergency Core Cooling
EDG	-	Emergency Diesel Generator
FDW	-	Feedwater
FME	-	Foreign Material Exclusion
GPM	-	Gallons per Minute
HPI	-	High Pressure Injection
HPSW	-	High Pressure Service Water
HX	-	Heat Exchanger
ICS	-	Integrated Control
IP	-	Inspection Procedure
IR	-	Inspection Report
ISI	-	Inservice Inspection
IST	-	Inservice Testing
KHU	-	Keowee Hydroelectric Unit
kV	-	Kilo Volt
LER	-	Limiting Condition for Operation
LER	-	Licensee Event Report
LOCA	-	Loss of Coolant Accident
LPI	-	Low Pressure Injection
LPSW	-	Low Pressure Service Water
MDEFW	-	Motor Driven Emergency Feedwater
MS	-	Main Steam
MT	-	Magnetic Particle
NCV	-	Non-Cited Violation
NDE	-	Non-Destructive Examination
NIST	-	National Institute of Standards and Technology
NRC	-	Nuclear Regulatory Commission
NRMCA	-	National Ready Mixed Concrete Association
NRR	-	Nuclear Reactor Regulation
ODCM	-	Offsite Dose Calculation Manual
ONS	-	Oconee Nuclear Station
OOS	-	Out of Service
OTSG	-	Once-Through Steam Generator

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PARS	-	Publicly Available Records
PASS	-	Post Accident Sampling System
PCM	-	Personnel Contamination Monitor
PIP	-	Problem Investigation Process report
PM	-	Preventive Maintenance
PMT	-	Post-Maintenance Testing
PT	-	Liquid Penetrant
PWHT	-	Post Weld Heat Treatment
QC	-	Quality Control
RBES	-	Reactor Building Emergency Sump
RBS	-	Reactor Building Spray
RCMUP	-	Reactor Coolant Makeup Pump
RCA	-	Radiologically Controlled Area
RCP	-	Reactor Coolant Pump
RCS	-	Reactor Coolant System
REMP	-	Radiological Environmental Monitoring Program
RFO	-	Refueling Outage
RII	-	Region II
RP	-	Radiation Protection
RPV	-	Reactor Pressure Vessel
RTP	-	Rated Thermal Power
RV	-	Reactor Vessel
SCBA	-	Self-Contained Breathing Apparatus
SDP	-	Significance Determination Process
SGRP	-	Steam Generator Replacement Project
SLC	-	Selected Licensee Commitments
SSC	-	Structure, System and Component
SSF	-	Standby Shutdown Facility
TDEFW	-	Turbine Driven Emergency Feedwater
TI	-	Temporary Instruction
TLD	-	Thermoluminescent Dosimetry
TS	-	Technical Specification
UFSAR	-	Updated Final Safety Analysis Report
URI	-	Unresolved Item
UT	-	Ultra Sonic
WBC	-	Whole Body Counter
WO	-	Work Order