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Licensee: Duke Energy Corporation

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

Location: 7812B Rochester Highway
Seneca, SC 29672

Dates: March 22 - May 2, 1998

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Enclosure 2

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EXECUTIVE SUMMARY

Oconee Nuclear Station, Units 1, 2, and 3
NRC Inspection Report 50-269/98-05,
50-270/98-05, and 50-287/98-05

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six-week period of resident inspection, as well as the results of announced inspections by five region based inspectors. [Applicable template codes and the assessment for items inspected are provided below.]

Operations

- The licensee properly completed the operations and maintenance spent fuel pool procedural enhancements listed in the Oconee probability and public risk analysis of December 4, 1996. (Section 03.1, [1C, 2B - Adequate])
- Refueling activities on Unit 2 were completed in a professional and conservative manner. Locating the defueling/refueling administrative and fuel tracking activities in a separate area adjacent to the control room was seen as a positive. (Section 04.1, [1A - Good])
- The inspectors identified a corrective action violation regarding lack of quality assurance review of engineering instructions for minor and temporary modifications. The licensee had identified this low level problem approximately two years earlier but instances of lack of review have continued. (Section 07.1, [5C - Poor])
- The corrective actions implemented for the failure to have a procedure for reactor building closeout were adequate. (Section 08.1, [5C - Adequate])
- The corrective actions implemented for the failure to make a timely notification in accordance with Title 10, Code of Federal Regulations, Part 50.72 following a reactor trip on March 16, 1996, were adequate. (Section 08.2, [5C - Adequate])
- The addition of operations procedural guidance to verify that fuel assemblies were properly positioned, the fuel bridge mast was properly secured, and spent fuel pool water level was maintained at least eight feet above the fuel storage racks was considered adequate to resolve the issue of previous occurrences of inadequate procedure control over spent fuel movement. (Section 08.3, [5C - Adequate])
- Retraction of the four-hour notification for the Keowee Unit 1 unanticipated start of April 9, 1998, was appropriate. (Section E2.1, [1B - Adequate])
- The licensee used conservative judgement in declaring Keowee Unit 2 inoperable in response to the April 20, 1998, failure to synchronize due to the speed adjustment motor. During this normal start for commercial power generation, an unknown condition was properly addressed with the operability determination. (Section E2.1, [1A - Adequate])

Maintenance

- Pump, engine, and valve on-line maintenance was generally completed in a thorough and professional manner. Personnel were knowledgeable of the assigned tasks and demonstrated attention to detail. Procedures were detailed and actively used on the job. Data was recorded as the steps were performed and compared to the acceptance criteria. Pre-job briefings were thorough and communication between test personnel was good. Work performance during these activities demonstrated that maintenance processes were positively in place. (Section M1.1, [2B, 3A, 3B - Good])
- The licensee properly completed a commitment to adjust the automatic voltage regulator for the main generators. These corrective actions were considered adequate resolution of the problem that previously resulted in a Unit 2 reactor trip. (Section M1.1, [5C - Adequate])
- The licensee's augmented inservice inspection programs for the high pressure injection connections to the reactor coolant system cold legs have been improved since the piping failure in the Spring of 1997. (Section M1.2, [2B - Adequate])
- Inspection and testing of the Unit 2 once through steam generators were being conducted in a thorough and conservative manner. Unexpected findings were thoroughly evaluated for significance and potential impact on the operating units. (Section M1.3, [2B - Good])
- The inspectors concluded that the Unit 2 emergency power switching logic test was successfully performed. This was indicative of adequately maintained equipment. (Section M1.4, [2A, 2B - Adequate])

Engineering

- A more thorough pre-test review of the quality and completeness of the procedure for the Unit 2 emergency power switching logic test could have precluded some of the minor discrepancies observed during the test and was considered a weakness. (Section M1.4, [3C - Poor])
- The technical resolution of the failure of the Keowee Unit 2 speed adjustment motor on April 20, 1998, was adequate. (Section E2.1, [5C - Adequate])
- The inspectors concluded that the failure of the speed adjustment motor on April 20, 1998, did not affect the safety function of Keowee Unit 2 but did reflect poorly on the material condition of the speed adjustment motor. (Section E2.1, [2A, Poor])
- Good engineering support was provided and good troubleshooting methods were used on the speed adjustment motor in response to the April 20, 1998, failure of Keowee Hydro Unit 2 to synchronize. (Section E2.1, [4B - Good])
- The performance of the licensee's failure investigation process team concerning the Keowee Unit 1 overcurrent and undervoltage disturbance of April 26, 1998, was excellent. (Section E2.1, [5B, 5C - Excellent])

- Changes to low pressure service water system design basis to allow for use of industry and Nuclear Regulatory Commission guidance concerning vulnerable target area and probability of impact of a turbine missiles was considered appropriate. The licensee's effort to understand their design was adequate. (Section E8.1, [4A - Adequate])
- The accountable engineer (individual performing modification) failed to list a snubber in the Technical Specification surveillance procedure which caused a required inspection to be missed and resulted in a non-cited violation. (Section E8.2, [3A - Poor])
- The licensee's identification of a missed surveillance following a snubber installation was adequate. (Section E8.2, [5A - Adequate])
- Corrective actions identified by the licensee in response to a missed snubber surveillance test were adequate to provide reasonable assurance of not missing TS required inspection when new snubbers are installed. (Section E8.2, [5C - Adequate])
- The inspector noted that the siphon seal water, emergency condenser circulating water, and essential siphon vacuum system test procedures were well written and required no changes. Only a few enhancements were identified during the conduct of the procedures. (Section E8.3, [2B - Excellent])
- The inspector attended the pre-job briefing for several of the seal water, emergency condenser circulating water, and essential siphon vacuum system tests and noted that the briefings were thorough. (Section E8.3, [3A, 3B - Good])
- Good control of the testing evolutions was demonstrated by the test coordinators. (Section E8.3, [1A - Good])

Plant Support

- The inspectors determined the licensee was effectively maintaining controls for personnel monitoring, control of radioactive material, radiological postings, radiation area controls, and high radiation area controls as required by 10 CFR Part 20. Efforts to reduce personnel contaminations was positive. (Section R1.1, [1C - Good])
- Based on licensee planning efforts to reduce source term and the licensee's efforts to achieve established exposure goals which were challenging, the inspectors determined the licensee's programs for controlling exposures as low as reasonably achievable were effective. All personnel exposures to date in 1998 were below regulatory limits. (Section R1.2, [1C - Adequate])
- Review of breathing air testing records verified that the licensee was calibrating breathing air compressor equipment and sampling in-use breathing air systems for certification in accordance with procedural requirements. For the tests reviewed, breathing air met Grade D or better quality requirements. Survey instrumentation had been adequately maintained. (Section R2.1, [2A - Adequate])

- The respiratory protection program was being implemented as required by 10 CFR Part 20 Subpart H. (Section R2.1, [1C - Adequate])
- The inspectors concluded that the check sources identified by the inspectors were exempt sources and were controlled appropriately. (Section R4.1, [1C - Adequate])
- Personal frisking practices in the Interim Radwaste Facility were acceptable. (Section R4.1, [3B - Adequate])
- Chemistry personnel were knowledgeable and competent during collection of a reactor coolant system sample. (Section R4.1, [3A, 3B - Adequate])
- Based on the training activities reviewed and interviews, the inspectors determined the radiation protection technicians had been provided an adequate level of training to perform routine survey activities involving radiation and control of radioactive material. (Section R5.1, [3B - Adequate])
- The proposed change to the Updated Final Safety Analysis Reports for additional requirements for performing radioactive work in the reactor coolant pump and ice blast buildings was considered appropriate. (Section R8.1, [1C - Adequate])
- The inspectors identified a configuration control and design violation for improper bend radius in two locations on the Unit 2 vent radiation monitors. (Section R8.2, [2A - Poor])
- The failure to include instructions for an electrical damage check of breakers in the procedure for operational guidelines following a fire resulted in a non-cited violation. The failure could prevent alignment of the low pressure injection system following a fire. (Section F8.1, [1C - Poor])
- The licensee's identification and resolution of deficiencies in operational guidelines following a fire were adequate. (Section F8.1, [5A, 5C - Adequate])
- Due to improper assumptions regarding pressure downstream of the reactor coolant pump seals, reactor coolant system leakage during a scenario identified for Title 10, Code of Federal Regulations, Part 50, Appendix R, could have exceeded design limits for the reactor coolant makeup system and resulted in a non-cited violation. (Section F8.2, [1C, 4A - Poor])
- The licensee's identification and resolution of a procedure problem involving excessive reactor coolant pump seal leakage following a fire was adequate. (Section F8.2, [5A, 5C - Adequate])

Report Details

Summary of Plant Status

Unit 1 began and ended the period at 100 percent power.

Unit 2 began and ended the period in a scheduled refueling outage. Major outage work completed included the replacement of the 2A1 and 2B1 reactor coolant pumps and low pressure service water modifications.

Unit 3 began and ended the period at 100 percent power.

Review of Updated Final Safety Analysis Report (UFSAR) Commitments

While performing inspections discussed in this report, the inspectors reviewed the applicable portions of the UFSAR that related to the areas inspected. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures, and parameters.

I. Operations

01 Conduct of Operations

01.1 General Comments (71707)

Using Inspection Procedure (IP) 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general the conduct of operations was professional and safety-conscious; specific events and noteworthy observations are detailed in the sections below.

02 Operational Status of Facilities and Equipment

02.1 Operations Clearances (71707)

The inspectors reviewed portions of the following clearances and Block Tag Outs (BTO) during the inspection period:

- 2-98-0646 BTO 5 Condenser Circulating Water (CCW)
- 2-98-1158 TN/2/A/2932/00 CCW/Siphon Seal Water (SSW)
- 2-98-0868 BTO 17 Building Spray

The inspectors observed that the clearances were properly prepared and authorized and that the tagged components were in the required positions with the appropriate tags in place.

02.2 Engineered Safety Features System Walkdown (71707)

The inspectors performed a walkdown of accessible portions of the following systems:

- Unit 1 Emergency Feedwater System
- Unit 2 Emergency Feedwater System

- Unit 2 Essential Siphon Vacuum System
- Unit 2 Siphon Seal Water System
- Unit 3 East Penetration Room Containment Isolation Valves

No discrepancies or concerns were identified.

03 Operations Procedures and Documentation

03.1 Spent Fuel Pool Procedural Controls

a. Inspection Scope (71707)

The inspectors independently reviewed the implementation of spent fuel pool procedural enhancements as part of the Oconee probability and public risk analysis of December 4, 1996.

b. Observations and Findings

The licensee committed to the following enhancements:

- Change Procedures OP/1.2.3/A/1102/15, Filling and Draining Fuel Transfer Canal, to provide explicit steps to close the fuel transfer canal deep end drains and fill the deep end with one foot of water before removing fuel transfer tube flanges;
- Change Procedure MP/0/A/1405/001, Fuel Transfer Tube Cover Plate - Installation and Removal, to require verification that water is standing in the fuel transfer canal deep end, the deep end drains are closed, and fuel transfer tube isolation valves SF-1 and SF-2 are closed using a remote camera before removing fuel transfer tube flanges; and
- Add steps to procedures for spent fuel pool draindown sequences involving standby shutdown facility (SSF) piping during normal operation to direct operators to attempt to arrest the draindown by closing SF-1 and SF-2.

The licensee implemented these enhancements as corrective actions under Problem Investigation Process (PIP) Report 0-096-2656. The inspectors determined that all changes were made as stated.

c. Conclusions

The licensee properly completed the spent fuel pool procedural enhancements listed in the Oconee probability and public risk analysis of December 4, 1996.

04 Operator Knowledge and Performance

04.1 Unit 2 Refueling Activities

a. Inspection Scope (71707)

The inspectors observed portions of the defueling and refueling activities for Unit 2.

b. Observations and Findings

The inspectors observed control room, spent fuel pool (SFP), and reactor building (RB) activities by operations personnel. The activities were conducted in a professional manner with emphasis on attention to detail, conservative judgement, and timeliness. The inspectors observed that operators in the control room were aware of the movement of each fuel assembly by number and monitored appropriate nuclear instrumentation. Management oversight of operations in the control room ensured focus was maintained on the refueling and defueling activities. Outside distractions were minimized by locating the refueling/defueling activities to the shift supervisor's office whereas they had been previously located in the control room.

The inspectors also reviewed tapes of the debris scan and core verification scan. No items were identified for followup.

c. Conclusions

Refueling activities on Unit 2 were completed in a professional and conservative manner. Locating the defueling/refueling administrative and fuel tracking activities in a separate area adjacent to the control room was seen as a positive.

07 Quality Assurance in Operations

07.1 Review of Licensee Corrective Action Reports

a. Inspection Scope (40500)

The inspectors reviewed a number of licensee PIP reports in order to identify potential issues and the licensee response to these issues.

b. Observations and Findings

PIP Report 4-098-1682, issued on April 1, 1998, identified that engineering instructions in Minor Modification 11772, did not receive Quality Assurance (QA) review prior to issuance. The detailed problem description of the PIP report stated that this was a repetitive problem that had been identified on several PIP reports over a two year period. The inspectors reviewed these PIP reports and confirmed that three temporary modifications and 12 minor modifications were identified where the modification was installed without prior QA review of the engineering instructions. The QA review was required for minor modifications by Site Directive 2.2.1, Minor Modification Program, dated July 11, 1996, and for temporary modifications by Site Directive 2.1.4.

Control of Temporary Modifications, dated March 30, 1995. Site Directive 2.1.4 was changed February 2, 1998. However the revision dated March 30, 1995, applied to all temporary modifications covered by the PIP reports listed below.

The inspectors reviewed the problem evaluations sections for the PIP reports referenced in PIP Report 4-098-1682 as follows:

- PIP Report 0-096-0518 regarding temporary modifications, dated March 14, 1996, stated the QA review requirement was overlooked. A team meeting was held May 1, 1996, to review the PIP report.
- PIP Report 0-096-2298 regarding minor modifications, dated November 8, 1996, stated that because engineering instructions were generic it was not the practice to route them for QA review unless engineering felt it was necessary. No specific corrective actions were documented for this PIP report.
- PIP Report 3-096-2540 regarding minor modifications, dated December 4, 1996, stated the missed review was an unintentional oversight. Training was planned to be conducted but no corrective actions were documented for this PIP report.
- PIP Report 1-097-1747 regarding temporary modifications, dated June 10, 1997, stated the responsible engineer did not follow procedure. As corrective action the responsible engineer reviewed the procedure.
- PIP Report 2-097-1580 regarding minor modifications, dated May 20, 1997, acknowledged the failure to follow procedure. As corrective action a team meeting was held on June 18, 1997, to remind all minor modification preparers that QA personnel must be given the opportunity to review engineering instructions.
- PIP Report 3-097-1614 regarding minor modifications, dated May 26, 1997, stated that the accountable engineer understood that QA personnel did not need or want to review engineering instructions if all work was governed by approved station instructions. The engineer was counseled and discussed the PIP report with QA personnel.
- PIP Report 1-097-4061 regarding minor modifications, dated November 13, 1997, stated that the apparent cause was human performance, but the problem was resolved as addressed in PIP Reports 0-096-2298 and 3-096-2540.
- PIP Report 1-097-4125 regarding minor modifications, dated November 18, 1997, stated that the QA engineer was contacted at home but was not aware of the requirement for QA to review engineering instructions. No specific corrective actions were documented for this PIP report.
- PIP Report 1-97-4132 regarding minor modifications, dated November 19, 1997, stated the engineering instructions were not specific instructions but a guideline. The PIP report was discussed at a

team meeting on January 8, 1998.

- PIP Report 1-098-0054 regarding minor modifications, dated January 7, 1998, referred to PIP Report 1-97-4132 for cause, resolution, and corrective actions.
- PIP Report 0-098-0470 regarding minor modifications, dated February 1, 1998, was not yet evaluated as of the end of the inspection period.

The inspectors determined minor and temporary modifications continued to be issued without the opportunity for QA personnel to review engineering instructions. The low level problem continued even though it was identified numerous times since 1996, and there have been several team meetings and counseling sessions to correct the problem. The inspectors determined this constituted a failure to correct a condition adverse to quality and was a violation of 10 CFR 50, Appendix B, Criterion XVI. Given that the licensee had opportunities to correct this problem as a result of several findings over the previous two years, this issue will not be subject to discretion. This is identified as violation (VIO) 50-269,270,287/98-05-01: Inadequate Corrective Actions for Recurring Problems With Engineering Instructions for Minor and Temporary Modifications.

c. Conclusions

The inspectors identified a corrective action violation regarding lack of quality assurance review of engineering instructions for minor and temporary modifications. The licensee had identified this low level problem approximately two years earlier but instances of lack of review have continued.

08 Miscellaneous Operations Issues (92901)

08.1 (Closed) VIO 50-269,270,287/96-20-04: Failure to Have RB Material Condition Closeout Procedure

This violation identified the failure of the licensee to have a procedure for RB closeout as required by 10 CFR 50, Appendix B, Criterion V. The inspectors reviewed the licensee's response to the violation, in letters submitted to the NRC dated April 9, 1996, and October 23, 1997. The inspectors also reviewed PIP Report 0-097-1038, which the licensee initiated to track the finding identified in the Notice of Violation (NOV) and the corrective actions identified as a result of the NOV. The inspectors determined that the corrective actions were adequate. The inspectors reviewed associated documentation and verified that the corrective actions identified by the licensee had been implemented. Based on the completed implementation of the correction actions, this violation is closed.

08.2 (Closed) VIO 50-269,270,287/96-05-01: Failure to Make Proper 10 CFR 50.72 Notification

This violation documented the failure of the licensee to make a 10 CFR 50.72 notification within the required time period, following a reactor

trip on March 16, 1996. The inspectors reviewed the licensee response to the NOV, and PIP Report 3-096-0536, which the licensee initiated to track the NOV, and associated documentation. The inspectors reviewed the corrective actions identified in the PIP. The corrective action included revisions to selected site procedure and additional training to selected site personnel. The inspectors verified that the corrective actions identified in the PIP had been completed. The inspectors concluded that the licensee's implementation of the corrective action adequately addressed the concerns associated with the violation. This violation is closed.

08.3 (Closed) VIO 50-269,270,287/E96-19-01013: Inadequate Procedure Control Over Movement of Spent Fuel

The inspectors performed followup inspection of licensee corrective actions to address the failure to provide adequate procedures for fuel handling activities. The inspectors reviewed revised fuel handling procedures for activities within the RB, spent fuel building and the interim spent fuel storage installation. During the review, the inspectors confirmed that the licensee had incorporated specific instructions to verify that fuel assemblies were properly positioned in acceptable storage locations and the fuel bridge mast was properly secured. The licensee also incorporated procedural guidance to inform control room operators of fuel handling evolutions in progress and to provide notifications when these activities were completed or suspended.

In accordance with a commitment made during the February 21, 1996, pre-decisional enforcement conference, the licensee performed a Self-Initiated Technical Audit (SITA) to evaluate and review plant design basis and fuel handling activities. As a result of the SITA, the licensee indicated their intention to provide additional guidance to operators to ensure spent fuel pool water level is maintained at least eight feet above the top of the irradiated fuel storage racks to have adequate shielding during SSF events. This was verified to be implemented in procedures. The inspectors concluded that the licensee's implementation of these corrective actions adequately addressed the concerns associated with the violation. This violation is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62707, 61726)

The inspectors observed all or portions of the following maintenance activities:

- TT/2/A/0750/017 Recovery of Jammed Control Rod Handling Tool, Revision 0
- MP/0/A/1500/009 Fuel Handling Operations, Revision 15

- PT/0/A/0400/004 Standby Shutdown Facility (SSF) Diesel Engine Service Water Pump Test, Revision 16
- CP/1/A/2002/04D Test Procedure for Operation of Post Accident Liquid Sample System, Revision 25
- PT/0/A/0750/11 Defueling/Refueling Activities Enclosure 13.1 Fuel Movement Verification Form Core Offload Sequence, Revision 14
- OP/2/A/1106/006 Turbine Driven Emergency Feedwater Pump Overspeed Test, Revision 78
- PT/2/A/0610/001J Emergency Power Switching Test, Revision 18
- PT/3/A/0204/007 Reactor Building Spray Pump Test, Revision 50
- PT/1/A/0251/003 Concentrated Boric Acid Transfer Pump Test, Revision 35
- PT/3/A/0152/016 Purge System Valve Stroke Test, Revision 1
- PT/1/A/0400/007 SSF Reactor Coolant (RC) Make Up Pump Test, Revision 25
- PT/0/A/0400/004 SSF Diesel Engine Service Water Pump Test, Revision 16
- WO 96030944-01 2CCW-14 Repair Seat Leak on Valve
- WO 98020989-01 Repair ½ Inch Hole in TDEFW Pipe
- WO 98010010-01 Repack Unit 2 TDEFW Pump

b. Observations and Findings

The inspectors found the work performed under these activities to be professional and thorough. All work observed was performed with the work package present and in use. Technicians were experienced and knowledgeable of their assigned tasks. The inspectors frequently observed supervisors and system engineers monitoring job progress. Quality control personnel were present when required by procedure. When applicable, appropriate radiation control measures were in place.

The inspectors documented in NRC Inspection Report (IR) 50-269,270,287/97-10, a trip of the Unit 2 reactor, from 100 percent power, due to the automatic voltage regulator control network not being properly adjusted. The IR also documented the adjustment of the Unit 2 automatic regulator. The licensee committed to adjusting the Unit 1 and Unit 3 automatic regulators. The Unit 3 regulator was adjusted during a forced outage and performed adequately. The Unit 1 regulator was adjusted during the most recent refueling outage. The regulator performed adequately during the post refueling runback and power escalation testing. These actions completed the commitment.

c. Conclusion

The inspectors concluded that the maintenance activities listed above were completed thoroughly and professionally.

On-line maintenance and surveillance activities involving the 3B reactor building spray pump, the concentrated boric acid storage tank transfer pump, the standby shutdown facility diesel engine service water pump, the standby shutdown facility reactor coolant make-up pump, and valves in the purge system were generally completed in a thorough and professional manner. Personnel were knowledgeable of the assigned tasks and demonstrated attention to detail. Procedures were detailed and actively used on the job. Data was recorded as the steps were performed and compared to the acceptance criteria. Pre-job briefings were thorough and communication between test personnel were good. Licensee performance during these evolutions was good.

The licensee properly completed a commitment to adjust the automatic voltage regulator for the main generators. These corrective actions were considered adequate resolution of the problem that previously resulted in a Unit 2 reactor trip.

M1.2 Augmented Inservice Inspection (ISI)

a. Inspection Scope (73753)

The inspector reviewed data from augmented ISI of the high pressure injection (HPI) connections to the main loop cold legs.

b. Observations and Findings

The licensee radiographed the HPI nozzle connections to the main loop cold legs to verify that required thermal sleeves were still located properly. Thermal sleeves were provided to protect the pressure boundary piping from thermal stresses when relatively cold water is injected into the operating system.

The inspectors reviewed the radiographs taken during the current outage, and compared them with the radiographs taken during the Spring 1997 outage. The comparison showed that there had been no measurable movement of the thermal sleeves.

The inspectors reviewed ultrasonic test (UT) data from inspection of the HPI piping and safe-end connections to the nozzle connections. The inspectors also reviewed the licensee's plans for the UT inspection of the inner radius of the nozzle connection to the main loop cold legs. To provide meaningful inspection results, the planned inspections required the use of a calibration block with cracks rather than notches as the reference standard. Receipt of the calibration block was scheduled for the week of April 12, 1998.

c. Conclusions

The licensee's augmented inservice inspection programs for the high pressure injection connections to the main loop have been improved since

the piping failure in the Spring of 1997.

M1.3 Once Through Steam Generator (OTSG) Inspections

a. Inspection Scope (50002)

The inspector reviewed OTSG inspection procedures and observed Unit 2 OTSG inspection activities.

b. Observations and Findings

The eddy current inspection of the Unit 2 OTSGs included 100 percent bobbin coil inspection of the inservice tubes. During the bobbin coil inspection of the 2A OTSG, the licensee discovered five tubes which had been improperly installed during the manufacture of the OTSG. The five tubes involved were installed at locations R21-C28, R21-C29, R22-C30, R22-C31, and R23-C31. The tubes were installed such that they were in one location in the lower tubesheet (LTS) and then crossed over to an adjacent location in the upper tubesheet (UTS). The tube from location R21-C28 in the LTS crossed to location R22-C30 in the UTS; LTS R22-C30 crossed to UTS R23-C31; LTS R23-C31 crossed to UTS R22-C31; LTS R22-C31 crossed to UTS R21-C29; and finally LTS R21-C29 crossed to UTS R21-C28.

The "twisted-tube" problem was discovered because two of the tubes were supposed to have been plugged during the Unit 2, End of Cycle-15 (EOC-15) outage; in fact they were only plugged at the LTS. Full-length bobbin coil eddy current examinations have historically been conducted from the lower tubesheet of the OTSGs. As a result of eddy current examinations in EOC-15, tubes R21-C28 and R23-C31 (as indexed from the lower tubesheet) were found to have rejectable indications and were plugged. (That is, locations R21-C28 and R23-C31 on both tubesheets were plugged.) During EOC-16 attempts to eddy current inspect locations R21-C29 and R22-C30, obstructions were noted which turned out to be the plugs which had been installed at UTS locations R21-C28 and R23-C31. The licensee generated PIP 2-098-1617 to document the problem, corrective actions, and potential impact on the operating Units 1 and 3.

The OTSG is a vertical, straight tube heat exchanger. With this design, the tube locations should match in the upper and lower tubesheets. The presumption that these tube locations are as designed is the basis by which all tube inspections and repairs are accomplished. Tube plugging requires positive identification of the tube by its location in each tubesheet; because of the design, there is not a requirement that the tube be verified to be the same tube "hole" in each tubesheet.

To determine the scope of the manufacturing problem, the licensee used eddy current equipment located on both upper and lower tubesheets to verify that the remainder of the tubes were at the same tube locations in both tubesheets. When it was determined that the set of five "twisted" tubes were unique in the 2A OTSG, the licensee elected to remove all five tubes from service by plugging.

The licensee conducted in-situ pressure testing of ten tubes from the 2A OTSG during the EOC-16. The tubes were subjected to test pressures of 1450 pounds per square inch (psi), 2900 psi, and 4300 psi, representing

normal operating differential pressure, main steam line break differential pressure, and Regulatory Guide 1.121 Structural Limit Pressure, respectively. Tubes tested were as follows:

<u>Tube</u>	<u>Defect Type</u>	<u>Location</u>	<u>Comments</u>
R6-C10	Axial	9th-10th	
R20-C28	Mixed	UTE-UTS	Leaker found during bubble test
R22-C30	Axial	14th-UTS	Mispositioned R21-C28 Lower
R22-C31	Axial	14th-UTS	Mispositioned R23-C31 Lower
R26-C3	Volumetric	2nd-3rd	
R32-C2	Axial	12th-13th	
R46-C21	Axial	10th-11th	
R73-C17	Axial	15th-UTS	
R145-C35	Axial	12th-14th	
R150-C19	Axial	15th-UTS	

The inspectors witnessed the in-situ pressure testing of tubes R22-C30 and R22-C31, which had been left in service with only the LTS plugged. Both of these tubes successfully passed pressure testing at 1450 psi (operating differential pressure) and 2900 psi (main steam line break pressure). Tube R22-C30 passed the Reg. Guide 1.121 structural limit pressure test at 4300 psi, but R22-C31 developed a through-wall leak at about 4200 psi. (The leak was determined to be through an axial indication just below the UTS.) The fact that the two defective tubes, left in service with only one end plugged, passed the main steam line break differential pressure test provided assurance that these tubes should have maintained leak integrity during accident conditions during the past operating cycle.

The inspectors also reviewed the licensee's justification for continued operation of Units 1 and 3, considering the potential for having rotated tube groups similar to the one found in the 2A OTSG. After reviewing the calculations, which included stresses expected if the rotation occurred between the two closest spaced support plates, and having witnessed the pressure testing of the 2A OTSG degraded tubes, the inspectors agreed that there should be no concern that would require shutdown and inspection of either of the units prior to the next scheduled refueling.

c. Conclusions

Inspection and testing of the Unit 2 once through steam generators were being conducted in a thorough and conservative manner. Unexpected

findings were thoroughly evaluated for significance and potential impact on the operating units.

M1.4 Emergency Power Switching Test

a. Inspection Scope (61726)

The inspectors observed, reviewed, and discussed the performance of the 18-month Technical Specifications (TS) required emergency power switching test. The test was performed to verify that the main feeder busses are energized by the most reliable source without operator actions.

b. Observations and Findings

The test, Procedure PT/2/A/0610/01J, Emergency Power Switching Logic Functional Test, Revision 18, consisted of manually tripping switchyard breakers, manually initiating engineered safety channels, and disabling selected relays. The relays were disabled to ensure that only the load shed relays would actuate the breakers. During the conduct of the test the inspectors observed several items which required on the spot procedure changes and the issuance of test discrepancies. The test coordinator issued PIP Report 2-098-2393 to document and track discrepancies. Among the items were the following:

- Enclosure 13.1 required the undervoltage relays for the individual 4160 volt (V) switchgear breakers to be disabled prior to performing the test, however, Section 12.4 required the same undervoltage relays to be checked for proper operation following a power transfer;
- Section 8.19, referred to a mislabeled undervoltage relay on a breaker for the SSF;
- Section 12.5 directed the operators to manipulate a switch on the wrong Engineered Safeguards (ES) panel and channel and;
- Section 8.33 omitted several breakers from the lists for removal of red breaker closed indicating bulbs and for verifying voltage on opened links, and improperly identified an open link.

The inspectors found from the reviews, observations, and discussions that none of the changes or discrepancies had an impact on the success of the test. The inspectors did find that these changes and discrepancies could have been avoided if a more thorough pre-test technical and administrative review had been performed.

c. Conclusions

The inspectors concluded that the Unit 2 emergency power switching logic test was successfully performed. This was indicative of adequately maintained equipment.

A more thorough pre-test review of the procedure for the Unit 2 emergency power switching logic test could have precluded some of the

minor discrepancies observed during the test and was considered a weakness.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Keowee Activities

a. Inspection Scope (37551, 92903, 93702)

The inspectors reviewed drawings, observed activities, reviewed procedures, and discussed with licensee personnel the circumstances surrounding three different events affecting Keowee Hydro Units 1 and 2.

b. Observations and Findings

On April 9, 1998, Keowee Units 1 and 2 were operating to the grid producing commercial power. Both units received an emergency start signal and separated from the grid as designed. On April 20, 1998, Keowee Unit 2 failed to synchronize to the grid during a normal start. On April 26, 1998, with Keowee Unit 1 tied to the grid at 78 megawatts and Unit 2 in standby, an undervoltage and an overcurrent condition was received by Unit 1. The over current condition lasted for one second and the undervoltage condition lasted for 13 seconds.

The emergency start on April 9, 1998, was caused by an inadvertent start signal from Oconee Unit 2, which was in refueling outage. Maintenance activity of wire tracing was being performed in the Keowee Emergency Start Channel A cabinet in the Oconee Unit 2 cable room. A four hour non-emergency notification was made to the NRC based on the possibility that the start was triggered by an Engineered Safeguards Features (ESF) module. The maintenance activities required the door to the cabinet to be open. The event occurred when the cabinet and/or relay was bumped. The licensee initiated PIP K-098-1854 to troubleshoot and attempt to determine the root cause of the actuation. Subsequently, licensee personnel were able to duplicate the event, but were unable to pinpoint the exact cause. Suspected modules were changed out and the licensee will monitor the system. At the end of the inspection period, the licensee retracted the notification but indicated that they may submit a voluntary LER.

When Keowee Unit 2 failed to synchronize during a normal start on April 20, 1998, the licensee declared the unit inoperable and issued PIP K-098-2061. During the inspectors' review of troubleshooting activities, the licensee revealed that the speed adjustment motor for the governor had failed. The cause of the failure was excessive carbon dust, produced by motor brush operation, in the motor. The motor was cleaned and the unit was returned to operable status. An inspector review of the operating controls and schematic, a review of vendor information on governor operation, and discussions with the licensee indicated that the failure of the motor did not affect the safety function of the unit. The motor adjusts the base speed of the unit between 58 and 63 hertz and it is used to auto synchronize the unit to the grid during normal start operation. The circuit used to synchronize

to the grid automatically is not required during a safety related emergency start operation. The licensee was considering preventive maintenance on the motors.

The licensee initiated a failure investigative process (FIP) team and PIP K-098-2215, to review the April 26, 1998, overcurrent and undervoltage condition on Keowee Unit 1. Based on the reviews, observations, and discussions, the inspectors understood the following:

- The Oconee Unit 2 control room operators closed a switchyard breaker to backfeed the unit from the grid through it's main and auxiliary transformers;
- the Keowee operators observed an electrical disturbance and the Keowee plant computer indicated a high current indication with a low voltage condition;
- the Keowee plant computer indicated that the high current condition cleared within 1 second and the low voltage condition lasted for approximately 13 seconds;
- a review of the event recordings of such items as the switchyard yellow buss voltage, the Oconee Units 1 and 3 generator outputs, and the megavolts reactive (MVARs) indicated that a transient of approximately 13 seconds occurred when the main and auxiliary transformers were brought on to the grid; and
- the FIP team did not observe the presence of any phase to phase detrimental harmonics, a check of the electrical condition of the transformers indicated no deficiencies, and a review of historical data indicated that low voltage conditions had occurred during backfeed operations.

The inspectors found that the 13 second transient on the grid and on the Oconee units corresponded to the 13 second Keowee low voltage condition. The inspectors also found that the electrical disturbance observed by the Keowee operators was a normal MVAR transient resulting from placing the transformers, a large electrical load, on to the grid. A review of historical information indicated that in the past the transformers had not been placed on to the grid with any of the Keowee units on line.

c. Conclusions

Retraction of the four hour notification for the Keowee Unit 1 unanticipated start of April 9, 1998, was appropriate.

The technical resolution of the failure of the Keowee Unit 2 speed changer motor on April 20, 1998, was adequate. The inspectors concluded that the failure of the speed adjustment motor on April 20, 1998, did not affect the safety function of Keowee Unit 2 but did reflect poorly on the material condition of the the speed adjustment motor. The licensee used conservative judgement in declaring the unit inoperable due to failure of the speed adjustment motor. Good engineering support was provided and good troubleshooting methods were used on the speed adjustment motor.

The performance of the licensee's failure investigative process team concerning the Keowee Unit 1 overcurrent and undervoltage disturbance of April 26, 1998, was excellent.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) LER 50-269/97-05: Low Pressure Service Water System (LPSW) Outside Design Basis for High Trajectory Turbine Missile

The circumstances surrounding this item have been previously discussed in IR 50-269,270,287/97-02 and IR 50-269,270,287/97-05. Enforcement discretion for this issue was granted in the cover letter for IR 50-269,270,287/97-05 dated July 18, 1997.

The inspectors evaluated this LER describing operation of the Oconee Units 1, 2, and 3 outside system design basis for high trajectory turbine missiles. The inspectors verified that the installed system did not conform to the design basis description. To correct the situation, the licensee made changes to the UFSAR to revise the design basis description for the system. The revision allowed use of industry and NRC guidance concerning vulnerable target area and probability of impact of a turbine missile without shielding or separation protection. The change was submitted for review and accepted by the staff. No unreviewed safety questions were identified. The inspectors determined that the revision to the design basis, approved by the staff in correspondence dated May 16, 1997, was an adequate change to the plant design and was confirmation that no other corrective actions were necessary. Additionally, the licensee's effort to understand their design was adequate. The inspectors also noted that operability of the LPSW system was maintained. This LER is closed.

E8.2 (Closed) LER 50-269/96-05: Failure to Perform TS Required Inspection

This LER identified an issue in which the licensee failed to perform a TS required inspection of snubber S/R# 1-03-401H. Specifically, the licensee failed to perform an 18-month inspection of the snubber as required by TS 4.18.1. Documentation reviewed indicated that following a modification, implemented in January 1993, the accountable engineer failed to ensure that the snubber had been entered into the TS surveillance maintenance procedure. PIP 1-096-1497 provided corrective actions to change procedures for engineering personnel to review snubbers for TS applicability and to ensure proper testing. Following the review of all associated documentation, the inspectors concluded that the corrective actions identified by the licensee were adequate to provide reasonable assurance of not missing TS required inspection when new snubbers are installed. The inspectors also verified that each of the corrective actions had been implemented.

The inspectors also concluded that the failure to perform the TS required inspection was a violation. However, this non-repetitive, licensee-identified and corrected violation is being treated as a Non-Cited Violation (NCV), consistent with Section VII.B.1 of the NRC Enforcement Policy. This is identified as NCV 50-269/98-05-02; Failure to Perform Snubber Inspection as Required by TS.

E8.3 (Closed) Inspector Followup Item (IFI) 50-269,270,287/96-13-03: Testing of the Modifications to the Low Pressure Service Water System.

The inspectors reviewed the following test procedures:

- PT/2/A/0261/007 Revision 18, Emergency CCW System Flow Test
- TT/0/A/0251/070 Revision 0, Siphon Seal Water Test
- TT/2/A/0261/010 Revision 0, ECCW/ESV Integrated Post-Modification Test
- PT/2/A/0251/023 Revision 8, LPSW Flow Test

The above listed procedures were reviewed for precautions, limitations, test acceptance criteria and contingency planning. The inspectors attended pre-job briefings for the procedures, and witnessed the performance of portions of each test. The acceptance criteria for each test was successfully met. The LPSW flow test demonstrated that the new essential siphon vacuum (ESV) system could maintain the condenser circulating water (CCW) system headers full of water with one operating unit (Unit 1) and one shutdown unit (Unit 2) taking LPSW suction from the unit 2 CCW crossover header in siphon flow.

The inspectors noted that the procedures were well written and required no changes and only a few enhancements were identified during the conduct of the procedures. The inspectors attended the pre-job briefing for several of the procedures and observed that the briefings were thorough. The briefings included the purpose of the testing, the precautions and limitations, the general outline of the test, the test acceptance criteria, and the contingency plans for terminating the test. Personnel safety and self-checking were emphasized. The importance of slow deliberate actions were emphasized and caution was stressed. The inspectors also observed operations shift turnovers. These were conducted in a very professional manner. The status of the testing was discussed as well as the expected results and changes in plant configurations that would occur during the testing were addressed. The test coordinators were very effective in conducting the testing and were very familiar with the procedures. Good control of the testing evolutions was demonstrated by the test coordinators observed.

This testing demonstrated the ability of the ESV system to maintain the emergency condenser circulating water (ECCW) first and second siphon for a period of at least eight hours. At the end of the LPSW flow test, the headers were still full of water and thus were capable of providing cooling water for the ECCW. These modifications and testing complete the required actions for the closure of this item on Unit 2. The Unit 3 ESV system was scheduled to be completed during the Fall 1998 outage and Unit 1 in the Spring 1999 outage. While the test acceptance criteria for the ECCW/ESV integrated test was met, a review by the licensee's engineering department identified that the air removal rate was less than the design rate of the ESV system. Discussion with the float valve manufacturer indicated that the float may be too light for the test conditions experienced at the time of the test. The licensee was in the process of modifying and testing different float weights to improve the

air removal rate. Based on the results of this testing the licensee was planning to modify the Unit 2 installed float valves and to re-run the ECCW/ESV integrated test.

The testing to be conducted on Units 3 and 1 is similar to the testing that has been completed on Unit 2. These tests will include a hydrostatic test of the units piping to the CCW pumps and motors and ESV tanks and pumps, a Siphon Seal Water (SSW) test to verify adequate SSW flow to the unit pumps and motors, an ECCW system flow test to verify the amount of air in leakage, an ECCW/ESV integrated test to verify that the ESV system can remove air from the ECCW siphon headers, and a LPSW flow test to demonstrate the LPSW pumps can take a suction from the ECCW siphon for an extended period of time. Successful completion of this testing on each unit will be identified as IFI 50-269,287/98-05-03: Units 1 and 3 Low Pressure Service Water Testing.

IV. Plant Support Areas

R1 Radiological Protection and Chemistry Controls

R1.1 Tour of Radiological Protected Areas

a. Inspection Scope (83750)

The inspectors reviewed implementation of selected elements of the licensee's radiation protection program as required by 10 CFR Parts 20.1201, 1501, 1502, 1601, 1703, 1802, 1902, and 1904. The review included observation of radiological protection activities including personnel monitoring controls, control of radioactive material, radiological surveys and postings, and radiation area and high radiation area controls.

b. Observations and Findings

During tours of the turbine building, reactor building, auxiliary building, and radioactive waste storage and handling facilities, the inspectors reviewed survey data and performed selected independent radiation and contamination surveys to verify area postings and labeling of radioactive material. The inspectors also reviewed storage locations for radioactive material and radioactive sources. Observations and survey results determined the licensee was effectively controlling and storing radioactive material. However, the inspectors observed three exempt quantity sources used for source checking instruments that were not marked as radioactive material. The licensee returned these unlabeled exempt quantity sources to labeled containers. These exempt quantity sources are not subject to NRC regulations. The licensee initiated a PIP to investigate the controls for these sources. Also, the inspectors discussed the storage of some flammable radioactive sources in storage lockers with other hazardous materials. The licensee was in the process of obtaining a special locker for these sources. The licensee initiated a PIP Report 0-098-1475, to review the controls for storage and handling of radioactive sources.

During plant tours, the inspectors observed that extra high radiation areas (locked high radiation areas) were locked as required by licensee procedures. The inspectors reviewed key controls for extra high radiation area and very high radiation area keys. The inspectors inventoried key storage locations and all keys were accounted for at the time of the inspection. The licensee had logged keys out to personnel qualified to work in these areas and the key boxes were locked when not in use as required by procedure to maintain control of the keys. Logs reviewed determined the keys had been accounted for once a shift. However, the inspectors found a means to bypass the lock on a desk that contained a key to open the box that stored the extra high radiation keys. The inspector discussed the potential for bypassing existing key controls with licensee management. The licensee removed the key from the desk drawer and initiated PIP Report 0-098-1471, to review the controls for the desk drawer containing the key. The inspectors also observed appropriate dosimetry controls for these areas were established in radiation work permits (RWPs) as required by licensee procedures.

The licensee's records determined the licensee was maintaining approximately 126,081 square feet (ft²) of floor space as a radiologically controlled area (RCA). Records also determined the licensee maintained approximately 559 ft² or less than 1 percent of the RCA as contaminated during the week of the inspection.

The inspectors reviewed personnel contamination event (PCE) reports prepared by the licensee to track, trend, determine root cause, and any necessary followup action. The licensee established a goal of 216 PCEs for 1998. As of March 26, 1998, approximately 45 PCEs had occurred during 1998 which included both particles and dispersed contamination events for clothing and skin contaminations. Licensee efforts in 1998 to reduce personnel contaminations had been positive.

RWPs established for performing work were reviewed. These controls included the use of RWPs to be reviewed and understood by workers prior to entering the RCA. The inspectors reviewed selected RWPs for adequacy of the radiation protection (RP) requirements based on work scope, location, and conditions. For the RWPs reviewed, the inspectors noted that appropriate protective clothing, and dosimetry were required. During tours of the plant, the inspectors observed the adherence of plant workers to the RWP requirements.

c. Conclusions

Based on observations and procedural reviews, the inspectors determined the licensee was effectively maintaining controls for personnel monitoring, control of radioactive material, radiological postings, radiation area controls, and high radiation area controls as required by 10 CFR Part 20. Efforts to reduce personnel contaminations were positive

R1.2 Occupational Radiation Exposure Control Program

a. Inspection Scope (83750)

The inspectors reviewed the licensee's implementation of 10 CFR 20.1101(b) which requires that the licensee shall use, to the extent practicable, procedures and engineering controls based upon sound RP principles to achieve occupational doses and doses to members of the public that are As Low As Reasonably Achievable (ALARA).

b. Observations and Findings

The inspectors interviewed licensee personnel and reviewed records of ALARA program results and activities.

An effective Unit 2 chemical shutdown crudburst had resulted in reactor building average dose rate reductions of approximately 1 millirem/hour. Dose rates in the steam generator bowls were reduced by approximately twenty-one percent. The licensee had established an annual exposure projection for 1998 of approximately 292 person-rem or 97.3 person-rem/unit. The licensee established an exposure goal of 109 person-rem for the current Unit 2 refueling outage. At the time of the inspection, the licensee was tracking approximately 44 person-rem year to date which was below year to date estimates of 64 person-rem. All personnel exposures to date in 1998 were below regulatory limits.

During tours of the facility, the inspectors observed RP technicians controlling access to work areas to minimize personnel exposure and briefing workers in the work areas as radiological conditions changed. The inspectors also observed effective use of shielding, teledosimetry, remote cameras and wireless communications systems for controlling personnel exposures during maintenance evolutions.

The inspectors attended an ALARA committee meeting where the licensee discussed responsibilities of the ALARA committee, current radiation exposure status for the site, Unit 2 outage exposure status and goals, temporary and permanent shielding projects, and future ALARA initiatives. The meeting was well managed and participation and attendance by primary committee members was observed to be good.

c. Conclusions

Based on licensee planning efforts to reduce source term and the licensee's efforts to achieve established exposure goals which were challenging, the inspectors determined the licensee's programs for controlling exposures ALARA were effective. All personnel exposures to date in 1998 were below regulatory limits.

R2 Status of RP&C Facilities and Equipment

R2.1 Breathing Air Testing and Quality

a. Inspection Scope (83750)

Title 30 CFR 11.121 requires that compressed, gaseous breathing air meet the applicable minimum grade requirements for Grade D or higher quality. Title 10 CFR Part 20 Subpart H provides requirements for respiratory protection programs. Title 10 CFR 20.1501 requires licensees ensure instruments and equipment used for quantitative radiation measurements are calibrated.

b. Observations and Findings

The inspectors reviewed and discussed with the licensee representatives the program for testing and qualifying breathing air as Grade D. The inspectors examined breathing air manifolds for physical integrity and current calibration of gauges. In addition, the inspectors further noted that the supplied air hoods and hoses available for use were compatible per manufacturer's instructions as were air supplied respirators and hoses. All respiratory protection equipment observed during facility tours was being maintained in a satisfactory condition. During facility tours, the inspectors noted that survey instrumentation and continuous air monitors observed in use within the RCA were operable and currently calibrated. The inspectors toured the instrument calibration room and discussed the portable instrument program with cognizant personnel. The inspectors determined the licensee had an adequate number of survey instruments available for use during the outage and the instruments were being calibrated and source checked as required by licensee procedures.

c. Conclusions

Review of breathing air testing records verified that the licensee was calibrating breathing air compressor equipment and sampling in-use breathing air systems for certification in accordance with procedural requirements. For the tests reviewed, breathing air met Grade D or better quality requirements. The respiratory protection program was being implemented as required by 10 CFR Part 20 Subpart H. Survey instrumentation had been adequately maintained.

R4 Staff Knowledge and Performance in RP&C

R4.1 Observations of Source Control and Frisking Requirements

a. Inspection Scope (71750)

The inspectors toured radiological areas, interviewed personnel, and reviewed licensee procedures in accordance with Inspection Procedure 71750 for sampling, personnel monitoring, and control of sources.

b. Observations and Findings

The inspectors located and reviewed requirements for the following sources:

- Two Cs-137 sources of approximately 8 microcuries located in the shift RP area, used for background check sources, were found attached to two clipboards;
- The sources located in the body burden room were contained in a locked cabinet. These sources were two Eu-152 sources of approximately 3 microcuries, one old internal check source from a Victorine 497 (a depleted Uranium source), and two CS-137 sources;
- An Am-241 and a Cs-137 source were located in the respirator area in a cardboard box with yellow and magenta tape; and,
- The source at the Independent Spent Fuel Storage Facility (ISFSI) area was for frisker background check and was located in a shielded lead lock box, the source was a depleted Uranium source also from a Victorine 497.

The above listed sources were identified as exempt sources used for instrument checks. No NRC requirements for exempt sources were identified.

While touring the Interim Radwaste Storage Building the inspectors observed that there was no personnel contamination monitor present. The facility was part of the RCA and was posted as a radiation area. The inspectors reviewed the frisking requirements for the facility and determined that a whole body frisk was required upon exit. There was a hand-held frisker available that could be used to perform a whole body frisk. The inspectors later accompanied several RP and chemistry personnel to the facility; all frisked properly upon leaving.

The inspectors observed a chemistry technician obtaining a reactor coolant system (RCS) sample. The technician wore appropriate personnel protective devices, observed applicable RP practices, stayed on station during sample flush and collection, and took satisfactory safety actions. The procedure was a reference use procedure and was taken to the sample site. Operations was notified prior to starting to sample the RCS as required by procedure. The sample sink hood sash was maintained below the maximum height posted and the sample sink was posted appropriately. The technician changed gloves frequently and frisked upon completion of obtaining the sample. The inspectors verified that the sample rooms are normally unlocked spaces. The door to the back of the sample sink is kept locked for contamination control reasons but is not required to be locked.

c. Conclusions

The inspectors concluded that the check sources identified by the inspectors were exempt sources and were controlled appropriately. Personal frisking practices in the Interim Radwaste Facility were

acceptable. Chemistry personnel were knowledgeable and competent during collection of the RCS sample.

R5 Staff Training and Qualification

R5.1 RP Technician Training

a. Inspection Scope (83750)

Training of RP technicians was reviewed to determine whether the technicians had been provided adequate training in procedures to minimize radiation exposures and control radioactive material as required by 10 CFR Part 19.12.

b. Observations and Findings

The inspectors discussed training requirements with training personnel, reviewed lesson plans and reviewed qualification records for personnel operating portable survey instruments and count room equipment. The inspectors compared training records for qualified individuals to daily and weekly survey records and determined personnel performing equipment checks had been formally qualified to use the survey instruments. The inspectors interviewed five personnel and discussed instrument background checks, source checks, use of sample containers, and counting procedures. The inspectors also discussed instrument calibration and counting procedures with cognizant technical personnel. The inspectors determined the licensee was following established procedures for the use of counting equipment. During facility tours, the inspectors observed work practices to determine the effectiveness of survey activities involving radiation and control of radioactive material.

c. Conclusions

Based on the training activities reviewed and interviews, the inspectors determined the radiation protection technicians had been provided an adequate level of training to perform routine survey activities involving radiation and control of radioactive material.

R8 Miscellaneous RP&C Issues

R8.1 (Closed) Unresolved Item (URI) 50-269,270,287/97-15-03: Determine the Applicability of Monitoring Requirements of Criterion 64 of 10 CFR 50 Appendix A and Reporting Requirements of 40 CFR 190 and 10 CFR 50.36a Regarding Potential of Unmonitored Release Pathways

During tours of the auxiliary building and radioactive waste storage/handling facilities the week of October 27-31, 1997, the inspectors observed the licensee had performed radiological work in two onsite buildings, the reactor coolant pump building and the ice blast building, not specified as monitored pathways for radioactive material in the licensee's Offsite Dose Calculation Manual. The licensee's review of this issue confirmed only work involving low levels of radioactive material had been performed in the buildings. The licensee proposed a change to the UFSAR to provide additional requirements for the buildings when performing radioactive work. The inspectors reviewed

what the licensee did regarding this issue and this issue is closed.

R8.2 (Closed) URI 50-270/98-02-13: Unit 2 Monitor Inlet Sample Tubing Bend Radius Not as Described by Design Drawings

The inspectors identified on February 11, 1998, the Unit 2 vent RIA monitor inlet sample tubing for RIA's 43 and 44 did not appear to have the correct bend radius in two locations as specified on licensee configuration control and design drawings number(s) 0-440A, Revision 37 and 0-440B Revision 38, Auxiliary Building Piping Layout Plan. This concern was addressed as URI 50-270/98-02-13. The licensee initiated a PIP regarding this item, confirmed the tubing did not have the correct bend radius, and modified the tubing bend radius as specified on licensee configuration and design drawings.

10 CFR Part 50, Appendix B, Criterion V, requires that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances, and shall be accomplished in accordance with these instructions, procedures, or drawings. Duke Energy Corporation Topical Report Quality Assurance Program states Duke Energy Corporation conforms to applicable regulatory requirements such as 10 CFR 50, Appendix B.

This URI is being upgraded into a violation and is identified as VIO 50-270/98-05-04: Inadequate Configuration Control of Unit 2 RIAs-43 and 44 Particulate and Iodine Sample Tubing.

F8 **Miscellaneous Fire Protection Issues**

F8.1 (Closed) LER 50-269/98-007-00: Potential Operation Outside Design Basis for Appendix R Fire Due to an Inadequate Procedure

The circumstances described in this LER were documented in NRC IR 50-269,270,287/98-02. Affected procedures for LP-1, LP-2, CF-1, and CF-2 were placed on hold pending completion of revisions to incorporate provisions to prevent closing the breakers during post Appendix R fire damage assessments. The licensee also plans to develop appropriate circuit validation process for use during post Appendix R assessments. The failure to have an adequate procedure for operation of the valves following a fire is contrary to the requirements of Appendix R. The inspectors concluded that the licensee's identification and resolution of this issue were adequate. This non-repetitive, licensee-identified, and corrected violation is being treated as a NCV consistent with Section VII.B.1 of the NRC Enforcement Policy. This is identified as NCV 50-269,270,287/98-05-05: Inadequate Appendix R Procedure.

F8.2 (Closed) LER 50-269/96-03: Reactor Coolant (RC) Makeup System Technically Inoperable for Appendix R Scenario Due to Design Analysis

On February 5, 1996, the licensee identified that an evaluation completed in 1987 had assumptions on Reactor Coolant Pump (RCP) seal leakage that did not agree with the assumptions that the licensee was including in plant procedures. The licensee evaluated the situation and concluded that when the current RCP seal leakage limits were applied to an Appendix R scenario, the RC system leakage could have exceeded the

reactor coolant makeup system design limits. If an Appendix R fire caused valve 1HP-276 to spuriously open, the back pressure downstream of the RCP seals could decrease below the vapor pressure of the liquid passing through the seal, resulting in two phase flow across the seal. This could cause degradation of the seal, possibly resulting in failure and leakage in excess of design makeup flow.

The licensee took the immediate action of closing 1HP-276 and opening the breaker to the motor operator for the valve. The inspector verified that subsequently, the licensee revised procedures OP/1/A/1104/02, HPI System, OP/1/A/1102/01, Controlling Procedure for Startup, PT/1/A/1103/06, Reactor Coolant Pump Operation, and OP/1/A/1102/10, Controlling Procedure for Shutdown, to assure that when RCS temperature was greater than 250 degrees F, 1HP-276 would be closed with its breaker open. The breaker for 1HP-276 was labeled with a warning that closing the breaker with RCS temperature greater than 250 degrees F was in violation of the Appendix R requirements. The licensee's identification and resolution of this issue were adequate. This non-repetitive, licensee-identified, and corrected violation is being treated as a NCV consistent with Section VII.B.1 of the NRC Enforcement Policy. This is identified as NCV 50-269/98-05-06: Reactor Coolant Makeup System Inoperable for Appendix R Scenario.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on May 6, 1998. The licensee acknowledged the findings presented. No proprietary information was identified to the inspectors.

X2 Management Oversight Group Meeting

On April 22, 1998, the NRC Oconee Management Oversight Group met with Oconee Site Management to discuss trends in licensee performance. This was the first of the scheduled meetings. Meetings will be scheduled on an approximate bimonthly agenda.

X3 NRC License Renewal Team Meeting

On April 29, 1998, the NRC met with licensee management to discuss information and responses for the Oconee reactor building license renewal evaluation. This meeting was open to the public. This meeting was to gather information and therefore no specific findings were identified.

X4 NRC Management Meetings

On April 22, 1998, Mr. Samuel J. Collins, Director of the Office of Nuclear Reactor Regulation and Mr. Luis Reyes, Regional Administrator, Region II, were at the site to tour the facility and meet with licensee personnel.

Partial List of Persons Contacted

Licensee

L. Azzerello, Mechanical Systems Engineering Manager
 E. Burchfield, Regulatory Compliance Manager
 T. Coutu, Nuclear Section Manager, Valves
 T. Curtis, Operations Superintendent
 W. Foster, Safety Assurance Manager
 D. Hubbard, Maintenance Superintendent
 C. Little, Electrical Systems/Equipment Engineering Manager
 W. McCollum, Vice President, Oconee Site
 M. Nazar, Manager of Engineering
 J. Forbes, Station Manager
 J. Smith, Regulatory Compliance
 J. Twiggs, Manager, Radiation Protection

Other licensee employees contacted during the inspection included technicians, maintenance personnel, and administrative personnel.

NRC

D. LaBarge, Project Manager

Inspection Procedures Used

IP37551	Onsite Engineering
IP37828	Installation and Testing of Modifications
IP40500	Effectiveness of Licensee Controls In Identifying and Preventing Problems
IP50002	Steam Generators
IP61726	Surveillance Observations
IP62707	Maintenance Observations
IP71707	Plant Operations
IP71750	Plant Support Activities
IP73753	Inservice Inspection
IP83750	Occupational Exposure
IP84750	Solid Radioactive Waste Management and Transportation of Radioactive Materials
IP92700	Onsite Followup of Written Event Reports
IP92901	Followup - Plant Operations
IP92902	Followup - Maintenance
IP92903	Followup - Engineering
IP92904	Followup - Plant Support
IP93702	Prompt Onsite Response to Events

Items Opened, Closed, and Discussed

Opened

50-269,270,287/98-05-01	VIO	Inadequate Corrective Actions for Recurring Problems With Engineering Instructions for Minor and Temporary Modifications (Section 07.1)
50-269/98-05-02	NCV	Failure to Perform Snubber Inspection as Required by TS (Section E8.2)
50-269,287/98-05-03	IFI	Units 1 and 3 Low Pressure Service Water Testing (Section E8.3)
50-270/98-05-04	VIO	Inadequate Configuration Control of Unit 2 Vent Monitor Particulate and Iodine Sample Tubing (Section R8.2)
50-269,270,287/98-05-05	NCV	Inadequate Appendix R Procedure (Section F8.1)
50-269/98-05-06	NCV	Reactor Coolant Makeup System Inoperable for Appendix R Scenario (Section F8.2)

Closed

50-269,270,287/96-20-04	VIO	Failure to Have RB Material Condition Closeout Procedure (Section 08.1)
50-269,270,287/96-05-01	VIO	Failure to Make Proper 10 CFR 50.72 Notification (Section 08.2)
50-269,270,287/E96-19-01013	VIO	Inadequate Procedure Control Over Movement of Spent Fuel (Section 08.3)
50-269/97-05	LER	LPSW System Outside Design Basis for High Trajectory Turbine Missile (Section E8.1)
50-269/96-05	LER	Failure to Perform TS Required Inspection (Section E8.2)
50-269,270,287/96-13-03	IFI	Testing of the Modifications the Low Pressure Service Water System (Section E8.3)

50-269,270,287/97-15-03	URI	Determine the Applicability of Monitoring Requirements of Criterion 64 of 10 CFR 50 Appendix a and Reporting Requirements of 40 CFR 190 and 10 CFR 50.36a Regarding Potential of Unmonitored Release Pathways Section (Section R8.1)
50-270/98-02-13	URI	Unit 2 Monitor Inlet Sample Tubing Bend Radius Not as Described by Design Drawings (Section R8.2)
50-269/98-07-00	LER	Potential Operation Outside Design Basis for Appendix R Fire Due to an Inadequate Procedure (Section F8.1)
50-269/96-03	LER	RC Makeup System Technically Inoperable for Appendix R Scenario Due to Design Analysis (Section F8.2)

List of Acronyms

ALARA	As Low As Reasonably Achievable
ASME	American Society of Mechanical Engineers
BTO	Block Tag Outs
B&W	Babcox & Wilcox
CCW	Condenser Circulating Water
CFR	Code of Federal Regulations
ECCW	Emergency Condenser Circulating Water
EOC	End-of-Cycle
ES	Engineered Safeguards
ESF	Engineered Safeguards Features
ESV	Essential Siphon Vacuum
F	Fahrenheit
FT ²	Square Feet
FIP	Failure Investigation Process
HPI	High Pressure Injection
IFI	Inspector Followup Item
IP	Inspection Procedure
IR	Inspection Report
ISFSI	Independent Spent Fuel Storage Installation
ISI	Inservice Inspection
LDST	Letdown Storage Tank
LER	Licensee Event Report
LPI	Low Pressure Injection
LPSW	Low Pressure Service Water
LSE	Less Significant Events
LTS	Lower Tubesheet
MVAR	Megavolt Reactive
NCV	Non-Cited Violation
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission

NSD	Nuclear System Directive
OSM	Operations Shift Manager
OTSG	Once Through Steam Generator
PCE	Personnel Contamination Event
PDR	Public Document Room
PIP	Problem Investigation Process
PSI	Per Square Inch
QA	Quality Assurance
RB	Reactor Building
RC	Reactor Coolant
RCA	Radiation Control Area
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RP	Radiation Protection
RWP	Radiation Work Permit
SFP	Spent Fuel Pool
SITA	Self-Initiated Technical Audit
SSC	Structure System Component
SSF	Standby Shutdown Facility
SSW	Siphon Seal Water
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
UT	Ultrasonic Test
UTS	Upper Tubesheet
V	Volt
VIO	Violation
WO	Work Order