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, SNM-2503
Report No:	50-269/98-07, 50-270/98-07, 50-287/98-07
Licensee:	Duke Energy Corporation
Facility:	Oconee Nuclear Station, Units 1, 2, and 3
Location:	7812B Rochester Highway Seneca, SC 29672
Dates:	June 14 - July 25, 1998
Inspectors:	M. Scott, Senior Resident Inspector S. Freeman, Resident Inspector E. Christnot, Resident Inspector D. Billings, Resident Inspector E. Girard, Regional Inspector (Section 08.6, E8.7) R. Gibbs, Regional Inspector (Sections E8.1, E8.2, E8.3, E8.4, E8.8) W. Rogers, Regional Inspector (Section E8.5, E8.6) R. Moore, Regional Inspector (Section E2.2, E4.1) M. Thomas, Regional Inspector (Section E7.1) D. Forbes, Regional Inspector (Sections R1.1, R1.2, R1.3, R4.1, R7.1)
Approved by:	C. Ogle, Chief, Projects Branch 1 Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY

Oconee Nuclear Station, Units 1, 2, and 3
NRC Inspection Report 50-269/98-07,
50-270/98-07, and 50-287/98-07

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 six regional inspectors. [Applicable template codes and the assessment for items inspected are provided below.]

Operations

- The licensee identified that the low temperature overpressure protection system was not single failure proof for all three units. (Section 01.2, [4A - Poor]).
- The licensee's identification and evaluation of a single failure vulnerability in the low temperature overpressure protection system were seen as positives. (Section 01.2 [5A, 5B, 4B - Adequate]
- The licensee has improved plant material condition and housekeeping as part of the recovery plan (**Recovery Plan**). (Section 02.3, [2A - Good])
- Management has explained its expectations regarding plant material condition to the staff and the staff has begun to implement these expectations (**Recovery Plan**). (Section 02.3, [3C - Good])
- The inspectors found the corrective actions for a failure to follow procedure violation to be reasonable and complete. (Section 08.1, [5C - Adequate])
- The corrective actions for a procedure administrative hold violation were adequate. (Section 08.3, [5C - Adequate])
- The licensee's corrective actions for a water hammer event on September 24, 1996, were adequate. (Section 08.3, [5C - Adequate])
- The inspectors concluded that the licensee exhibited a weakness in understanding surveillance requirements for the Unit 3 reactor building hatch testing. (Section 08.4, [1A, 3B - Poor])
- Weaknesses in the licensee clearance and work control process were the root cause of a Unit 2 reactor trip on June 3, 1998. (Section 08.5, [2B - Poor])
- Inappropriate actions by operations staff and inexperience on the part of the tagout administrator were contributing factors to the Unit 2 reactor trip on June 3, 1998. (Section 08.5, [3A, 3B - Poor])

Maintenance

- The licensee's identification of an unknown degradation of the Keowee hydroelectric units' field flash breaker moving contacts was adequate. (Section M1.2, [5A - Adequate])

- The analysis and resolution activities associated with an earlier Keowee hydroelectric unit's problem occurred before any breaker loss of function occurred. (Section M1.2, [5B, 5C - Good])

- A weakness existed in the followup and resolution of previous problems with the reactor building spray pumps' oil system. (Section M2.1, [5A - Poor])

- Engineering follow-up to the loss of oil in the reactor building spray pump on June 30, 1998, was good. (Section M2.1, [4B, 5B - Good])

- A non-cited violation was identified for inadequacies in the alignment procedures, the failure to verify magnetic center, and the installation of the wrong bearings in the low pressure service water pumps. (Section M8.1, [2A, 2B - Poor])

- The formation of the failure investigation process and associated investigation and corrective actions for low pressure service water pump bearings problems were good. (Section M8.1, [4B, 5B, 5C - Good])

- The failure to detect an incorrect part prior to installation in a valve was identified as a non-cited violation. (Section M8.2, [2B, 5A - Poor])

- The failure to adequately document activities in the problem investigation process for installation of the wrong parts in a low pressure service water valve was another example of a previously identified weakness. (Section M8.2, [5B - Poor])

- The licensee adequately resolved questions identified in an unresolved item regarding the use of Teflon tape. (Section M8.3, [4B, 5C - Adequate])

- The investigation and followup testing to confirm the effect of a mispositioned valve on the penetration room ventilation system was good. (Section M8.4, [5B, 5C, 4B - Good])

Engineering

- The use of a failure investigation process team to investigate failed relays in the emergency condenser circulating water system showed good sensitivity to the safety function of the relays. (Section E1.2, [2A, 4B -Good]

- As a result of the licensee's initiative and guidance, the Keowee vendor report was very comprehensive, the goal and objectives were precise, and

the scope was inclusive. The methodology for collecting field data, the input sources utilized, and the development of the data base for the study was excellent (**Recovery Plan**). (Section E2.1, [4C - Excellent])

- The Keowee vendor report consisted of a review of material conditions, equipment performance, identification of problems, and was communicated to the licensee very well (exit and written report) (**Recovery Plan**). (Section E2.1, [5A - Excellent])

- The licensee's initiative to have the Keowee study and report done, commit resources for its performance, schedule modifications and procedure changes, and the tracking of actions to resolve the issues was excellent (**Recovery Plan**). (Section E2.1, [4A, 5C - Excellent])

- Reactor building temperature conditions were appropriately monitored and maintained within the limits established by the associated Generic Letter 96-06 operability evaluations. (Section E2.2, [4B - Good])

- An engineering weakness was identified in that the modification process did not assure routine review and documentation of the general design criteria as design inputs. (Section E4.1, [4C - Poor])

- The 10 CFR 50.59 safety evaluation for the main steam line break modification was comprehensive and thorough. (Section E4.1, [4B - Good])

- The operability discussion provided in the problem description for Problem Investigation Process Report 0-098-0165 for low pressure injection valve stroke time issues was weak, in that there was not an adequate basis to support the conclusion that there was not an operability concern. (Section E7.1, [5B - Poor])

- There was a weakness in the timeliness of the resolution for Problem Investigation Process Report 0-098-0165, in that, the design stroke time requirement for low pressure injection system valves LP-21 and LP-22 was not determined prior to the performance of subsequent quarterly inservice test valve stroke time tests. (Section E7.1, [5C - Poor])

- There was an identified weakness in the interface between the inservice test program and the design control process, in that requirements from design output documents such as calculations and nuclear station modifications were not being incorporated into the inservice test program. (Section E7.1, [4C - Poor])

- The corrective actions for a violation regarding inadequate post-modification testing and inspection requirements were adequate. (Section E8.1, [5C - Adequate])

- Corrective actions for open items identified during the Maintenance Rule baseline inspection were effectively implemented. (Section E8.2, E8.3, E8.4, [2B, 5C - Good])

- The licensee's use of the 1996 PRA model revision results in the Expert Panel's determination of risk ranking and performance criteria were good. (Section E8.5, [2B, 5B, 5C - Good])

- Delaying inclusion of out-of-service equipment configurations considered prohibited by the Expert Panel into the on-line maintenance administrative procedure was a weakness. (Section E8.5, [2B, 5C - Poor])

- The licensee's corrective actions developed in the high pressure injection reliability study, in response to a violation involving the inoperability of three high pressure injection pumps, were adequate. (Section E8.6, [2B, 4B, 5C - Adequate])

- The licensee had thoroughly addressed the causes of two violations involving shortcomings in the inservice inspection program for high pressure injection nozzles and monitoring thermal stresses in the injection nozzles. (Section E8.7, [5C - Good])

- The licensee's Maintenance Rule periodic assessment was considered a strength. (Section E8.8, [2B - Excellent])

Plant Support

- The licensee was maintaining good 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. (Section R1.1, [1C - Good])

- The licensee's programs for controlling exposures As Low As Reasonably Achievable was effective. All personnel exposures to date in 1998 were below regulatory limits. (Section R1.2, [1C - Good])

- The licensee was maintaining good controls for personnel monitoring, control of radioactive material, radiological postings, and radiation area controls at the Independent Spent Fuel Storage Installation area as required by 10 CFR Part 20. (Section R1.3, [1C - Good])

- Radiation protection personnel interviewed were knowledgeable and competent in the task of performing unit ventilation sampling for radioactivity. (Section R4.1, [3A, 3B - Adequate])

- The licensee was performing reviews in the area of radiation protection as required by 10 CFR Part 20.1101. Licensee self-assessment in the area of radiation protection was good. (Section R7.1, [5A, 5B, 5C - Good])

- Communications between the chemistry and operations groups during shift turnovers and during shift operations were improved and are considered good (Recovery Plan). (Section R8.1, [1A - Good])

- Initiatives to improve the operations - chemistry interface were comprehensive and identified specific problem areas. The areas were identified by group and the responsibility for these areas were assigned by name to various individuals (Recovery Plan). (Section R8.1, [1A, 5C - Good])

- The licensee did not identify the group or individuals responsible for tracking and completing three of the operations - chemistry interface initiatives considered as long-term items or needing further evaluation. Following inspector questioning, the licensee resolved ownership of the three items (**Recovery Plan**). (Section R8.1, [5C - Poor])

- The resolution and the resources committed to the operations - chemistry interface initiative short term items, the tracking and completion of the items, the procedure changes, and the involvement of the supervisors and the managers were excellent (**Recovery Plan**). (Section R8.1, [1C, 5C - Excellent])

- The actions to address the closure of the configuration control violation involving a radiation monitor sampling tubing were timely and adequate. (Section R8.2, [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 at 100 percent power.

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

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. The inspectors accompanied some non-licensed operators (NLO) on tours of plant areas and spaces. Minor problems noted were identified to licensee management.

01.2 Notification of Low Temperature Overpressure Protection (LTOP) System Not Being Single Failure Proof

a. Inspection Scope (92700)

The inspectors reviewed documents and interviewed personnel concerning the discovery by the licensee that LTOP was not single failure proof.

b. Observations and Findings

LTOP is designed to protect the reactor coolant system (RCS) from overpressurization at temperatures below 325 degrees Fahrenheit (F). Technical Specification (TS) 3.1.2.9 outlines the requirements for two trains of LTOP. The first train is the active train and consists of a power operated relief valve (PORV) and controls to automatically relieve pressure at a low pressure setpoint. The second train is a passive train that consists of instrumentation and controls to ensure appropriate operator action can be taken in an LTOP condition. Both trains rely on a single low pressure instrument for input to the active train logic and for an alarm to alert the operator.

Problem investigation process report (PIP) 0-097-1967, initiated June 26, 1997, resulted in a detailed licensing review to clarify the LTOP system. The PIP was generated following the review of the LTOP licensing basis and resulting Updated Final Safety Analysis Report (UFSAR) clarifications by the Oconee Safety Related Designation Clarification project. A review identified that the 0-600 pounds per square inch gauge (psig) low range pressure transmitter feeds the essential high pressure alarms in the passive LTOP train and feeds the PORV low setpoint in the active LTOP train.

On May 12, 1998, PIP 0-098-2552 was initiated for engineering to complete a detailed operability evaluation. The PIP stated that the LTOP system may not be single failure proof due to only one low pressure transmitter being available to serve both LTOP trains. On May 14, 1998, the passive train of LTOP was declared inoperable on all three units. As a compensatory measure, TS 3.1.2.9 requires that a dedicated LTOP operator be stationed whenever LTOP was required.

On June 17, 1998, the licensee concluded that the LTOP system was not single failure proof, initiated a four-hour report in accordance with 10 CFR 50.72(b)(2)(iii)(B) due to potential inoperability of the residual heat removal system, and declared the LTOP system past inoperable on all three units. The licensee plans to modify the LTOP system to remove the single failure vulnerability. Licensee Event Report (LER) 50-269/98-09, Revision 0, was issued July 16, 1998. LER 50-269/98-09, Revision 1 was issued on July 22, 1998, to correct the LER reporting section from potential inoperability of the residual heat removal system to a condition prohibited by TS and outside the design basis.

PIP 0-098-3653, initiated on July 23, 1998, also identified potential concerns with the computer points used for LTOP. Further NRC review of this issue will be performed during closeout of LER 50-269/98-09.

c. Conclusions

The licensee identified that the low temperature overpressure protection system was not single failure proof for all three units. The identification and evaluation of this problem were seen as positives.

02 Operational Status of Facilities and Equipment

02.1 Operations Clearances (71707)

The inspectors reviewed the following clearance during the inspection period:

- Clearance 98-2752 PCB 8 and 9 Out-of-Service Due to Thermography Indications

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.

The inspectors also reviewed the following clearance no longer in effect during the inspection period:

- Clearance 98-2364 Valve 2BS-4 Preventive Maintenance

The inspectors observed that the equipment was returned to service appropriately and that the tags were removed.

O2.2 Engineered Safety Feature (ESF) System Walkdowns (71707)

The inspectors conducted walkdowns of accessible portions of the following ESF systems:

- Reactor Building Spray (Units 1,2,3)
- Low Pressure Injection (Units 1,2,3)
- Keowee Hydro (Units 1,2)
- Emergency Feedwater (Units 1,2,3)
- Standby Shutdown Facility Direct Current (DC) Power System

Equipment operability, material condition, and housekeeping were acceptable in all cases. Several minor discrepancies were brought to the licensee's attention and were corrected. The inspectors identified no substantive concerns as a result of these walkdowns.

O2.3 Material Condition

a. Inspection Scope (71707)

Over the past several inspection periods, the licensee has been improving the overall condition of the facility. The inspectors and NRC management have completed tours of the facility to observe the progress of this effort.

b. Observations and Findings

The licensee established a material inspection team to inspect and upgrade the three units. The team has identified about 11,000 items for evaluation and work on all three units. These items have been catalogued, tagged in place, and planning has been initiated to complete these items, starting with Unit 1. This is a well-identified program with high visibility under the licensee's Recovery Plan.

The licensee removed debris and clutter from around the three units. Unused material has been taken from the site in multiple truck loads (greater than 60). Through daily meetings and a weekly site newsletter (site team notes), site management has kept station personnel informed of the efforts and new expectations regarding plant condition. These announcements and supervisory discussions have reinforced and clarified management expectations.

Additionally, the licensee has initiated a paint and piping insulation renewal program to improve plant housekeeping conditions. The control rooms, parts of the auxiliary building, and parts of the Unit 1 turbine building have been upgraded. This has improved the ability to identify emerging material condition problems that may not have been identified previously. This work has, to this point, been done with little if any impact to plant operations.

Unit 1 is nearing completion of its material condition upgrade project. The material condition upgrade of Units 2 and 3 is pending.

c. Conclusions

The licensee has improved plant material condition and housekeeping.

Management has explained its expectations regarding plant material condition to the staff and the staff has begun to implement these expectations.

08 **Miscellaneous Operations Issues** (92901, 92700)

08.1 (Closed) Violation (VIO) 50-270/97-05-01: Failure to Follow Low Pressure Injection (LPI) Test Procedure

The inspectors verified the corrective actions described in the licensee's response letter, dated August 18, 1997, to be reasonable and complete. No similar problems were identified. This violation is closed.

08.2 (Closed) Unresolved Item (URI) 50-269/97-14-01: Failure to Follow LTOP Procedure

This issue involved operators placing two of three pressurizer level alarms in "no alarm check." Approximately 62 minutes elapsed before the operators recognized that the points should not have been placed in "no alarm check." Procedure OP/1/A/1104/49 Revision-Low Temperature Overpressure Protection, required verification that pressurizer levels are not in "inserted value, scan lockout, or no alarm check." The operators removed the points from "no alarm check" and initiated PIP 1-097-3047. The PIP corrective actions included counseling and training of operators on the importance of a questioning attitude when performing tasks that may affect plant operations.

Engineering completed an evaluation which confirmed that the points in "no alarm check" were still monitored for the LTOP pressurizer high-level alarm logic. This alarm would have functioned to alert the operators of an increase in pressurizer level.

Technical Specification 3.1.2.9.5c states, in part, that if the second train of LTOP is inoperable, restore the second train or take compensatory measures within four hours or depressurize the RCS in 16 hours. The second train of LTOP is considered to be the operator and the alarms to alert the operators. Based on the fact that this was licensee identified, the alarms were potentially degraded for only 62 minutes of a possible four hour limiting condition for operation (LCO), and that the pressurizer high level alarm would still have operated, this failure constitutes a violation of minor significance and is not subject to formal enforcement action.

08.3 (Closed) VIO 50-270/96-20-06: Failure to Use Procedure Administrative Hold

(Closed) LER 50-270/96-04, Revisions 0 and 1: Secondary Drain Line Rupture Results in a Manual Reactor Trip

The licensee has completed the corrective actions identified in their April 9, 1997, violation response. OMP 1-9, Use of Procedures, Revision 27, and Nuclear Station Directive (NSD) 703, Administrative Instructions for Station Procedures, Revision 17, have been changed and verified by the inspectors. Since the steam line break event, the licensee has satisfactorily placed a number of procedures on hold. Violations involving administrative control of procedures have not occurred since the initial violation. The corrective actions for this procedure administrative hold violation were considered to be adequate. Accordingly, this violation is closed.

The original LER stated the facts of the event. It did not contain a detailed safety analysis or long-term corrective actions. The abstract indicated that an LER revision would address these points. The inspectors verified that the short-term actions were appropriately taken and that analysis to the date of issue (October 24, 1996) was adequate. The licensee issued Revision 1 to the LER on December 9, 1996. It contained more extensive corrective actions.

The corrective actions identified in the subject LER have been completed and documented in previous NRC inspection reports. Enforcement on the LER issues has been previously addressed (IR 50-269,270,287/96-17). The inspectors attended training for the plant operators regarding water hammers and reviewed the associated training package. The attendant event-based corrective modifications and associated procedure changes have reduced the number and severity of water hammer incidents. Since the modifications and enhancements have occurred, personnel are not required to be in the secondary plant during power changes for valve manipulations. The licensee's corrective action for the aforementioned water hammer event were considered to be adequate. Accordingly, this LER is closed.

08.4 (Closed) URI 50-269,270,287/97-18-02: Containment Air Lock Testing

This URI involved an issue in which the Unit 3 reactor building emergency hatch did not close properly following testing on January 19, 1998. At that time, the licensee entered and exited a 24-hour Limiting Condition for Operation (LCO) after incorrectly determining that no maintenance had been performed on the outer door. This item has been unresolved pending review of past surveillance practices concerning containment air lock testing.

In response to inspector questions on past surveillance practices concerning the outer door, the licensee provided TS amendment submittals for containment testing in accordance with 10 CFR 50, Appendix J dated July 24, 1981, and September 3, 1981. In these submittals, the licensee proposed that upon completion of an air lock test, the outer door would

be opened to remove restraints from the inner door. If no damage was found on the outer door, this would not be considered an entry and hence no retest of the outer door would be required. The submittals were deemed acceptable in a safety evaluation issued by the NRC on November 6, 1981. The inspectors reviewed the submittals and safety evaluation and concluded that past surveillance practices concerning containment airlock testing have been acceptable.

However, on January 19, 1998, the outer door did not close properly since the seal on the door was not fully seated. The licensee manipulated the seal to allow the door to operate properly. Hence the licensee was obliged to retest the door prior to exiting the LCO. This was recognized by the licensee prior to the time the LCO would have expired. The failure to properly apply the requirements of the LCO on the outer dopr on January 19, 1998, is identified as a weakness. This item is closed.

08.5 (Open) LER 50-270/98-03: Low Condenser Vacuum Results in a Reactor Trip Due to an Inadequate Work Clearance Process

On June 3, 1998, Unit 2 tripped from 83 percent power after the main turbine tripped on condenser vacuum below the trip setpoint. The loss of condenser vacuum resulted from maintenance work on a desuperheater in the auxiliary steam (AS) system. Maintenance workers had removed the cover flange from the desuperheater, which created an air in-leakage pathway to the condenser. This occurred because the maintenance work package had been released without proper component isolation. After stabilizing the plant, the licensee located and isolated the air in-leakage, completed the work on the desuperheater, and placed the AS system back in service. In the subsequent evaluation of the trip, the licensee determined that the root cause of the trip was lack of a documented process for operations to review component isolation prior to releasing work to maintenance.

The licensee indicated that inappropriate actions were taken by the operations staff. These actions included: not recognizing that the desuperheater was outside the tagging boundary for the auxiliary steam system and not obtaining an independent review of the preparation of the red tags. The licensee also determined that, due to inexperience, the block tag out (BTO) administrator was not aware of the tagout boundaries.

The inspectors reviewed the LER corrective actions, reviewed the root cause analysis, and interviewed individuals involved with the trip. The inspectors agreed with the licensee assessment that the root cause involved several weaknesses in the work control process. The licensee has identified these weaknesses in the LER and committed to correcting them. The inspectors will follow these corrective actions with this LER.

Weaknesses in the licensee work control process were the root cause of a Unit 2 reactor trip on June 3, 1998.

Inappropriate actions by operations staff and inexperience on the part of the tagout administrator were factors to the Unit 2 reactor trip on June 3, 1998.

O8.6 (Closed) LER 50-270/97-01: Unisolable Reactor Coolant Leak Due to Inadequate Surveillance

This LER dealt with an unisolable leak that occurred in high pressure injection (HPI) system piping. The event was discussed in detail in IR 50-269,270,287/97-07, and led to the issuance of Violations EA 97-297-02013 and EA 97-297-02023. The licensee's investigation and corrective actions were reviewed by the NRC inspectors and the violations were closed during the current inspection, as discussed in Section E8.7 of this report.

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:

- PT/1/A/0204/007 Reactor Building Spray Pump Test, Revision 61
- IP/0/B/0360/039 Sorrento Liquid Monitor Calibration, Revision 15
- PT/3/A/0251/002 Spent Fuel Pool Cooling Pump Test, Revision 26
- WO 98060938-01 Unit 3 NI-7 (linear preamplifier replacement)
- PT/1/A/0600/013 Motor Driven Emergency Feedwater Pump Test, Revision 36
- WO 98049513-01 Inspect KHU1 Field Flash Breaker
- WO 98066385-01 Inspect KHU2 Field Flash Breaker
- OP/0/A/1107/003 Charging Standby Bus #1 and Bus #2 from Lee Steam Station for Backup Power, Revision 36
- PT/2/A/0110/010 Penetration Room Ventilation, Revision 2, Change A
- IP/0/A/0385/01B SSF 125 V DC Battery Service Test and Annual Surveillance, Revision 18
- WO 97067609 Replace Cells and Test SSF Battery DCSF A/B

- IP/O/A/3000/26 Battery Cell Connection Resistance Test, Revision 6
- IP/O/A/0385/01D SSF Battery Quarterly Surveillance, Revision 13
- PT/O/A/0620/016 Keowee Hydro Emergency Start Test, Revision 25

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.

c. Conclusion

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

M1.2 Keowee Field Flash Breaker (DB-25) Problems

a. Inspection Scope (93702, 71707)

The licensee identified a failure in the Keowee Hydroelectric Unit 1 (KHU) field flash breaker (FFB). The inspectors followed the activities through the inspection and repair of both KHU's FFB.

b. Observations and Findings

During routine breaker maintenance on July 13, 1998, the licensee identified that the moving DC contact parts had a failure on the KHU 1 FFB. The unit was in an LCO at the time for the work. Both active DC contacts had the failure. The licensee initiated a failure investigation process (FIP) team evaluation and PIP K-098-3539. KHU 1 and the FFB were satisfactorily tested within the LCO period and the unit was returned to service late in the afternoon on July 13, 1998. The licensee replaced the failed parts and sent the failed parts to the Duke lab and to the vendor for examination. The failed parts had been in the FFB for at least seven years.

The Westinghouse DB-25 breaker has the post of the upper moving contact fabricated from a single piece cast from a brass alloy. The post, which was continuous with the upper moving contact, connected the upper moving contact to the shunt and armature plate creating a pivoting moving assembly. The connected pieces moved as a unit to close or to open the breaker. An anti-bounce spring had kept tension on each moving contact assembly preventing the assembly from separating and thus the FFB remained functional. The post had separated at the body of the upper moving contact. Upon questioning by the licensee, the breaker vendor indicated that this failure was an unknown type of failure.

Following return to service of KHU 1, KHU 2 was taken out of service to inspect its FFB. The moving contact posts were intact at the body to post joint. The moving contact bradded-over post head had lost about 1/3 of the bradded head. When the anti-bounce spring was removed, the armature plate came off the post. The KHU 2 moving contact assemblies were replaced. KHU 2 was satisfactorily tested and returned to service late on the night of July 13, 1998.

The breakers had operated for the past several months in this degraded condition. In mid-April, the licensee had noticed marks and missing bakelite pieces from the KHU 1 FFB arc chutes. PIP K-098-1979 had been initiated to evaluate the indications. Initially, the licensee evaluation drew the conclusion that the indications were due to over-travel of the moving contacts from worn contact points and that the assemblies required adjustment. Part of the July 13, 1998, planned maintenance was to attempt to adjust the moving contact travel. The discovery of the failed post indicated that the over-travel was due to the post failure. The KHU 1 had last been operated on July 12, 1998, prior to being taken out-of-service. KHU 2 was operated twice on July 13, 1998, as a part of the LCO requirements for KHU 1 out-of-service.

c. Conclusions

The inspectors concluded that the licensee's identification of an unknown degradation of the Keowee hydroelectric units' field flash breaker moving contacts was adequate.

The inspectors also concluded that the analysis and resolution activities associated with an earlier Keowee hydroelectric unit's problem occurred before any breaker loss of function.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Reactor Building Spray (RBS) Pump 1A Loss of Oil

a. Inspection Scope (62707,40500)

During rounds on June 30, 1998, an NLO discovered oil on the 1A RBS pump stand and no oil in the oiler for the pump transfer case. The 1A RBS pump had been returned to service after normal train maintenance and performance testing. Oil had been changed out in the pump's transfer case. The inspectors interviewed personnel, toured the areas, and reviewed documents relating to this issue.

b. Observations and Findings

PIP 1-098-3356 was initiated and an investigation team was formed to address the root cause of the loss of oil in the oiler. The licensee initiated a four hour non-emergency notification to the NRC in accordance with 10 CFR 50.72(b)(2)(iii). The notification was made because the 1B RBS pump was also out of service for normal train maintenance. This conservatively placed Unit 1 into a TS 3.0 for the plant being outside the design basis with both RBS pumps not available.

The licensee completed maintenance on the 1B RBS pump and exited TS 3.0. within the appropriate time limit. Likewise, the LCO for the 1A RBS pump was exited prior to expiration.

The engineering evaluation was completed on July 1, 1998, and determined that the 1A RBS pump was operable because sufficient oil was retained in the housing. The cause of the oil spill was attributed to a painted over vent hole in the vent cap. The manufacturer was contacted and agreed that it was possible for pressure to build up in the casing with the vent blocked.

The licensee inspected all of the other RBS and LPI pumps for all three units. All of the pumps with obstructed vent holes or no vent holes were cleaned or the caps were drilled to provide a vent hole. The technical manual did not discuss the vent hole but the drawings did show a vent for the cap and the parts list from 1969 did identify a vent for the cap.

A review of historical work orders and operating experience revealed that the 2A and the 2B RBS pumps had work orders generated in 1996 for no oil in the oiler. The 2B RBS pump also had a work order generated in 1998 for no oil in the oiler. All of these incidents occurred immediately after performance testing. Operating experience from 1991 also discussed a similar problem at Indian Point 2 that was attributed to inadequate venting.

c. Conclusions

The inspectors concluded that a weakness existed in the followup and resolution of previous problems with the reactor building spray pumps oil systems.

The inspectors also concluded that the engineering followup of this event was good.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) URI 50-269,270/98-06-07: Low Pressure Service Water (LPSW) Pump Bearing Failures

Units 1 and 2 share three LPSW pumps. On June 3, 1998, the B LPSW pump bearings were replaced due to indications of wear and oil contamination. On June 6, 1998, maintenance personnel monitoring the B LPSW pump bearings noted an increase in vibration and obtained an oil sample. The oil sample indicated some bearing degradation. The outboard bearing was replaced on June 8, 1998, for the B LPSW pump. PIPs 5-098-3006 and 5-098-2983 were initiated, a FIP team was formed, and the A and C LPSW pump bearings were checked. The C LPSW pump bearings had similar indications and were replaced following completion of the maintenance on the B LPSW pump. The A LPSW pump had no indications of excessive wear or noise but upon visual confirmation had the same type of Fafnir bearings as installed in the B and C pump. During the bearing investigation, the inspectors observed data analysis, pump operation,

and pump testing before and after bearing replacements. The inspectors agreed with the licensee's operability assessment during the repair activities. Vibration analysis is being performed on a more frequent basis to observe for any bearing degradation.

Results of the FIP team investigation revealed three contributing factors to the bearing failure. The factors were: a misalignment of the pump to motor; a shift in the magnetic center of the motor; and the wrong bearing type (Fafnir instead of Conrad) installed in the pumps.

The licensee replaced the Fafnir 5319 bearings with Fafnir 5319 BR bearings. This was done based on vendor information that any failure with the Fafnir 5319 BR bearings installed would not be short term concern. This allowed the licensee time to obtain the correct Conrad style bearings. The licensee indicated that the original Fafnir 5319 bearings cannot take thrust in either direction while the Fafnir 5319 BR bearings can take thrust in only one direction. The LPSW pumps can thrust in both directions due to system flow changes. Conversations with the pump manufacturer confirm that the correct bearing would be a Conrad style bearing which can accept thrust in either direction. The vendor had shipped the new pump rotating element, which had been replaced during the Unit 1 outage, with the Fafnir style bearings and had also shipped the Fafnir bearings as replacements. The licensee was still working out the details of the FIP team report after the end of the inspection period. The proper Conrad style bearings have been installed on the B and C LPSW pumps. Given the slow nature of degradation anticipated on the A pump, bearing replacement has been deferred until the next refueling outage.

The operability evaluation found the pumps to be operable based on confirmation from the manufacturer that the Fafnir 5319 BR bearings could operate successfully in the system. A failure would be preceded by a slow increase in the vibration levels and not a sudden failure.

The licensee held continuing discussions with the pump manufacturer to discuss improvements or changes to the alignment procedures for the LPSW pumps. These improvements or changes to the maintenance procedures are scheduled to be completed by December 5, 1998.

The inspectors concluded that the inadequacy in the alignment procedures, the failure to verify magnetic center, and the installation of the wrong bearings in the LPSW pumps was a violation of Appendix B, Criteria V, Procedures, Drawings, and Instructions. 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 50-269,270/98-07-01: Inadequate Maintenance Procedures. Subsequently the URI is closed.

The inspectors also concluded that the formation of the failure investigation process, associated investigation, and corrective actions were good.

M8.2 (Closed) URI 50-269,270,287/97-15-02: Valve Parts Identification Problem

The licensee's corrective action report (PIP 1-097-4025) determined that the valve, 1LPSW-4, with the wrong part would have been past operable. The installed trunnion part was for the next smaller size valve made by the same vendor and this part was only slightly smaller than the required piece. Even with the incorrect part it would have functioned properly. The inspectors agreed with this determination. Further, the licensee determined that the manufacturer inadvertently mislabeled the installed part at the factory. As corrective action, the licensee installed the correct parts and placed the vendor on the restricted vendor list. This will result in the licensee's corporate office performing increased inspections of the vendor. The failure to detect this incorrect part prior to installation was a violation of Appendix B, Criteria VII, Control of Purchased Material, Equipment, and Services. 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 50-269/98-07-02: Lack of Adequate Receipt Inspection.

The PIP did not document several licensee activities. Specifically, the licensee had written communications with the vendor about the mislabeling that were not mentioned in the June 9, 1997, version of the PIP. The PIP also did not address the potential or required re-inspection of the vendor by the licensee's corporate office staff. Following subsequent questioning by the inspectors, the licensee provided documentation that the corporate staff had indeed identified the vendor for further inspection and/or overview. Both items were added to the July 9, 1997, version of the PIP. This was a documentation weakness similar to those previously identified in IR 50-269,270,287/98-06, Section E7.2. This item is closed.

The failure to adequately document activities in the problem investigation process was another example of a previously identified weakness.

M8.3 (Closed) URI 50-269,270,287/97-18-04: Teflon Tape Use on LPI System

The licensee satisfactorily addressed the concerns of this URI in PIP 2-98-0455. The LPI and building spray piping discussed in the URI and the PIP were the not harmed or potentially degraded by the presence of the tape on instrument piping. The site requirements regarding Teflon prohibitions were promulgated after the installation the observed tape. The later instructions would have prevented the installation of new tape. The licensee initiated actions to enhance site instructions regarding Teflon tape use. Actions listed in the PIP were verified to be completed or scheduled. This item is closed.

M8.4 (Closed) URI 50-270/98-06-05: 2LWD-444 May Affect Penetration Room Ventilation (PRVS)

This URI was opened pending resolution of the impact on PRVS operation of normally closed valve 2LWD-444 being found open. Valve 2LWD-444

is a non-safety related floor drain from the penetration room to the cask decontamination room. Change A to test procedure PT/2/A/0110/010, Penetration Room Ventilation, Revision 2, was made to perform a one time test of the system with valve 2LWD-444 open. The inspectors reviewed the procedure and observed the test performance. The test was performed with both trains operating individually and with the valve closed and then with the valve open. The inspectors observed that negative pressure was maintained in the penetration room with the valve closed and with the valve open. The inspectors concluded that the opened valve did not affect the safety function of the ventilation system. The licensee indicated that this valve mispositioning will be included in the corrective actions as documented in PIP 0-097-0737, as discussed in IR 50-269,270,287/97-14, Section 08.1. The inspectors considered that the investigation and followup testing to confirm the effect of a mispositioned valve in the PRVS were good. This URI is closed.

III. Engineering

E1 Conduct of Engineering

E1.1 General Comments

Keowee Interim Report (37551)

The inspectors reviewed the Keowee Interim Report issued by NRR March 17, 1998. The inspectors observed that the report did not mention an event previously documented in IR 50-269,270,287/97-16. The event concerned the inadvertent backfeeding of the KHU 1 generator from the Oconee Unit 3 main feeder bus. The event occurred when simultaneous electrical testing was being performed on Oconee Units 1 and 3. As a result of the event, licensee personnel discussed the possibility of a change to the switching logic. The inspectors discussed this observation with the NRC Senior Project Manager and the licensee's engineering personnel.

E1.2 Evaluation of Condenser Circulating Water (CCW) Relay Failures

a. Inspection Scope (37551)

On July 15, 1998, a relay in the non-safety-related but important to safety control circuit for the CCW Pump 2D discharge valve failed and melted insulation on several of the attached wires. The licensee disconnected the link that supplied the power to the failed relay and formed a FIP team to investigate the failure. The inspectors followed the engineering resolution of this failure.

b. Observations and Findings

The function of the failed relay was to ensure that the CCW pump discharge valve remained open when power was restored following a loss of offsite power event in order to ensure the emergency CCW siphon was available. The FIP began a troubleshooting process to verify that the

contacts on the failed relay were in the correct position for the circuit to perform its safety function. This troubleshooting also involved the relays for all Unit 2 CCW pump discharge valves as they were located in close proximity to each other in the control cabinet. The troubleshooting efforts confirmed that the relay contacts were indeed in the correct positions but also revealed that the relay for CCW pump 2C was also damaged. The licensee disconnected the link that supplied power to the relay for CCW pump 2C. The relays for CCW pumps 2A and 2B were not damaged and were confirmed operable. The licensee then implemented a temporary modification to bypass the affected relay contacts and keep any possible contact failure from preventing the emergency CCW siphon from functioning. The inspectors found these actions to show good sensitivity toward maintaining emergency CCW siphon operability.

Upon further investigation, the FIP found evidence that the plungers for the affected relays had been striking the inside of the cabinet door. The FIP then implemented plans to modify the cabinet doors and replace the failed relays at the same time. The inspectors found these actions to be appropriate.

c. Conclusions

The use of a failure investigation process team to investigate failed relays in the emergency condenser circulating water system showed good sensitivity to the safety function of the relays. The actions taken to ensure emergency condenser circulating water siphon operability and to modify the cabinet doors and replace the failed relays at the same time showed proper concern for maintaining the siphon.

E2 Engineering Support of Facilities and Equipment

E2.1 Emergency Power System Continued Reliability Assessment Report

a. Inspection Scope (37551)

The inspectors reviewed the Emergency Power System Continued Reliability Assessment Report dated February 2, 1998, which was part of the Oconee Recovery Plan. The subject of the report was titled: "Study on the Present and the Projected Availability and Reliability of the Emergency Power System for the Oconee Nuclear Station." The study was initiated by the licensee and was performed by Systems Research International, Incorporated (SRI) and was submitted to Duke Energy Corporation.

b. Observations and Findings

The inspectors noted from the review that recommendations were made concerning equipment, procedures, training, and personnel. Among the recommendations were a modification to allow separate isolation and dewatering of the redundant Keowee units, changes to upgrade the excitation system, training turbine technicians, and to improve trending such as including Doble testing from applicable transformers and as found relay calibration data.

Subsequent to the issuance of the report the inspectors were informed by the licensee that resources were being dedicated to the implementation of selected recommendations. The inspectors reviewed a matrix that indicated licensee implementation schedule. Among the recommendations to be implemented were:

- Three nuclear station modifications (NSM), NSM 52887, NSM 52965, and NSM 53027.
- Other work items identified to be completed such as: install online turbine generator monitor, upgrade turbine governor, and replace excitor/field flash breaker with contactor.
- Six miscellaneous items placed under PIP K-098-2197 such as, resolution of the MG6 relay aging issue and include loop surveillance in protective relay procedures.
- Ten items under PIP K-098-1921, referred to as management issues such as ensure availability of governor technician, evaluate need for operations to operate the central switchyard locally, and establish an oil circuit breaker 101 and transformer CT 5 refurbishment program.

The inspectors noted that three of the PIP items and two management issues were completed. The emergency power availability and reliability subsection of the Oconee Recovery Plan is considered closed.

c. Conclusions

The inspectors concluded that the Keowee report was very comprehensive, the goal and objectives were precise, and the scope was inclusive. The methodology for collecting field data, the input sources utilized, and the development of the data base for the study were excellent.

The Keowee report consisted of a review of material conditions, equipment performance, identification of problems, and was communicated to the licensee very well.

The licensee's initiative to perform the Keowee report, commit resources, schedule modifications and procedure changes, and the tracking of actions to resolve the issues was excellent.

E2.2 Status of Generic Letter 96-06 Response

a. Inspection Scope (37550)

The inspectors reviewed the status of the licensee's actions to address NRC Generic Letter (GL) 96-06, Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions, dated September 30, 1996. These actions included the monitoring of reactor building temperatures due to the isolation of the reactor building auxiliary cooling units (RBACUs).

b. Observations and Findings

The licensee's actions in response to GL 96-06 included determination of water hammer vulnerability and subsequent system operability and piping construction code compliance of the LPSW. This system provided the heat sink for the safety related reactor building cooling units (RBCUs), which cool the lower containment environment, and the non-safety related RBACUs which cool the upper containment environment. The initial operability evaluations of the RBCUs were documented in PIPs 1-097-0310, 2-097-0240, and 3-097-311, dated January 17, 1997. This operability required a configuration which isolated the RBACUs from service and established a reactor building temperature limit of 180 degrees F. Initial and supplemental licensee responses to GL 96-06 were documented on January 28, 1997, August 1, 1997, and May 28, 1998. A Request for Additional Information from the NRC was dated June 17, 1998, and addressed specific information regarding the computer codes and assumptions used in the independent water hammer analyses. Additionally, the licensee attended a GL 96-06 nuclear industry conference in May, 1998.

Two independent studies were initiated to analyze the water hammer vulnerability of the LPSW supplying the RBACUs and were scheduled for completion on August 1, 1998. The studies had been completed and indicated that the system would be operable with the RBACUs returned to service. During this inspection, the licensee was performing a 10 CFR 50.59 evaluation to permit realigning the LPSW to the RBACUs. The 50.59 evaluation was required because although the system was acceptable for operability considerations, potential water hammer conditions were not consistent with the applicable B31.1 piping code criteria.

The inspectors verified the licensee was monitoring the reactor building temperature to assure the 180 degrees F limit established in the operability evaluations was not exceeded due to the isolation of the RBACUs. The building temperature during the inspection was a maximum of 166 degrees F. Engineering was trending lake temperatures and building temperatures. A correlation between the two temperatures was noted and review of temperatures from the previous year indicated that the building temperature would not exceed 175 degrees F. The licensee expected to return the RBACUs to service in August of this year.

c. Conclusion

Close communication was maintained with the NRC regarding the status of GL 96-06. Activities were consistent with the established schedule. Reactor building temperature conditions were appropriately monitored and maintained within the limits established by the associated operability evaluations.

E4 Engineering Staff Knowledge and Performance

E4.1 Main Steam Line Break (MSLB) Protection Modification

a. Inspection Scope (37550)

The inspectors reviewed the NSMs for the installation of the MSLB Detection and Mitigation Circuitry which were installed on November 21, 1995, April 23, 1996, and January 27, 1997, for Units 1, 2, and 3 respectively. This included a review of the design and the 10 CFR 50.59 safety evaluation.

b. Observations and Findings

The modification was a response to NRC IE Bulletin 80-04 concerning the over pressurizing of containment due to an MSLB. The licensee initially determined that a containment over pressure event was not feasible at Oconee based on a Babcock and Wilcox MSLB event analysis which was found to be in error in 1992. Subsequently, the licensee developed this modification to detect and mitigate an MSLB by securing feed water to the steam generators. The modification installed safety related, single failure detection circuitry to operate non-safety related non-single failure control circuits to stop the feedwater pumps and close valves to secure feed water to the steam generators if an MSLB was detected. The licensee had communicated clearly with the NRC and received general approval regarding this design approach to resolving the IEB 80-04 issue.

The licensee submitted a TS amendment on July 15, 1997, to include the MSLB circuitry as TS instrumentation. During this review it was noted that the MSLB protection system modification design did not include the capability for on-line testing. The capability for on-line testing is a design requirement for protection systems specified by the general design criteria (GDC) of UFSAR Section 3.1.19. Section 7.1.1 of the UFSAR, Identification of Safety Related Systems, identified "protective systems" as the Reactor Protective System and the Engineered Safeguards Protective Systems. Section 3.1.1, of the UFSAR, Quality Standards, provided a functional description of the Engineered Safeguards Systems as "structures, systems, and components necessary to maintain the integrity of the reactor building." The purpose of the MSLB circuitry modification is to prevent the over pressurization of the reactor building thereby maintaining the integrity of the reactor building. Pending further review of the adequacy of the design of the MSLB circuitry modification in regards to on-line testing, this is identified as an Inspector Followup Item (IFI) 50-269,270,287/98-07-03, Potentially Inadequate Design Control for MSLB Modification.

The inspectors identified a weakness in the modification process in that there was no mechanism to assure the GDC in Chapter 3 of the UFSAR are routinely reviewed and documented as consideration for design inputs. The design input calculation for the MSLB modification, OSC-6194, Design Inputs and 10 CFR 50.49 Evaluation of NSM ON-12873, ON-22873, and ON-32873, dated June 11, 1996, did not identify the UFSAR GDCs as design

inputs. The calculation stated there was no required design features to be incorporated as a result of special system or equipment testing requirements. Although the licensee indicated that the GDCs were considered, it was not documented to what extent these were considered or why these did not apply to this safety-related modification. This will be identified as Inspector Followup Item 50-269;270,287/98-07-05: Review of Design Inputs for Calculations. During the inspection, the licensee identified this process weakness in PIP 0-098-3570.

During the inspection, the licensee stated that the on-line test capability would be added to the MSLB logic in a planned urgent modification to implement the Feed Only Good Generator Logic (FOGG) on the MSLB circuitry. This was documented on a preliminary scope document for the FOGG modification dated June 23, 1998. The modification was in the early development stage.

The inspectors reviewed the 10 CFR 50.59 evaluation for this modification and related internal correspondence during development of the evaluation. The evaluation, FDW and EFW System Circuitry Changes for Mitigation of MSLB 10 CFR 50.59 Evaluation was dated July 18, 1996. The documented internal correspondence demonstrated a good questioning attitude and interaction between engineering groups. The final approved evaluation was appropriately detailed and thorough.

c. Conclusion

Two Inspector Followup Items were identified with respect to: a potentially inadequate design control in that the general design criteria requirement for on-line test capability was not incorporated into the main steam line break modification; and review of design inputs for calculations. An engineering weakness was identified in that the modification process did not assure routine review and documentation of the general design criteria as design inputs. The modification 50.59 safety evaluation was comprehensive and thorough.

E7 Quality Assurance Audits and Assessments

E7.1 Review of Problem Investigation Process Reports

a. Inspection Scope (40500)

The inspectors reviewed several PIP reports associated with audit SA-97-10(ON)(SITA)(HPI/LPI), which was the Self-Initiated Technical Audit (SITA) performed on the HPI and LPI systems. The inspectors also reviewed the status of licensee corrective actions for resolving the SITA findings assigned to engineering.

b. Observations and Findings

The HPI/LPI SITA was performed during the period from November 10, 1997, through December 11, 1997. This SITA was performed by the Regulatory Audit Group of the Nuclear Assessment and Issues Division in the General Office. The purpose of this SITA was to assess the operational

readiness and functionality of the HPI and the LPI systems and interconnecting systems. The HPI/LPI SITA identified 41 findings and seven recommendations. The audit findings and recommendations were documented in the Oconee Nuclear Station (ONS) PIP reports. The licensee had initiated corrective actions to resolve the HPI/LPI SITA findings and recommendations.

The SITA findings indicated that there were weaknesses in some areas. One of these areas was the interface between the inservice test (IST) program and the design control process relative to the translation of design information from modifications and calculations to the IST program. The inspector made the following observations regarding the PIP process during review of the HPI/LPI SITA findings:

(1) PIP report 0-098-0165, dated January 13, 1998, identified that the LPI design basis specification did not include pertinent information related to LPI valve stroke times. The inspectors questioned what was the actual design stroke time requirement for valves LP-21 and LP-22. The inspectors also questioned the justification provided in the problem description with regard to why this issue was not an operability concern. Simply stating that the increased stroke time was not an operability issue for the opening stroke because the valves were "normally" open in the ES alignment was, by itself, not adequate justification to base an operability conclusion. The inspectors noted that (although it was not included in this PIP report) the DBD and other licensee administrative controls provided additional justification to support the operability conclusion. The inspectors considered the operability discussion to be a weakness in the analysis for this PIP report.

The corrective actions for PIP report 0-098-0165 included revising the required stroke times for the valves as assumed in calculation OSC 2820, updating the LPI DBD, and revising the IST Valve Stroke Test data base. The inspectors noted during this inspection that the corrective actions were not scheduled to be completed until after September 1, 1998. The inspectors further noted that the design basis stroke time requirement for valves LP-21 and LP-22 was not determined prior to the performance of subsequent quarterly IST valve stroke time tests. The inspectors considered this to be a weakness in the timeliness of the resolution for PIP report 0-098-0165.

(2) PIP report 0-098-0179, dated January 13, 1998, identified that some LPI valves were not included in the ASME Section XI IWV Inservice Test program. The original LPI piping configuration for valves LP-40, LP-41, and LP-42 for Units 1 and 3 prior to initiation of this PIP (and the original piping configuration for Unit 2 at the time of this PIP) only provided single valve protection between the discharge header of the LPI pumps and the BWST. These valves should have been included in the ONS IST program to check for leakage. The ONS IST program data base indicated that these valves were not included in the IST program.

Prior to this PIP, the original piping configurations for Units 1 and 3 were modified (in 1997) by minor modifications (MM) in accordance with the ONS design control process. The MMs relocated valve LP-42 in order to provide double isolation between each LPI train and the BWST. The modification process did not identify that valve LP-42 from the new configuration for Units 1 and 3 was required to be included in the ONS IST program. The Unit 2 original piping configuration was modified by a MM subsequent to the initiation of PIP report 0-098-0179 to provide double isolation between each LPI train and the BWST. The inspectors noted during this current inspection that the licensee had initiated corrective actions to incorporate valve LP-42 for Units 1, 2, and 3 into the ONS IST program and develop a procedure to test the valve for leakage.

The above PIP reports identified potential issues involving the interface between the IST program and the design control process, in that, requirements from design output documents such as calculations and NSMs were not being incorporated into the IST program. Pending further review of the ONS IST program, this matter will be identified as URI 50-269,270,287/98-07-04: IST Program and Design Control Process Interface.

c. Conclusion

The inspectors concluded that the operability discussion provided in the problem description for Problem Investigation Process Report 0-098-0165 was weak, in that, there was not an adequate basis to support the conclusion that there was not an operability concern. There was a weakness in the timeliness of the resolution for Problem Investigation Process Report 0-098-0165, in that, the design stroke time requirement for low pressure injection system valves LP-21 and LP-22 was not determined prior to the performance of subsequent quarterly inservice test valve stroke time tests. There was also an Unresolved Item concerning the interface between the program and the design control process, in that, requirements from design output documents such as calculations and nuclear station modifications were not being incorporated into the inservice test program.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) VIO 50-270/96-13-08: Failure to Provide Adequate Test and Inspection Requirements

The licensee's corrective actions were identified in the December 4, 1996, response to the violation and were contained in PIPs 2-096-1869 and 0-0-97-1691. PIP 0-097-1691 contained extensive post-maintenance test actions and enhancements that addressed portions of the issues of the violation. The licensee altered the Duke Quality Assurance topical report (Amendment 23, Section 17.2.3.8) to clarify test and inspection acceptance criteria requirements. Related lower tier site procedures now clearly indicate topical report test and inspection requirements.

The inspectors verified that the corrective actions were completed or scheduled. This item is closed.

The corrective actions for a violation regarding post-modification testing and inspection requirements were adequate.

E8.2 (Closed) VIO 50-269,270,287/97-09-01: Failure to Include All Required Structures, Systems, and Components in the Scope of the Maintenance Rule

This item identified that three structures, systems or components (SSCs) had not been included in the scope of the Maintenance Rule as required by 10 CFR 50.65. The licensee's reply to the violation (dated September 8, 1997) agreed with the violation for omission of the 525 KV relay house and the service building, but did not agree with the auxiliary instrument air (AIA) example. The reply provided a technical justification for not including the AIA system in the rule, and provided corrective actions for the other two examples. Based on an NRC request, the licensee provided additional technical information concerning the AIA system in a letter dated October 9, 1997. The NRC accepted the licensee's response in a letter dated October 2, 1997. Corrective actions included:

- Including the 525 KV relay house and the service building in the scope of the Rule, and the Maintenance Rule civil inspection schedule.
- Revision of the Maintenance Rule implementing procedure to require supporting SSCs to be included in the Rule.
- Reevaluation of all non-Maintenance Rule SSCs for proper scoping.
- Revision of the UFSAR to clearly state that the AIA system is not credited for mitigation of transients and accidents.

The inspectors reviewed the following in order to verify proper implementation of corrective actions: EDM-210, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," revision 7; EDM-410, "Inspection Program for Civil Engineering Structures and Components," revision 3; PIPs 0-097-1940 and 0-097-1892; expert panel meeting minutes dated August 6, 1997 and October 9, 1997; and Section 9.5.2.2 of the current UFSAR. This item is closed.

Corrective actions for open items identified during the Maintenance Rule baseline inspection were effectively implemented.

E8.3 (Closed) VIO 50-269,270,287/97-09-03: Failure to Establish Adequate Goals and Monitoring for (a)(1) Systems

This violation identified that adequate goals and monitoring had not been established for a generic failure of motor operated valves, which had been classified as (a)(1) by the licensee. The licensee had established a long term corrective action for the problem, which was not scheduled for immediate implementation. The licensee had not provided any interim corrective action or goals and monitoring. The licensee also had not performed any engineering analysis, which justified the

delay in corrective action implementation. The licensee's reply to this violation (dated September 8, 1997) stated that:

- extensive testing is currently being performed on the most important motor operated valves
- a risk based analysis has been done as a basis for interim goals and monitoring
- interim goals and monitoring has been established based on this analysis
- provisions has been made to change corrective actions should interim monitoring determine a degrading condition
- the design change for long term corrective action has been approved and scheduled
- provisions would be developed for monitoring the effectiveness of long term corrective actions, and
- EDM-210 would be revised to require interim corrective action, goals, and monitoring when corrective actions can not be implemented within a reasonable time.

The details of these corrective actions were documented in PIP 0-097-1050, EDM-210, PRA calculation titled "Oconee MOV B-Finger Contacts Failure Trigger Value dated August 28, 1997," and documentation provided by the system/component engineer. The inspectors reviewed these corrective actions and determined that they were acceptable. This item is closed.

Corrective actions for open items identified during the Maintenance Rule baseline inspection were effectively implemented.

E8.4 (Closed) Inspector Followup Item (IFI) 50-269,270,287/97-09-04: Review of Maintenance Rule Baseline Results for Structures

During the initial Maintenance Rule baseline inspection the structures program was found to be satisfactory. However, the implementation of the program could not be properly evaluated, due to the fact that only a few structures had been inspected under the program. As a result, this IFI was identified to inspect implementation once additional structures were inspected by the licensee. During this inspection, the inspectors determined that all structures, except the interior of the Unit 3 containment, had been inspected. The inspectors reviewed the licensee's inspection results, and verified appropriate corrective action was being implemented for inspection deficiencies. This item is closed.

Corrective actions for open items identified during the Maintenance Rule baseline inspection were effectively implemented.

E8.5 (Closed) IFI 50-269,270,287/97-09-02: Followup Licensee Actions to Implement Revision 2 of the Oconee Probabilistic Risk Analysis (PRA)

In December 1996, the licensee completed Revision 2 of the PRA for Oconee. At the time of the NRC Maintenance Rule baseline inspection in the Summer of 1997, the licensee had not completed evaluating the impact this PRA revision had on the key Maintenance Rule aspects of risk ranking and performance criteria.

The licensee used PIP 0-097-1705 as the controlling document to evaluate changes to the risk ranking and performance criteria due to the PRA revision. The PIP corrective actions included revising Calculation OSC-5771, "ONS PRA Significant SSCs for Maintenance Rule," and Calculation OSC-6551, "PRA Analysis of Maintenance Rule Availability Performance Criteria." These revised calculations were reviewed by the Expert Panel to establish the risk rankings and performance criteria with due consideration for the limitations of the PRA methodology and incorporating qualitative insights. As defined in the Maintenance Rule administrative procedures, the final determination of risk ranking and performance criteria was the responsibility of the Expert Panel. The program documents were then revised based upon the Expert Panel's decision.

The inspectors reviewed Calculation OSC-5771 and determined that the criteria used for risk significance for Maintenance Rule functions was consistent with the licensee's administrative procedures. Also, the risk significance criteria for the importance measures of risk reduction worth, risk achievement worth and percent contribution to core damage frequency was consistent with Nuclear Utility Management and Resource Council (NUMARC) 93-01, including the exclusion of seismic events from the quantification of the risk rankings. The inspectors confirmed through a review of Expert Panel minutes and supplemental information, that systems assigned a different risk ranking other than indicated by Calculation OSC-5771 had been dispositioned by the Expert Panel. The inspectors determined that the basis for the Expert Panel's disposition was valid.

The inspectors reviewed OSC-6551 and evaluated select risk significant Maintenance Rule functions to determine whether the performance criteria established were consistent with the licensee's administrative procedure, EDM-210, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants for the Maintenance Rule." The procedure defined varying levels of reliability and availability performance criteria for risk significant functions, mainly depending upon the risk achievement worth. The performance criteria reviewed by the inspectors adhered to the procedure's risk achievement worth criteria or had been justified by the Expert Panel.

The inspectors further reviewed whether the 1996 PRA results were incorporated into present equipment out-of-service considerations for on-line maintenance. The on-line maintenance, out-of-service risk consideration process was described in Procedure WPM-607, "Maintenance

Rule Assessment of Equipment Removed from Service," Revision 5. This document contained the results of the Expert Panel's deliberation as to which were acceptable out of service configurations of risk significant equipment in a matrix format (provided no more than two systems were out-of-service).

On February 2, 1998, the licensee's PRA specialists completed a report titled "Quantification of Oconee Maintenance Rule PRA Matrix." The report used the revised 1996 PRA model to attempt to quantify the matrix. Intersections of two out-of-service systems were defined as white - allowed; yellow - allowed provided no other yellow intersection existed; and red - not allowed. Generally, the color was based upon whether the intersection doubled the risk achievement worth, the resulting risk achievement worth of the intersection was more than just the addition of the risk achievement worths associated with each individual system being removed from service, and whether the core damage frequency was greater than 1E-3. Based upon the PRA results and the specialist's understanding of the model, the report recommended that the Expert Panel classify a significant number of intersections from yellow to red, one intersection from white to red and three more from white to yellow.

In the meeting minutes of April 2, 1998, the Expert Panel accepted most of the report's recommendations. Subsequently, on May 18, 1998, the Expert Panel chairman forwarded the information to the personnel responsible for changing Procedure WPM-607 suggesting its revision during the third quarter of 1998.

The inspectors reviewed WPM-607 and determined that the prohibited configurations had yet to be incorporated into the matrix. None of the new conditions to be added to the matrix had been entered during the period since May 1998 (a licensee review of out-of-service components was performed in July 1998).

The licensee's use of the 1996 PRA model revision results in the Expert Panel's determination of risk ranking and performance criteria were good. However, delaying inclusion of out-of-service equipment configurations considered prohibited by the Expert Panel into the on-line maintenance administrative procedure was a weakness.

E8.6 (Open) VIO EA 97-298-01012: Failure to Adhere to TS Requirements for the HPI System

There were four items to avoid further violations documented in the licensee's violation response. This followup inspection only dealt with the first item in response to the May 3, 1997, event which rendered two of the three Unit 3 HPI pumps inoperable. This item was to perform a HPI reliability study. Consistent with their violation response of September 25, 1997, the licensee completed the reliability study in December 1997. The inspectors reviewed PIP 0-097-4546, documenting the licensee's disposition of the recommendations contained within the reliability study. Also, the inspectors reviewed the conclusions and recommendations section of the reliability study. There were three

recommendations within the reliability study. These were: (1) to monitor and confirm on an ongoing basis the reliability of the HPI system, (2) to provide the capability to isolate the potential flow diversion to the letdown storage tank via check valve HP-97 when operating the emergency core cooling system in the piggyback mode, (LPI pumps providing suction to the HPI pumps, which inject into the reactor core while the LPI pumps take suction from the containment sump), and (3) to enact additional initiatives to reduce the common cause failure mode of inadequate volume in the letdown storage tank without operator knowledge when that tank was the suction source for the operating HPI pump(s).

The PIP disposition of the recommendations were as follows:

- Recommendation (1) - The HPI system was classified as risk significant under the Maintenance Rule with commensurate reliability and availability performance criteria established. The system's performance was monitored and periodically evaluated to this criteria through the Maintenance Rule reliability monitoring program.

- Recommendation (2) - EP 1800/001, "Emergency Operating Procedure," was revised at the applicable sections for all three units. The revision directed closure of valve HP-23, the letdown storage tank outlet valve, from the control room prior to initiating the emergency core cooling system's piggyback mode of operation. Closure of this valve isolated check valve HP-97 and established two barriers, HP-23 and HP-97, to prevent flow diversion to the letdown storage tank.

- Recommendation (3) - Additional letdown storage tank level and pressure indications will be installed and routinely compared to the presently existing instrumentation to reduce the possibility of a common cause failure of the letdown storage tank instruments.

The inspectors confirmed that the HPI system was classified risk significant under the Maintenance Rule with reliability and availability performance criteria established. The inspectors verified that each unit's EP 1800/001 procedure kept in document control had been revised to include direction to close valve HP-97 in the appropriate section of the procedure. The inspectors observed Revision 2 to the final scope document for facility modification NSM ON-32885/00 to reduce common mode failure possibilities. This modification will provide additional non-safety related local indication of letdown storage tank level and pressure. Once installed, these instruments will be checked by auxiliary operators during routine rounds and compared to the level and pressure instrumentation already installed in the facility. The manufacturers of the new and already installed instruments will be different. The inspectors ascertained from a discussion with the HPI system engineer that this modification was scheduled for installation in Unit 3 during the Fall 1998 refueling outage and succeeding refueling outages for the other two units.

The licensee's corrective actions developed in the HPI reliability study, in response to a violation involving the inoperability of three HPI pumps were adequate.

E8.7 (Closed) VIO EA 97-297-02013: Failure to Establish Measures to Assure Cracks in HPI Safe End Nozzles Are Promptly Identified and Corrected

(Closed) VIO EA 97-297-02023: Failure to Take Corrective Actions for Temperature Differentials in Safety-Related HPI Makeup Piping

The licensee's corrective actions for these violations were described in a letter dated September 25, 1997. The licensee's investigation and initial corrective actions were previously verified to have been satisfactorily performed during an inspection documented in IR 50-269,270,287/97-07. During the current inspection, the inspectors verified that all of the licensee's corrective actions for these violations were reasonable and, except in one case, the inspectors verified that the corrective actions had been completed. The corrective action that had not been completed involved an analysis of data and procedures to establish actions to minimize thermal stresses in HPI nozzles. The collection and analysis of data for this corrective action was scheduled to continue through refueling outage 3EOC18, tentatively in the year 2000. The inspectors verified that the data for this corrective action was being collected and that preliminary evaluations of the data had resulted in changes to operating procedures to minimize thermal stresses in HPI piping and nozzles. The completion of the analysis was being tracked as an open action in the licensee's PIP O-097-1368.

The inspectors verified the licensee's corrective actions during the current inspection through a review of the following documents and through related discussions with cognizant licensee personnel:

- Report SA-97-20(ON)(ENG), "Augmented Inspection Review," dated July 15, 1997
- Letter from licensee to NRC, dated August 6, 1997, submitting a revision to the inservice inspection program regarding augmented inspections
- Letter from licensee to NRC, dated September 10, 1997, submitting supplemental information on the inservice inspection program augmented inspections
- Letter from NRC to licensee, dated October 23, 1997, accepting the previously submitted changes to the inservice inspection program augmented inspections and requesting further related commitments
- Letter from licensee to NRC, dated January 7, 1998, providing the commitments requested in the NRC's October 23, 1997 letter
- Letter from licensee to NRC, dated February 26, 1998, providing supplemental response to NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to the Reactor Coolant System"

- Procedure NDE-105, "Radiography Procedure for the Examination of Oconee Nuclear Station Thermal Sleeves," Revision 1
- Procedure NDE-960, "Ultrasonic Examination of High Pressure Injection System Piping Welds and Base Material at Oconee Nuclear Station," Revision 1
- Procedure NDE-690, "Ultrasonic Examination of High Pressure Injection System Nozzle Inner Radius at Oconee Nuclear Station," Revision 0
- "ISI Inspection Listing" (separate listings for Oconee Units 1, 2, and 3), Revision 4
- Procedure QA-513, "Preparation and Implementation of ASME Section XI Inservice Inspection Plans Including Requirements for Augmented Examinations," Revision 12
- Oconee Engineering Review SA-97-28(ON)(PA), dated August 20, 1997
- Regulatory Audit SA-97-68(ON)(RA), "ISI Augmented Inspection Program," approved January 9, 1998
- PIP 0-097-1368, identified April 27, 1997
- PIP 0-097-1507, identified May 12, 1997
- Unit 2 database of HPI temperature and flow data for October 19 and 24, 1997 (examples of data collected for long-term analysis to minimize thermal stresses in HPI nozzles)
- Class 1 HPI line fatigue analyses provided in a transmittal from Structural Integrity Associates to the licensee dated April 9, 1998 (including, for example, "Fatigue Analysis of Oconee Unit 1 HPI/Emergency Line Using PIPEFAT," Revision 0)
- "Engineering Support Program Reactor Coolant System HPI Nozzles," dated October 10, 1997
- Letter from licensee to NRC, dated January 7, 1998, providing the commitments requested in the NRC's October 23, 1997, letter.
- Videotapes of inspections of Unit 1 HPI/makeup safe ends and thermal sleeves performed conducted October 14 and 16, 1997
- SITA SA-97-10(ON)(SITA)(HPI/LPI), "High Pressure Injection and Low Pressure Injection Systems Departmental Audit," dated January 26, 1998
- PIP 2-097-2847 (identification of thermal fatigue cycle from thermocouples installed on HPI/makeup lines), identified September 8, 1997

- Procedure OP/1/A/1104/002, HPI System Startup, Revision 86 (incorporated step to increase cooling flow to preclude thermal cycle in response to PIP 2-097-2847)

- NRC Inspection Reports 50-269,270,287/98-02 and 98-05, which documented satisfactory licensee Unit 1 and Unit 2 augmented inservice inspections.

Based on their review of the licensee's corrective actions, the inspectors concluded that the licensee had thoroughly addressed the causes of both violations. The violations are closed.

E8.8 Maintenance Rule Periodic Assessment

a. Inspection Scope (62706)

Paragraph (a)(3) of the Maintenance Rule requires that performance and condition monitoring activities and associated goals and preventive maintenance activities be evaluated taking into account, where practical, industry-wide operating experience. This assessment is required to be performed at least one time during each refueling cycle, not to exceed 24 months between evaluations. The inspector discussed the requirements with the maintenance rule coordinator who is responsible for this activity, and reviewed the completed assessment which was issued July 5, 1998.

b. Observations and Findings

The licensee's periodic assessment included the following:

- Discussion of initial scoping and changes made in scoping during the period.

- Evaluation of corrective actions, goals and monitoring for (a)(1) structures, systems and components (SSCs).
- Assessment of performance of (a)(2) SSCs.

- Discussion of changes in and additions to performance criteria, including performance criteria for unavailability, reliability, and plant level.

- Evaluation of plant events against SSC performance criteria.

- Evaluation of the effectiveness of the use of industry operating experience.

- Discussion of the balancing of availability and reliability.

- Discussion of the Probabilistic Risk Assessment (PRA) aspects of the program, including risk determination and changes made in this determination.

- Evaluation of the implementation of a revision to the PRA and its effects on the program.
- Discussion of the preventive maintenance program and changes to this program as a result of Maintenance Rule monitoring.
- Discussion of the effectiveness of orientation and training of site personnel in the Maintenance Rule.

In addition, the assessment provided summary data for all Maintenance Rule SSCs, and provided the results of the calculated core damage frequency (CDF), based on actual plant performance for all three Oconee units, which clearly showed CDFs less than the baseline PRA values. Based on the above, the inspector determined that the licensee's periodic assessment exceeded the guidance provided in Section 12 of NUMARC 93-01 for accomplishing a periodic assessment. The licensee's assessment clearly provided a management level assessment of the effectiveness of the Maintenance Rule program, and of the performance of SSCs monitored under the program. The periodic assessment was considered a strength.

c. Conclusions

The licensee's Maintenance Rule periodic assessment was considered a strength.

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 observed area postings and labeling of radioactive materials. The inspectors reviewed selected radiation work permits (RWPs) for adequacy of the radiation protection requirements based on work scope, location, and conditions. For the RWPs reviewed, the 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.

Storage of radioactive material and radiological housekeeping was good at the time of the inspection. The licensee had established warehouse space to accommodate storage boxes that had previously been stored outside.

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 the auxiliary building 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.

The licensee's records determined the licensee was maintaining approximately 126,091 square feet of floor space as a radiologically controlled area (RCA). Records also determined the licensee maintained approximately 2,012 square feet or approximately 1.5 percent of the RCA as contaminated during the week of the inspection. During tours with licensee management, the inspectors reviewed established controls for personnel entering overhead areas 8 feet above the floor. Because these overhead areas are not routinely surveyed, surveys of these areas were required by radiation protection (RP) prior to worker entry. The inspectors verified radiation area workers were instructed during general employee training to contact RP prior to entry into overhead areas.

The inspectors observed personnel frisking practices and licensee followup to frisking alarms and determined the licensee was responding to potential contamination events as required by licensee procedures. The inspectors reviewed personnel contamination event (PCE) reports prepared by the licensee to track, trend, determine root cause, and any necessary follow up actions. As of July 6, 1998, approximately 199 PCEs had occurred during 1998 which included both particles and dispersed contamination events for clothing and skin contaminations.

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 determined the licensee had an adequate number of survey instruments available for use and the instruments were being calibrated and source checked as required by licensee procedures. The inspectors observed an RP technician source check a survey instrument. The source check was performed as required by licensee procedure.

c. Conclusions

Based on observations and procedural reviews, the inspectors determined the licensee was maintaining good 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.

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 radiation protection 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.

The licensee had established an annual exposure projection for 1998 of approximately 292 person-rem or 97.3 person-rem per unit. On July 7, 1998, the licensee was tracking approximately 183.3 person-rem versus a year to date projection of 143.7 person-rem. The increase in year to date site exposure was primarily attributable to the 1998 Unit 2 outage extending from approximately 47 days planned to 71 days in length based on extended work scope. The inspectors determined the licensee's programs for controlling exposures ALARA were effective. All personnel exposures to date in 1998 were below regulatory limits.

The inspectors observed the effective use of the licensee's interactive video system for pre-planning work and dose estimates and viewed the systems use as a good ALARA initiative. During tours of the facility the inspectors observed RP technicians controlling access to work areas to minimize personnel exposure and briefing workers on radiological conditions and work controls.

c. Conclusions

The inspectors determined the licensee's programs for controlling exposures ALARA were effective. All personnel exposures to date in 1998 were below regulatory limits.

R1.3 Operation of an Independent Spent Fuel Storage Installation (ISFSI)

a. Inspection Scope (60855)

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 a tour of the ISFSI, the inspectors observed that the licensee's posting and control of the radiation control zone (RCZ) was adequate. All postings were conspicuous and legible. The inspectors determined the licensee had conducted area radiation and contamination surveys at the ISFSI with appropriate radiation survey instruments. During the tour, the inspectors observed an RP technician performing radiation and contamination surveys. The inspectors conducted independent radiation and contamination surveys and found the survey results to be consistent with licensee surveys and area postings.

Based on discussions, reviews of records and observations, the inspectors determined the licensee had appropriately monitoring individuals entering the ISFSI RCZ with dosimetry as required by the appropriate RWPs.

c. Conclusions

Based on observations and procedural reviews, the inspectors determined the licensee was maintaining good controls for personnel monitoring, control of radioactive material, radiological postings, and radiation area controls at the Independent Spent Fuel Storage Installation area as required by 10 CFR Part 20.

R4 Staff Knowledge and Performance in RP&C

R4.1 Review of Staff Knowledge and Performance For Sampling Unit Ventilation for Radioactivity

a. Inspection Scope (83750)

Training of radiation protection technicians was reviewed to determined 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 reviewed procedures for performing unit ventilation gas, tritium, iodine, and particulate samples and discussed the use of these procedures with RP technicians and RP management to assess RP technician knowledge and performance in this area. The inspectors determined based on interviews and demonstration of sampling techniques that the RP technicians were knowledgeable of the sampling task. The inspectors also verified based on observations of sampling equipment that sampling cartridges, filters, and gas collection containers were being installed as required by procedure. A review of weekly survey results determined adequate sample volumes had been obtained to achieve the required lower limit of detection (LLD) counting requirements and the licensee was following established procedures for the use of counting equipment.

c. Conclusions

Based on observations and interviews, the inspectors determined RP personnel interviewed were knowledgeable and competent in the task of performing unit ventilation sampling for radioactivity.

R7 Quality Assurance in Radiological Protection and Chemistry Activities

R7.1 Quality Assurance Audits

a. Inspection Scope (83750)

10 CFR 20.1101 requires that the licensee periodically review the RP program content and implementation at least annually. Licensee periodic reviews of the RP program were reviewed to determine the adequacy of problem identification and corrective actions.

b. Observations and Findings

Reviews by the inspectors determined that quality assurance review in the area of RP were accomplished by reviewing RP procedures, observing work, reviewing industry documentation, and performing plant walkdowns including surveillance of work areas by supervisors and technicians during normal work coverage. Documentation of problems by licensee representatives was included in quality assurance audits. The inspectors reviewed the licensee's most recent audit in the area of radiation protection, audit report number SA-97-06(ON)(RA), dated August 4, 1997. The audit identified four findings and three recommendations were offered. The inspectors also reviewed Safety Review Group Evaluation Report, Radiation Worker Practices Inplant Review, SA-98-116(ONS)(SRG), dated June 5, 1998, and discussed the assessment with one of the auditors. The inspectors determined the self-assessment performed to be good in identifying areas of improvement.

c. Conclusions

The inspectors determined the licensee was performing reviews in the area of radiation protection as required by 10 CFR Part 20.1101. Licensee self-assessment in the area of radiation protection was good.

R8 Miscellaneous RP&C Issues

R8.1 Chemistry and Operations Interfaces

a. Inspection Scope (71750)

The inspectors reviewed the Chemistry to Operations Interfaces included as part of the Oconee Recovery Plan. The purpose of the interface program was to prevent human performance errors in communications between chemistry and operations.

b. Observations and Findings

The inspectors observed that the Chemistry and Operations Interfaces consisted of 13 initiatives. Five of the initiatives were considered long-term items or contained long-term items and were removed from the short-term action plan. These five initiatives were: Initiative 2, Code Chemistry Work Orders; Initiative 4, Clarify Turbine Building Sump Routing; Initiative 9, Operations' Procedures Evaluation; Initiative 11, Logging Reactor Coolant System Flushes; and Initiative 13, Criteria for Operations Notifying Chemistry.

The inspectors identified during their inspection a deficiency in that initiatives 9, 11, and 13, considered as long-term items, did not indicate what type of licensee followup would be in place to ensure implementation. These concerns were discussed with licensee management. The inspectors were subsequently informed that the these concerns were addressed by assigning responsibilities for ownership.

The licensee considered the remaining eight items as closed. The inspectors did not identify any deficiencies with these eight short-term initiatives.

The inspectors have observed that communications between the chemistry and operations group during shift turnovers and during shift operation were improved.

c. Conclusions

The inspectors concluded that the communications between the chemistry and operations groups during shift turnovers and during shift operations were improved and are considered good.

The inspectors concluded that the initiatives were comprehensive and identified specific problem areas. For the most part, the areas were identified by group and the responsibility for these areas were assigned by name.

The inspectors concluded that the licensee did not identify the group or individuals responsible for tracking and completing three of the items considered long-term or needing further evaluation. Following inspector questioning, the licensee resolved ownership of the three items.

The inspectors concluded that resolution and the resources committed to the short-term items, the tracking and completion of the items, the procedure changes, and the involvement of the supervisors and the managers were excellent.

R8.2 (Closed) VIO 50-270/98-05-04, Inadequate Configuration Control of Unit 2 Radiation Indicating Alarm (RIA) Particulate and Iodine Sample Tubing

The inspectors performed followup inspection of licensee corrective actions to address the an inadequate configuration control of Unit 2 RIA particulate and iodine sampling tubing. The inspectors reviewed the

licensee's PIP regarding this item. During the review, the inspectors confirmed that the licensee had modified the Unit 2 sample tubing bend radius as specified on licensee configuration and design drawings. The licensee also incorporated procedural guidance to add detail on the configuration drawings to show where the tubing bends were required. The inspectors concluded that the licensee's implementation of these corrective actions adequately addressed the concerns associated with the violation. This violation is closed.

The inspectors concluded the actions to address the closure of the configuration control violation were timely and adequate.

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 July 29, 1998, and August 24, 1998. The licensee acknowledged the findings presented. No proprietary information was identified to the inspectors. Dissenting comments were not received from the licensee.

Partial List of Persons Contacted

Licensee

L. Azzarello, Manager, Mechanical Systems & Equipment Engineering
E. Burchfield, Regulatory Compliance Manager
T. Coutu, Scheduling Manager
D. Coyle, Mechanical Systems Engineering Manager
T. Curtis, Operations Superintendent
B. Dobson, Mechanical/Civil Engineering Manager
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
B. Peele, Station Manager
T. Saville, Supervisor, Primary Systems
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
K. Landis, Engineering Branch Chief, Division of Reactor Safety, Region II

Inspection Procedures Used

IP37550	Engineering
IP37551	Onsite Engineering
IP40500	Effectiveness of Licensee Controls In Identifying and Preventing Problems
IP60855	Operation of an ISFSI
IP61726	Surveillance Observations
IP62707	Maintenance Observations
IP71707	Plant Operations
IP71750	Plant Support Activities
IP83750	Occupational Radiation Exposure
IP90712	In-office Review of Written Reports of Nonroutine Events at Power Reactor Facilities
IP92700	Onsite Followup of Written Event Reports
IP92901	Followup - Plant Operations
IP92902	Followup - Maintenance
IP92903	Followup - Engineering
IP93702	Prompt Onsite Response to Events

Items Opened, Closed, and Discussed

Opened

50-269,270/98-07-01	NCV	Inadequate Maintenance Procedures (Section M8.1)
50-269/98-07-02	NCV	Lack of Adequate Receipt Inspection (Section M8.2)
50-269,270,287/98-07-03	IFI	Potentially Inadequate Design Control for MSLB Modification (Section E4.1)
50-269,270,287/98-07-04	URI	IST Program and Design Control Process Interface (Section E7.1)
50-269,270,287/98-07-05	IFI	Review of Design Inputs for Calculations (Section E4.1)

Closed

50-270/97-05-01	VIO	Failure to Follow LPI Test Procedure (Section O8.1)
50-269/97-14-01	URI	Failure to Follow LTOP Procedure (Section O8.2)
50-270/96-20-06	VIO	Failure to Use Procedure Administrative Hold (Section O8.3)
50-270/96-04-00	LER	Secondary Drain Line Rupture Results in a Manual Reactor Trip (Section O8.3)
50-270/96-04-01	LER	Secondary Drain Line Rupture Results in a Manual Reactor Trip (Section O8.3)
50-269,270,287/97-18-02	URI	Containment Air Lock Testing (Section O8.4)
50-270/97-01	LER	Unisolable Reactor Coolant Leak Due to Inadequate Surveillance. (Section O8.6)
50-269,270/98-06-07	URI	LPSW Pump Bearing Failures (Section M8.1)
50-269,270,287/97-15-02	URI	Wrong Service Water Valve Parts (Section M8.2)

50-269,270,287/97-18-04	URI	Teflon Tape Use on LPI System (Section M8.3)
50-270/98-06-05	URI	2LWD-444 May Affect Penetration Room (Section M8.4)
50-270/96-13-08	VIO	Failure to Provide Adequate Test and Inspection Requirements (Section E8.1)
50-269,270,287/97-09-01	VIO	Failure to Include All Required Structures, Systems, and Components in the Scope of the Maintenance Rule (Section E8.2)
50-269,270,287/97-09-03	VIO	Failure to Establish Adequate Goals and Monitoring for (a)(1) Systems (Section E8.3)
50-269,270,287/97-09-04	IFI	Review of Maintenance Rule Baseline Results for Structures (Section E8.4)
50-269,270,287/97-09-02	IFI	Followup Licensee Actions to Implement Revision 2 of the Oconee PRA (Section E8.5)
EA 97-297-2013	VIO	Failure to Establish Measures to Assure Cracks in High Pressure Injection Safe End Nozzles Are Promptly Identified and Corrected. (Section E8.7)
EA 97-297-2023	VIO	Failure to Take Corrective Actions for Temperature Differentials in Safety-related High Pressure Injection Makeup Piping. (Section E8.7)
50-269,270,287/98-05-04	VIO	Inadequate Configuration Control of Unit 2 RIA Particulate and Iodine Sample Tubing (Section R8.2)

Discussed

50-270/98-03	LER	Low Condenser Vacuum Results in a Reactor Trip Due to an Inadequate Work Clearance Process (Section 08.5)
EA 97-298-01012	VIO	Failure to Adhere to TS Requirements for the HPI System (Section E8.6)

List of Acronyms

AIA	Auxiliary Instrument Air
ALARA	As Low As Reasonably Achievable
AS	Auxiliary Steam
ASME	American Society of Mechanical Engineers
BTO	Block Tag Out
BWST	Borated Water Storage Tank
CDF	Core Damage Frequency
CCW	Condenser Circulating Water
CFR	Code of Federal Regulations
DBD	Design Basis Document
DC	Direct Current
ES	Engineered Safeguards
ESF	Engineered Safety Feature
F	Fahrenheit
FFB	Field Flash Breaker
FIP	Failure Investigation Process
FOGG	Feed Only Good Generator
GDC	General Design Criteria
GL	Generic Letter
HPI	High Pressure Injection
IFI	Inspector Followup Item
IP	Inspection Procedure
IR	Inspection Report
ISFSI	Independent Spent Fuel Storage Installation
IST	Inservice Test
KHU	Keowee Hydroelectric Unit
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LLD	Lower Limit of Detection
LPI	Low Pressure Injection
LPSW	Low Pressure Service Water
LTOP	Low Temperature Overpressure Protection
MM	Minor Modification
MSLB	Main Steam Line Break
NCV	Non-Cited Violation
NLO	Non-Licensed Operator
NRC	Nuclear Regulatory Commission
NSD	Nuclear System Directive
NSM	Nuclear Station Modification
NUMARC	Nuclear Utility Management and Resource Council
OLPI	Low Pressure Injection and Core flood System
ONS	Oconee Nuclear Station
PCE	Personnel Contamination Event
PDR	Public Document Room
PIP	Problem Investigation Process
PORV	Power Operated Relief Valve
PRA	Probabilistic Risk Analysis
PSIG	Pounds Per Square Inch Gauge
PT	Performance Test
PVRS	Penetration Room Ventilation System
RBACU	Reactor Building Auxiliary Cooling Unit

RBCU	Reactor Building Cooling Unit
RBS	Reactor Building Spray
RCA	Radiologically Controlled Area
RCS	Reactor Coolant System
RCZ	Radiation Control Zone
REV	Revision
RIA	Radiation Indicating Alarm
RP	Radiation Protection
RWP	Radiation Work Permit
SITA	Self-Initiated Technical Audit
SRI	Systems Research International
SSC	Structures, Systems or Components
SSF	Safe Shutdown Facility
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
USQ	Unreviewed Safety Question
VIO	Violation
WO	Work Order