



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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ATLANTA, GEORGIA 30303-8931

March 23, 2000

Duke Energy Corporation
ATTN: Mr. W. R. McCollum
Vice President
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: NRC INSPECTION REPORT 50-269/2000-03, 50-270/2000-03, AND
50-287/2000-03

Dear Mr. McCollum:

This refers to an inspection conducted on February 28 - March 3, 2000, at the Oconee facility. The purpose of the inspection was to examine a sample of plant equipment and the documentation that support your application for renewed operating licenses for Oconee Nuclear Station. The enclosed report presents the results of this inspection.

Based on the results of this inspection, we have concluded that you have resolved the open issues identified in the two previous license renewal inspections. The inspection also concluded that documentation supporting your application is in an auditable and retrievable form.

Within the scope of the inspection, violations or deviations were not identified. In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

\RA

Victor M. McCree, Deputy Director
Division of Reactor Projects

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

cc w/encl - (See page 2)

Enclosure: NRC Inspection Report

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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

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

Report Nos: 50-269/2000-03, 50-270/2000-03, 50-287/2000-03

Licensee: Duke Energy Corporation

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

Location: 7812B Rochester Highway
Seneca, SC 29672

Dates: February 28 - March 3, 2000

Inspectors: B. Crowley, Reactor Inspector, RII
E. Girard, Reactor Inspector, RII
G. MacDonald, Reactor Inspector, RII
H. Wang, Reactor Inspector, NRR
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Approved by: Caudle Julian
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Division of Reactor Safety

EXECUTIVE SUMMARY

Oconee Nuclear Station, Units 1, 2, and 3

NRC Inspection Report 50-269/2000-03, 50-270/2000-03, and 50-287/2000-03

This special team inspection included inspection of a sample of plant equipment and documentation that support Duke Energy Corporation's application for renewed operating licenses for the Oconee units.

The team concluded that the applicant's actions have been sufficient to resolve NRC issues identified during the previous two license renewal inspections.

The team reviewed the Specification 16 document, the transition document for implementing Oconee license renewal commitments, in parallel with the draft Updated Final Safety Analysis Report (UFSAR) Supplement and the License Renewal Application (LRA). NRC found the documents to be mutually consistent and of good quality. Exceptions were the descriptions of the Service Water Corrosion Program (see Section E8.1) and the Electrical Cables and Connectors Program (see Section E8.10). The applicant agreed to modify Specification 16 and the UFSAR Supplement as appropriate to enhance those descriptions.

During previous inspections, NRC expressed concern over external corrosion on Low Pressure Service Water piping inside the reactor buildings. The applicant has examined and analyzed the piping to ensure that it is acceptable for interim operation and has established a plan to inspect and replace the piping during upcoming outages. The inspectors found the applicant's action acceptable for continued operation until pipe replacement is completed (see Section E8.8).

Report Details

LICENSE RENEWAL INSPECTION REPORT 99-11

III. Engineering

E8 Miscellaneous Engineering Issues

Inspection Scope (71002)

This was the third and final inspection in support of the Duke application for extension of the Oconee Nuclear Station (ONS) operating license term. This inspection focused on applicant activities in response to NRC issues identified during the previous license renewal inspections documented in NRC inspection reports 99-11 and 99-12. The inspectors reviewed supporting documentation for closure of a previous NRR Safety Evaluation Report (SER) open item. The circumstances related to a recent reactor coolant system (RCS) leak through a crack in the bend of an elbow of a small drain line were also inspected.

Observations and Findings

E8.1 Development and Implementation of Aging Management Programs

During previous inspection 99-12, the NRC concluded that existing aging management programs had minimal procedural guidance and were not always conducted at the specified frequency. Additionally there was no management program or tracking mechanism in place to ensure the development and implementation of aging management programs as described in the License Renewal Application (LRA).

Subsequent to inspection 99-12, the applicant developed a document that identifies the plant level actions necessary to implement the commitments made during the Oconee license renewal process. The inspectors reviewed that document OSS-0274.00-00-0016, Oconee License Renewal Commitments, Rev. 0, 2/17/2000, referred to as Specification 16, to determine if it addresses the NRC's conclusions expressed above. The inspectors also reviewed a document titled Oconee Nuclear Station UFSAR Supplement, Draft February 2000, which was also under review by the NRC Office of Nuclear Reactor Regulation (NRR). The intended purpose of the UFSAR supplement when finalized, is to incorporate Duke's license renewal commitments into the Oconee Updated Final Safety Analysis Report, primarily as a new chapter 18. The inspectors compared these two documents to each other and to the LRA including many Duke letters to the NRC which provided clarification to the LRA. The inspectors concluded that both documents were mutually consistent and of good quality. Issues identified during the review were as follows.

During inspection 99-12, the inspectors noted that enhancement of the Service Water Piping Corrosion Program was planned to add additional inspection locations for license renewal commitments. In addition, the inspectors noted that the program as issued needed enhancements relative to: (1) formalization and approval of program, (2) requirement to

evaluate generic implications or the need for inspection of other locations if a location is found to be below minimum wall thickness, and (3) details on required inspection intervals. During the current inspection, the inspectors found that the applicant was in the process of improving the program, but further enhancements were needed. The applicant agreed that further enhancement of the program was needed and stated that Specification 16 would be revised to specify enhancements of the Service Water Piping Corrosion Program in the areas of: (1) frequency of inspections, (2) evaluation of need to inspect other locations if acceptance criteria are not met for a given location, (3) documentation of inspection results in a retrievable form, and (4) enhancement of the program to ensure that all aspects of the program are encompassed in one guidance document.

During inspection 99-12, the inspectors also identified weaknesses in the Keowee Oil Sampling Program relative to inconsistencies in frequency of sampling, responsibilities and logistics for analysis, parameters to be analyzed, and acceptance criteria. The applicant was in the process of formalizing and improving the program at the time of the 99-12 inspection. During the current inspection, the inspectors found that the requirements for the Keowee Oil Sampling Program, including requirements for a formal proceduralized program, testing frequency, and acceptance criteria, had been included in the draft UFSAR Supplement. These requirements with additional details had been included in Specification 16, which documents program changes required to implement license renewal activities. The UFSAR Supplement and the Specification 16 should ensure implementation of a detailed Keowee Oil Sampling Program.

The LRA identified the Keowee Air and Gas Systems Inspection for management of aging in the Carbon Dioxide, Depressing Air, and Governor Air Systems. This program included a one-time inspection of portions of tanks and pipe to assess the loss of material due to general corrosion. The inspection was described in Specification OSS-0274.00-0005, which stated, in part, that four feet of Carbon Dioxide System pipe would be volumetrically examined. During NRC inspection 99-12, the inspectors found that the applicant had performed an inspection of the Keowee Unit 2 Carbon Dioxide System pipe and reviewed the results. The inspection performed by the applicant was consistent with that stated in the LRA, Specification, and the NRC SER, except that the pipe was inspected visually rather than volumetrically. The applicant's position was that the inspection had not been accepted as meeting the aging management program requirements. In the current inspection the inspectors verified that the licensee had taken further steps to ensure that the volumetric inspection would be performed by specifying it in the UFSAR supplement and Specification 16.

E8.2 Revised Steam Generator Tube Rupture Analysis

During previous inspection 99-11, the inspectors observed in the applicant's license renewal documentation, an open item stating that a new Steam Generator Tube Rupture (SGTR) analysis is under review by the NRC, and this might require a future expansion of the license renewal scope to include Component Cooling and perhaps other systems. The applicant was tracking this issue along with other license renewal issues, with a Problem Investigation Process (PIP) corrective action document. During the current inspection, the inspectors reviewed the status of PIP O-99-00621 and discussed the issue with applicant engineers. The applicant has determined that during a postulated SGTR event, reactor coolant pumps will continue to run. The applicant concluded that to support reactor coolant pump operation, the Component Cooling system needs to be functional, and therefore the Component Cooling system was declared within the scope of license renewal. The inspectors reviewed Duke's

September 30, 1999 letter to the NRC that described this decision, Calculation OSC-6116 Steam Generator Tube Rupture Event Mitigation Requirements, Rev. 2 dated September 7, 1999, and portions of Calculation OSC-7070 Oconee Event Mitigation Database, Rev. 2. The inspectors also reviewed piping and instrumentation drawings for the Component Cooling system which were marked to show the portions of the system in license renewal scope. No discrepancies were identified and NRC considers the issue resolved.

E8.3 Emergency Feedwater System Unit Cross Connect Function

During previous inspection 99-11, the inspectors observed that the Emergency Feedwater (EFW) system function to provide flow between units had not been identified for consideration in license renewal scoping. This unit cross-connect function was believed by NRC to be required for addressing scenarios involving high energy line breaks in the turbine building and tornado events. The inspectors reviewed this issue and determined that the applicant's position was that the cross-connect function is not needed for any design basis accident. This issue was further discussed in a letter from Herbert Berkow, NRR to William McCollum, Vice President ONS dated February 24, 1999, and is the subject of ongoing discussions between NRC and Oconee. Although the function of unit cross connection was not considered by the applicant during the scoping process, the EFW equipment (i.e. valves, piping, etc.) used to support the cross-connect function was declared in scope for other functions. NRC considers this issue resolved.

E8.4 License Renewal Scoping Methodology Issues

During previous scoping inspection 99-11, the inspectors reviewed a number of plant systems, functions, and postulated events determined by the applicant to be out of scope for license renewal. Based on this review, the team expressed the view that the function of spent fuel pool cooling performed by the Recirculating Cooling Water (RCW) System, and the postulated plant events of loss of decay heat removal and pipe rupture should have been addressed in the mechanical scoping process for license renewal. The RCW System was not included within the scope of license renewal by the applicant.

Because these concerns were similar to questions raised by the staff during its evaluation of the applicant's scoping methodology, they were referred to the NRR program office for resolution under the methodology review. In general, the NRR staff was concerned with the applicant's methodology for identifying the systems, structures, and components within the scope of 10 CFR 54.4(a)(1) and (a)(2) as it applies to design basis events (DBEs) defined under 10 CFR 50.49(b)(1).

In a May 11, 1999, meeting with NRC, the applicant stated that the license renewal "scoping events" included UFSAR Chapter 15 analyzed events, natural phenomena criteria, post-Three Mile Island emergency feedwater design basis scenarios, and turbine building floods mitigated by the standby shutdown facility. Thus the applicant considered a total of 26 events when initially scoping to comply with 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(2). Duke also stated that it reviewed an additional 32 events for possible inclusion into the set of scoping events. Duke determined that none of the additional 32 events needed to be considered for purposes of scoping in accordance with 10 CFR 54.4 (a)(1) and 10 CFR 54.4(a)(2).

Because the applicant's definition of DBEs, limited the range of analyzed events to only those described in the UFSAR Chapter 15, the staff was concerned that the applicant may have overlooked some systems, structures, and components needed to prevent or mitigate any of the additional 32 events that might have been identified if the applicant used the broader 10 CFR 50.49(b)(1) view of a DBE. As a result of this concern, the staff performed a review of the 32 events against the applicant's UFSAR, license conditions, the applicable regulations, Commission orders, and exemptions that are in effect and that define the applicant's design requirements. As a result of these activities, the staff identified 10 events that they believed needed additional consideration under the license renewal scoping criteria, 10 CFR 54.4(a) of the rule. The applicant was asked to reevaluate these 10 events for potential equipment that needed to be included within the scope of license renewal. In response to this request the applicant identified 7 of the 10 events that needed to be considered for scoping under 10 CFR 54.4(a)(1) and (a)(2). In general, the results of the applicant's review were as follows:

- Five events (high energy line break, loss of control room, steam generator overfill, steam generator dryout, and loss of instrument air) had components that met the scoping criteria. However, the components from these five events, that met the scoping criteria under 10 CFR 54.4(a), were already included in the scope of license renewal for other applications with similar intended functions.
- One event (loss of spent fuel pool cooling) credited "operator actions and mentioned non-specific plant capability." This event met the definition for a DBE, but did not require adding any additional systems and components to the current scope of mechanical systems and components.
- One event (loss of decay heat removal) credited the non safety-related reactor coolant bleed transfer pumps and connecting piping and two other safety-related systems and components. The applicant included in scope the two safety-related systems and components for other applications. However, because redundant means of adding inventory to the reactor coolant system were available in case of such an event, the non safety-related mechanical systems and components were not added to the scope of license renewal.
- Three events (control of heavy loads, loss of condensate, and internal flooding of Auxiliary Building) were not identified in any of the five document types that define the applicant's design requirements, and thus, were not included as scoping events.

With respect to the issues identified in inspection 99-11, the NRR staff determined the following:

- Recirculating Cooling Water System - The RCW system is relied upon to supply cooling water to the spent fuel pool (SFP) Cooling System to maintain the bulk SFP coolant temperature below the SFP design limits and below assumptions for the fuel handling accident analysis described in UFSAR Section 15.11.2.1. On the basis of this information, the staff requested the applicant to clarify its basis for excluding the RCW from the scope of license renewal. In its response, the applicant stated that the fuel handling accident analysis for ONS assumes that spent fuel pool cooling, and thus the RCW Systems, is not functional during and following a fuel handling accident. The applicant also stated that the results of the safety analysis for the fuel handling accident

demonstrated that the consequences of such an accident are within the 10 CFR Part 100 guidelines. Since the applicant's analysis demonstrated that spent fuel pool cooling is not required to remain functional during or following a fuel handling accident to prevent or mitigate the consequences of that accident, the equipment required to remove decay heat from the spent fuel pool, including the RCW system, is not within the scope of license renewal. The NRR staff found the applicant's justification acceptable.

- Decay Heat Removal Systems - There are three systems that provide alternate means of maintaining the core covered if normal decay heat removal is lost; the non safety-related reactor coolant bleed transfer pumps and connecting piping in addition to two other safety-related systems and components. The applicant included the two safety-related systems in the original scope for license renewal, but for reasons other than decay heat removal. On the basis of this review, the applicant considered the decay heat removal function for the two safety related systems and determined that no additional components needed an aging management review. Because redundant means of adding inventory to the reactor coolant system were available in case of such an event, the non safety-related mechanical system was not added to the scope of license renewal.
- High Energy Line Break - This event was added to the list of scoping events for the purpose of license renewal. The applicant considered the potential of a high energy line break in its evaluation of the nine systems potentially affected by this kind of an event and determined that no additional components needed an aging management review.

On the basis of the staff's reviews and the applicant's actions, this inspection issue is considered closed.

E8.5 Observations of Plant Condition Deficiencies

During previous inspection 99-11, in the lowest level of the Standby Shutdown Facility (SSF), the inspectors observed white stains in a horizontal line on the concrete wall resulting from apparent concrete leaching due to ground water seepage through the wall at a construction joint. Inspectors were informed that the condition was being tracked as a minor modification but no date had been established for repair. During the current inspection, the inspectors discussed the status of this issue with applicant civil engineers. The inspectors reviewed a draft copy of procedure MP/O/A/1000/007, Seal Injection of Hairline Cracks in Concrete, Rev. 0 that was in final review for approval. The procedure specifies drilling diagonal holes near the joint and injecting hardening sealing resin to eliminate water seepage. The engineers stated that the same procedure had been used in the auxiliary building walls at the McGuire plant. The inspectors concluded that the proposed corrective actions were reasonable, that progress had been made, and that no further NRC review was required.

During previous inspection 99-11, the NRC inspectors observed several examples of concrete spalling on concrete trench covers of the cable trench from the SSF to the plant. The inspectors recognized that the applicant had identified deteriorating conditions and documented them in 1998, but were told that the resulting work request and work order were later canceled. During the current inspection, inspectors discussed this issue with applicant engineers and reviewed PIP O-99-02050. The PIP described the problem that the work request and work

order were subsequently rejected for budget considerations but no feedback was given to the engineer who initiated the work order. The PIP stated that work orders are relied on as a means of assuring the accomplishment of work and Engineering commonly closes PIP corrective actions on the basis of work order numbers. The PIP "Actual Corrective Action" section states that work request descriptions should include PIP numbers with the problem statement to ensure that appropriate actions are taken to resolve problems where PIPs are being closed out.

The inspectors reviewed completed work order 98160186 dated 9/21/99 which documented the replacement of cable trench covers in the 230KV electrical switchyard. The inspectors reviewed work order 98195161 which documents replacement of three trench covers on the standby shutdown facility cable trench. Some work tasks have been completed, but the work is currently on hold pending arrangements to procure the necessary high quality concrete. The inspectors concluded that the repair work is scheduled and in progress and no further review of this issue by the NRC is needed.

E8.6 Active/Passive Definition Disagreements for RTDs and Fire Detector Cables

NRC Inspection Report 99-11 discussed Electrical Commodity Group Screening, and reported that the applicant classified Resistance Temperature Detectors (RTDs) and Thermocouples as active components not subject to an aging management review. At the time of the 99-11 inspection, the temperature sensor commodity group function designation was still under review by NRR. Nuclear Energy Institute (NEI) Guideline 95-10, revision 0, Industry Guideline For Implementing The Requirements Of 10 CFR Part 54-The License Renewal Rule, recommended that RTDs and thermocouples should be subject to an aging management review. Duke's LRA response to the NRC's Request For Additional Information (RAI) 2.6-6 and 2.6-7 required that Duke include the pressure boundary function for RTDs and thermocouples within the aging management review. The inspectors reviewed NEI Guideline 95-10, revision 1, dated January, 2000, and verified that RTDs/Thermocouples are now considered active components with the exception of the pressure boundary function of the thermowell portion of the sensor. The inspectors verified that the thermowell portion of the temperature sensors were included within the commodity group "PIPE" whose aging affects were managed by the reactor coolant system components review and the mechanical system components review. This issue is correctly described in the NRC final Oconee License Renewal Safety Evaluation Report (SER), the ONS Updated Final Safety Analysis Report (UFSAR) Supplement, and Oconee License Renewal Commitments document, OSS-0274.00-00-0016, revision 0, (Specification 16). This issue is closed.

Fire detector cables were an open issue in NRC inspection report 99-11. This item was also identified in the draft ONS License Renewal SER as Open Item 2.2.3.7-1. The applicant responded to the SER open item by letter dated October 15, 1999. Attachment 2 to the applicant's letter indicated that fire detector cables are now included within the scope of license renewal and were included in the cable aging management program. The inspectors reviewed OSS-0274.00-00-0006, Oconee Electrical Component Aging Management Review For License Renewal, revision 1, (ONS License Renewal Specification 6), the October 15, 1999 letter, ONS License Renewal Specification 16, the final NRC License Renewal SER, and the ONS draft UFSAR Supplement and verified that fire detector cables were no longer exempt from license renewal and were included within the cable aging management program. ONS Specification 6

should be revised to correctly describe the inclusion of fire detector cables within the scope of ONS License Renewal. This issue is closed.

E8.7 Cable Drawings Versus Database Discrepancies

During previous inspection 99-11, the inspectors identified 7 cables from a selected sample of 26, representing 3 cable types, that were not included on the Oconee electrical cable tabulation drawings which were utilized by the applicant to identify the cable types and materials for the Oconee aging management review. The applicant initiated PIP O-99-01737 for resolution.

NRC inspection report 99-12 described the Oconee Cable Type Database Review Project which was a research project to identify all cable types/materials at Oconee. The research project identified 14 cable types and 4 cable materials not previously evaluated by the license renewal aging management review. The review effort evaluated the new materials for license renewal but did not incorporate the results into the ONS cable drawings. ONS License Renewal Specification 6 should be revised to include the results of the Oconee Cable Type Database Review Project.

The inspectors reviewed PIP O-99-01737 and verified that corrective action 1 which consisted of performing the research project was completed August 10, 1999. Corrective Action 2 was to incorporate the new cable information into the OEE cable drawings via minor modification ONOE 14057. Final PIP approval and closure was completed September 30, 1999. ONOE 14057 was reviewed and the inspectors verified that the Oconee/Keowee Cable Type Listing database spreadsheet information had been incorporated into revised OEE drawings OEE-14-5 through OEE-14-14, and the KEE Drawings were revised to add a note which indicated that the drawings were historical and current data were included on the OEE series drawings. The minor modification was completed and approved October 21, 1999. This item is closed.

E8.8 Corrosion of Exterior Surface of Low Pressure Service Water Piping Inside the Reactor Buildings

During walkdown inspections documented in NRC Inspection Report 99-12, the inspectors observed a significant buildup of corrosion product on the Unit 1 un-insulated carbon steel Service Water System piping inside the Reactor Building. The insulation had been removed from this piping for all three units because of the potential for clogging the emergency sump during a Loss of Coolant Accident (LOCA). Problem Investigation Process (PIP) Report 0-097-038 had been issued to address the insulation problem on all three Units. PIP Corrective actions included plans for replacement of some of the carbon steel piping with stainless steel. A portion of the piping in Unit 3 had been replaced during the last refueling outage. Replacement of the remainder of piping in Unit 3 and the piping in Units 1 and 2 had been delayed. PIP 0-097-038 did not address interim measures until the piping is replaced. After questioning by the inspectors, the applicant revised the PIP to take ultrasonic (UT) thickness measurements on a sample of Unit 1 piping to verify that pipe wall thicknesses remained acceptable.

After the surface rust (corrosion products) was removed, sample UT thickness measurements showed the Unit 1 pipe to be generally uniform in thickness and within acceptable limits.

However, one small localized area was found to be below minimum thickness requirements of the Service Water Piping Corrosion Program and required engineering evaluation. At the end of NRC inspection 99-12, the applicant had not provided the engineering analysis.

During the current inspection the applicant provided Revision D5 to Calculation OSC-1307-06, which documented engineering calculations for the localized thin area in the Unit 1 service water piping. The calculation showed the area to be acceptable. In addition to review of the calculation, the inspectors also reviewed Work Order 98250440, which had been issued to inspect the localized area again at the next refueling outage.

The inspectors also discussed with the applicant the plans for future inspections and replacements for Units 1 and 2 piping and the remainder of the Unit 3 piping. Responsible engineering personnel stated that plans are as follows:

Unit 1 - During the refueling outage scheduled for November/December 2000, piping in Reactor Building Cavity "A" will be replaced and piping in cavity "B" will be inspected. Piping not replaced in the 2000 outage will be replaced the following outage.

Unit 2 - During the refueling outage scheduled for April/May 2001, piping in one Reactor Building Cavity will be replaced and piping in the other cavity will be inspected. The piping not replaced in the 2001 outage will be replaced the following outage.

Unit 3 - During the refueling outage scheduled for April 2000, the piping not previously replaced will be inspected. The piping will be replaced during the following outage.

The piping replacements will be accomplished with the Minor Modifications identified in PIP 0-097-038.

Based on the above review, the inspector found the applicant's actions acceptable for continued operation until pipe replacement is completed and Inspection Followup Item 50-269/99-12-01 is closed.

E8.9 Discrepancies in License Renewal Documentation

During the scoping inspection documented in NRC Inspection Report 99-11, the inspectors identified several omissions and contradictions in various license renewal documents. During the current inspection, the team reviewed revisions to the affected documents and verified corrections had been made, as appropriate. The following is a list of the affected documents and changes made:

Appendix A-2 of Specification OSS-0274.00-00-0002 identified the material for the pipe expansion joints at the LPSW Pumps as carbon or stainless steel. The installed material, which agreed with the applicable drawing was Nylon Tire Cord/Chlorobutyl. Revision 2 to the Specification OSS-0274.00-00-0002 was issued on September 17, 1999, to show the correct material for the expansion joints.

The license renewal flow diagram for the LPSW system did not show the connection for the siphon seal water system. Revision 2 to Calculation OSC-6605 was issued in the September, 1999 and included Revision 32 of Flow Diagram OFD-124A-1.1, which showed the Siphon Seal Water connection.

A number of systems were omitted from Sections 3.3.1 and 3.3.2 of Specification OSS-0274.00-00-0001, although listed in the summary of systems and functions in scope at the end of the specification. These omissions were corrected in Revision 3, issued August 30, 1999, to Specification OSS-0274.00-00-0001.

E8.10 Aging Management Program for Electrical Cables and Connectors

During previous inspection 99-12, the inspectors concluded that cables and connectors at ONS are experiencing applicable aging effects that were discussed in the LRA. The NRC team could not agree with the applicant's conclusion that no aging management program is needed for electrical cables and connectors. This issue was designated by NRC as ONS License Renewal SER Open Item 3.9.3-1. By letter dated November 18, 1999, the staff sent Duke a letter that provided the status and detailed four staff concerns with the open item. Duke responded by letter dated December 17, 1999, to the four concerns, three of which were considered closed by the staff and the fourth item was left open. By letter dated January 12, 2000, Duke responded to the last concern and included a description of the Insulated Cable Aging Management Program. NRC's final License Renewal SER section 3.9.3.2.1 evaluated the Insulated Cable Aging Management Program and concluded that aging effects will be adequately managed.

Duke letters dated December 17, 1999, January 12, 2000, the final ONS License Renewal SER section 3.9, ONS License Renewal Specification 16, and the ONS License Renewal UFSAR Supplement were reviewed. The final ONS License Renewal SER indicated that the cables and connectors would require an aging management program. The inspectors observed that the applicant had an aging management program for cables but connectors were not included. The Fluid Leak Management Program had been modified to include requirements to monitor for boric acid intrusion into electrical equipment. This program would address the aging effects of connector corrosion due to boric acid exposure but would not address connector aging effects due to temperature or radiation. There were some examples of connector temperature related aging at ONS identified in the applicant's document entitled, Electrical Walkdown at Oconee, which detailed the finding of a walkdown performed for license renewal. The November, 1996 ONS Reactor Building walkdown noted cable connector splices in a cable tray near the pressurizer and heat shrink over connectors near the pressurizer which appeared to have been heat affected.

The inspectors discussed the connector concerns with applicant license renewal personnel and the applicant agreed that connectors would be added to the scope of the ONS Insulated Cables Aging Management Program. ONS License Renewal UFSAR Supplement, ONS License Renewal Specification 16, and ONS License Renewal Specification 6 will require revision to include descriptions of the cable and connectors aging management program.

The inspectors noted that the new Insulated Cables Aging Management Program incorporated periodic walkdowns to detect aging for accessible cables and testing for inaccessible in-conduit or direct buried medium voltage cables exposed to significant voltage and moisture. The

program included monitoring of the manholes utilized by these medium voltage cables for water accumulation. The inspectors observed the manholes in the transformer yard and did not observe the presence of water. The inspectors concluded that with the addition of connectors to the scope of the Insulated Cables Aging Management Program, the program addressed the NRC concerns identified in the November 18, 1999 letter and would adequately manage the aging of cables and connectors at ONS for the period of extended operation. This item is closed.

E8.11 Systems and Components Added to the Scope of License Renewal During the Review Process

By letter dated September 30, 1999, Duke Energy Corporation issued Amendment 1 to the Oconee LRA to add a number of systems and components into the scope of the Oconee LRA. The inspectors reviewed the aging management programs for a sample of these plant systems and components as described below to verify that program requirements were identified and implemented consistent with the LRA and the NRC SER dated February 2000.

E8.11.A Essential Siphon Vacuum (ESV) And Siphon Seal Water Systems

For these systems, Amendment 1 to the LRA identified three aging management programs. The existing Service Water Piping Corrosion Program was identified for managing the effect of loss of material in stainless steel components due to: (1) pitting corrosion and microbiologically influenced corrosion caused by exposure to raw water and (2) pitting corrosion caused by exposure to an air environment with intermittent exposure to raw water. The existing Performance Testing (PT) Program was identified for managing fouling of small diameter stainless steel piping in the Siphon Seal Water System. Existing preventive maintenance (PM) activities (Condenser Circulating Water System Internal Coatings Inspection and the Standby Shutdown Facility Diesel Fuel Oil Tank Inspection) were identified for managing the loss of wall and cracking in the underground stainless steel piping due to exposure to an underground environment.

The inspectors previously reviewed the Service Water Piping Corrosion Program (see NRC Inspection Report 99-12) and found that the program had been implemented, but had areas that needed enhancing as discussed in Section E8.1 above.

The PT Program for the Essential Siphon Vacuum and Siphon Seal Water Systems had been implemented through quarterly performance testing. The inspectors reviewed completed quarterly PTs, PT/1/A/0261/010 (performed 9/14/99), PT/2/A/0261/010 (performed 11/1/99), PT/3/A/0261/010 (performed 10/26/99). These PTs were reviewed to verify that system performance testing managed the effects of fouling for the ESV and Siphon Seal Water Systems. The PTs appeared to be appropriate to manage the effects of fouling.

Relative to PM activities to manage the effects of the underground environment on the stainless steel piping, the inspectors previously reviewed the PM activities for the Condenser Circulating Water System (see NRC Inspection Report 99-12). During the current inspection, the inspectors reviewed completed procedure MP/0/A/5050/039 (performed 3/24/92), Diesels - SSF- 10-Year Inservice Inspection, which included inspection and cleaning of the Standby Shutdown Facility Diesel Fuel Oil Tank. These PM activities, although not directly related to the

ESV and Siphon Seal Water Systems, should provide general indication of degradation of piping and components exposed to an underground environment.

The inspectors also verified that the ESV System, Siphon Seal Water System, and associated structures were included in the draft UFSAR Supplement and Specification 16.

The inspectors performed walkdown inspections of accessible portions of the Essential Siphon Vacuum System and the Siphon Seal Water System. The objective was to determine the condition of plant equipment through visual examination. The material condition of the piping and components observed in these systems was good. In general, the equipment was clean with no evidence of system leakage.

The inspectors concluded that for these systems, aging management programs had been implemented consistent with the LRA and the NRC SER.

E8.11.B Reactor Building Auxiliary Coolers

These coolers are connected to the Low Pressure Service Water System (LPSW). At the time of the original application they were isolated from the LPSW system by manual isolation valves because of operability concerns. Subsequently, those concerns were resolved and the coolers were returned to service. Consequently, the applicant added these coolers to the scope of license renewal. Amendment 1 to the LRA identified one aging management program for these coolers. This is a planned Reactor Building Auxiliary Cooler Inspection to determine the condition of the coolers. This inspection, which the applicant has not yet developed, is characterized as a preventive maintenance inspection. One tube bundle is to be pressure tested and visually inspected each outage, rotating the inspection among the tube bundles. Amendment 1 to the LRA indicates that the inspection will be initiated at the first refueling outage of each unit following receipt of the license extension.

The inspectors reviewed the applicant's Specification OSS-0274.00-00-0005 which described the proposed preventive maintenance inspection and provided a tabulation of its attributes. The inspectors verified that the description of the program in this specification was consistent with Amendment 1 to the LRA, the NRC SER, the applicant's draft UFSAR Supplement, and Specification 16. The inspectors also reviewed drawings for the coolers which were marked to show the license renewal scope.

The coolers were not accessible for visual inspection by the inspectors due to plant being in operating conditions. The inspectors discussed the condition of the coolers with the applicant's component engineer. The engineer indicated the coolers were in good condition for the required application and was aware of the planned preventive maintenance inspection that was to be used for aging management.

The inspectors concluded that the applicant had implemented the aging management program consistent with Amendment 1 to the LRA and the NRC SER.

E8.11.C Chilled Water System

This system was added to the scope of license renewal through the applicant's letter to the NRC dated October 15, 1999. This resolved SER Open Item 2.2.3.4.3.2.1-1. Attachment 2 to the October 15 letter identified eight aging management programs for this system:

- Boric Acid Wastage Surveillance Program
- Cast Iron Selective Leaching Inspection
- Chemistry Control Program
- Chilled Water Refrigeration Unit Preventive Maintenance Activity
- Galvanic Susceptibility Inspection
- Inspection Program for Civil Engineering Structures and Components
- Service Water Piping Corrosion Program
- Treated Water Stainless Steel Inspection

With one exception, these were existing or planned programs reviewed during inspection 99-12. The exception was the Chilled Water Refrigeration Unit Preventive Maintenance Activity. This is an existing activity that is performed quarterly. The inspectors verified implementation of this program through review of the record of its performance documented on model work order 91040173, completed December 16, 1999.

The inspectors reviewed the applicant's Calculation OSC-7502, which described the aging management programs for this system. The inspectors verified that the description of the programs in this calculation was consistent with that in the applicant's October 15, 1999 letter, the NRC SER, the applicant's draft UFSAR Supplement, and Specification 16. The inspectors also reviewed drawings for the Chilled Water System which were marked to show the portions of the system in license renewal scope.

The inspectors performed a walkdown inspection of portions of the Chilled Water System with the system engineer. The objective was to determine the condition of plant equipment through visual examination. The material condition of the piping and components observed in this system was good. In general, the equipment was clean with no evidence of system leakage or deterioration. The system engineer was aware of the aging management program requirements applicable to the system.

The inspectors concluded that for this system, aging management programs had been implemented consistent with the applicant's commitment in the October 15, 1999 letter and with the NRC SER.

E8.11.D Component Cooling System

As discussed in Section E8.2 above, The Component Cooling system was added to the scope of license renewal to support continued operation of reactor coolant pumps during a postulate Steam Generator Tube Rupture event. Inspectors examined license renewal documentation for that system and found it satisfactory.

E8.12 Preventive Maintenance Programs for Aging Management

E8.12.A Quality Assurance Relationship to the Preventive Maintenance Program

The NRR staff had originally understood, and stated in its SER, that the ONS Preventive Maintenance Program, as it applies to aging management for the purpose of license renewal, was controlled by the applicant's Quality Assurance Program, and 10 CFR Part 50, Appendix B. During the aging management inspection activities of inspection 99-12, the applicant stated that the PM activities for nine of the ten non safety-related structures and components/commodity groups were not controlled under its Appendix B program. Instead, if any concerns with PM activities are identified, the Problem Investigation Process (PIP) would be used to identify and implement corrective actions. Although the PIP administrative controls are maintained under the applicant's Appendix B program, the implementation of these activities as it applies to non safety-related systems, structures, and components are not. Therefore, the corrective actions, confirmatory process and administrative controls associated with any of the PMs used to manage aging of non safety-related structures and components are not controlled under the applicant's Appendix B program.

During the technical review of the applicant's PM aging management activities, the staff requested that the applicant clarify the intent of the PM program and explain how it differs from the applicant's quality assurance program. The staff also requested that the applicant provide a description of the PM activities and suggested that it consider the activities as programs unto themselves. In its response, the applicant agreed to consider the PM activities as stand-alone aging management programs for license renewal. The applicant stated that the PM activities in question met most of the attributes of stand-alone aging management programs except that the programs lacked sufficient documentation to demonstrate the effectiveness of these activities.

The applicant had initially intended to perform a one-time assessment of each of the PM activities against the attributes of a successful program listed in Section 4.2 of the LRA, document and analyze the results, and demonstrate that the activities adequately manage the effects of aging so that the intended functions of the structures and components will be maintained consistent with the current licensing basis for the period of extended operation. This assessment was to be a distinct part of the current ONS self-assessment process. In response to the staff's review activities, the applicant withdrew its plans to perform a one-time assessment of the PM activities.

The applicant stated that the successful operating experience to date using these PM activities provides reasonable assurance that these PM activities, which have been performed for most of the affected systems for more than a decade, will continue to be effective through the period of extended operation. If conditions adverse to quality are identified, including identification that aging effects are not being effectively managed by these PM activities, the applicant will implement a PIP report to implement the necessary corrective actions, confirmatory process and documentation controls. Thus, the staff finds the applicant's withdrawal of performing a one-time assessment acceptable.

In its technical review of the applicant's Quality Assurance Program, SER Subsection 3.2.3.1, the staff requested clarification regarding the applicant's commitment to extend 10 CFR Part 50, Appendix B requirements for corrective actions, confirmation process and administrative controls to non safety-related systems, structures, and components subject to an aging management review. In its response, the application stated that it will use its existing 10 CFR Part 50, Appendix B, corrective action program embodied in its plant Problem Investigation Process for corrective action elements to address those aspects for non safety-related structures and components. The applicant further stated that the attributes related to corrective

actions, including the confirmation process and administrative controls, for non safety-related structures and components apply to both non safety-related and safety-related structures and components subject to an aging management review. In a supplemental response, the applicant committed to revising the corrective action statement in the UFSAR Supplement for each applicable credited aging management program (including PMs) that contains non safety-related structures and components to direct those corrective actions to be implemented under the PIP. The staff determined that the actions described in the applicants response provides reasonable assurance that the effects of aging would be adequately managed during the period of extended operation, and therefore, this inspection issue is closed.

E8.12.B Eddy Current Testing

During inspection 99-12, while reviewing the applicant's aging management program for heat exchangers and coolers eddy current testing (ECT), the inspectors learned that the 1996 and 1998 biennial ECT activities for the Component Coolers were canceled. The cancellation was allowable because there was no regulatory requirement to perform ECT on the Component Coolers. However, because the staff found that a biennial ECT was an acceptable aging management program for the Component Coolers, concerns with canceled ECTs were raised. In response, the applicant informed the inspectors that the description of each aging management program (including ECT) will be incorporated in the FSAR Supplement, making each aging management program a licensing commitment activity that will impose specific requirements (e.g. engineering evaluation) before delaying or deleting aging management activities. At the time of this inspection, a draft of the FSAR Supplement was under NRR staff review. The inspectors reviewed the UFSAR Supplement document and found that ECT testing for various coolers is included in Section 18.3.17. Based on the information reviewed, the inspectors consider this inspection issue is closed.

E8.12.C Auxiliary Service Water Aging Management

During inspection 99-12 of the Auxiliary Service Water (ASW) aging management program, the inspectors were informed that the applicant used visual inspection to detect fouling and to manage the loss of piping material. In response to questions from the inspectors, the applicant indicated that no measurements or ultrasonic testing (UT), and trending of wall thickness was performed under this aging management activity. However, UT is performed under the Service Water Piping Corrosion Program for the ASW System. Under this program, UT testing is performed at the discharge of CCW-101, but not in the piping with the stagnant flow condition. However, the Service Water Piping Corrosion Program is designed to monitor stagnant flow locations throughout the service water systems of the plant. This program uses UT to directly measure and trend wall thickness. In a letter dated October 15, 1999, the applicant informed the staff that the visual inspection program will no longer be performed and the Service Water Piping Corrosion Program will be used to monitor the loss of material for the ASW system. This inspection issue is closed.

E8.13 SER Open Item 3.1.1-1 - Keowee Turbine Guide Bearing Oil Cooler

The applicant's response to SER Open Item 3.1.1-1 in a letter dated October 15, 1999, conflicts with the License Renewal Application (LRA) relative to the license renewal function of the Keowee Turbine Guide Bearing Oil Cooler. The LRA describes the cooler as having a heat

transfer function as well as a pressure boundary function. The October 15, 1999, letter only describes a pressure boundary function. A Duke letter dated December 17, 1999, states that the October 15, 1999 letter is correct based on previously performed testing and analysis to show that the heat transfer function is not required for the coolers to be operable for event mitigation. During the current inspection, the inspectors reviewed Calculation KC Unit 1-2-0107, Keowee Turbine Guide Bearing Temperature Calculation, dated 11/2/94. This calculation documented testing and engineering analysis showing that under worst case conditions with the Turbine Guide Bearing Oil Coolers isolated and operating with unit output reduced to the level required for Oconee emergency power conditions, the bearing temperature limit would not be reached for approximately 40 days. This took no credit for cooling effects of the air around the turbine shaft and the water around the turbine. Taking these cooling effects into account, the analysis projected that the bearing temperature would never reach the temperature limit specified by the manufacturer. The inspectors concluded that the applicant's analysis and conclusions were adequate to show that the heat transfer function of the coolers was not a required function under license renewal.

E8.14 Followup on Leak From Cracked Elbow in Reactor Coolant System Drain Line

Approximately two weeks before this inspection, Oconee Unit 1 was shut down to investigate and repair a small leak from the reactor coolant system (RCS). The leak was coming from a crack on the outside bend of an elbow fitting in a nominal 1.5 inch diameter drain line off the RCS. The inspectors reviewed this event with the applicant during this license renewal inspection. At the conclusion of this inspection, the applicant had replaced the elbow and was completing an evaluation of the cause of the cracking. The cracking was thought to be due to thermal fatigue caused by the temperature difference between the hot RCS water entering and impinging on the cooler uninsulated drain line. For continuity, it was decided that the results of this event followup will be included with the work of the NRC resident inspectors in integrated report 2000-001.

Conclusions

The team concluded that the applicant's actions have been sufficient to resolve NRC issues identified during the previous two license renewal inspections.

The team reviewed the Specification 16 document, the transition document for implementing Oconee license renewal commitments, in parallel with the draft Updated Final Safety Analysis Report (UFSAR) Supplement and the License Renewal Application (LRA). NRC found the documents to be mutually consistent and of good quality. Exceptions were the descriptions of the Service Water Corrosion Program (see section E8.1) and the Electrical Cables and Connectors Program (see section E8.10). The applicant agreed to modify Specification 16 and the UFSAR Supplement as appropriate to enhance those descriptions.

During previous inspections, NRC expressed concern over external corrosion on Low Pressure Service Water piping inside the reactor buildings. The applicant has examined and analyzed the piping to ensure it is acceptable for interim operation and has established a plan to inspect and replace the piping during upcoming outages. The inspectors found the applicant's actions acceptable for continued operation until pipe replacement is completed (see section E8.8).

II. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of applicant management on March 3, 2000. Proprietary information was not reviewed during this inspection and no proprietary information is included in this report.

Partial List of Persons Contacted

Applicant

L. Nicholson, Regulatory Compliance Manager
P. Colaianni, License Renewal
J. Forbes, Station Manager
W. Foster, Safety Assurance Manager
R. Gill, License Renewal
W. McCollum, Site Vice President, Oconee Nuclear Station
R. Nader, License Renewal
M. Nazar, Manager of Engineering
D. Ramsey, License Renewal
G. Robison, License Renewal
M. Semmler, License Renewal

NRC

D. Billings, Resident Inspector
E. Christnot, Resident Inspector
P. Kuo, Section Chief, RLSB, NRR
L. Reyes, Regional Administrator, RII
M. Shannon, Senior Resident Inspector

Other applicant employees contacted during the inspection included engineers, operators, regulatory compliance personnel, and administrative personnel.

Inspection Procedures Used

IP 71002: License Renewal Inspection Procedure

Partial List of Documents Reviewed

Application for Renewed Operating Licenses, Exhibit A, License Renewal - Technical Information, OLRP-1001

License Renewal Flow Diagrams, OLRP-1002

Oconee Nuclear Station Updated Final Safety Analysis Report (UFSAR)

Oconee Nuclear Station UFSAR Supplement, Draft February 2000

NRC Safety Evaluation Report Related to the License Renewal of Oconee Nuclear Station Units 1, 2, and 3, February 3, 2000

Letter from Duke Power to the NRC dated October 15, 1999, "Safety Evaluation Report - Oconee Nuclear Station License Renewal Application Comments and Responses to Open Items and Confirmatory Items."

Letter from Duke Power to the NRC dated September 30, 1999, "Amendment 1 - CLB Changes for 1999, Application to Renew the Operating Licenses, Oconee Nuclear Station."

Nuclear Energy Institute (NEI) Guideline 95-10, Revisions 0 and 1, Industry Guideline For Implementing The Requirements Of 10 CFR Part 54-The License Renewal Rule

Specification OSS-0274.00-00-0001, "Oconee Mechanical System Scoping for License Renewal," Rev. 3, August 30, 1999.

Specification OSS-0274.00-00-0002, "Oconee Mechanical Component Screening for License Renewal," Rev. 2, September 17, 1999.

Specification OSS-0274.00-00-0005, "Oconee Mechanical Component Aging Management Review Specification Screening for License Renewal", Rev. 2

Specification OSS-0274.00-00-0006, "Oconee Electrical Component Aging Management Review For License Renewal," Rev. 1, April 9, 1999.

Specification OSS-0274.00-00-0016, "Oconee License Renewal Commitments," Rev. 0, February 17, 2000.

Service Water Piping Inspection Program Manual, Revision 1

Engineering Support Document - Service Water Pipe Inspection Program, Revision O dated February 4, 2000

Calculation Number OSC-1307-06, Revision D5, Piping Analysis Problem 1-14-10 (Vol. A) and Problem 1-14-18 (Vol. B) Bechtel Item-12, system - 14B

Work Order 98250440 - Inspection of Unit 1 Service Water Pipe Thin Area

MP/O/A/5050/039 (performed 3/24/92), Diesels -SSF- 10-year Inservice Inspection

PT/1/A/0261/010 (performed 9/14/99), Essential Siphon Vacuum System Test

PT/2/A/0261/010 (performed 11/1/99), Essential Siphon Vacuum System Test

PT/3/A/0261/010 (performed 10/26/99), Essential Siphon Vacuum System Test

Calculation KC Unit 1-2-0107, Keowee Turbine Guide Bearing Temperature Calculation, dated 11/2/94

Calculation OSC-7502, "Aging Management Review for Additional Mechanical License Renewal Scope," Revision 0, dated 1/10/00.

Model Work Order 91040173 - A Chiller Quarterly PM, completed 12/16/99.

Calculation OSC-6116 Steam Generator Tube Rupture Event Mitigation Requirements, Rev. 2 9/7/99

Calculation OSC-7070, Revision 2, Oconee Event Mitigation Database

Oconee Electrical Cable Drawings OEE-14-5 through OEE 14-14

Keowee Electrical Cable Drawing KEE- 40-2 through KEE-40-6

Items Opened, Closed, and Discussed

Closed

50-269/99-12-01 IFI Review of LPSW Piping Data and Corrosion Analysis

List of Acronyms

ASW	- Auxiliary Service Water
CC	- Component Cooling
DBE	- Design Basis Event
ECT	- Eddy Current Testing
EFW	- Emergency Feedwater
ESV	- Essential Siphon Vacuum
LOCA	- Loss of Coolant Accident
LPSW	- Low Pressure Service Water
LRA	- License Renewal Application
NEI	- Nuclear Energy Institute
NRC	- Nuclear Regulatory Commission
NRR	- NRC office of Nuclear Reactor Regulation
ONS	- Oconee Nuclear Station
PIP	- Problem Investigation Process
PM	- Preventive Maintenance
PT	- Performance Testing
RCP	- Reactor Coolant Pump
RCS	- Reactor Coolant System
RCW	- Recirculating Cooling Water

RTD	- Resistance Temperature Detector
SER	- Safety Evaluation Report
SFP	- Spent Fuel Pool
SGTR	- Steam Generator Tube Rupture
SSF	- Standby Shutdown Facility
UFSAR	- Updated Final Safety Analysis Report
UT	- Ultrasonic Thickness Measurement