U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Licensee:	Duke Energy Corporation
Facility:	Oconee Nuclear Station, Units 1, 2, and 3
Location:	7812B Rochester Highway Seneca, SC 29672
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EXECUTIVE SUMMARY

Oconee Nuclear Station, Units 1, 2, and 3

NRC Inspection Report 50-269/99-11, 50-270/99-11, and 50-287/99-11

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

The team concluded that the mechanical scoping and screening process was conducted as described in the applicant's License Renewal Application. However, the inspection revealed the following issues:

During review of license renewal documentation for the selected systems the team identified several minor documentation discrepancies:

a. During walkdown of the Low Pressure Service Water (LPSW) system, the team noted that some of the expansion piping joints at the LPSW pumps were constructed from a rubber type material. Appendix A-2 of Specification OSS-0274.00-00-0002, only listed LPSW system expansion joints made from carbon and stainless steels. The applicant agreed with this documentation discrepancy and stated that the rubber type expansion joint material would be added to the list.

b. In review of Specification OSS-0274.00-00-0002, which identifies the mechanical systems in the license renewal scope, the team found that Section 3.1.1 did not list the Component Cooling (CC) system. After further review, the applicant found that 13 systems, including the CC system, had been inadvertently omitted from Section 3.1.1 of Revision 1 of the specification. Although not listed in Section 3.1.1, the omitted systems were listed in the summary of systems and functions in scope at the end of the specification, as well as being identified as in scope on flow diagrams and other license renewal documentation.

c. The team found that the Keowee Hydro Station Service Water system was omitted from Section 3.3.2 of Specification OSS-0274.00-00-0001. The applicant stated that the Service Water system had been omitted in error. Although not listed in Section 3.3.2, or the summary at the end of the specification, the Service Water system was identified as being in scope on flow diagrams and other license renewal documentation.

d. The license renewal flow diagram for the LPSW system did not show the connection for the siphon seal water system, although the siphon seal water system was included in scope. The siphon seal water system had been added by a recent modification and the flow diagram for the LPSW system had no yet been updated. The applicant stated that the siphon seal water connection would be added to the LPSW system flow diagram at the next annual update in September 1999.

The applicant stated that these documentation discrepancies would be corrected.

The team observed in the applicant's license renewal documentation, an open item stating that a new Steam Generator Tube Rupture analysis is under review by the NRC. This may require a future expansion of the license renewal scope to include Component Cooling and perhaps other systems. The applicant is tracking this issue with a Problem Investigation Process (PIP) corrective action document and the resolution will be reviewed during a future NRC inspection.

In reviewing the Emergency Feedwater System the team found that a design function to provide flow through piping and valves between units had not been considered during licensee renewal scoping. The applicant stated they had omitted the cross-connect function because it was not required for Updated Final Safety Analysis Report (UFSAR) Chapter 15 events or for regulatory-required programs. NRC noted that this unit cross-connect function was approved by the NRC for addressing scenarios involving high energy line breaks in the turbine building and tornado events. The team identified the omission as an open issue to be resolved in a subsequent license renewal inspection. The inspectors noted that the applicant's omission of the cross-connect function only affected documentation because the cross-connect components were already designated in scope.

The team expressed the view that the function of spent fuel pool cooling, 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. These omissions are examples of a larger issue on scoping adequacy which is currently being reviewed for resolution by the NRC Office of Nuclear Reactor Regulation (NRR).

The walkdown inspections found the mechanical systems to be well maintained and in good condition.

The team concluded that the scoping and screening process for structures was conducted conservatively as described in the License Renewal Application.

The inspectors toured the Intake Structure, Standby Shutdown Facility, 230 KV Switchyard, and the Keowee dam and Power House. The structures were found to be in acceptable condition.

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. The condition is being tracked but no date is currently specified for repair action. Additionally 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 both deteriorating conditions and documented them, but observed that years have passed without actual corrective action being taken. These matters will be reviewed further in a future NRC inspection.

The Oconee generic electrical commodity group scoping method was acceptable and addressed all electrical commodity groups in 10CFR54 and NEI 95-10. No components were identified during this inspection that were not included within the generic commodity groupings. Electrical screening met 10CFR54 requirements except for resistance temperature detectors/thermocouples and fire detector cables/connectors which were still under review by NRR.

The team identified three cable types/mark numbers not included in the Oconee cable drawings which the license renewal documentation said were used to form the basis for the population of cable/insulation material selected for the aging management review. The licensee initiated PIP 0-O99-1737 for resolution within the Oconee corrective action program.

Report Details

LICENSE RENEWAL INSPECTION REPORT 99-11

III. Engineering

E8 Miscellaneous Engineering Issues

E8.1 System and Component Level Scoping and Screening

a. Inspection Scope (71002)

This inspection was conducted to examine a sample of the equipment and documentation at the Oconee Nuclear Station (ONS) site which supports the request for license renewal for Oconee. This inspection reviewed the results of the applicant's scoping of plant systems and screening of components within those systems to identify the list of components that need evaluation for aging management effects. The team identified a sample of systems, structures and commodity groups (SSC) to verify the adequacy of the applicant's scoping and screening documentation and implementation activities. The team reviewed the evaluation boundaries, intended functions, active/passive and short/long lived characteristics of the selected SSCs to confirm the adequacy of the applicant's results. The SSCs selected were as follows.

Mechanical Systems
- Reactor Coolant System
- Core Flood System
- Reactor Building Spray
- Component Cooling
- Low Pressure Service Water
- High Pressure Injection
- Emergency Feedwater
- Feedwater
- Standby Shutdown Facility Reactor Coolant Makeup System
- Keowee - Carbon Dioxide
  - Turbine Generator Cooling Water
  - Governor Oil
  - Governor Air
  - Service Water

Structural
- Standby Shutdown Facility
- Keowee Power House
- Intake Structure

Electrical Systems
- 230KV Switchyard 125 VDC Power
- 4160V Auxiliary Power System

Electrical Components
- 230 KV Switchyard
- Keowee Power House
- Transformer Yard and Vaults
- CT5 Transformer Yard
- Turbine Building

Additionally, the inspection team reviewed a group of plant systems and structures that were determined to not be within the scope of the rule by the applicant. The inspection team selected these systems and structures using insights from the ONS plant specific Probabilistic Risk Assessment, a review of the applicant's licensee event reports, and concerns identified in staff's technical evaluation of the ONS license renewal application. The inspection team also looked at accidents covered in the ONS Updated Final Safety Analysis Report (UFSAR), Chapter 6 and 15 , and other events with which the plant is designed to cope and are described in the UFSAR. The team reviewed the design, function, and documentation of these systems and events to determine independently if these systems should have been excluded from the scope of license renewal.

Mechanical
- Spent Fuel Pool Cooling
- Decay Heat Removal
- Instrument Air
- Pipe Rupture Event

Electrical
- Lee Station Electrical Supply

b. Observations and Findings

Review of Systems Within License Renewal Scope

Evaluation of Scoping and Screening of Mechanical Components

The inspectors evaluated the success of the applicant's scoping and screening process for mechanical components through a review of several plant systems that the applicant determined to be within the scope of license renewal. The applicant had identified the scope boundaries on License Renewal Flow Diagrams. System functions within scope were identified in Specification OSS-0274.00-00-0001. The screening of mechanical components was described in Specification OSS-0274.00-00-0002. The mechanical components screened and found subject to aging management and the functions of those components were identified in the License Renewal Application (LRA). The inspectors reviewed the designs and functions of the systems to verify that the system functions and scope boundaries were correctly established. The inspectors' conclusions were as follows:

The Reactor Coolant System

The Reactor Coolant System (RCS) is a Class 1 system that includes the reactor vessel and control rod drive mechanism motor tube housings, two vertical once through steam generators, four shaft sealed reactor coolant pumps, an electrically heated pressurizer, and main coolant piping. The reactor coolant system also includes non-Class 1 portions. Duke Energy defines the non-Class 1 portion as the part that "extends from either the first or second isolation valve within the Bechtel-supplied piping attached to the Babcock and Wilcox scope of supply: that is, vent lines, drain lines, instrument lines, and ancillary systems attached to the system." The ancillary systems include Low Pressure Injection, Core Flood, High Pressure Injection, Nitrogen Purge and Blanket, and Chemical Addition. The RCS Class 1 component supports include the RCS Class 1 piping supports, pressurizer support plate assemblies, and support frame assembly, reactor vessel support skirt, control rod drive service structure, once through steam generator upper lateral support structure, and reactor coolant pump lateral and vertical support assemblies.

Duke Energy identifies a portion of the RCS piping by using the Class 1 definition of American National Standards Institute (ANSI) N18.2-1973 with ANSI N18.2a-1975 addenda. The system boundaries also correspond to the Class 1 definition of ANSI B31.7. The portion of the piping Duke Energy refers to as Non-Class 1 is done so because it does not fit the definition of Class 1 under ANSI N18.2-1973 with ANSI N18.2a-1975 addenda but does meet the definition of Class II in ANSI B31.7. For the purposes of license renewal the reactor vessel internals and RCS component supports are treated as part of the RCS.

The RCS is required to mitigate the consequences of the twenty design basis events (except the Steam Generator Tube Rupture event as discussed in the section on the Steam Generator) contained in Chapter 15 of the Oconee UFSAR. The RCS is required to mitigate additional events used by the applicant to scope systems for license renewal. These scoping events are Loss of Main Feedwater, Turbine Building Flood, Tornado, Seismic, External Floods and Groundwater, and Snow and Ice. The RCS is also required to meet the requirements of 10CFR54.4(a)(3), fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout. To support these mitigation scenarios the applicant identified the following intended functions:

Transfer heat from the reactor to the steam generators.

Provide a barrier to prevent the release of fission products from the reactor core to the environment.

Provide reactor core cooling.

Neutron moderator, neutron reflector, and solvent for the boron used for reactivity control.

Provide RCS pressure control including over pressure protection.

Monitor RCS temperature and inventory.

Contain, align, and support the reactor core, and provide for interfaces for reactor control.

Vent noncondensible gases and steam following postulated accidents and events.

As part of the License Renewal Application (LRA), the applicant produced Oconee flow diagrams which are color coded, based on the intended functions, to identify the RCS components required to support the function. The mechanical components identified through this mapping process are grouped according to the Oconee American Society of Mechanical Engineers (ASME) Section XI Inservice Inspection classification system. This classification uses the definitions of Regulatory Guide 1.26 "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants", Revision 3, February 1976 and ANSI N18.2a-1975 "Revision and Addendum to Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants." The groups are identified as Classes A, B, and C in the application however in the current ISI program they are referred to as Classes 1, 2, and 3. This nomenclature more closely conforms to the industry practice of identifying systems and components such as piping based on their intended safety function.

Reactor Vessel

The reactor vessel is a cylindrical vessel comprised of a vessel shell, lower vessel head, closure head, nozzles, interior attachments and pressure bolting. The reactor has two outlet nozzles and four inlet nozzles for transfer to the steam generator. Two smaller nozzles located between the inlet nozzles serve as inlets for decay heat removal and emergency core cooling water injection. The reactor vessel is vented through the control rod drives. Instrumentation nozzles penetrate the lower vessel head. The reactor vessel scope used by Duke Energy is based on the generic topical report BAW-2251. This topical report was reviewed by the NRC and conditionally accepted in a Final Safety Evaluation Report issued April 16, 1999.

Reactor Coolant Piping

The RCS is arranged in two heat transport loops designed structurally for 2,500 psig and 650 °F with the system normally operating at 2,155 psig and 604 °F. The reactor coolant is transported through a 36-inch diameter main coolant piping, connecting the reactor vessel to the steam generators and flows down through the steam generator tubes. The reactor coolant is then returned through two lines, each 28 inches in diameter, containing a reactor coolant pump, to the reactor vessel. For the purposes of seismic analysis the RCS piping includes the 10-inch diameter pressurizer surge line and the 2 ½-inch pressurizer spray line. The reactor coolant generally serves as a heat transfer media, a neutron moderator and reflector, and a solvent for the soluble poison.

Pressurizer

The pressurizer, with the bottom surge line penetration, surge line piping, and electric heater pressure boundary are included within the scope of license renewal. The Oconee application uses the description contained in generic topical report BAW-2244A for the pressurizer. The internal spray line and spray head were omitted from the generic report; however these components were credited with mitigation of a steam generator tube rupture (SGTR) in the Oconee UFSAR and are included, by Duke Energy, in the scope of license renewal as components subject to an aging management review. The inclusion of the pressurizer spray in

the LRA because it is used to mitigate the consequences of a SGTR in the UFSAR is inconsistent with the position taken by Duke Energy elsewhere in the application.

Steam Generator

Each unit has two once through steam generators. Each generator contains over 15,000 tubes and 15 tube support plates. The portions of the steam generators subject to aging management include the hemispherical heads, secondary shell, tubes, plugs, mechanical sleeves, tube sheets, primary nozzles, main and auxiliary feedwater nozzles, steam outlet nozzles, instrumentation nozzles, drain nozzles, all associated pressure retaining bolting, and integral attachments inspected in accordance with ASME Section XI, Subsections IWB and IWC. The steam generator nozzles, included welded joints are covered in the RCS piping portion of the application. Secondary piping attached to the nozzles including the main and auxiliary feedwater headers and riser piping is addressed in the steam and power conversion portion of the application.

An updated safety analysis for SGTR, topical report "DPC-NE-3005-P, UFSAR Chapter 15 Transient Analysis Methodology", was submitted to the NRC for review. Because the updated analysis is significantly different from the original SGTR analysis this design basis event was not used in license renewal scoping. This difference may cause some future system scoping changing. For example the Reactor Coolant Pumps (RCP) are now given credit for maintaining flow for 20 minutes. This requires a re-evaluation of the intended functions for mitigation; something that has not yet been done as part of the license renewal application. The new mitigation scheme however now embraces such intended functions as providing cooling water to the RCP heat exchangers and thermal barrier seals, and transferring heat from the Component Cooling system to the Low Pressure Service Water system (LPSW). This, would now require the Component Cooling system to be included in the license renewal program.

The inspectors discussed with the applicant what vehicle would track this open item. A PIP corrective action document was opened to track the item. The resolution of this matter will be reviewed during a future NRC inspection.

Reactor Coolant Pumps

The reactor coolant pump casing including the bolted closures and connections, cover, and associated piping are included in the scope of the rule. The portion of the reactor pump rotating element above the pump coupling, the electric motor, and the flywheel are not subject to aging management review in keeping with the rule.

Summary

The Team concluded that the RCS was evaluated for scope and the components were screened in conformance with the methodology submitted in the license renewal application with the exception of the use of the design basis SGTR. A new SGTR methodology is under review by the NRC and the result of that review may require additional equipment to be brought into license renewal scope.

The Core Flood System

The Core Flood system (CFS) is a passive system that injects stored borated water directly into the reactor vessel when the reactor coolant system pressure drops below a certain value following an accident. The CFS is maintained at a pressure lower than normal RCS operating pressure by a blanket of pressurized nitrogen over the injection volume. The CFS is separated from the higher pressure system during normal operation by check valves in the connecting 12-inch diameter stainless steel combined core flood/decay heat removal/low pressure injection lines to the reactor vessel.

The CFS tanks are carbon steel with an internal stainless steel cladding and are included within the scope of license renewal. The portions of the CFS within the scope of license renewal are the Oconee piping class B and F piping.

The Team concluded that the CFS was evaluated for scope and the components were screened in conformance with the methodology submitted in the license renewal application.

Reactor Building Spray system

The Reactor Building Spray (BS) system consists of two redundant trains including a BS pump with associated valves and piping, and an array of spray nozzles located on the spray header in the upper containment. The system is designed to spray water into the containment following a large pipe rupture accident to remove heat from the reactor building, to reduce the temperature and pressure inside the containment and to remove fission product iodine from the Reactor Building atmosphere in the event of a design basis accident. The applicant considered all of the BS System to be in scope. The team found that the applicant had performed scoping and screening for this system in accordance with the methodology detailed in the Oconee LRA. A walkdown inspection by the inspectors found the system to be in good condition.

Component Cooling Water System

The Component Cooling (CC) system consists of two CC pumps in parallel and associated valves and piping to circulate water through the letdown coolers, reactor coolant pump thermal barrier heat exchanger, the quench tank coolers, and the control rod drive cooling coils. If a design basis event causes the engineered safeguards (ES) system to isolate the containment, the necessary CC isolation valves close. This is the only required function during a design basis event. Therefore, the applicant considered only the containment isolation valves and piping and penetration between the valves to be in scope for license renewal. However, during review of licensing renewal associated documentation, the team found that the applicant has submitted for NRC review and approval a revised steam generator tube rupture analysis, which will possibly require adding the entire CC system to the licensing renewal scope. This issue is described in the Reactor Cooling System section above.

In review of Specification OSS-0274.00-00-0001, which identifies the mechanical systems in the license renewal scope, the team found that Section 3.1.1 did not list the CC system. Section 3.1.1 identified the systems that are in scope because of performing a function required to mitigate design basis events. The CC System has a containment isolation function during a

design basis event. After further review, the applicant found that 13 systems, including the CC system, had been inadvertently omitted from Section 3.1.1 of Revision 1 of the specification. Although not listed in Section 3.1.1, the omitted systems were listed in the summary of systems and functions in scope at the end of the specification, as well as being identified as in scope on flow diagrams and other license renewal documentation.

The applicant stated that these documentation discrepancies in Specification OSS-0274.00-00-0001 would be corrected. The team found that the applicant had performed scoping and screening for the CC system in accordance with the methodology detailed in the Oconee LRA. The inspectors examined accessible portions of the CC system and found it to be well maintained.

Low Pressure Service Water System

The Low Pressure Service Water (LPSW) system consists of pumps (two for Unit 3 and three shared for Units 1 and 2) and associated valves and piping to provide cooling water for normal and emergency equipment services throughout the station. The system provides cooling water for safety-related equipment needed to meet high pressure injection system, low pressure injection system, emergency feedwater system, reactor building cooling system and siphon seal water system functional design bases requirements. Specifically, cooling is provided to the reactor building cooling units, decay heat removal coolers, high pressure injection pump motor bearing coolers, motor driven emergency feedwater pump motor air coolers, turbine driven emergency feedwater pump cooling water jackets, and siphon seal water system. The applicant had included the portions of the LPSW System necessary to support cooling of this safety-related equipment. This resulted in most of the LPSW system being considered in scope.

During review of license renewal documentation for the LPSW system the team identified the following minor documentation discrepancy. During walkdown of the LPSW System, the team noted that some of the expansion piping joints at the LPSW Pumps were constructed from a rubber type material. Subsequent review of drawings revealed that the material was Nylon Tire Cord/Chlorobutyl. Appendix A-2 of Specification OSS-0274.00-0002, which identifies the equipment and materials subject to aging management, only listed LPSW system expansion joints made from carbon and stainless steels. The applicant agreed with this documentation discrepancy and stated that the rubber type expansion joint material would be added to the list.

The license renewal flow diagram for the LPSW system did not show the connection for the siphon seal water system, although the siphon seal water system was included in scope. The siphon seal water system had been added by a recent modification and the flow diagram for the LPSW system had no yet been updated. The applicant stated that the siphon seal water connection would be added to the LPSW System flow diagram at the next annual update in September 1999.

The team concluded that the applicant had preformed scoping and screening for this system in accordance with the methodology detailed in the Oconee LRA. A walkdown inspection of the LPSW system by the inspectors found the system to be well maintained and protected.

High Pressure Injection System

This system provides isolation, makeup of reactor coolant inventory, reactor coolant pump seal cooling, and/or highly borated makeup water to counteract positive reactivity. The inspectors reviewed the description of this system given in Section 6.3 of the UFSAR and in Design Basis Specification OSS-0254.00-00-1001. In addition, they reviewed the system flow diagrams and component functions identified in the LRA and discussed the system with the applicant's engineering personnel. The inspectors concluded that the applicant had appropriately scoped and screened this system and identified the mechanical components and their functions that were subject to aging management.

Emergency Feedwater System

This system provides emergency cooling to the Oconee steam generators if there is a loss of main feedwater. In addition, it has isolation and flow control functions. The inspectors reviewed the description of this system and its functions given in Section 10.4.7 of the UFSAR and in Design Basis Specification OSS-0254.00-00-1046. In addition, the inspectors reviewed the system flow diagrams and component functions identified in the LRA and toured and discussed the portions of the system within the turbine building with the applicant's system engineer. The inspectors concluded that the applicant had appropriately scoped and screened this system and identified the mechanical components that were subject to aging management. However, the inspectors found that one of the system functions had not been identified for consideration in license renewal scoping. Specifically, a design function to provide flow through piping and valves between units had not been included. This unit cross-connect function was approved by the NRC for addressing scenarios involving high energy line breaks in the turbine building and tornado events. The applicant stated they had omitted the cross-connect function because it was not required for UFSAR Chapter 15 events or for regulatory-required programs. The inspectors identified the omission as an open issue to be resolved in a subsequent license renewal inspection. The inspectors noted that the applicant's omission of the cross-connect function only affected documentation because the cross-connect components were already designated in scope.

Feedwater System

This system removes heat from the reactor coolant system through the stream generators for conversion to electric power. The system isolates in response to a steam line break event to prevent overpressurization of the containment. Portions of the system are required to retain structural and pressure boundary stability during design basis events. The inspectors reviewed the description of this system and its functions given in Section 10.4.6 of the UFSAR and in Design Basis Specification OSS-0254.00-00-1036. In addition, they reviewed the system flow diagrams and component functions identified in the LRA and toured and discussed the portions of the system within the turbine building with the applicant's system engineer. The inspectors concluded that the applicant had appropriately scoped and screened this system and identified the mechanical components and their functions that were subject to aging management.

Standby Shutdown Facility Reactor Coolant Makeup System

This system provides reactor coolant pump seal cooling and limited reactor coolant makeup and letdown capabilities. It has features, such as an independent power source, required for safe shutdown during postulated events such as a control room fire or station blackout. The inspectors reviewed the description of this system given in Section 9.6 of the UFSAR and in Design Basis Specification OSS-0254.00-00-1004. In addition, they reviewed the system flow diagrams and component functions identified in the LRA and discussed the system with the applicant's system engineer. The inspectors concluded that the applicant had appropriately scoped and screened this system and identified the mechanical components and their functions that were subject to aging management.

The inspectors performed a walkdown inspection of the following Keowee systems and found them to be in good condition.

Keowee Hydroelectric Station Carbon Dioxide System

This system supplies carbon dioxide for Keowee Hydroelectric Station generator fire protection. The Keowee Hydroelectric Station is the emergency on-site electric power supply. The inspectors reviewed the description of the carbon dioxide system and its functions given in section 9.5.1.5.5 of the UFSAR and in Design Basis Specification OSS-0254.00-00-4008. In addition, they reviewed the system flow diagram and component functions identified in the LRA and toured and discussed the accessible portions of the system with the applicant's system engineer. The inspectors concluded that the applicant had appropriately scoped and screened this system. The mechanical components subject to aging management and their related functions had been identified.

Keowee Hydroelectric Station Turbine Generator Cooling Water System

This system supplies cooling water for Keowee Hydroelectric Station turbine generator operation to the generator packing boxes, thrust bearing coolers, and air coolers. The inspectors reviewed the description of this system and its functions provided in Design Basis Specification OSS-0254.00-00-1000. In addition, they reviewed the system flow diagram and component functions identified in the LRA and toured and discussed the accessible portions of the system with the applicant's system engineer. The inspectors concluded that the applicant had appropriately scoped and screened this system and identified the mechanical components and their functions that were subject to aging management.

Keowee Hydroelectric Station Governor Oil System

The Governor Oil system consists of a governor oil pressure tank, oil pumps, a sump tank, governor actuator, and associated valves. Following a Loss of Offsite Power (LOOP) at Oconee, in conjunction with a design bases event, with Keowee supplying emergency power, the Governor Oil system supplies hydraulic oil to operate the turbine wicket gates to control water flow to the turbine and thus generator output. All of the Governor Oil system was determined to be in scope by the applicant. The team found that the applicant had preformed scoping and screening for this system in accordance with the methodology detailed in the Oconee LRA.

Keowee Hydroelectric Station Governor Air System

The governor air system consists of two air compressors, a compressor after cooler, a compressor receiver tank, an air receiver tank, and associated valves and piping. The system maintains a blanket of pressurized air in the governor oil system pressurized oil tank. The safety-related portion of the system (the air receiver tank and piping) was considered to be in scope by the applicant. The team found that the applicant had preformed scoping and screening for this system in accordance with the methodology detailed in the Oconee LRA.

Keowee Hydroelectric Station Service Water System

The Service Water system is fed from Lake Keowee through piping and valves to a fire protection pump to provide fire protection to the Keowee Station. In addition, the system provides cooling to various Keowee non- essential equipment such as air compressors. The fire protection portion of the system was considered to be in scope by the applicant.

The team found that the Keowee Hydro Station Service Water system was omitted from Section 3.3.2 of Specification OSS-0274.00-00-0001. Section 3.3.2 identified systems that were in scope because of performing fire protection functions. As noted above, the Service Water system was in scope because of a fire protection function. The Keowee fire detection/protection system was listed in the summary of systems and functions in scope at the end of the specification, but the Service Water system was not listed. The applicant stated that the Service Water system had been omitted in error. Although not listed in Section 3.3.2, or the summary at the end of the specification, the service water system was identified as being in scope on flow diagrams and other license renewal documentation.

The applicant stated that these documentation discrepancies in Specification OSS-0274.00-00-0001 would be corrected. The team found that the applicant had performed scoping and screening for this system in accordance with the methodology detailed in the Oconee LRA.

Review of Structural Scoping and Screening

The focus of this inspection effort was the review of scoping and screening criteria for the structures within the scope of License Renewal Rule and thus subject to an aging management review. The process involves the following activities: a) identifying evaluation boundaries; b) listing of structures and components and their intended functions; c) listing of structures and components subject to an aging management review.

The functions of Class 1 and Class 2 structures fulfill the intent of the requirements of 10 CFR §54.4(a)(1), (2), and (3); therefore, all Oconee Class 1 and Class 2 structures are within the scope of license renewal. The structures and components required to demonstrate compliance with the regulated events identified in §54.4(a)(3) were determined through a review of licensing commitments for the following regulated events: a) Fire Protection; b) Environmental Qualification; c) Pressurized Thermal Shock; d) Anticipated Transient Without Scram; and e) Station Blackout.

Duke has determined in their license renewal basis document (LRBD) that the following structures are considered to be within the scope of license renewal:

- Auxiliary Buildings (Units 1,2, and 3)(includes Hot Machine Shop, and Spent Fuel Pools
- Earthen Embankments (includes Keowee River Dam, Little River Dam and Dikes, and Intake Canal Dike)
- Intake Structure
- Keowee Structures (includes Breaker Vault, Intake Structure, Penstock, Power House, Service Bay Structure, and Spillway)
- Reactor Buildings (Units 1,2, and 3) (includes Internal Structures, and the Unit Vent Stacks)
- Standby Shutdown Facility
- Turbine Buildings (Units 1,2, and 3) (includes Switchgear Enclosures)
- Yard Structures (includes 230 kV Relay House, 230 kV Switch-yard Structures, 230 kV Towers from Keowee to Oconee, Elevated Water Storage Tanks, Transformer Pads, and Foundations)

The team reviewed the LRBD along with the license renewal application (LRA), and a review of the applicant's selection criteria. The team's finding for the screening process about structures and components subject to an aging management review was that the process was effective and conducted as described in the LRA.

The inspectors toured the Intake Structure, Standby Shutdown Facility, 230 kV Switchyard, and the Keowee dam and Power House. The structures were found to be in acceptable condition.

In the lowest level of the 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. The water inflow was not significant from a flooding standpoint, and the rooms contain two sump pumps. However the inspectors pointed out to the applicant that their Specification OSS-0274.00-00-0007 paragraph 6.6, page 108 states that the SSF foundation walls are waterproofed from the exterior to prevent inflow of water. Exterior waterproofing either was not installed or has deteriorated, because it is not currently effective as evident by the seepage. The inspectors expressed concern that with future aging the water leakage path could grow large enough to pose a room flood potential in the event of a site flood from an upstream dam break. The SSF is credited with remaining functional in such a flooding event.

The applicant produced documentation of a 1997 structural inspection of the SSF in which the seepage condition was identified and a corrective action document PIP 4-097-0660 was written on the condition. Review of that PIP showed it was closed in December of 1997 with the opening of a proposed future minor modification ONOE - 11378 to attempt to seal the leakage. The condition is being tracked but no date is currently specified for repair action.

Additionally, the NRC inspectors observed several examples of concrete spalling on concrete trench covers of the cable trench from the SSF to the plant. The applicant produced documentation of an earlier cable trench inspection in early 1998 in which the spalling condition

was identified and a work order written. However, the inspector was later informed by the applicant that the work order was subsequently canceled.

The inspectors recognized that the applicant had identified both deteriorating conditions and documented them, but observed that years have passed without actual corrective action being taken. These matters will be reviewed in a future NRC inspection.

Review of Electrical Scoping and Screening

The team reviewed the licensee's electrical scoping and screening process to determine if the licensee implemented the scoping and screening process in accordance with the Oconee Licensee Renewal Application section 2.6.1 and 10CFR 54. Additionally, two electrical systems were independently reviewed and selected electrical equipment walkdowns were performed to verify the completeness of the electrical scoping and screening process.

Electrical Commodity Group Scoping

The electrical scoping and screening integrated plant assessment process License Renewal Application description was completely revised in response to Request for Additional Information (RAI) 2.6-1. The revised process was contained in electrical specification document OSS-0274.00-00-0006, Rev. 1 "Oconee Electrical Component Aging Management Review for License Renewal."

Oconee's methodology for the electrical scoping and screening review used a generic commodity grouping approach rather than a system/component approach as described in 10CFR54. The electrical scoping process determined the electrical commodity groups and included all equipment within the group unless components were specifically scoped out.

The team compared the Oconee electrical commodity grouping in Chapter 3 of the specification to the commodity groups listed in: Appendix B of NEI 95-10, Rev. 0, "Typical Structures Components and Commodity Groups and Active/Passive Determination For The Integrated Plant Assessment" ; Table 2.2-2 of the Working Draft of the Standard Review Plan for the Review of License Renewal Applications for Nuclear Plants ; and September 19, 1997 NRC letter to NEI, "Determination of Aging Management Review For Electrical Components." The Oconee electrical commodity groupings included the commodity groups in the three documents listed above and six additional groups. The team concluded that the Oconee electrical commodity groupings were acceptable.

Chapter 4 of Specification OSS-0274.00-00-0006, Rev. 1, discussed the specific electrical components which were scoped out of the aging management review. The team reviewed the scoping evaluations and Oconee design basis documentation and verified that these components did not meet the requirements in 10CFR54.4(a) and could be excluded from the aging management review. The specific electrical component scoping exemptions were concluded to be acceptable.

Electrical Commodity Group Screening

The Oconee electrical commodity group active/passive function screening was reviewed and the team noted that the screening met the requirements of: 10CFR54.21 (a)(1)(i); NEI 95-10 Appendix B, Rev.0; and the September 19, 1997 NRC Letter to NEI, with the exception of Resistance Temperature Detectors (RTDs)/Thermocouples. The applicant excluded those devices from license renewal scope because they believe them to be active. This temperature sensor commodity group function designation is still under review by NRR.

The team reviewed the screening based on component qualified life or specified replacement interval and verified that the replacement interval screening met the requirements of 10CFR54.21(a)(1)(ii) except for fire detector insulated cables and connectors. These cables and connectors were screened out by the licensee because they were considered to be covered by a performance or condition monitoring program with the monthly channel functional testing of fire detectors and associated cables and connectors. Additionally, the wiring of the fire detection system is supervised to provide a trouble alarm for any open circuit, short circuit, or ground condition. The fire detector cables and connectors replacement interval/ condition monitoring evaluation is still under review by NRR.

Independent Sample Results

The team selected two electrical systems and reviewed the equipment within the systems to determine if all system components were identified within the Oconee electrical commodity groups. Walkdowns were performed of electrical equipment located in: 230KV switchyard, Keowee Hydro Station, turbine building, transformer yard and vaults, and the CT-5 transformer yard to determine if any electrical components which should be in the scope of license renewal were not included in the Oconee electrical commodity groups. No components were identified by the team which were not included within the Oconee generic commodity groups.

The team selected the 4KV Auxiliary Power System and the 230 KV Switchyard 125 VDC power system based on the risk significance of the system functions. Both of the systems were safety-related and all components within the systems were noted to be included within the Oconee generic commodity groups with the exception of specific cable types. License renewal document specification OSS-0274.00-00-0006, Rev. 1 states in Section 8.1.1 that Oconee electrical cable drawings (OEE-14 through OEE 14-14, and KEE-40-2 through KEE-40-6) were used by the applicant to determine all cable types/insulation materials for the aging management review. To test this methodology, the team selected 26 cables from the plant drawings of 125 VDC power, 4KV power, and control power and noted that seven cables representing 3 cable mark numbers were not included within the Oconee electrical cable drawings. The team was therefore concerned about the incompleteness of the population of cable insulation materials to be considered in the aging management review. The seven cables were however, included within the Oconee Cable Tracking Database and the team requested that the cable drawings be reviewed against the database to ensure that all existing cable types/insulation materials be considered in the aging management review.

The licensee initiated PIP 0-O99-1737 to include this issue in the Oconee Corrective Action Program for tracking. The team considered this issue as an open item which should be resolved prior to the July, 1999 Oconee License Renewal Aging Management Inspection.

Review of Systems Determined by the Applicant to be out of Scope for License Renewal

Spent Fuel Pool Cooling and Recirculating Cooling Water System

As stated in the ONS LRA Section 2.5.6.1, Spent Fuel Cooling System, and UFSAR 9.1.3.1 Spent Fuel Pool Cooling-Design Bases, the primary function of the Spent Fuel Pool Cooling system is to provide decay heat removal for the spent fuel stored in the spent fuel pools. Other system functions are to maintain pool inventory, clarity and chemistry at acceptable levels. Based on the revised criteria imposed during the 1980 re-racking modification, the thermal-hydraulic analyses associated with the spent fuel racks assumes that the bulk spent fuel pool temperature remains at or below 150°F, for normal heat loads.

UFSAR 9.1.3.3.1 states that spent fuel heat removal is accomplished by recirculating spent fuel coolant water through heat exchangers and back to the pool. The waste heat is removed from the shell side of the coolers by the Recirculating Cooling Water (RCW) system.

In addition, UFSAR 15.11.2.1 states that among the base assumptions for a fuel handling accident in the spent fuel pool (SFP), are a fuel assembly gap pressure based on a bulk fuel pool coolant temperature of 150°F.

UFSAR 9.2.2.4 states the RCW system is relied upon to provide cooling water to the spent fuel cooling system cooler to maintain bulk SFP coolant temperature below the SFP design limits and below assumptions for the fuel handling accident analysis described in UFSAR 15.11.2.1.

"Design Basis Specification for the Spent Fuel Cooling System" (Spec. OSS-0254.00-00-1006, Rev. 3), Subsection 20.2.1, "SFP Heat Loads and Temperature Limits", states that "A maximum pool temperature of 150°F was assumed in the thermal-hydraulic analyses contained in the Units 1 and 2 [Unit 3] re-rack submital in determining the maximum fuel clad temperatures which may occur as a result of using the poison spent fuel racks."

In 10 CFR 54.4.(a) Plant systems, structures, and components within scope of this part are the following statements.

> 10 CFR 54.4.(a)(2) states "All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1), (i), (ii), or (iii) of this section." and
>
> 10 CFR 54.4.(a).(1).(iii) states "The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the 10 CFR Part 100 guidelines"

The inspection team concluded that the applicant should have included the Recirculating Cooling Water (RCW) System in the scoping of systems, structures, and components for license renewal as required by the criteria indicated above. The RCW is relied upon to maintain the spent fuel pool water less than 150° F which is the assumed initial temperature for the fuel handling accident analysis.

Decay Heat Removal

A portion of the Low Pressure Injection (LPI) system is used to remove decay heat during cold shutdown and refueling operation as stated in ONS design basis documents, OSS-0254.00-00-1028, Design Basis Specification for the Low Pressure Injection and Core Flood System. ONS specification OSS-0254.00-00-1028, Subsection 20.1.2.2.2, "Loss of Decay Heat Removal," identifies the potential for losing decay heat removal under the applicant's current licensing basis (CLB), and states that the major concern for this event is the potential radiological releases due to core damage if all decay heat removal was lost. Therefore, the potential of a loss of decay heat removal is a viable failure within the ONS CLB that can affect the applicant's ability to prevent or mitigate a potential offsite exposure comparable to 10 CFR Part 100 guidelines. In addition, an LER search identified nine events at ONS categorized as a loss of decay heat removal, and an additional eight events related to the loss of decay heat removal.

Specification OSS-0254.00-00-1028 states that the ONS design requires that at least two out of three decay heat removal methods be available during operating Modes 5 and 6. Although these methods appear to involve systems (LPI, HPI, and the RCS) that have been included in the scope of license renewal for reasons other than decay heat removal, the lack of consideration for the potential loss of shutdown cooling as a viable event under 10 CFR 54.4(a)(1)(iii), may have resulted in the failure to identify applicable system-level functions that could have resulted in the failure to identify structures and components and applicable aging effects requiring an aging management review.

The loss of decay heat removal is consistent with the license renewal scoping criteria under 10 CFR 54.4(a)(1)(iii) in that it could potentially result in offsite exposures comparable to the 10 CFR 100 guidelines. Because the loss of decay heat removal is an ONS design basis event that has occurred at ONS as documented in a number of ONS LERs, the inspection team determined that the applicant should have considered the function of loss of decay heat removal in the scoping of systems, structures, and components for license renewal.

Instrument Air (IA) System

As stated in the ONS LRA Section 2.5.4.6 "Instrument Air System" the system provides a reliable source of clean, dry, oil-free compressed air at the proper pressure to air-operated valves, instruments, and other miscellaneous components in the plant.

The "Design Basis Specification for the IA System" Specification OSS-0254.00-00-0125, Rev. 1, states in Subsection 20.1 "System Functional Design Bases," that "The Instrument Air (IA) System performs only one safety function; the normally closed IA Reactor Building isolation valves and penetration piping shall be capable of maintaining Containment Isolation." The containment isolation valves which perform this function are 1,2,3 IA-90 & 1,2,3 IA-91 utilizing

containment penetrations number 41. These penetrations are normally closed to provide containment isolation. All containment isolation valves identified in the Oconee UFSAR are within scope of license renewal and subject to an aging management review and were correctly identified in the LRA. Section 20.3.13 of the Specification "Loss of Instrument Air" states that "each air-operated component supplied by the IA System which performs a safety related function shall fail to a safe state or into a state established as tolerable on a defined bases if a condition such as loss of IA System pressure is experienced." However, the IA System has no air-operated components which perform a safety related function.

Instrument Air is consistent with the license renewal scoping criteria under 10 CFR 54.4.(a).(2) in that the failure of the containment penetration for the Instrument Air system (piping and isolation valves) could affect the integrity of the containment boundary, and the capability to prevent or mitigate the consequences of accidents that could result in potential exposures comparable to the 10 CFR 100 guidelines. The team concluded that the applicant was correct in the decision that only the containment isolation portion of instrument air was within the scope of license renewal.

PIPE RUPTURE EVENT

ONS Specification No. OSS-0254.00-00-4017, "Design Basis Specification for the Pipe Rupture," states that pipe rupture is a design event for ONS. It also states that pipe ruptures may prevent the plant from achieving and maintaining safe shutdown conditions and require additional consideration.

This specification provides design bases and criteria that are to be considered in designing systems, performing modifications, and assessing operability rather than providing a focus on a well defined accident(s) involving pipe rupture(s). However, it does provide a list of related specifications for systems vulnerable to pipe ruptures including the Purification & Deborating Demineralizing System, Condensate Heater Drain System, Condensate Heater Vent System, and Auxiliary Steam System that were not identified as being within the scope of the applicant's license renewal programs and activities. The potential of a pipe rupture is a viable failure for these systems within the ONS CLB that can affect the applicant's ability to achieve and maintain the plant in a safe shutdown condition.

In addition, the pipe rupture specification references specifications for nine additional systems susceptible to pipe rupture that are within the scope of license renewal. Although these systems are included in the scope of license renewal, the exclusion of pipe rupture as a viable failure mode may have resulted in the failure to identify other structures and components, and applicable aging effects requiring an aging management review.

The statement of considerations (SOC) that accompanied the license renewal rule, 60 FR 22467, last paragraph states the following:

> The inclusion of these nonsafety-related systems, structures, and components whose failure could prevent other systems, structures, and components from accomplishing a safety function is intended to provide protection against safety function failure in cases where the safety-related structure or component is not itself impaired by age-related

degradation but is vulnerable to failure from the failure of another structure or component that may be so impaired.

Furthermore, the SOC, 60 FR 22467, introductory paragraph to III.c(iii) states the following:

> To limit this possibility for the scoping category relating to nonsafety-related systems, structures and components, the Commission intends this nonsafety-related category (§54.4(a)(2)) to apply to systems, structures, and components whose failure would prevent the accomplishment of an intended function of a safety-related system, structure, and component. An applicant for license renewal should rely on the plant's CLB, actual plant-specific experience, as appropriate, and existing engineering evaluation to determine those nonsafety-related systems, structures, and components that are the initial focus of the license renewal review. Consideration of hypothetical failures that could result from system interdependencies that are not part of the CLB and that have not been previously experienced is not required.

Pipe Rupture is consistent with the license renewal scoping criteria under 10 CFR 54.4(a)(2) in that it could affect the integrity of the reactor coolant pressure boundary, the ability to shutdown the reactor and maintain it in a shutdown condition, and the capability to prevent or mitigate the consequences of accidents that could result in potential exposures comparable to the 10 CFR Part 100 guidelines. Because this type of failure is a part of the applicant CLB and has occurred at ONS, the inspection team concluded that pipe rupture should have been considered in the scoping of systems, structures, and components for license renewal.

Lee Station Electrical Supply

ONS AC electrical Power System consists of off-site power sources and two on-site standby power sources; the Keowee Hydro Units (KHUs). This system is designed to supply the required Engineered Safeguards (ES) loads of one unit and safe shutdown loads of the other two units. The design of the AC Power System provides independence and redundancy to ensure an available source of power to the ES Systems (refer to ONS UFSAR, Chapter 8.0).

Certain Oconee Design Basis Events assume that off-site power sources are not available leaving the KHUs as the sole independent, redundant sources of AC power to the ES and shutdown systems for the three units. Because the hydro units require maintenance from time-to-time, the Technical Specifications (TS), § 3.8.1, contains a limiting condition of operation (LCO) that allows continued operation for 72 hours with only one KHU available. Operation beyond the 72 hours is allowed by TS 3.8.1, but only if the applicant uses the Lee Combustion Turbine (LCT) as an alternate power supply in place of the second (redundant) KHU. The TS requirement for a backup electrical supply is only a conservative redundancy requirement, and is not required to ensure the integrity of the reactor coolant pressure boundary, the capability to shutdown the reactor and maintain it in a shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the 10 CFR Part 100 guidelines.

Because the LCT is not required to supply safe shutdown loads during design bases event conditions within the applicant's CLB, the inspection team concluded that the systems, structures, and components required for the LCT to provide an alternate source of power to ONS are not required to be within the scope of license renewal.

Maintenance of License Renewal Records

The inspectors visited an Oconee document control center to determine if the license renewal documentation was acceptably controlled and maintained in an auditable and retrievable form. As examples of the license renewal documents, the inspectors requested the license renewal flow diagrams. The inspectors found that they were readily available on microfiche through the applicant's standard document control process. License Renewal Application supporting documentation was found to be retrievable.

c. Conclusions

The team concluded that the mechanical scoping and screening process was conducted as described in the applicant's License Renewal Application. However, the inspection revealed the following issues:

The team identified several examples of omissions and contradictions in various license renewal documents. The applicant stated that these will be corrected.

A design function of the Emergency Feedwater System to provide flow through piping and valves between units had not been included in a license renewal Specification The team identified the omission as an open issue to be resolved in a subsequent license renewal inspection.

The team observed in the applicants license renewal documentation an open item stating that a new Steam Generator Tube Rupture analysis is under review by the NRC. This may require a future expansion of the license renewal scope to include component cooling and perhaps other systems. The applicant is tracking this issue with a PIP corrective action document and the resolution will be reviewed during a future NRC inspection.

The team expressed the view that the function of spent fuel pool cooling and the postulated plant events that could result from a of loss of decay heat removal and pipe rupture should have been addressed in the mechanical scoping process for license renewal. These omissions are examples of a larger issue on scoping adequacy which is currently being reviewed for resolution by the NRC Office of Nuclear Reactor Regulation.

The team concluded that the scoping and screening process for structures was conducted conservatively as described in the LRA.

The inspectors toured the Intake Structure, Standby Shutdown Facility, 230 kV Switchyard, and the Keowee dam and Power House. The structures were found to be in acceptable condition.

In the lowest level of the 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. The condition was previously identified by the applicant and is being tracked but no date is currently specified for repair action. Additionally 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 both deteriorating conditions and documented them, but observed that years have passed without actual corrective action being taken. These matters will be reviewed in a NRC inspection.

The Oconee generic electrical commodity group scoping method was acceptable and addressed all electrical commodity groups in 10CFR54 and NEI 95-10. No components were identified during this inspection that were not included within the generic commodity groupings. Electrical screening met 10CFR54 requirements except for resistance temperature detectors and thermocouples and fire detector cables/connectors which were still under review by NRR.

The team identified three cable types/mark numbers not included within the Oconee cable drawings which the license renewal documentation said were used to form the basis for the population of cable/insulation material considered for the aging management review. The licensee initiated PIP 0-O-99-1737 for investigation and resolution of this issue within the Oconee corrective action program.

II. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management on April 30, 1999, and again in a meeting of May 26, 1999 which was open for public observation. Proprietary information was reviewed during this inspection and identified as such by the applicant to the inspectors but no proprietary information is included in this report.

Partial List of Persons Contacted

Applicant

E. Burchfield, 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
D. Ramsey, License Renewal
G. Robison, License Renewal
M. Tuckman, Executive Vice President, Nuclear Generation

NRC

E. Christnot, Resident Inspector
S. Freeman, Resident Inspector
P. Kuo, Section Chief, RLSB, NRR
V. McCree, Deputy Director, Division of Reactor Safety, RII
J. Sebroski, Project Manager, RLSB, NRR

Other licensee 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)

Specification OSS-0274.00-00-0001, "Oconee Mechanical System Scoping for License Renewal," Rev. 2

Specification OSS-0274.00-00-0002, "Oconee Mechanical Component Screening for License Renewal," Rev. 1

Specification OSS-0274.00-00-0004, "Oconee Reactor Coolant System Aging Management Review for License Renewal," Rev. 0.

Specification OSS-0274.00-00-0005, "Oconee Mechanical Component Aging Management Review Specification Screening for License Renewal", Rev. 1

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

Design Basis Specification OSS-0254.00-00-4008, "Design Basis Specification for the Keowee Turbine Generator Cooling Water (WL) System," Rev. 3

Design Basis Specification OSS-0254.00-00-1000, "Design Basis Specification for the Emergency Feedwater and the Auxiliary Service Water Systems," Rev. 20

Design Basis Specification OSS-0254.00-00-1036, "Design Basis Specification for the Feedwater System," Rev. 6

Design Basis Specification OSS-0254.00-00-1001, "Design Basis Specification for the High Pressure Injection and Purification & Deborating Demineralizer Systems," Rev. 9

Design Basis Specification OSS-0254.00-00-1004, "Design Basis Specification for the SSF RC Makeup System," Rev. 11

Design Basis Specification OS-0243.00-00-001, "Oconee Piping Installation Specification", April 1996

Design Basis Specification OSS-0254.00-00-4015, "Design Basis for Oconee Piping Classification," Rev. 0, December 14, 1993

Design Basis Specification OSS-0274.00-00-1022, "Design Basis Specification for Component Cooling System," Rev. 3

Design Basis Specification OSS-0274.00-00-1034, "Design Basis Specification for Reactor Building Spray System," Rev. 4

Design Basis Specification OSS-0274.00-00-1039, Revision 12, Design Basis Specification for Low Pressure Service Water System

Design Basis Specification OSS-0254.00-00-1006, Rev. 3, Design Basis Specification for the Spent Fuel Cooling System

Design Basis Specification OSS-0254.00-00-0125, Rev. 1 Design Basis Specification for the IA System

Design Basis Specification OSS-0254.00-00-1028, Design Basis Specification for the Low Pressure Injection and Core Flood System

Design Basis Specification No. OSS-0254.00-00-4017,"Design Basis Specification for the Pipe Rupture

Calculation OSC-6107, Revision 3, Large Break Loss of Coolant Accident/ Loss of Offsite Power (LBLOCA/LOOP): Event Mitigation Requirements

Calculation OSC-6659, Revision 2, Station Blackout Event Mitigation Requirements

Calculation OSC-7070, Revision 1, Oconee Event Mitigation Database

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

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

List of Acronyms

AC	- Alternating Current
ANSI	- American National Standards Institute
ASME	- American Society of Mechanical Engineers
ASW	- Auxiliary Service Water
CC	- Component Cooling
CLB	- Current Licensing Basis
EFW	- Emergency Feedwater
HPI	- High Pressure Injection
KHU	- Keowee Hydro Unit
LCT	- Lee Combustion Turbine
LER	- Licensee Event Report
LOCA	- Loss of Coolant Accident
LRA	- License Renewal Application
LRBD	- License Renewal Basis Document
NRC	- Nuclear Regulatory Commission
NRR	- NRC office of Nuclear Reactor Regulation
PIP	- Problem Investigation Process
PRA	- Probabilistic Risk Assessment
RCP	- Reactor Coolant Pump
RCS	- Reactor Coolant System
SER	- Safety Evaluation Report
SGTR	- Steam Generator Tube Rupture
SSF	- Standby Shutdown Facility
UFSAR	- Updated Final Safety Analysis Report