April 24, 1998

Mr. William R. McCollum
Vice President, Oconee
Duke Energy Corporation
P. O. Box 1439
Seneca, SC 29679

Distribution: OGC SB O-11F23
Docket File LPlisco,RII CRS T-2-E-26
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JZwolinski TLH3 (e-mail SE only)

SUBJECT: ISSUANCE OF AMENDMENTS - OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 (TAC NOS. M99487, M99488, AND M99489)

Dear Mr. McCollum:

The Nuclear Regulatory Commission has issued the enclosed Amendment Nos. 229 ,230 , and 226 to Facility Operating Licenses DPR-38, DPR-47, and DPR-55, respectively, for the Oconee Nuclear Station, Units 1, 2, and 3. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated August 28, 1997, as supplemented January 22, February 19, March 19, and April 6, 13, and 17, 1998.

The amendments incorporate new testing and operability requirements related to the installation of new systems and upgrades associated with the Emergency Condenser Circulating Water (ECCW) System. Review of the system for the amendments also included a review of the new design features incorporated into the upgrade and its acceptability as a safety grade system.

As stated in the change to Appendix C of the amended license, our approval of these amendments is conditional on your providing the staff with additional information related to seismic qualification of the new equipment installed in the ECCW system. These conditions are specified in your letter dated April 17, 1998.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,
ORIGINAL SIGNED BY:
David E. LaBarge, Senior Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287
Enclosures:
1. Amendment No. 229 to DPR-38
2. Amendment No. 230 to DPR-47
3. Amendment No. 226 to DPR-55
4. Safety Evaluation
cc w/encl: See next page

***see previous concurence**

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DATE	4/21/98 *		4/22/98		4/21/98		4/21/98		4/21/98	

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DATE	4/21/98		4/21/98		4/23/98		4/24/98	

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 24, 1998

Mr. William R. McCollum
Vice President, Oconee Site
Duke Energy Corporation
P. O. Box 1439
Seneca, SC 29679

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Docket Nos. 50-269, 50-270, and 50-287

Enclosures:
1. Amendment No. 229 to DPR-38
2. Amendment No. 230 to DPR-47
3. Amendment No. 226 to DPR-55
4. Safety Evaluation

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DUKE ENERGY CORPORATION

DOCKET NO. 50-269

OCONEE NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 229
License No. DPR-38

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 1 (the facility) Facility Operating License No. DPR-38 filed by the Duke Energy Corporation (the licensee) dated August 28, 1997, as supplemented January 22, February 19, March 19, and April 6, 13, and 17, 1998, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Facility Operating License No. DPR-38 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 229 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

In addition, Paragraph 3.K of the Facility Operating License No. DPR-38 is hereby amended to read as follows:

3.K Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 229, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Additional Conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
1. Technical Specification Changes
2. Appendix C Changes

Date of Issuance: April 24, 1998

APPENDIX C

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. DPR-38

Duke Energy Corporation shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Conditions	Implementation Date
	The licensee will:	
229	(1) Provide comparisons of critical characteristics for the new equipment that is installed by the ECCW upgrade with data from testing or from recorded earthquakes, in accordance with Section 2.3.4, Part I of GIP-2 and Section I.2.3.4, paragraphs 2, 3, and 4 of the staff's SSER dated May 22, 1992, that is needed by the staff to complete its review of associated seismic issues or will qualify the new equipment using the existing methods in Section 3 of the Oconee UFSAR.	Conditon 1: July 15, 1998
229	(2) Add the Oconee Unit 2 equipment in the ECCW System that is necessary for safe shutdown per GIP-2 to the USI A-46 SSEL and include its evaluation in a revision to the USI A-46 submittal.	Condition 2: 4 months of the completion of the Unit 2 refueling outage.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DUKE ENERGY CORPORATION

DOCKET NO. 50-270

OCONEE NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 230
License No. DPR-47

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 2 (the facility) Facility Operating License No. DPR-47 filed by the Duke Energy Corporation (the licensee) dated August 28, 1997, as supplemented January 22, February 19, March 19, and April 6, 13, and 17, 1998, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Facility Operating License No. DPR-47 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 230 , are hereby incorporated in the license. The licensee shall operate the facility inccordance with the Technical Specifications.

In addition, Paragraph 3.K of the Facility Operating License No. DPR-47 is hereby amended to read as follows:

3.K Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 230, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Additional Conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
1. Technical Specification Changes
2. Appendix C Changes

Date of Issuance: April 24, 1998

APPENDIX C

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. DPR-47

Duke Energy Corporation shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Conditions	Implementation Date
	The licensee will:	
230	(1) Provide comparisons of critical characteristics for the new equipment that is installed by the ECCW upgrade with data from testing or from recorded earthquakes, in accordance with Section 2.3.4, Part I of GIP-2 and Section I.2.3.4, paragraphs 2, 3, and 4 of the staff's SSER dated May 22, 1992, that is needed by the staff to complete its review of associated seismic issues or will qualify the new equipment using the existing methods in Section 3 of the Oconee UFSAR.	Conditon 1: July 15, 1998
230	(2) Add the Oconee Unit 2 equipment in the ECCW System that is necessary for safe shutdown per GIP-2 to the USI A-46 SSEL and include its evaluation in a revision to the USI A-46 submittal.	Condition 2: 4 months of the completion of the Unit 2 refueling outage.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DUKE ENERGY CORPORATION

DOCKET NO. 50-287

OCONEE NUCLEAR STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 226
License No. DPR-55

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 3 (the facility) Facility Operating License No. DPR-47 filed by the Duke Energy Corporation (the licensee) dated August 28, 1997, as supplemented January 22, February 19, March 19, and April 6, 13, and 17, 1998, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (I) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Facility Operating License No. DPR-55 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 226 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

In addition, Paragraph 3.K of the Facility Operating License No. DPR-55 is hereby amended to read as follows:

3.K Additional Conditions

The Additional Conditions contained in Appendix C, as revised through Amendment No. 226 , are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Additional Conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
1. Technical Specification Changes
2. Appendix C Changes

Date of Issuance: April 24, 1998

APPENDIX C

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. DPR-55

Duke Energy Corporation shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Conditions	Implementation Date
	The licensee will:	
226	(1) Provide comparisons of critical characteristics for the new equipment that is installed by the ECCW upgrade with data from testing or from recorded earthquakes, in accordance with Section 2.3.4, Part I of GIP-2 and Section I.2.3.4, paragraphs 2, 3, and 4 of the staff's SSER dated May 22, 1992, that is needed by the staff to complete its review of associated seismic issues or will qualify the new equipment using the existing methods in Section 3 of the Oconee UFSAR.	Conditon 1: July 15, 1998
226	(2) Add the Oconee Unit 2 equipment in the ECCW System that is necessary for safe shutdown per GIP-2 to the USI A-46 SSEL and include its evaluation in a revision to the USI A-46 submittal.	Condition 2: 4 months of the completion of the Unit 2 refueling outage.

ATTACHMENT TO LICENSE AMENDMENT NO. 229

FACILITY OPERATING LICENSE NO. DPR-38

DOCKET NO. 50-269

AND

TO LICENSE AMENDMENT NO. 230

FACILITY OPERATING LICENSE NO. DPR-47

DOCKET NO. 50-270

AND

TO LICENSE AMENDMENT NO. 226

FACILITY OPERATING LICENSE NO. DPR-55

DOCKET NO. 50-287

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change.

Remove	Insert
iv	iv
--------	3.19-1
--------	3.19-2
--------	3.19-3
--------	3.19-4
--------	3.19-5
4.1-9	4.1-9
4.1-9(a)	4.1-9(a)

3.19 EMERGENCY CONDENSER CIRCULATING WATER

Applicability

Applies to the first siphon portion of the Emergency Condenser Circulating Water (ECCW) System, the Essential Siphon Vacuum (ESV) System, and the Siphon Seal Water (SSW) System whenever operability of the Low Pressure Service Water (LPSW) System is required.

Applicability of this Specification for each Oconee unit will begin following completion of the Service Water upgrade on the respective unit.

Objective

Supports operability of the LPSW pumps by specifying operability requirements for the systems required to maintain siphon flow capability.

Specification

3.19.1 ECCW Siphon Headers for Unit 1&2 LPSW

a. Whenever the shared Unit 1&2 LPSW System is required to be operable, at least two ECCW siphon headers shall be operable from among the four ECCW siphon headers on Unit 1 and Unit 2.

b. For each ECCW siphon header required to be operable per Specification 3.19.1.a; the ESV System shall be operable with an ESV pump and its supporting SSW flow operating, with ESV aligned to the ECCW siphon header, and, at least one CCW pump discharge valve shall be open on that ECCW header.

c. If only one ECCW siphon header is operable and two ECCW siphon headers are not restored to meet the requirements of Specification 3.19.1.a within 72 hours, then the reactor(s) shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.19.1.a are not met within 24 hours following hot shutdown, the reactor(s) shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

3.19.2 ECCW Siphon Headers for Unit 3 LPSW

a. Whenever the Unit 3 LPSW System is required to be operable, at least two ECCW siphon headers shall be operable from among the four siphon headers on Unit 2 and Unit 3.

b. For each ECCW siphon header required to be operable per Specification 3.19.2.a; the ESV System shall be operable with an ESV pump and its supporting SSW flow operating, with ESV aligned to the ECCW siphon header, and, at least one CCW pump discharge valve shall be open on that ECCW header.

c. If only one ECCW siphon header is operable to supply suction to the Unit 3 LPSW system and two ECCW siphon headers are not restored to meet the requirements of Specification 3.19.2.a within 72 hours, then the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.19.2.a are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

3.19.3 A Unit 2 ECCW siphon header shall not simultaneously serve to support operability of both the Unit 1&2 LPSW System and the Unit 3 LPSW System.

3.19.4 Lake level requirements to support operability of the LPSW System shall be contained in the ONS Selected Licensee Commitment Manual.

BASES:

The Low Pressure Service Water (LPSW) pumps receive their suction supply from the Condenser Circulating Water (CCW) crossover header. During normal operation, the CCW pumps from all Oconee units can provide the water supply to the CCW crossover header. During certain events involving loss of off-site power, the CCW pumps will receive a load shed signal, and the Emergency Condenser Circulating Water (ECCW) first siphon must be capable of supplying suction to the LPSW pumps. The ECCW first siphon

takes suction from the CCW intake canal and supplies flow to the CCW crossover header where the LPSW System takes its suction.

The LPSW System provides a heat sink for the removal of process and operating heat from safety related components during an accident or transient. During normal operation and normal shutdown, the LPSW System also provides this function for various safety related components. The LPSW System cannot perform these functions, in the event of a loss of offsite power, if the ECCW System is not available to support LPSW System operability. Therefore, the applicability of this specification is any time LPSW System operability is required.

Due to the piping configuration, each CCW inlet header on a given Oconee unit is independent of the other header for the purposes of siphoning water from the intake canal to the CCW crossover header. If one CCW inlet header is incapable of supplying siphon flow, it would not prevent the other CCW inlet header on that Oconee unit from supplying siphon flow. Therefore, each CCW inlet header may be considered to be an independent "ECCW siphon header".

An "ECCW siphon header" provides an open flow path from the intake canal to the CCW crossover header. A single open CCW pump discharge valve supplying a single 11 ft. diameter CCW inlet header on a given Oconee unit may qualify as an ECCW siphon header if the applicable CCW crossover tie valve is open to align the ECCW siphon header to the suction of the LPSW pumps. Each Oconee unit has two CCW inlet headers that can supply flow to the CCW crossover header. Therefore, each Oconee unit can potentially provide up to two ECCW siphon headers.

The ECCW siphon supply to LPSW must be capable of withstanding a single active failure. For example, failure of the ESV pump or float valve for a given ECCW siphon header could cause siphon flow in that header to eventually fail due to air accumulation. Therefore, two ECCW siphon headers are required to be operable for each LPSW system. By requiring two ECCW siphon headers to be operable, no single active failure will cause a loss of function for the ECCW supply to the LPSW pumps.

Based on analysis of the net positive suction head (NPSH) for the LPSW pumps, the Unit 1&2 LPSW pumps cannot be supplied with adequate suction from a Unit 3 siphon header using worst case assumptions. Therefore, the siphon headers for the Unit 1&2 LPSW pumps must come from either Unit 1 or Unit 2. Similarly, the Unit 3 LPSW pumps cannot be supplied adequate NPSH from a Unit 1

siphon header, so the siphon headers for the Unit 3 LPSW pumps must be supplied from Unit 2 or Unit 3. A Unit 2 ECCW siphon header shall not simultaneously serve to support operability of both the Unit 1&2 LPSW System and the Unit 3 LPSW System. Under certain conditions of low lake level and high LPSW System demand, a Unit 2 ECCW siphon header is not capable of simultaneously providing adequate NPSH to both the Unit 1&2 LPSW System and the Unit 3 LPSW System.

Lake level requirements to support operability of the LPSW System shall be contained in the ONS Selected Licensee Commitment (SLC) Manual. SLC 16.9.7 currently contains the lake level requirements which are necessary to support operability of the LPSW System in conjunction with this specification.

For any ECCW siphon header to be considered operable, one Essential Siphon Vacuum (ESV) pump must be operating and aligned to the header, to ensure that the CCW piping remains sufficiently primed during normal operation. This configuration maintains the initial conditions used during testing and assumed in accident analyses. The ESV pump must be capable of restarting after restoration of emergency power following a loss of off-site power. This ensures that the siphon supply to LPSW can be maintained by removing any air that may leak into the CCW piping or any air that is degassed from the lake water.

To operate any ESV pump, it must have a continuous supply of seal water from the SSW System. The safety function of the SSW System is to supply seal water to the ESV pumps, but the SSW System also supplies seal/cooling water to the CCW pumps. SSW is fed from the LPSW System. The SSW System consists of two headers. One SSW header is sufficient to provide sealing flow to ESV pumps and CCW pumps. A solenoid valve is provided to isolate SSW flow to each ESV pump. This solenoid valve must be operable to ensure that SSW flow is provided to its respective ESV pump.

To maintain separation between the ESV System headers on a given unit, the cross-connect between the ESV pumps' suction shall be closed. Operability of the ESV System also requires that the float valve on the respective ECCW siphon header be operable. When the potential for freezing exists, the heat tracing on the ESV float valve must also be operable. To support continued operability of the ESV System during a LOCA/LOOP, instrumentation must be available to ensure that the ESV vacuum tank will be drained, and the SSW duplex strainers will be rotated, on an as needed basis. The instrumentation used to support these two activities is ESV vacuum tank level, and SSW to ESV pump flow,

respectively. Other instrumentation is provided to monitor proper operation of the ESV System, but is not required for ESV System operability.

Surveillance testing for the ECCW, ESV, and SSW systems is conducted by performing tests listed in Table 4.1-2. The Emergency Condenser Circulating Water System test is conducted every 18 months. This test verifies that air in-leakage to the ECCW siphon headers will not exceed ESV pump capability.

The Essential Siphon Vacuum System Test is performed quarterly to verify adequate performance of the ESV system. This includes a functional test to ensure the ESV float valves are capable of opening, a test of the ESV pumps performance, a test of ESV Pumps to ensure that they can be automatically restarted upon restoration of emergency power after a loss of off-site power, and a test of active valves which support operability of the ESV System.

Applicability of this Specification as described above for each Oconee unit will begin following completion of the Service Water upgrades on the respective unit. The Service Water upgrade is scheduled for completion in the Unit 2 EOC 16 refueling outage, in the Unit 3 EOC 17 refueling outage, and in the Unit 1 EOC 18 refueling outage.

Table 4.1-2
MINIMUM EQUIPMENT TEST FREQUENCY

	Item	Test	Frequency
1.	Control Rod Movement [1]	Movement of Each Rod	Monthly
2.	Pressurizer Safety Valves	Setpoint	18 months[4]
3.	Main Steam Safety Valves	Setpoint	18 months[4]
4.	Refueling System Interlocks[5]	Functional	Prior to Refueling
5.	Main Steam Stop Valves [1]	Movement of Each Stop Valve	Monthly
6.	Reactor Coolant System [2] Leakage	Evaluate	Daily
7.	Emergency Condenser [6] Circulating Water System Test	Functional	18 months
8.	High Pressure Service Water Pumps and Power Supplies	Functional	Monthly
9.	Spent Fuel Cooling System	Functional	Prior to Refueling
10.	High Pressure and Low [3] Pressure Injection System	Vent Pump Casings	Monthly and Prior to Testing
11.	Emergency Feedwater Pump Automatic Start and Automatic Valve Actuation Feature	Functional	18 months
12.	(Reserved)		
13.	Essential Siphon Vacuum [8] System Test	Functional	Quarterly

Amendment No. 229 (Unit 1)
Amendment No. 230 (Unit 2)
Amendment No. 226 (Unit 3)

(1) Applicable only when the reactor is critical.

(2) Applicable only when the reactor coolant is above 200°F and at a steady-state temperature and pressure.

(3) Operating pumps excluded.

(4) Number of safety valves to be tested every 18 months shall be in accordance with ASME Codes Section XI, Article IWV-3511, such that each valve is tested at least once every 5 years.

(5) Applicable only to the interlocks associated with the Reactor Building Purge System.

(6) Verification of the Emergency Condenser Circulating Water (ECCW) System function to supply siphon suction to the Low Pressure Service Water System shall be performed to ensure operability of the LPSW System.

(7) (Reserved)

(8) Applicability of these surveillances for each Oconee unit will begin following completion of the Service Water upgrade on the respective unit.

Amendment No. 229 (Unit 1)
Amendment No. 230 (Unit 2)
Amendment No. 226 (Unit 3)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 229 TO FACILITY OPERATING LICENSE DPR-38

AMENDMENT NO. 230 TO FACILITY OPERATING LICENSE DPR-47

AND AMENDMENT NO. 226 TO FACILITY OPERATING LICENSE DPR-55

DUKE ENERGY CORPORATION

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

1.0. INTRODUCTION

By letter dated August 28, 1997, as supplemented by letters dated January 22, February 19, March 19, and April 6, 13, and 17, 1998, Duke Energy Corporation (the licensee) submitted a request for changes to the Oconee Nuclear Station (ONS), Units 1, 2, and 3, Technical Specifications (TS). The requested changes would incorporate new testing and operability requirements related to the installation of new systems and upgrades associated with the Emergency Condenser Circulating Water (ECCW) System. Review and approval of the system for the amendments also includes review and approval of the new design features incorporated into the upgrade and its acceptability as a safety grade system at the ONS.

The supplements dated January 22, February 19, March 19, April 6, 13, and 17, 1998, provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

1.1 Description of Proposed TS Changes

The specific TS changes proposed by the licensee are as follows:

- Page iv: Addition of section number, system name, and page number to the index.
- Page 3.19-1 through 3.19-5: Add a new section delineating the specific TS requirements for the Emergency Condenser Circulating Water system.
- Page 4.1-9, Table 4.1-2, Item 7: Change the wording from "Condenser Circulating Water Flow Test" to "Emergency Condenser Circulating Water System Test."
- Page 4.1-9, Table 4.1-2, Item 13: Addition of new Item 13, "Essential Siphon Vacuum System Test" as a "Functional" test to be performed at a "Quarterly" frequency and indication that footnote "(8)" applies.

- Page 4.1-9a: Addition of footnote (8) to specify that the applicability of the surveillances for each Oconee unit will begin following completion of the Service Water upgrade on the respective unit.

2.0. EVALUATION

2.1 Evaluation of Changes to the Licensing Basis

2.1.1 System Overview

The ECCW system is a subsystem of the Condenser Circulating Water (CCW) system and has a safety function of providing cooling water to the Low Pressure Service Water (LPSW) system following a Loss-of-Offsite Power (LOOP). The licensee determined that a loss-of-coolant accident (LOCA)/LOOP was the limiting scenario for the ECCW system. During NRC inspections and licensee reviews starting in 1994, concerns have been raised regarding the operability of the ECCW since it relies, in part, on nonsafety-related equipment to fulfill its safety function. The ECCW system, which uses a siphon or gravity as its motive force, can be divided into two parts. The first siphon provides safety-related cooling water to the LPSW pumps. The second siphon provides flow through the main condenser to the Keowee Hydro tailrace. The operation of the first siphon is unaffected by the operation of the second siphon.

During normal operation, the CCW pumps supply cooling water from Lake Keowee to the CCW crossover header. The crossover header is a common suction for Units 1 and 2 LPSW and Unit 3 LPSW systems. In the event of a LOCA/LOOP, the CCW pumps are load shed and the ECCW must provide the LPSW cooling water. The flowpath for the cooling water does not change. However, the motive force is now by siphon or gravity. Gravity flow is possible if the lake level is sufficient to maintain net positive suction head and flow demand. Siphon flow to the LPSW pumps is currently controlled by a combination of lake level and CCW system alignment. The siphon is credited for 1.5 hours of operation until a CCW pump can be manually restarted. To maintain siphon flow, the system must be relatively air-free and leak tight. Nonsafety-related High Pressure Service Water (HPSW) system provides seal water to the CCW pump shafts to minimize air in-leakage following a LOOP. Additionally, HPSW water is necessary for sealing and cooling to restart the CCW pumps.

The licensee proposed to install two new support systems and upgrade portions of the existing CCW system so that safety-related equipment is used to fulfill the ECCW first siphon safety function. The Essential Siphon Vacuum (ESV) system is a vacuum pump system that prevents air from accumulating in the ECCW siphon headers during normal operation and following an LOOP. The Siphon Seal Water (SSW) system provides necessary seal water for the ESV pumps. During normal operation, for every ECCW header that is operable, one ESV pump will be running. When offsite power is lost, the ESV pumps running prior to the LOOP would be load shed and an interlocked solenoid valve will isolate the seal water to the ESV pump. An unassisted siphon will occur until the ESV pumps are restarted (at least 2 minutes). After the power is restored, the SSW solenoid valve will energize open, and the ESV pumps that were operating prior to the LOOP will automatically restart. The restart of the ESV pumps ensures that air will not accumulate in the ECCW header and break the siphon. For the duration of the event, ECCW siphon water will continue to supply water to the CCW crossover header. The

ESV system removes reliance on the nonsafety-related HPSW system for system air-tightness and the manual restart of nonsafety-related CCW pumps following an LOOP. The ESV system also supplies water to the SSW system, which takes its suction from the LPSW system. The SSW system replaces the HPSW system function of supplying cooling and seal water to the CCW pumps with a safety-related system.

The staff has reviewed the ESV and SSW systems with respect to their ECCW safety function. Existing systems and components were reviewed only in relation to the new modifications proposed by the licensee. The capability to transfer heat, as required by General Design Criterion (GDC)-44 of Appendix A to 10 CFR Part 50, has not changed due to this modification. However, these new systems can affect whether the ECCW system is capable of performing its safety function. The staff reviewed the ESV and SSW systems for sufficient redundancy in components and features and suitable interconnections and isolation capabilities. One ECCW header is capable of supplying the associated LPSW system. In accordance with the TS, two ECCW headers are required to be operable per LPSW system. Two ECCW headers are required for the Units 1 and 2 LPSW system and two ECCW headers are required for the Unit 3 LPSW system. The ECCW system's safety function can still be performed assuming a single failure in the ESV or SSW system and was designed with sufficient redundancy, and therefore, meets GDC-44, related to the ECCW system for cooling water.

2.1.2 Essential Siphon Vacuum System

The ESV system's safety function is to maintain the ECCW headers relatively air-free during normal operation and following an LOOP so that siphon flow will be established to supply the LPSW system when the CCW pumps are load shed. During plant operation, the ESV system must be operating to maintain the ECCW headers relatively air-free. Operation of the minimum required ESV pumps also ensures that all essential ESV valves are properly aligned to perform their safety function. The restart of the ESV pumps ensures the siphon will not be broken due to air in-leakage. The ESV system is Quality Assurance Condition 1 (QA-1) and seismically qualified. The pumps are powered by Class 1E power with independent sources to each pump per unit. The float valve heat tracing for the ESV float valves is QA-1 and supplied with Class 1E power. The licensee determined that the emergency power system is capable of handling the addition of the ESV and SSW loads with no significant impact on the electrical ac power distribution systems.

The ESV piping is routed from each CCW header and passes through a float valve and underground to the ESV building. In the ESV building, each line contains a vacuum tank and a cross connection at the suction of the ESV pumps. There are three vacuum pumps per unit. The pumps are cross-connected so that each pump has the capability of taking suction from either header. This provides greater flexibility for operability for the unit. Each pump is capable of removing the maximum amount of air expected to accumulate in one ECCW header. One pump is an installed spare. A minimum flow line is connected to each ESV vacuum tank to prevent deadheading of the pump during operation. The staff reviewed the locations and types of components associated with the ESV system for inspectability. The ESV system does not use any unique components. Given the locations and components, the staff concludes that the design permits inspection of the important components and, therefore, meets GDC-45.

The staff reviewed the ESV system to identify new shared components. The ESV system for each unit is independent and does not share any components, and therefore compiles with GDC-5, as related to systems and components.

The licensee evaluated the ESV system in accordance with its licensing basis as described in the ONS Updated Final Safety Analysis Report (UFSAR). The conclusions of these reviews, listed below, are acceptable to the staff since they comply with the safety analysis:

- The licensee performed a single failure analysis for the ESV system and determined that a single active failure will not preclude the ESV system from performing its intended safety function.

- The ESV system conforms with UFSAR Section 3.1.40 for the analysis of turbine missiles. The system is in a low probability strike zone for low and high trajectory missiles. Therefore, no separation or shielding protection is necessary for turbine missiles.

- Neither tornado wind loads nor tornado missiles were considered in this design. The licensee takes credit in UFSAR Section 3.2.2 for water trapped in the embedded CCW piping as a source for the auxiliary service water pump. Therefore, the system is not required to function in the event of a tornado.

- The licensee reviewed the ESV pumps as possible outside containment, internally generated missiles. Due to the pumps' low speed and the outer casing, the licensee determined that these pumps could not become sources of internally generated missiles.

- UFSAR Section 9.5.1.4.3 generally precludes routing cable and piping within the same trench, as proposed in this amendment. The licensee performed a safety evaluation in accordance with 10 CFR 50.59 and determined with additional restrictions, that in this specific application a fire concern did not exist. The licensee will revise UFSAR Section 9.5.1.4.3 to reflect this change.

2.1.3 Siphon Seal Water System

The SSW system's safety function is to provide seal water to the ESV pumps. The SSW system also has the nonsafety-related function of providing cooling and seal water to the CCW pumps. Two SSW headers are routed from the LPSW system headers. One SSW header takes suction from the Units 1 and 2 LPSW system, and one header takes suction from the Unit 3 LPSW system. The SSW system contains no pumps. The pressure from the LPSW pumps provides the motive force for the SSW. The SSW headers are cross-connected at each ESV and CCW pump such that either header could supply seal water to all nine ESV pumps and twelve CCW pumps. Downstream of the cross connect is a solenoid valve that is interlocked with the ESV pump controls. This valve isolates SSW to the ESV pump on loss of power and restores SSW to the ESV pumps when power is restored. The piping and components necessary to support the safety function are QA-1 and seismically qualified. The licensee

determined that the Emergency Power System is capable of handling the addition of the ESV and SSW loads with no significant impact on the Electrical AC Power Distribution Systems.

The SSW system piping takes suction downstream of the LPSW pumps in the turbine building. From the turbine building, it is routed along the existing radwaste trench to the new ESV trench into the ESV building. In the ESV building, SSW is filtered by duplex strainers and is cross-connected prior to the ESV pumps. After the strainer, the piping is also routed underground to the intake structure, where it is cross-connected prior to entering the CCW pumps. The staff reviewed the locations and types of components associated with the SSW system for inspectability. The SSW system does not use any unique components. Given the locations and components, the staff concludes that the design permits inspection of the important components and, therefore, meets GDC-45.

The SSW system is a shared system for the three Oconee units. The two SSW headers service all nine ESV pumps for the three units. Only one header is necessary to supply all units with SSW. Therefore, a shutdown or accident in one unit will not affect the operability of the SSW for the remaining operating units. The SSW system meets GDC-5, as related to shared systems and components.

The licensee evaluated the SSW system in accordance with its licensing basis, as described in the ONS UFSAR. The conclusions of these reviews, listed below, are acceptable to the staff.

- The licensee performed a single failure analysis for the SSW system and determined that a single active failure will not preclude the SSW system from performing its intended safety function.

- The SSW system conforms with UFSAR Section 3.1.40 for the analysis of turbine missiles. The system is in a low probability strike zone for low and high trajectory missiles. Therefore no separation or shielding protection is necessary for turbine missiles.

- Neither tornado wind loads nor tornado missiles were considered in this design. The licensee takes credit in UFSAR Section 3.2.2 for water trapped in the embedded CCW piping as a source for the auxiliary service water pump. Therefore, the system is not required to function in the event of a tornado.

2.1.4 Testing

The ECCW system functional test will be performed on a refueling outage basis to verify that unassisted siphon flow is established and the air accumulation in the ECCW system is within the removal capabilities of the ESV system. During the test, the ESV system will be isolated from the ECCW header. As air is accumulated in the ECCW header, the water level will decrease. The level will be measured during a finite period of time to ensure that the air accumulated is within the removal capacity of the ESV system. The SSW system will be isolated from the CCW pumps so that air in-leakage will be maximized. During the Unit 3 test, the siphon flow to the LPSW system will be verified. Since LPSW is a shared system for

Units 1 and 2, there is a concern for adequate LPSW for the operating unit. Therefore, the Units 1 and 2 LPSW system will not be supplied by the siphon flow. This is acceptable, since the establishment of the siphon can still be verified and the flowpath from the ECCW header to the LPSW system is used during normal operation. This test is required by TS Table 4.1-2.

The ESV system functional test will be performed on a quarterly basis to ensure operability of the system. This test will include the automatic restart of the pumps after restoration of power, a test of the active ESV and SSW valves, and the time delay between loss of power and restart of the ESV pumps. The pumps' performance will be tested, at a minimum, for vacuum pressure, flow rate, and vibration. This information will be evaluated for pump degradation. The ESV float valves, which must cycle during an LOOP, will be tested according to in-service testing requirements. This test is required by TS Table 4.1-2.

Post-modification testing will verify that the systems can perform their intended safety function. Individual tests, equivalent to the periodic tests, will be performed. An integrated test will be performed following the individual tests, which will establish siphon flow with the ESV system operating. After the ESV system is declared operable, a one-time endurance test will also be performed to demonstrate that the ECCW system can establish and maintain siphon flow to the LPSW pumps for an extended period of time.

The staff has reviewed the functional test descriptions for the ECCW, ESV, and SSW systems. The design permits operational functional testing of these systems and their components. The periodicity of the testing is designated in the TS. The staff concludes that the ECCW system and its support systems, SSW and ESV, meet GDC-46 related to testing the functions of the ECCW system.

2.1.5 Proposed Technical Specification

Proposed TS 3.19, "Emergency Condenser Circulating Water," applies to the first siphon portion of the ECCW, ESV, and SSW systems whenever the LPSW system for the associated unit is required. For the Units 1 and 2 LPSW system, two of the possible four ECCW headers are required to be operable. For the Unit 3 LPSW system, two ECCW headers shall be operable from the possible four headers on Unit 2 and Unit 3. A Unit 2 ECCW header cannot supply both the Units 1 and 2 LPSW system and the Unit 3 LPSW system simultaneously. Lake levels must be maintained in the ONS selected licensee commitment (SLC) manual for the operability of the LPSW system.

For a CCW header to be considered an operable ECCW header, the following criteria must be met: a flow path is open from the CCW intake to the LPSW pump suction; the CCW pump discharge valve is open; an ESV pump is operating on that header; the ESV system is aligned to that header; SSW flow is provided to the ESV pump; the ESV float valve must be operable; and heat tracing, if necessary, to the ESV float valve is operable. Further details are included in the proposed TS Bases.

If only one ECCW header is available to supply suction to the associated LPSW system, two ECCW headers must be operable within 72 hours. If two headers cannot be restored, the reactor(s) must be placed in hot shutdown within 12 hours. If two headers cannot be restored

within 24 hours following hot shutdown, the reactor(s) will be placed in a condition with reactor coolant system (RCS) pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours. These limiting conditions of operation actions and time allowances are the same as current TS 3.3.7 for LPSW. The ECCW system supports the operability of the LPSW system; therefore, these actions and time allowances are acceptable. The staff finds that the proposed TS and Bases are acceptable.

The licensee proposed to eliminate SLC 16.9.8, "HPSW Pump Requirement to Support LPSW," and Commitments A and B in SLC 16.9.7, "Keowee Lake Level." The purpose of SLC 16.9.8 and SLC 16.9.7.A was to provide greater assurance that the HPSW would be available to support CCW during and following an LOOP. SLC 16.9.7.B pertained to maintaining a minimum number of CCW pumps operating to provide greater assurance that the system was relatively air-free so that a siphon would be established during an LOOP. The functions served by these licensee commitments are no longer necessary and have been replaced by the ECCW upgrades and associated TS. The staff agrees that SLC 16.9.7.A and B and SLC 16.9.8 can be eliminated.

2.1.6 Conclusion

Based on the preceding discussion, the staff concludes that the proposed changes to the licensing basis meet the requirements of GDC-4, -5, -44, -45, and -46 with respect to the new systems installed in ONS Units 1, 2, and 3. The staff finds, for this analysis, that the proposed license amendments and associated TS are acceptable.

2.2. Mechanical and Structural Evaluation

2.2.1 Introduction

The purpose of the proposed change for the ECCW system upgrade and reclassification is to eliminate reliance on existing non-QA systems and equipment, including the CCW pumps and the HPSW, following a LOCA/LOOP.

Existing equipment, required to maintain the ECCW siphon to the LPSW pumps' suction, would be reclassified to QA-1 and upgraded as necessary to meet the seismic design criteria appropriate for the reclassification. Newly constructed structures that directly support equipment required to function to maintain the ECCW siphon to the LPSW pumps' suction and some newly added equipment or replacement equipment are designed and fabricated to appropriate seismic and QA-1 requirements and are classified as Seismic Category 2.

The staff reviewed the proposed amendments (Reference 1) and requested additional information (RAI) on December 22, 1997 (Reference 11), March 2, 1998 (Reference 12), and April 2, 1998 (Reference 13). The licensee responded to the staff's RAIs on January 22, 1998 (Reference 2), March 19, 1998 (Reference 14) and April 6, 1998 (Reference 15).

By letters dated April 2 (Reference 13) and April 9, 1998 (Reference 18), the staff requested the licensee to provide evaluation and documentation of a sample of new and replacement equipment (NARE) in the ONS ECCW systems. By letters dated April 6 (Reference 15) and

April 13, 1998 (Reference 19), the licensee provided responses to the staff's RAIs. In Reference 2, the licensee stated that the equipment in the ECCW system upgrade includes new and existing equipment that will be added to the USI A-46 safe shutdown equipment list and that the addition will be addressed in a revision to the USI A-46 submittal.

2.2.2 Evaluation

The ONS Service Water project includes the addition of a new QA-1 ESV system, addition of a new QA-1 seal water path, implementation of the LPSW system changes, and reclassification of all existing systems and components required to maintain the ECCW System first siphon supply to LPSW to QA-1.

The ESV System vacuum pumps and tanks are supported by a Seismic Category 2 QA-1 reinforced concrete foundation located in the plant yard just north of the CCW intake dike. A Seismic Category 2, QA-4 preengineered structural steel building (ESV Building) provides shelter for the ESV vacuum pumps and other components. The reinforced concrete foundation was seismically reclassified from a Class 1 to a Class 2 structure pursuant to ONS UFSAR Section 3.2.1.1.2, and the preengineered ESV Building was seismically classified as Class 2 pursuant to the same UFSAR section. Both of these structures were qualified to the design response spectra that are based on a 0.15g Maximum Hypothetical Earthquake (MHE), for structures founded on overburden (Refer to Section 3.7.1.1 and Figure 2-55 of ONS UFSAR) with damping values shown in ONS UFSAR Section 3.7.1.3. The equivalent static analysis method was used for evaluating the seismic adequacy of the reinforced concrete foundation. The American Institute of Steel Construction, Inc.'s (AISC's) Steel Construction Manual, Allowable Stress Design, 9th Edition, was used to assess the seismic adequacy of the preengineered ESV building, although, UFSAR Section 3.8.5.2 currently specifies the AISC 6th Edition for Class 2 structures.

Implementation of the above seismic analysis method and design code ensures that these structures will perform essentially as QA-1/Class 2 structures for which protection against tornado wind, tornado missiles, or turbine missiles is not necessary pursuant to ONS UFSAR Section 3.2.2. Since the licensee used the updated version of the AISC standards in qualifying the preengineered ESV building and the reinforced concrete foundation, and since the ESV building is classified as a Class 2 structure, the staff considers that the approach used by the licensee in seismically qualifying these structures is adequate and acceptable.

The Radwaste Facility trench was reclassified by the licensee as a Class 2 structure pursuant to Oconee UFSAR Section 3.2.1.1.2. The trench was seismically analyzed in accordance with the design criteria of Section 11.6.2 of the Oconee UFSAR. The analysis considered the combination of dead and live loads, earth pressure, and earthquake loads as stipulated in the design criteria except that the earthquake loads were computed by static analysis techniques using the 0.15g MHE response spectrum instead of the Design Base Earthquake (DBE). GT STRUDL Version 9701 NT and the Ultimate Strength Design method of ACI 359-77 were used in the analysis of the trench. The licensee stated that besides the above noted exception, the criteria used for the Radwaste Facility trench qualifications are consistent with the applicable licensing basis as described in Chapter 11 of the UFSAR. Use of these criteria including the upgrading of the seismic input motion from the 0.05g DBE to the 0.15g MHE in computing the

equivalent earthquake loads for evaluating the seismic adequacy of the trench is judged adequate and acceptable.

The ESV system cable trench, dike trench, and personnel and utility bridge to the intake structure are classified as Class 2 structures pursuant to Section 3.2.1.1.2 of the UFSAR. These structures were evaluated for their seismic adequacy by performing static analysis in accordance with the design requirements of Section 3.8.5.2 of the ONS UFSAR. Specifically, the Working Stress Design method of ACI 318-63 was used to qualify these trenches for the loading requirements for Class 2 structures, except that earthquake loads were computed using the 0.15g MHE ground response spectrum instead of the 0.05g DBE. The licensee stated that these criteria are consistent with the licensing basis for original Oconee Class 2 structures such as the Turbine Building and the Intake Structure. The use of the ACI 318-63 codes and the application of an equivalent static analysis method in evaluating the seismic loads expected from the enhanced 0.15g MHE for the above-mentioned trench structures will ensure the structural integrity and functionality of these trench structures under the influence of an MHE and are, therefore, acceptable.

The buried ESV piping was qualified for seismic loads resulting from the 0.15g MHE based on a static analysis. The analysis method used for the buried ESV piping was reported by the licensee to be based on the same methodology, which was used for seismically qualifying safety-related buried Standby Shutdown Facility Auxiliary Service Water pump discharge line (refer to UFSAR Section 3.7.3.8). Where seismic loads resulting from the DBE are needed for computing the effect of design basis earthquake motion, the DBE was conservatively taken as one-half of the MHE. Pipe stresses induced by the DBE and MHE were determined based upon the relevant criteria described in UFSAR Section 3.9.2 and the stresses were combined with those from other applicable loads to ensure their seismic design adequacy in accordance with the ANSI B31.1 Code. The use of the ANSI B31.1 Code is acceptable for seismic Category 2 piping in accordance with UFSAR Section 3.9.3.1. Use of the above approach in determining the applicable seismic loads as input to the overall piping stress analysis and assessment of the piping design adequacy is judged as reasonable and acceptable.

For the above-ground ESV piping, Impell Corporation's Superpipe program was used to analyze the seismic loads resulting from the MHE. The Superpipe program performs a modal spectrum analysis of the piping system using appropriate ground response spectra developed from Section 3.7.1.1, "Design Response Spectra," and Section 3.7.1.3, "Critical Damping Values." For piping segments supported at more than one elevation or supported by more than one building, the envelope of all applicable response spectra is used. In summary, the analysis methods and design code provisions used in determining seismic loads for qualification of the ESV system piping were performed in accordance with the ONS UFSAR. The staff considers the approach used in generating the seismic loads for input to the applicable piping design load combination is reasonably conservative and is consistent with pertinent licensing basis delineated in the ONS UFSAR, and is, therefore, acceptable.

The buried SSW System piping is statically analyzed for seismic loads resulting from the 0.15g MHE and the overburden load. The method and the seismic input motion used to seismically qualify the buried SSW piping is identical to that used for the buried ESV piping previously discussed. The same method and criteria that were used for seismically qualifying the above

ground ESV piping were also adopted for the seismic qualification of the above ground SSW piping. These methods and criteria were determined to be consistent with the provisions of the ONS UFSAR and were judged reasonable and acceptable for the determination of the seismic loads for both the buried and the above-ground SSW piping.

Existing and new cable trays and supports, which are essential to the safe shutdown function of the ECCW System, are designed to withstand the seismic maximum hypothetical earthquake (MHE). These existing and new cable trays and supports are constructed and maintained under the QA-1 or QA-4 quality assurance program. The seismic design of these cable trays and supports is consistent with the seismic design of the structures in which they reside. The structures in which they reside are the Turbine building, ESV building, ESV trenches, and Radwaste trench. These structures are constructed and maintained under the QA-4 quality assurance program, and are also designed to withstand the seismic MHE. These cable trays and supports, as well as the structures in which they reside, are not designed to withstand tornado and missile loadings.

All new cable supports and trays are Seismic Category 2 and were analyzed for the required seismic loads utilizing the equivalent static analysis method and are QA-1. The new cable trays that were installed in the ESV building, ESV trenches, and the Radwaste trench were analyzed with the 0.15g ground response spectrum. The new cable trays that were installed in the Turbine Building were analyzed with the 0.10g ground response spectrum applicable for structures founded on rock. Appropriate damping values provided in Section 3.7.1.3 of Oconee UFSAR were used in these analyses. Where QA-1 cable supports/trays were added, the licensee performed a review of the potential for any interaction of non-seismic equipment with the new QA-1 cable supports/trays to ensure that no seismic interaction exists between non-seismic equipment and the new QA-1 cable supports and trays.

All new cable supports/trays were seismically qualified by analysis utilizing the equivalent static analysis method. The new cable trays that were installed in the ESV building, ESV trenches and the Radwaste trench were analyzed with the 0.15g ground response spectrum. The new cable trays that were installed in the Turbine Building were analyzed with the 0.10g ground response spectrum applicable for structures founded on rock. Appropriate damping values provided in Section 3.7.1.3 of the ONS UFSAR were used in these analyses. Where QA-1 cable supports/trays were added, the licensee performed a review of the potential for any interaction of nonseismic equipment with the new QA-1 cable supports/trays to ensure that no seismic interaction exists between non-seismic equipment and the new QA-1 cable supports and trays. The staff finds that both the analysis method and the definition of a seismic ground response spectrum used for ensuring seismic adequacy of the ESV system-related cable supports and trays are conservative and consistent with the intent of the ONS UFSAR, and are, therefore, acceptable.

UFSAR Section 2.4.2.2 describes the potential for flooding and overflow of the Keowee dam due to the maximum hypothetical precipitation. The current parameters for this condition listed in the UFSAR are 808 feet for static lake level and a wave height of 6.42 feet at the Keowee dam. The bottom of the trench will cause a low spot of approximately 810 feet. The results of the recent licensee evaluation of the acceptability of this condition revealed that the potential for site flooding is not a concern since it was determined that no overwash into the trench would

occur. In addition, the licensee stated that since the trench was made of concrete, the anticipated maximum water level would not cause degradation of the trench or dike. The staff finds that the licensee's evaluation regarding the flooding potential of the ONS site is acceptable.

Seismic qualification of equipment at ONS has to meet the licensing commitments as delineated in the ONS UFSAR. According to Section 3.9.2.2 of the ONS USFAR, the methods for seismic qualification of safety-related mechanical equipment are analysis and/or testing or based on tests of similar equipment. An example of this would be the use of similar type pumps. Section 3.10.2 of the UFSAR also states that the methods and procedures used for seismic qualification of instrumentation and electrical equipment are testing and/or analysis.

In the proposed amendments (Reference 1), the licensee stated that the new ESV System is QA-1 and is seismically qualified. The licensee further stated that the ESV pumps and motors are QA-1 components, and were seismically qualified by using the Generic Implementation Procedure, Revision 2 (GIP-2, Reference 16), developed by the Seismic Qualification Utility Group (SQUG), and supplemented by the NRC's Supplemental Safety Evaluation Report No. 2 on GIP-2, dated May 22, 1992 (Reference 17).

In response to the staff's RAI (Reference 11), the licensee stated in Reference 5 that in addition to the ESV pumps and motors, some other equipment associated with the modification of the ECCW system were also qualified by using GIP-2. GIP-2 is not included in the licensing basis for seismic qualification of equipment at ONS. The staff found that the qualification of equipment using the GIP-2 methodology was not in conformance with the licensing basis and, therefore, using the GIP-2 to determine the seismic adequacy of that equipment in the ECCW system was questionable. The licensee clarified in its response (Reference 14) to the staff's RAI that the ECCW upgrade was the result of an earlier commitment by the licensee and stated that the ECCW upgrade is the preferred means to provide the Unresolved Safety Issue (USI) A-46 safe shutdown function. The licensee further stated that it has been its intent, from the origination of the USI A-46 Safe Shutdown Equipment List (SSEL), to include the equipment within the scope of the ECCW system upgrade and amend the SSEL accordingly. The staff accepts that the ECCW system upgrade is part of the safe shutdown system and, therefore, is part of the USI A-46 program scope for ONS. The staff also agrees that the licensee can verify the seismic adequacy of each item of NARE in the ONS ECCW system (equipment-specific) in accordance with Section I.2.3.4 of GIP-2 (Reference 16) and Section I.2.3.4 of the staff's SSER-2 on GIP-2 (Reference 17). In that the staff has not completed the USI A-46 review for ONS, use of GIP-2 for systems and components outside of the ECCW is not appropriate at this time.

The staff also reviewed the seismic adequacy of mechanical and electrical equipment in the ONS ECCW system upgrade. Some of the equipment was qualified by testing in accordance with IEEE Standard-344, 1975, some equipment was qualified by analysis, and some by a combination of test and analysis. These approaches are consistent with the licensing basis delineated in the ONS UFSAR and are, therefore, acceptable.

Based on its review of the licensee's technical justification for the proposed amendments and the licensee's responses to the RAIs, the staff finds that the licensee has, in general, provided sufficient information to establish confidence in the seismic adequacy of the majority of

equipment in the ECCW system and to address the questions raised in the staff's RAIs. However, the final evaluation of the seismic adequacy of some equipment in the ECCW system is incomplete. As stated in the licensee's April 6, 1998, response (Reference 15) to item No. 5 of the staff's April 2, 1998, RAI (Reference 13), some of the ECCW equipment is not yet fully installed and the Screening Evaluation Work Sheet (SEWS) forms are only partially complete. The licensee has provided sufficient documentation to demonstrate the operability of the new equipment in the ECCW system; however, such documentation is not detailed enough for the staff to determine that the new equipment (i.e., new pumps and electrical cabinets) are represented in the earthquake experience data base.

By letter dated April 17, 1998 (Reference 20), the licensee submitted the completed SEWS forms for the new ONS Unit 2 equipment that is being added as part of the ECCW upgrade. In Reference 20, the licensee also agreed to provide comparisons of critical characteristics of the new equipment that is installed by the upgrade with data from testing or from recorded earthquakes, in accordance with Section I.2.3.4 of GIP-2 (Reference 16) and Section I.2.3.4 of the staff's SSER-2 on GIP-2 (Reference 17). This information is needed by the staff to complete its evaluation. In Reference 20, the licensee also committed to add the ONS Unit 2 equipment in the ECCW system that is necessary for safe shutdown per GIP-2 to the USI A-46 SSEL and include its evaluation in a revision to the USI A-46 submittal of December 15, 1997, within 4 months of the completion of the Unit 2 outage. A similar update for ONS Units 1 and 3 will be provided within 4 months of the completion of their respective refueling outages.

2.2.3 Conclusion

The licensee proposed a change to revise the TS to add new testing and operability requirements for the systems installed and upgraded under the ONS service water project. The staff's review included the structural integrity and seismic design adequacy evaluation of the Seismic Category 2 preengineered structural steel building (ESV Building), reinforced concrete foundation, the Radwaste Facility Trench, the ESV System Cable Trench, the Dike Trench and the newly added cable supports and trays. The staff also reviewed the reasonableness and adequacy of the approaches used in determining the seismic loads for both the buried and the above ground ESV piping and the buried SSW piping. The staff's review covered the selection of proper ground response spectra and associated damping values, the analysis methods used in determining the seismic loads, proper use of load combination and structural design criteria and codes, adequacy of the seismic modeling and potential II/I spatial seismic interaction of newly added cable supports and trays. Based on its review, the staff finds that the licensee has implemented the structural and seismic portion of its ONS Service Water project in a manner consistent with the applicable licensing bases delineated in the ONS UFSAR, and that the engineering assumptions and analysis adopted in the design are sufficiently conservative to ensure maintenance of the structural integrity and functionality of these structures.

The seismic adequacy of certain equipment in the ONS ECCW system upgrade was verified using GIP-2. The staff concludes that, since the ECCW system upgrade is part of the safe shutdown system, it is acceptable for the licensee to verify the seismic adequacy of existing equipment and each item of NARE in the ONS ECCW system (equipment-specific) in accordance with Section I.2.3.4 of GIP-2 and Section I.2.3.4 of the staff's SSER-2 on GIP-2. However, as discussed in the staff's evaluation above, additional licensee actions are required

to complete the final seismic adequacy evaluation of some of the equipment in the ECCW system.

Based on the above determination, the staff finds the licensee's proposed amendments to the ONS Units 1, 2, and 3 TS acceptable with the following conditions:

1. Duke Energy Corporation will provide comparisons of the critical characteristics for the new equipment that is installed as part of the ECCW upgrade with data from testing or recorded earthquakes, in accordance with Section 2.3.4, Part I of GIP-2 and Section I.2.3.4, paragraphs 2, 3, and 4 of the staff's SSER-2 dated May 22, 1992, for new equipment, needed for the staff to complete its review, or will qualify the new equipment using the existing methods in Section 3 of the Oconee UFSAR by July 15,1998.

2. Duke Energy Corporation will add the ONS Unit 2 equipment in the ECCW System that is necessary for safe shutdown per GIP-2 to the USI A-46 SSEL and include its evaluation in a revision to the USI A-46 submittal within 4 months of the completion of the Unit 2 outage.

The above conditions are incorporated into Appendix C of each of the ONS Facility Operating Licenses by these amendments.

Regarding future use of GIP-2 for systems and components outside the ECCW System, the licensee may revise its licensing basis in accordance with the guidance in Section I.2.3 of the staff's SSER No. 2 on SQUG/GIP-2, and the staff's letter to SQUG's Chairman, Mr. Neil Smith, on November 26, 1997, "Incorporation of the Generic Implementation Procedures into the Licensing Basis." The primary consideration in the licensee's determination to incorporate GIP-2 in the licensing basis is addressing any aspects where incorporation of GIP-2 would introduce the use of criteria not in compliance with the licensing basis, or may involve an unreviewed safety question as specified in 10 CFR 50.59.

2.3. Evaluation of Electrical System Changes

2.3.1 Introduction

The purpose of this upgrade is to eliminate reliance on existing non-QA Condition systems and equipment for ensuring the supply of suction coolant to the low-pressure service water pumps after a loss of coolant accident with loss of offsite power. The amendment proposes revisions to the TSs, adds new limiting conditions for operation, and new surveillance requirements for the ECCW, ESV, and SSW systems. These TSs revisions are to apply to each ONS unit following the completion of the installation of the upgrade for that unit. These upgrades are scheduled to be completed for Units 2, 1, and 3 during early 1998, early 1999, and late 1998, respectively.

The proposed amendments contain the additional system TS requirements and design information for upgrading the ECCW system for each Oconee unit, including electrical components such as Class 1E motors, instrumentation, control logic, heat tracing, cabling, and

solenoid valves in the upgraded system for each ONS unit. These electrical components are to be powered from the unit attendant Class 1E electrical power system and, as such, the electrical power system review for the proposed amendments focused on related design issues. These design issues involve the impact of the additional loading on the existing emergency power systems (EPSs) and specific design criteria used for the electrical equipment attendant to the upgraded ECCW systems. These two design issues were discussed with the licensee during a teleconference that occurred on December 18, 1997. In addition, the licensee provided additional information regarding these issues in a letter dated February 19, 1998.

2.3.2 Evaluation

To address the issue involving the additional loading on the EPSs, the licensee performed studies and calculations. These studies and calculations incorporated conservative assumptions and specific design features. The studies incorporated the design features of three ESV pump motors for each ONS unit. Each of these pump motor start circuits contains a time delay of 2 minutes to provide assurance that the pump motor starts. This time delay feature was also selected to preclude the potential impact of the major additional loads on the EPS, LOCA/LOOP, or LOOP initial loading scenarios. With this design feature, all major LOCA/LOOP loads such as emergency core cooling pump motors, vital direct current battery chargers, and vital motor control centers (MCCs) are expected to be loaded and at steady-state conditions prior to loading the ESV pump motors. In addition, results of the studies note that minor loads such as instrument circuits, heat tracing, and solenoid valves have a negligible impact on the EPSs due to their small current loading (about one ampere) at the 600 Vac level. Another result from the studies notes that the additional 240/120 Vac single phase QA-1 panelboard loadings do not have any significant effect on the safety system loads.

In addition, the licensee performed calculations to evaluate the additional loadings to Oconee degraded grid conditions. The degraded grid condition analysis is considered a conservative case for determining voltage adequacy of plant loads. These calculations considered both LOCA and normal loads being required with the degraded grid conditions present. These calculations further assumed that three ESV pump motors would be required even though the third pump motor, per unit, is an installed spare and not automatically started. The calculations also assumed other significant loads, such as a condensate booster pump motor, which are not normally operating, are started, or are operating. With these assumptions, the calculations showed that acceptable voltages were available for the additional loads, the normal plant loads, and the emergency loads. Additional reviews and calculations confirmed that no changes are required to the 600 Vac power system equipment, including the 600 Vac MCC bus work and incoming feeder breakers. Six hundred volt MCC individual compartment changes were required. However, these changes involved relocating non-QA-1 loads to non-QA MCCs and resulted in the net difference in load on the QA-1 MCCs being small and insignificant. Breaker coordination reviews and calculations confirmed that the impact of the additional loads does not affect the 600 Vac MCC incoming breaker coordination calculations and that the 600 Vac MCC breakers are coordinated with the ESV loads. The power systems for the additional loads to panelboards are coordinated with the plant power distribution systems. In summary, the studies and calculations performed for the additional loading of the electrical power distribution systems, both auxiliary (normal) and emergency, determined that this loading has no significant impact and is, therefore, acceptable.

Regarding design criteria for the electrical equipment attendant to the upgraded ECCW systems, the cable separation criteria are in accordance with those contained in Section 8.3.1.4.6.2 of the UFSAR. Cable routes for the upgraded systems use existing QA-1 cable supports/trays and new QA-1 cable supports/trays. Sections 8.3.1.5.1 (Cable Derating) and 8.3.1.5.2 (Cable Tray Fill) of the UFSAR currently provide descriptions of power cable installation configuration with respect to laying and spacing of cables. The current UFSAR cable tray fill criterion for trays containing power cables allows only one layer of power cables to be routed in any tray, and in general, separation of one-quarter the diameter of the largest cable is maintained between adjacent power cables within a tray. The cable spacing may vary between tiedown points due to cable snaking or cables entering/exiting a tray; however, if cables touch, the contact is limited to approximately 2 feet. These criteria are consistent with the recommendations permitted under ICEA (Insulated Cable Engineers Association) P-46-426, which is currently referenced in the UFSAR. However, the licensee performed a 10 CFR 50.59 safety evaluation to revise UFSAR Sections 8.3.1.5.1 and 8.3.1.5.2 to adopt additional installation methodologies that are also permitted under ICEA P-46-426. Although these additional installation methodologies result in less restrictive cable laying and spacing in both the existing and new cable trays, they continue to provide conservative installation practices. The basis for this conclusion is that these cables are conservatively derated per ICEA P-46-426 to assure that the potential for overheating due to loading is remote and there is no increase in fire potential. The cable derating assures that the cables are sized 30 percent larger than the permitted loads, and when combined with the breaker sizing for the maximum permitted loading of the derated cable, provides additional protective margin for the actual cable installed. Thus, conditions that result in cable fires and any fault impact to adjacent cables are not significantly increased, even with cables installed in layers with contact far greater than the approximate 2 feet as currently provided in Section 8.3.1.5.2 of the UFSAR.

2.3.3 Conclusion

On the bases of our review, the staff concludes that the electrical power system design criteria for the upgraded ECCW systems conform to the design criteria currently provided in the ONS UFSAR or are the result of an evaluation performed in compliance with 10 CFR 50.59. Therefore, we conclude that these electrical design criteria are acceptable.

2.4. Quality Assurance Evaluation

2.4.1 Introduction

The ECCW design change is being performed to resolve several service water issues at ONS. Among other things, the licensee proposes to upgrade the existing system and to reclassify portions of the existing CCW System from non-safety grade to QA-1 (i.e., the QA-1 program). The scope of Oconee's QA-1 program, implemented to meet the criteria of 10 CFR Part 50, Appendix B, is provided in Section 3.1.1.1, "Quality Assurance," of the UFSAR.

The licensee's quality assurance program, which conforms to 10 CFR Part 50, Appendix B criteria, is described in the licensee's QA Topical Report (Reference 3). The QA Topical Report defines QA Condition 1 as covering those systems and their attendant components, items, and services that have been determined to be nuclear safety related. The Topical Report applies in

its entirety to systems, components, items, and services identified as QA-1. This safety evaluation addresses the proposed CCW System reclassification.

2.4.2 Evaluation

The purpose of the ECCW upgrade and reclassification is to eliminate reliance on existing non-QA Condition systems and equipment, including the CCW pumps and the HPSW, following a loss of coolant accident with loss of off-site power.

Existing equipment, required to function to maintain the ECCW siphon to the LPSW pumps suction, would be reclassified to QA-1 and upgraded as necessary to meet seismic design criteria. The licensee states that the following equipment would be reclassified:

- CCW pumps (pressure boundary only.)
- CCW piping from the CCW pumps to the CCW crossover header and to the LPSW pumps suction.
- CCW discharge valves , 1, 2, 3 CCW-10 through 13, and specific portions of their control circuitry related to maintaining position on power loss and restoration.
- CCW crossover valves 1 CCW-40, 2 CCW-41, 3 CCW-42, and 3 CCW-94.

The licensee's equipment classification for determining the quality level to be applied to structures, systems, and components (SSCs) is described in Chapter 3 of the UFSAR. The equipment classification has been previously evaluated by the staff and determined to provide an acceptable basis for defining QA-1 equipment that is consistent with the original Oconee licensing basis (Reference 4). Section 3.1.1.1 of the UFSAR has been updated (December 31, 1996) to reflect QA-1 commitments that have been added since the original licensing basis of Oconee was established (Reference 5).

The proposed reclassification process would involve changing applicable design documents to indicate that the items have been reclassified as QA-1. Although these items were not originally designed, procured, or constructed to meet QA-1 criteria, future activities affecting these items would be performed using QA-1 programs and procedures. These activities would include operation, testing, maintenance, replacement parts procurement, and future modifications.

The CCW flow path that is being upgraded serves as a pressure boundary to ensure that a leak-tight siphon path exists to the suction of the LPSW pumps. The flow path does not perform any active function, nor are any changes in component positions necessary to support the siphon function.

QA-1 requirements associated with original procurement and material traceability have been excluded for this equipment for which no QA-1 documentation exists. To provide reasonable assurance that the upgraded equipment will meet its intended safety function, the licensee

reviewed the performance history, work history, and procurement history of the equipment providing the leak-tight siphon path.

The CCW system operating parameters and normal operating requirements provide reasonable assurance that it will perform its pressure boundary integrity safety function. The CCW system operates at pressures under 15 psig under all conditions. The system serves as the ultimate heat sink for the units during normal operation. Portions of the CCW system comprising the siphon pressure boundary are slightly pressurized, with water flowing through the pressure boundary components during normal operation.

Under current TS, the equipment is functionally tested every 18 months. This testing is designed to quantify component inleakage and overall system performance. Observations made during operator rounds, conducted at least once per shift in the plant areas where the subject equipment is located, would identify any component leakage by water accumulating on the turbine building floor. Based on review of the system's operating and performance history, the licensee concluded that the CCW system has operated reliably since plant construction, without significant leakage or performance problems.

Although the bulk of the CCW siphon pressure boundary is piping, some components, such as the CCW crossover valves and the HPSW pump strainers, contain internal parts needed to establish the pressure boundary. Licensee review of component procurement and work histories determined that only one CCW crossover valve (3 CCW-94) had been replaced since plant construction. The valve was procured as a QA-1 component in 1993. In addition, a review of the work history by the licensee found that a modification had been made to a CCW pump flange. This modification involved addition of an elastomeric seal to enhance system leak tightness at low lake levels. Because this modification did not involve procurement of metal-based pressure retaining components, it was concluded that the only pressure boundary component that had been replaced since plant construction was the crossover valve.

The licensee's review of the work history for components associated with the siphon pressure boundary concluded that, with the exception of the modifications noted above, only normal routine, preventive maintenance, and functional testing have been performed since plant construction. Based on review of the work and procurement histories, the licensee concluded that there is reasonable assurance that items procured and installed in the system to be upgraded will meet their intended safety functions.

Newly constructed structures which directly support equipment required to function to maintain the ECCW siphon to the LPSW pumps suction are QA-1 and seismically designed. For nonseismic, critical characteristics of equipment to be dedicated, the licensee follows the guidance of Generic Letter (GL) 89-02, GL 89-09, and GL 91-05, which include applicable criteria of 10 CFR Part 50, Appendix B.

Existing structures, such as the CCW intake structure and the turbine building, are QA Condition 4, which covers those seismically designed/restrained SSCs whose continued functions are not required during and after a seismic event. These SSCs are non-Seismic Category I, as defined by Regulatory Guide 1.29, "Seismic Design Classification."

Changes and modifications to these SSCs follow the design requirements defined in UFSAR, Section 3.8.5 for non-Class 1 structures.

2.4.3 Conclusion

Oconee's equipment classification, identifying the scope of safety-related SSCs within the scope of the QA-1 program, has previously been found to be an acceptable basis for defining QA-1 program requirements. The CCW system has operated reliably since plant construction, without significant performance problems. The proposed equipment reclassification process will involve changing applicable design documents to indicate that the items have been reclassified as QA-1. Future activities affecting these items will be performed using QA-1 programs and procedures. These activities will include operation, testing, maintenance, replacement parts procurement, and future modifications. The proposed reclassification of portions of the CCW System, as described in Reference 1, provides an acceptable approach for inclusion of the identified equipment within the scope of the QA-1 program. Sections 3.1.1 of the UFSAR should be corresponding revised as necessary to reflect these reclassifications.

2.5 Evaluation of Proposed TS Changes

The staff has reviewed the new TS requirements proposed by the licensee for the Oconee Units 1, 2, and 3 ECCW systems and, based on the evaluations described above, has concluded that they are satisfactory.

The proposed change to page iv would add the appropriate section number, description, and page number to the index. This change is administrative and is acceptable.

By letter dated April 17, 1998, the licensee also proposed adding "Reserved" to Table 4.1-2 and footnote number 7 to support a proposed TS change that is under staff review related to the main steamline break circuitry. This proposed change is administrative and is acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (62 FR 50002 dated September 24, 1997). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR

51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Attachment: References

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Date: April 24, 1998

References

1. Letter dated August 28, 1997 from W. R. McCollum, Jr. to the U.S. Nuclear Regulatory Commission, "Proposed Revision to Technical Specifications for the Upgraded ECCW System."

2. Letter dated January 22, 1998 from W. R. McCollum, Jr. to the U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information on Proposed Revision to Technical Specifications for the Upgraded ECCW System."

3. Quality Assurance Program, Topical Report Duke-1, Amendment 21, submitted to the U.S. Nuclear Regulatory Commission by letter dated June 2, 1997.

4. NRC Safety Evaluation, dated August 3, 1995, concerning Duke Energy Corporation's Response to Subpart 1 of Section 2.2.1 of Generic Letter (GL) 83-28, General Criteria for Classifying QA-1 for Structures, Systems, and Components.

5. Letter dated May 6, 1996 from J. W. Hampton to the U.S. Nuclear Regulatory Commission, "Oconee License Basis and GL 83-28, Section 2.2.1, Subpart 1 Supplemental Response."

6. Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 3.

7. Regulatory Guide 1.29, "Seismic Design Classification," Revision 3.

8. GL 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marketed Products," March 21, 1989.

9. GL 89-09, "ASME Section III Component Replacements," May 8, 1989.

10. GL 91-05, "Licensee Commercial-Grade Procurement and Dedication Programs," April 9, 1991.

11. Letter, D. E. LaBarge, NRC, to W. R. McCollum, "Request for Additional Information-Emergency Condenser Circulating Water System," dated December 22, 1997.

12. Letter, D. E. LaBarge, NRC, to W. R. McCollum, "Request for Additional Information-Emergency Condenser Circulating Water System," dated March 2, 1998.

13. Letter, D. E. LaBarge, NRC, to W. R. McCollum, "Request for Additional Information-Oconee Nuclear Station Units 1, 2, and 3 Emergency Condenser Circulating Water System," dated April 2, 1998.

14. Letter, W. R. McCollum, Jr., Duke Power Company, to the USNRC, "Response to Request for Additional Information on Proposed Revision to Technical Specifications for the Upgraded ECCW System," dated March 19, 1998.

15. Letter, W. R. McCollum, Jr., Duke Power Company, to the USNRC, "Response to Request for Additional Information on Proposed Revision to Technical Specifications for the Upgraded ECCW System," dated April 6, 1998.

16. "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Power Plant Equipment," Revision 2, corrected February 14, 1992, Seismic Qualification Utility Group.

17. NRC "Supplemental Safety Evaluation Report No. 2 on Seismic Qualification Utility Group's Generic Implementation Procedure, Revision 2, corrected February 14, 1992," dated May 22, 1992.

18. Letter, D. E. LaBarge, NRC, to W. R. McCollum, "Request for Additional Information-Emergency Condenser Circulating Water System," dated April 9, 1998.

19. Letter, W. R. McCollum, Jr., Duke Power Company, to the USNRC, "Response to Request for Additional Information on Proposed Revision to Technical Specifications for the Upgraded ECCW System," dated April 13, 1998.

20. Letter, W. R. McCollum, Jr., Duke Power Company, to the USNRC, "Response to Request for Additional Information on Proposed Revision to Technical Specifications for the Upgraded ECCW System," dated April 17, 1998.