December 10, 1999

LICENSEE: Duke Energy Corporation (Duke)

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

SUBJECT: SUMMARY OF DISCUSSIONS BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND DUKE REPRESENTATIVES REGARDING A SEPTEMBER 30, 1999, SUBMITTAL FROM DUKE FOR THE OCONEE LICENSE RENEWAL APPLICATION (LRA)

Duke submitted summary description of changes to the current licensing basis that materially affected its LRA by letter dated September 30, 1999. As a result of the staff's review of this response the staff raised an issue that was documented in a November 18, 1999, letter to Duke. The staff's question and Duke's proposed response to the question can be found in Enclosure 1. Based on Duke's proposed response contained in Enclosure 1 the staff developed question number 2 and 3 contained in Enclosure number 2. The first question in Enclosure 2 deals with a previous submittal from Duke. Based on Duke's responses contained in Enclosure 2 the staff considers the issues contained in Enclosure 2 resolved. Duke will be informed as soon as possible if the staff has any additional questions regarding Enclosure 1.

Original Signed By

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

Enclosures: As stated (2)

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Follow-on Question to Duke's Submittal dated 9/30/99

Staff Question

Duke's September 30, 1999, letter amended the license renewal application based on changes to the Oconee current licensing basis that materially affected the contents of the application. In the September 30, 1999, letter Duke add several systems, structures, and components to the scope of license renewal. The staff has the following question related to the portions of the component cooling water system that were added as a result of the revised steam generator tube rupture analysis.

The staff used diagram OLRFD 144A-1.2 to complete the review of the additional components subject to AMR for the component cooling water system. Two sets of heat exchangers are included on those diagrams but are not identified on Table 2-1 as being within the scope of license renewal. These components are the Quench Tank Heat Exchanger and the two Letdown Coolers.

Please indicate whether these components and their associated piping and valves are within the scope of license renewal and whether they are listed on Table 2-1. If these components are not within scope, state the boundary of the Component Cooling water system using OLRFD 144A-1.2, and identify the components that provide pressure boundary isolation.

Duke Response:

At the time the technical documentation was being revised to support the annual update of the Oconee License Renewal Application, the letdown cooler shells and the quench tank coolers were inadvertently overlooked for an aging management review. The letdown coolers except for the shell are currently within the scope of license renewal in support of the High Pressure Injection System intended functions. The coolers are required to maintain pressure boundary in support of the High Pressure Injection System intended functions. Failure of the carbon steel shell would not affect the pressure boundary function in support of the High Pressure Injection System intended functions. As a result, an aging management of the carbon steel shell was not required. The aging management review of the letdown cooler channel heads, tubes, and tube sheets is presented in Section 3.4.10 of Exhibit A of the Application.

For the annual update, the results of the Steam Generator Tube Rupture Event analysis completed after the submittal of the Application caused an addition to the scope of license renewal. This analysis resulted in additional portions of the Component Cooling System being added to the scope of license renewal. These additional portions resulted in the letdown cooler shells being added to the scope of license renewal. In addition, the quench tank coolers were also added to the scope of license renewal. The component intended function of the letdown cooler shells and the quench tank coolers is to maintain pressure boundary in support of the Component Cooling System intended functions. Heat transfer is not an intended function of the letdown coolers in support of the either the Component Cooling System or High Pressure Injection System intended functions. The quench tank coolers are not required for heat transfer in support of the Component Cooling System or Coolant Storage System intended functions.

The following sections present the aging management review for the letdown cooler shells and the quench tank coolers. The results of the following aging management review show that the effects of aging are managed by programs currently credited for license renewal. No new programs were credited with managing the aging of these components. The aging management review for the letdown cooler shells and the quench tank coolers is summarized in Tables 1 and 2, respectively.

1.0 Aging Management Review for the Letdown Cooler Shells

0.1 Environments

The internal surfaces of the letdown cooler shells are exposed to the treated water of the Component Cooling System. The potential aging effects for materials exposed to treated water are discussed in Section 3.5.2.5 of Exhibit A of the Application.

The external surfaces of the letdown cooler shells are exposed to the Reactor Building environment. The potential aging effects for materials exposed to the Reactor Building environment are discussed in Section 3.5.2.7.1 of the Application.

0.2 Applicable Aging Effects

The material of construction of the shell of the Letdown Coolers is carbon steel. The applicable aging effect for the internal surfaces of the carbon steel shell exposed to treated water is loss of material. The staff review of the aging effects of materials exposed to treated water is provided in Section 3.1.3.1.5 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

The exterior surfaces of the carbon steel shell of the letdown coolers are exposed to the Reactor Building environment. The applicable aging effect for the carbon steel shell is loss of material. The staff review of the aging effects of materials exposed to the Reactor Building environment is provided in Section 3.1.3.1.7.1 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

1.3 Aging Management Programs

The applicable aging effect must be adequately managed so that the component intended function will be maintained consistent with the current licensing basis for the period of extended operation. The applicable aging effect for the carbon steel shell of the letdown coolers will be managed by monitoring and controlling the aging effects directly or the relevant conditions that contribute to the onset and propagation of a specific aging effect. The following program will manage the aging effects for the carbon steel shell exposed for the period of extended operation:

- Boric Acid Wastage Surveillance Program
- Chemistry Control Program
- Inspection Program for Civil Engineering Structures and Components

The above programs are described in the following paragraphs.

1.3.1 Boric Acid Wastage Surveillance Program

The Boric Acid Wastage Surveillance Program will manage loss of material on the exterior surfaces of the carbon steel shell of the letdown cooler exposed to the Reactor Building environment. This program is described in Section 4.5 of Exhibit A of the Application. The staff review of the Boric Acid Wastage Surveillance Program is provided in Section 3.2.1.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the carbon steel components exposed to the Reactor Building environment for the period of extended operation.

1.3.2 Chemistry Control Program

For loss of material in the carbon steel shell of the letdown cooler exposed to treated water, the Chemistry Control Program described in Section 4.6 of Exhibit A of the Application will manage the applicable aging effect for carbon steel components, including the letdown cooler shell. The staff review of the Chemistry Control Program is provided in Section 3.2.2.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the carbon steel components exposed to treated water for the period of extended operation

1.3.3 Inspection Program for Civil Engineering Structures and Components

The Inspection Program for Civil Engineering Structures and Components will manage loss of material on the exterior surfaces of the carbon steel shell of the letdown cooler exposed to the Reactor Building environment. This program is described in Section 4.19 of Exhibit A of the Application. The staff review of the Inspection Program for Civil Engineering Structures and Components is provided in Section 3.2.6.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the carbon steel components exposed to the Reactor Building environment for the period of extended operation.

Table 1
Aging Management Review Summary – Letdown Cooler Shell

Component	Component Function	Material	Environment Internal (External)	Aging Effects	Programs
HX Shell	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	Chemistry Control Program
			(Reactor Building)	Loss of Material	Inspection Program for Civil Engineering Structures and Components Boric Acid Wastage Surveillance Program

2.0 Aging Management Review of the Quench Tank Coolers

2.1 Environments

The quench tank coolers are exposed to three environments. The internal surfaces of the channel heads, tubes, and one side of the tube sheets are exposed to borated water. The potential aging effects for materials exposed to borated water environments are discussed in Section 3.5.2.2 of Exhibit A of the Application.

The external surfaces of the tubes, the inside surfaces of the shell, and the other side of the tube sheets are exposed to treated water. The potential aging effects for materials exposed to treated water environments are discussed in Section 3.5.2.5 of the Application.

The external surfaces of the channel heads and shell are exposed to the Reactor Building environment. The potential aging effects for materials exposed to the Reactor Building environments are discussed in Section 3.5.2.7.1 of the Application.

2.2 Applicable Aging Effects

The materials of construction for the quench tank coolers are stainless steel for the channel heads, tubes, and tube sheets and carbon steel for the shell. The applicable aging effects for stainless steel components exposed to borated water are loss of material and cracking. The staff review of the aging effects of materials exposed to borated water is provided in Section 3.1.3.1.2 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

The applicable aging effect for carbon steel components exposed to treated water is loss of material. The staff review of the aging effects of materials exposed to treated water is provided in Section 3.1.3.1.5 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

The applicable aging effects for stainless steel components exposed to treated water are loss of material and cracking. The staff review of the aging effects of materials exposed to treated water is provided in Section 3.1.3.1.5 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

The exterior surfaces of the carbon steel shell of the quench tank coolers are exposed to the Reactor Building environment. The applicable aging effect for the carbon steel shell is loss of material. The staff review of the aging effects of materials exposed to the Reactor Building environment is provided in Section 3.1.3.1.7.1 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

No applicable aging effects were identified for the stainless steel components of the quench tank coolers exposed to the Reactor Building environment. The staff review of the aging effects of materials exposed to the Reactor Building environment is provided in Section 3.1.3.1.7.1 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the Application has included aging effects that are consistent with published literature and industry experience and that are acceptable to the staff.

2.3 Aging Management Programs

The applicable aging effect must be adequately managed so that the component intended function will be maintained consistent with the current licensing basis for the period of extended operation. The applicable aging effect for the carbon steel shell of the letdown coolers will be managed by monitoring and controlling the aging effects directly or the relevant conditions that contribute to the onset and propagation of a specific aging effect. The following program will manage the aging effects for the carbon steel shell exposed for the period of extended operation:

- Boric Acid Wastage Surveillance Program
- Chemistry Control Program
- Inspection Program for Civil Engineering Structures and Components
- Reactor Coolant System Operational Leakage Monitoring

The above programs are described in the following paragraphs.

2.3.1 Boric Acid Wastage Surveillance Program

The Boric Acid Wastage Surveillance Program will manage loss of material on the exterior surfaces of the carbon steel shell of the quench tank cooler exposed to the Reactor Building environment. This program is described in Section 4.5 of Exhibit A of the Application. The staff review of the Boric Acid Wastage Surveillance Program is provided in Section 3.2.1.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the carbon steel components exposed to the Reactor Building environment for the period of extended operation.

2.3.2 Chemistry Control Program

For loss of material and cracking of stainless steel components of the quench tank exposed to borated water, the Chemistry Control Program described in Section 4.6 of Exhibit A of the Application will manage the applicable aging effect for carbon and stainless steel component. The staff review of the Chemistry Control Program is provided in Section 3.2.2.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the stainless steel components exposed to borated water for the period of extended operation.

For loss of material of carbon and stainless steel components of the quench tank cooler exposed to treated water, the Chemistry Control Program described in Section 4.6 of Exhibit A of the Application will manage the applicable aging effect for carbon and stainless steel component. The staff review of the Chemistry Control Program is provided in Section 3.2.2.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the carbon and stainless steel components exposed to treated water for the period of extended operation.

2.3.3 Inspection Program for Civil Engineering Structures and Components

The Inspection Program for Civil Engineering Structures and Components will manage loss of material on the exterior surfaces of the carbon steel shell of the quench tank cooler exposed to the Reactor Building environment. This program is described in Section 4.19 of Exhibit A of the Application. The staff review of the Inspection Program for Civil Engineering Structures and Components is provided in Section 3.2.6.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the carbon steel components exposed to the Reactor Building environment for the period of extended operation.

2.3.4 Reactor Coolant System Operational Leakage Monitoring

Reactor Coolant System Operational Leakage Monitoring will manage cracking of the stainless steel surfaces of the quench tank coolers exposed to the treated water environments. This program is described in Section 4.23 of Exhibit A of the Application. The staff review of Reactor Coolant System Operational Leakage Monitoring is provided in Section 3.2.7.3 of the Safety Evaluation Report (June 1999). Based on its review, the staff concluded that the applicant has demonstrated that this program will adequately manage aging effects associated with the stainless steel components exposed to the treated water environment for the period of extended operation.

Table 2
Aging Management Review Summary – Quench Tank Coolers

Component	Component Function	Material	Environment Internal (External)	Aging Effects	Programs
HX Channel	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			(Reactor Building)	None	None Required
HX Tubes	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			(Treated Water)	Loss of Material	Chemistry Control Program
				Cracking	Reactor Coolant System Operational Leakage Monitoring
HX Tube Sheet	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	Chemistry Control Program
				Cracking	Chemistry Control Program
			(Treated Water)	Loss of Material	Chemistry Control Program
				Cracking	Reactor Coolant System Operational Leakage Monitoring
HX Shell	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	Chemistry Control Program
			(Reactor Building)	Loss of Material	Inspection Program for Civil Engineering Structures and Components Boric Acid Wastage Surveillance Program

NRC STAFF QUESTIONS AND DUKE RESPONSES

1. Please confirm that the reactor building auxiliary cooler inspection is performed in each plant, one tube bundle of four total, each refueling outage.

Response: The inspection will be performed on each unit (ONS 1, 2, and 3), one tube bundle of four total, each refueling outage, rotating the inspection among the four bundles.

2. With respect to their 11/29/99 submittal (see Enclosure 1), the staff does not understand how the RCS operational leakage monitoring can manage cracking for the quench tank cooler tubes and tubesheet. The staff does not think the coolers normally see RCS pressure.

Response: When RCS operational leakage monitoring is performed, one of the parameters monitored is quench tank level. The quench tank receives equipment leakoff from around the reactor coolant system. The water cooling the quench tank coolers is at a higher pressure than the quench tank. If a leak were to develop in the quench tank coolers, quench tank level would rise. This would be calculated by the RCS operational leakage monitoring program as a leakage from the reactor coolant system. Operator actions would then be taken to determine source of RCS leakage. The operators would identify quench tank level as rising and then look for sources of inleakage to the quench tank.

3. Is the quench tank level available for direct review at all times from the control room? If it is not, please explain how the operators determine quench tank level and what event would trigger the operators to perform this action.

Response: RCS Operational Leakage calculation is performed every 72 hours as required by technical specifications. The plant has two means to peform this calculation: plant computer or manual calculation. The calculation is performed over the period of about an hour. One of the many inputs into these calculations is change of QT level over this period of time.

When the plant computer is used, the data required including QT level is sensed directly from devices on specific equipment. The plant computer calculates total RCS gpm leak rate.

When the manual calculation is performed by the operator, they use a procedure and data sheet that is filled in using data available from instrumentation in the control room. One of the steps requires the determination of QT level change in gallons over this period of time.