

November 18, 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 ADDITIONAL SYSTEMS, STRUCTURES AND COMPONENTS ADDED TO THE OCONEE LICENSE RENEWAL APPLICATION (LRA)

By letter dated September 30, 1999, Duke submitted summary descriptions of changes to the current licensing basis that materially affected its LRA. As a result of these changes Duke added several systems, structures, and components (SSCs) to the scope of license renewal. In an October 15, 1999, letter Duke also provided a response to safety evaluation report (SER) open item 2.2.3.4.3.2.1-1 that added the chilled water system and portions of other SSCs to the scope of license renewal. Enclosure 1 contains a question from the NRC staff regarding how vibration was assessed in the aging management review for the additional SSCs. Enclosure 1 also documents Duke's response to the staff's questions. The staff believes that Duke's response contained in Enclosure 1 resolves the staff's question.

In addition, Enclosure 2 contains a staff question regarding fouling of the condenser circulating water system related to the Duke response to SER open item 2.2.3.4.3.2.1-1. Enclosure 2 also contains Duke's response to the staff's question. The staff believes that Duke's response contained in Enclosure 2 resolves the staff's questions.

**Original Signed By**

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

Enclosure: As stated (2)

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DATE	11/15/99	11/16/99	11/18/99	11/17/99	11/18/99

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Vibration Question Associated with 9/30/99 Duke Submittal and SER Open Item 2.2.3.4.3.2.1-1

1. Based on the staff's experience, degradation of piping systems (e.g., cracking of welds) may potentially be caused by vibration (mechanical or hydrodynamic) loading. Clarify whether this loading effect has been considered in the aging review for the additional SSCs being added to the scope of license renewal for Oconee that are included in the LRA 9/30/99 update change and in the response to SER OI 2.2.3.4.3.2.1-1 dated 10/15/99. In addition, if the effect is excluded, provide the basis for its exclusion.

**Response:** Cracking due to vibrational (mechanical or hydrodynamic) loads was a potential aging effect that was determined to be not applicable to auxiliary systems components subject to an aging management review. Cracking due to vibration can be attributed to insufficient design. Vibration characteristically leads to cracking in a short period of time, on the order of hours to days of operation. For example, a component with an 1 Hz vibratory load will be subjected to  $1.0 \times 10^7$  cycles in four months of service, so that failure is probably early in life for vibratory stresses above the endurance limit. Because this time period is short when compared to the overall plant operational life, any cracking will be identified and corrected long before the period of extended operation. Therefore, cracking due to vibrational loads, both mechanical and hydrodynamic, is not an applicable aging effect for the auxiliary systems components subject to an aging management review.

Note: Based on Duke's response the staff requested that Duke be more specific regarding the systems that were affected by the response. As a result of the staff's request Duke provided the following amended response.

**Response:** Cracking due to vibrational (mechanical or hydrodynamic) loads was a potential aging effect that was determined to be not applicable to the components subject to an aging management review contained in SSCs added to the scope of license renewal for Oconee that are included in the LRA 9/30/99 update change and in the response to SER OI 2.2.3.4.3.2.1-1 dated 10/15/99. These SSCs include the Essential Siphon Vacuum System, the Siphon Seal Water System, portions of the Component Cooling Water System, portions of the Low Pressure Water Service Water system, portions of the Chilled Water System, portions of the Condenser Circulating Water System, and portions of the Control Room and Pressurization and Filtration System.

Cracking due to vibration can be attributed to insufficient design. Vibration characteristically leads to cracking in a short period of time, on the order of hours to days of operation. For example, a component with an 1 Hz vibratory load will be subjected to  $1.0 \times 10^7$  cycles in four months of service, so that failure is probably early in life for vibratory stresses above the endurance limit. Because this time period is short when compared to the overall plant operational life, any cracking will be identified and corrected long before the period of extended operation. Therefore, cracking due to vibrational loads, both mechanical and hydrodynamic, is not an applicable aging effect for the SSCs added to the scope of license renewal for Oconee that are included in the LRA 9/30/99 update change and in the response to SER OI 2.2.3.4.3.2.1-1 dated 10/15/99 subject to an aging management review (as identified above).

### Condenser Circulating Water Fouling Question

1. In its October 15, 1999, response to SER open item 2.2.3.4.3.2.1-1 Duke provided an integrated plant assessment for the condenser circulating water system. Section 2.2.2 of that assessment states that "piping in the portions of the condenser circulating water system that have been added are greater than or equal to six-inches is diameter. Therefore, fouling is not likely to cause a loss of system functions and therefore does not require aging management." The staff notes that for a 6 inch pipe with 1 inch of scale the cross sectional area is reduced from 28 square inches to approximately 12 square inches, a reduction of over 50 percent. In light of this example, please justify why fouling is not considered an applicable aging effect for the condenser circulating water system.

**Response:** The quality of the lake water at Oconee is excellent - see Section 3.2.2 of the Application. Based on Oconee operating experience, fouling is the result of corrosion products and silt that occurs in small diameter lines of 2-inches or less that are normally stagnant or have low flow. Low flow is defined to be 3 feet/sec or less. Based on visual observations and a review of Oconee operating experience, thick scale deposits that would significantly reduce the cross sectional area to the point that the system is unable to deliver sufficient flow at an adequate pressure have not been observed in larger diameter piping of the Condenser Circulating Water System. Therefore, fouling was determined not to be an applicable aging effect that would result in loss of function.