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 INSULATED CABLES ASSOCIATED WITH THE OCONEE LICENSE RENEWAL APPLICATION (LRA)

On November 10, 1999, representatives of Duke had a phone call with the NRC staff in Rockville, Maryland to discuss the Oconee license renewal application. The purpose of the phone call was to discuss Duke's proposed response to a staff letter dated October 5, 1999, regarding the aging management review for insulated cables and connections. The Duke participants in the call were Bob Gill and Paul Colaianni. The staff participants were Jit Vora, Steve Koenick, Paul Shemanski, George MacDonald (Region II), and Joe Sebrosky.

Enclosure 1 contains Duke's proposed response to the October 5, 1999, letter. The proposed response was provided to the staff on November 5, 1999. Enclosure 2 contains the staff's questions based on Duke's proposed response. The Enclosure 2 questions served as an agenda for the phone call. One of the major issues involving the insulated cable response was that the staff believes that Duke's proposed cable aging management program needs to be broadened to include more cables. Duke does not believe that this is appropriate. Both Duke and the staff agreed that the issue needed to be raised to upper management levels for a resolution. The staff noted that it was scheduled to issue a letter to Duke by mid-November containing all of the remaining open issues associated with the Oconee LRA. The staff stated that the questions in Enclosure 2 will be part of the letter. Duke requested that question number 1 be modified because it does not use the term "plausible degradation." The staff agreed to modify the question.

Original Signed By

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

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Enclosure: As stated (2)
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Duke's Proposed Response to the Insulated Cable Issue

Open Item 3.9.3-1

Per letter dated October 5, 1999, Duke is requested to provide the technical basis for the conclusion that no aging management program is needed or provide a description of the aging management program that will be utilized for insulated cables and connections at Oconee.

DRAFT Response to Open Item 3.9.3-1

NRC Inspection Report 99-12 stated that *"for electrical cables and connections, the inspection team concluded that the potential aging effects of moisture, radiation, and heat identified in the LRA are applicable at ONS. Based on the evidence of aging effects and the team's review of actual plant experience, the team could not agree with the applicant that no aging management review is needed for electrical cables and connectors for the period of extended operation."* The areas of focus and the inspection team's findings for electrical cables and connectors that support this conclusion were discussed in the inspection report.

The inspection report describes several items individually and then lists several problem reports without any descriptions. The station problem reports are from the Problem Investigation Process (PIP) database that is an integral part of the station corrective action process.

NRC Inspection Report 99-12 referred to comprehensive electrical system visual inspections conducted by Duke personnel in 1996. These Duke inspections included all plant areas included in the aging management review and all accessible electrical components. Many non-optimum conditions were identified and all potentially adverse conditions observed during the walkdowns were documented in a series of PIPs. These PIPs were included in the comprehensive review conducted by the NRC inspectors.

During the inspection most of the items identified in the inspection report were reviewed and categorized by the NRC inspection team. Most of the items and PIPs identified in the inspection report were found not to involve problems relevant to the aging management review. The additional items and PIPs not categorized during the inspection have been categorized by Duke. All items and PIPs identified in the inspection report were organized into the following groups:

(1) Those Involving the Identification of Cable Insulation Materials

(2) Those Involving Components Other Than Insulated Cables & Connections

(3) Those Involving Insulated Cables & Connections Serving No License Renewal Intended Functions

(4) Those Involving Installation Problems, Maintenance Problems, Equipment Problems and Other Non-Aging Problems

(5) Those Involving Insulated Cables and Connections With No Applicable Aging Effects

(6) Those Involving Insulated Cables and Connections With Applicable Aging Effects

Groups 1 through 5 above either do not involve insulated cables and connections or involve insulated cables and connections that do not have applicable aging effects. Only Group 6 above is relevant for establishing the scope of an aging management program.

Group 6 involves insulated cables and connections as follows:

(a) Black instrumentation cables in a Reactor Building cable tray are installed directly over a feedwater line. The heat escaping from the shield wall penetration sleeve around the pipe is accelerating the aging of the cable insulation. A similar configuration exists in the Reactor Building of each unit. No scoping was performed to determine if these cables perform any license renewal intended functions.

(b) Black instrumentation cables are routed next to a steam generator or a pressurizer. Heat from the steam generator or pressurizer is accelerating the aging of the cable insulation. Instances of this were found in both the Unit 1 and Unit 2 Reactor Buildings. No scoping was performed to determine if these cables perform any license renewal intended functions.

(c) Heat-shrink tubing is installed over the cable/connector interface on some pressurizer heater cable connectors. Heat from the pressurizer is accelerating the aging of the heat-shrink tubing. Instances of this were found in both the Unit 1 and Unit 2 Reactor Buildings. The connectors used for the pressurizer heaters controlled from the Standby Shutdown Facility (SSF) are the only pressurizer heater cable connectors within the scope of license renewal.

From discussions during the inspection, it was recognized that there are situations that are clearly design, installation and maintenance problems that are not relevant to license renewal and that there are situations that are clearly aging problems that are relevant to license renewal. Engineering judgement must be used for items that fall somewhere between these clear distinctions. At the time of the 1996 Duke inspections, each of these situations were identified as design problems or maintenance problems that would not lead to a loss of function if left unmanaged. During the NRC license renewal inspections, the NRC inspectors expressed that physical evidence of degradation indicates the need for aging management. The NRC inspector observations were noted and Duke subsequently decided to include these situations as the basis for a focused insulated cable aging management program.

The scope of the program is defined so as to include insulated cables and connections with applicable aging effects. Conservatism will be added to the program in that some of the situations were found only in the Unit 1 and Unit 2 Reactor Buildings and the inspections will be performed for all three units. In addition, accelerated aging was found only in isolated areas around steam generators and pressurizers, but the inspections will expand beyond these specific areas to include all areas around these components. The aging management program will be performed by visual inspections that will be performed at least every 10 years. As the aging effects are relatively slow acting, even when accelerated by higher temperatures, a thorough inspection every 10 years is adequate.

The aging management program for the insulated cables and connections at Oconee, the *Reactor Building Insulated Cables and Connections Inspection*, is described below in the table using the program attributes described in Section 4.2 of Exhibit A of the Application.

Reactor Building Insulated Cables and Connections Inspection
Inspection Attributes

Purpose – The purpose of the *Reactor Building Insulated Cables and Connections Inspection* will be to inspect insulated cables and connections in areas where accelerated aging has occurred.

Scope – The scope of the *Reactor Building Insulated Cables and Connections Inspection* will include insulated cables and connections in all accessible areas immediately adjacent to the steam generators and the pressurizer of each Oconee unit. This will include any heat shrink

covering the cable/connector interface on pressurizer heater cable connectors for pressurizer heaters controlled from the Standby Shutdown Facility (SSF). This inspection will also include the instrumentation cables installed directly over a feedwater line in the Reactor Buildings.

Aging Effects – Insulated cables and connections will be inspected for signs of accelerated aging such as discoloration and cracking.

Method – A visual inspection will be performed.

Sample Size – All insulated cables and connections within the scope areas will be inspected.

Industry Codes and Standards – No specific codes or standards exist to guide or govern the *Reactor Building Insulated Cables and Connections Inspection.*

Frequency – The *Reactor Building Insulated Cables and Connections Inspection* will be inspected at least once every 10 years.

Acceptance Criteria or Standard – No unacceptable visual indications of cable accelerated aging as determined by engineering evaluation.

Corrective Action – Insulated cables and connections not meeting the acceptance criteria will be evaluated by engineering for continued service. Specific corrective actions will be implemented in accordance with the Problem Investigation Process. The Problem Investigation Process applies to all structures and components within the scope of the *Reactor Building Insulated Cables and Connections Inspection.*

Timing of New Program or Activity – Following the issuance of renewed operating licenses for Oconee Nuclear Station, the *Reactor Building Insulated Cables and Connections Inspection* will be initiated during the next refueling outage for each unit.

Administrative Controls – The *Reactor Building Insulated Cables and Connections Inspection* will be performed as part of the System Engineering Walkdowns by the engineer responsible for insulated cables. The responsible engineer may adjust the attributes of this inspection provided such changes do not adversely affect the capability of the inspection to manage the affects of aging.

Regulatory Basis – The *Reactor Building Insulated Cables and Connections Inspection* has no current regulatory basis.

Comments on Draft Response to Open Item 3.9.3-1

OCONEE INSULATED CABLES AND CONNECTIONS PROGRAM

The staff review of the November 5, 1999, draft response to OI 3.9.3-1 identified several concerns that need to be addressed by Duke in order to resolve this open item. The proposed cables and connections inspection program is too limited and needs to be expanded to include all non-EQ instrumentation, control, and power cables that are within scope for license renewal and not only those that were identified in NRC Inspection Report 99-12. The proposed inspection program by Duke is limited to black instrumentation cables in the reactor building associated with a feedwater line and those next to a steam generator or pressurizer.

In addition, heat-shrink tubing on pressurizer cable connectors is included in the inspection program. The program is limited only to a visual inspection for signs of accelerated degradation such as discoloration and cracking. Cables that are inaccessible such as those that are directly buried or in conduits will not be inspected for degradation with this program. In addition, the inspection program does not contain any provisions for periodic monitoring of changes to the service environments for localized hot spots (radiation or temperature) or moisture/water accumulation in conduits or trenches that may develop and result in unacceptable degradation. In summary, the following staff recommended changes to the proposed Duke cables and connections inspection program include:

1. Expansion of the inspection program to include all non-EQ cables (instrumentation, control, and power) and connections located in the Reactor Buildings, Auxiliary Buildings, Turbine Buildings, and Standby Shutdown Facility that are subject to plausible degradation.

2. Further investigation of the cable condition where visual observations of cable degradation have shown cable surface anomalies such as discolorization, cracking or surface contamination. Acceptance criteria need to be established for visual inspections.

3. Electrical measurements on selected cables that are inaccessible or directly buried to detect aging due to radiation, temperature, or moisture.

4. Periodic monitoring of service environments of cables and connections for radiation or temperature hot spots or moisture/water accumulation in conduits or trenches.