

January 14, 2000

LICENSEE: Duke Energy Corporation (Duke)  
FACILITY: Oconee Nuclear Station (ONS), Units 1, 2, and 3  
SUBJECT: SUMMARY OF JANUARY 10, 2000, PHONE CALL BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND DUKE REPRESENTATIVES TO DISCUSS INSULATED CABLES RELATED TO THE OCONEE LICENSE RENEWAL APPLICATION (LRA)

On January 10, 2000, 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 insulated cables aging management program. The Duke participants were Paul Colaianni and Robert Gill. The staff participants were Richard Wessman, Dale Thatcher, Paul Shemanski, Jit Vora, Chris Grimes, P. T. Kuo, Caudle Julian, George MacDonald, Dave Skeen, Bob Weisman, and Joe Sebrosky.

The staff sent Duke a letter dated January 4, 2000, that described an open issue related to aging effects of insulated cables for ONS. Duke's proposed response to the letter is provided in the Enclosure. The first page of the Enclosure provides a description of the changes to the cable aging management program that Duke submitted in a December 17, 1999, letter. The staff stated that, in general, Duke's proposed response addressed its concerns stated in the January 4, 2000, letter.

The staff suggested there may be difficulties with the restrictions on attributes for the testing to be done on inaccessible or direct-buried medium-voltage cables subject to significant moisture and voltage exposure. These attributes are listed under the "Method" criteria in the Enclosure. The staff stated that it believes that the attributes for the test are too restrictive because Duke's proposed commitment would need to meet all of the attributes contained in the Enclosure. If the restrictions could not be met, it may not be clear what alternative actions may be appropriate.

Although Duke believes it is premature to conclude that a test method currently exists, the staff indicated that certain testing approaches may be useful in assessing degradation of buried or inaccessible medium-voltage electrical cables potentially subject to moisture. Because there is limited experience in this area, the staff agreed with Duke that establishing a prescriptive testing approach seemed premature at this time.

The staff and Duke discussed 3 options to address the staff's concerns. These options were:

- Use the list of attributes in Enclosure 1 as an example of the type of attributes that the test needs to demonstrate and do not restrict the test to meeting all of the attributes.

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Duke would also need to describe the process that would be used to determine which test would be chosen.

- If Duke determined that the test needed to meet all the attributes contained in the Enclosure then the staff believes that the test would need to be captured by a license condition. Therefore, if a test could not meet all of the attributes the staff would need to review a license amendment for alternatives to the test (e.g., delaying the test or performing a test that meets some, but not all, of the criteria).
- Eliminate the specific attributes for the test from the aging management program. The staff stated that it believes that it is sufficient for Duke to state that a test will be performed prior to the period of extended operation, continuing on into the period of extended operation, and the specific type of test performed will be determined prior to the initial test.

Duke stated that it would consider the above options and adjust its insulated cable aging management program accordingly. Duke stated that it would submit its response to the staff's January 4, 2000, letter by January 14, 2000.

A draft of this meeting summary was provided to Duke to allow them the opportunity to comment prior to issuance.

***/RA/***

Joseph M. Sebrosky, Project Manager  
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Office of Nuclear Reactor Regulation

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

Enclosure: As stated

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DOCUMENT NAME:C:\1-10 electrical sum.WPD

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## **Description of Significant Changes to the Oconee Insulated Cables Aging Management Program from that Provided in the 17-Dec-1999 Letter**

- (f) The Scope description was changed to add "accessible and inaccessible" and "in conduit and direct buried."
- (g) The second sentence under Aging Effects was moved to the end of the first sentence of Method.
- (h) Added the description under Method for inaccessible or direct buried medium-voltage cables. This states that the cables will be tested. As discussed in the conference call, the test to be used is not identified since it will not be performed for at least a decade and there may be more advanced methods at that time. But, in order to provide a basis for choosing an adequate test, the basic attributes of the test are identified. The basis for the listed attributes came from a presentation given by Satish Aggarwal in November 1999 to the NUGEQ/NUS conference in Clearwater, FL.
- (i) Below the criteria is a statements that provides a road map in the future if a test meeting the listed criteria is not available. Since the test will be a UFSAR commitment and a License Condition will control any changes to the date of the test, if such a test method meeting the criteria is not available, the NRC would have to be notified and approve a change to the date of the UFSAR commitment.
- (j) As discussed in the conference call, significant moisture exposure is defined. This definition is based on the normal exposure to "rain & drain." Also added is a definition of significant voltage exposure. There is no set time value in any literature we, or any of our industry contacts, are aware of but the 25% value is judged a reasonable value.
- (k) All references to the 13.8kV direct buried cable Technical Specification surveillance testing have been removed.
- (l) The Sample Size attribute was changed to allow for the option of using samples instead of performing the actions on the full scope of cables.
- (m) A statement was added regarding the Frequency of testing for inaccessible or direct buried medium-voltage cables.
- (n) A statement was added regarding the Acceptance Criteria for the inaccessible or direct buried medium-voltage cables. The specific acceptance criteria are not given in that the values used will depend on the test chosen. That's why the sentence specifying that the criteria "shall ensure . . ." was also added.
- (o) Conforming changes were made to the Corrective Action section.

## Insulated Cables Aging Management Program

**Purpose** – The purpose of the *Insulated Cables Aging Management Program* is to provide reasonable assurance that the license renewal intended functions of insulated cables within the scope of license renewal will be maintained consistent with the current licensing basis through the extended period of operation.

**Scope** – The *Insulated Cables Aging Management Program* includes accessible and inaccessible insulated cables within the scope of license renewal that are installed in adverse, localized environments in the Reactor Buildings, Auxiliary Buildings, Turbine Buildings, Standby Shutdown Facility, Keowee, in conduit and direct buried which could be subject to applicable aging effects from heat, radiation or moisture. This program does not include insulated cables that are in the Environmental Qualification program. An adverse, localized environment is defined as a condition in a limited plant area that is significantly more severe than the specified service condition for the equipment. An applicable aging effect is an aging effect that could cause a component to lose its license renewal intended function before the end of the extended period of operation.

**Aging Effects** – Change in material properties of the conductor insulation is the applicable aging effect.

**Method** – Accessible insulated cables in the adverse, localized environments will be visually inspected for cable jacket surface anomalies such as embrittlement, discoloration, cracking or surface contamination, which are indications that can be visually monitored to preclude the conductor insulation applicable aging effects.

Inaccessible or direct-buried medium-voltage cables subject to significant moisture and voltage exposure will be tested to demonstrate that the effects of aging will be adequately managed so that the license renewal intended function will be maintained consistent with the current licensing basis. The specific type of test performed will be determined prior to the initial test. The specific type of test chosen must have published, objective evidence that it meets all of the following attributes:

- The test must be in-situ, non-destructive and non-intrusive.
- The test must be capable of measuring conductor insulation property changes that can be correlated to degradation.
- The test must measure a conductor insulation property that can be correlated to an existing, well-defined measurement.
- The test must provide reproducible output data that is not affected by the environment such that conductor insulation degradation can be trended with output data from subsequent tests.
- The test must have predefined acceptance criteria for the specific type of cable to be tested.
- The test must be applicable to the specific type of cable to be tested.

If there is no test that meets these criteria, then the commitment can not be met and actions will be taken at that time as required by the commitment management program.

Significant moisture exposure is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as a being subjected to system voltage for more than twenty-five percent of the time.

Water collection in cable manholes containing medium voltage cables will be monitored.

**Sample Size** – Samples may be used for this program. If used, an appropriate sample size will be determined prior to the inspection or test.

**Industry Codes and Standards** – EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments* will be used as guidance in implementing this program.

**Frequency** – An inspection of all adverse, localized environments containing accessible in-scope, insulated cables will be performed at least once every 10 years.

Testing of inaccessible or direct buried medium-voltage cables exposed to significant moisture and voltage will be performed at least once every 10 years.

Water collection in cable manholes containing in-scope, medium-voltage cables will be monitored at a frequency adequate to prevent significant moisture exposure to the cables.

**Acceptance Criteria or Standard** – For accessible insulated cables, no unacceptable, visual indications of cable jacket surface anomalies, which suggest that conductor insulation applicable aging effects may exist, as determined by engineering evaluation. An unacceptable indication is defined as a noted condition or situation that could lead to a premature failure of the component if the condition or situation is left unmanaged.

For inaccessible or direct buried medium-voltage cables exposed to significant moisture and voltage, the test acceptance criteria will be defined by the specific type of test being performed. The acceptance criteria shall ensure that the license renewal intended functions of the cables will be maintained consistent with the current licensing basis.

**Corrective Action** – Further investigation by engineering will be performed on accessible and inaccessible insulated cables when the acceptance criteria is not met in order to ensure that insulated cable license renewal intended functions will be maintained consistent with the current licensing basis. Corrective actions may include, but are not limited to, testing, shielding or otherwise changing the environment, relocating or replacement of the affected cable. 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 *Insulated Cables Aging Management Program*. When an unacceptable condition or situation is identified, a determination will be made as to whether this same condition or situation could be applicable to other accessible or inaccessible cables.

**Timing of New Program or Activity** – Following issuance of a renewed operating licenses for Oconee Nuclear Station, the initial inspections and testing will be completed by February 6, 2013 (the end of the initial license term for Oconee Unit 1).

**Administrative Controls** – The *Insulated Cables Aging Management Program* will be controlled by plant procedures. The responsible engineer may adjust the attributes of this program provided such changes do not adversely affect the capability of the program actions to

manage the affects of aging such that the license renewal intended functions of the cables will be maintained.

**Regulatory Basis** – The *Insulated Cables Aging Management Program* has no current regulatory basis.



Oconee Nuclear Station (License Renewal)

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