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Mr. Victor McCree, Regional Administrator
U. S. Nuclear Regulatory Commission - Region II
Marquis One Tower
245 Peachtree Center Ave., NE, Suite 1200
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Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Station (ONS), Units 1, 2 and 3
Renewed Facility Operating License Numbers DPR-38, -47, -55;
Docket Numbers 50-269, 50-270 and 50-287;
Recommendations Resulting from ONS Bus Duct High Energy Arcing Fault Reliability and Risk Reduction Evaluation

References:

1) Duke Energy letter from T. Preston Gillespie to Victor McCree (Nuclear Regulatory Commission), ONS Standby Shutdown Facility and Bus Duct Studies, dated January 26, 2012

2) Letter from Victor McCree to T. Preston Gillespie, Jr., Confirmatory Action Letter - Oconee Nuclear Station, Units 1, 2, and 3 Commitments to Perform a Comprehensive Standby Shutdown Facility Design Review and an Evaluation of Modifications/Procedure Changes to Reduce the Risk of Bus Duct Faults, dated March 6, 2012

Dear Mr. McCree:

In Reference 1, Duke Energy Carolinas, LLC (Duke Energy) communicated plans to the Nuclear Regulatory Commission (NRC) to evaluate modifications and/or procedure changes to reduce core damage frequency associated with Oconee Nuclear Station (ONS) Main Feeder Bus (MFB) High Energy Arcing Faults (HEAFs). In Reference 2, the NRC confirmed commitments made by Duke Energy in Reference 1. As stated in Reference 1, Duke Energy committed to evaluate modifications and/or procedure changes to reduce core damage frequency associated with bus duct faults by July 12, 2012.

Duke Energy has completed this evaluation and, as such, believes that this confirmatory action letter (CAL) item is ready for closure. The evaluation considered insights from the transition to NFPA-805, industry operating experience, industry maintenance practices and bus duct configurations, a review of ONS bus duct design and construction, a review of the Oconee Preventative Maintenance (PM) program, and modifications in progress including installation of the Protected Service Water (PSW) modification.

Installation of PSW addresses the consequences of Turbine Building bus duct HEAFs, specifically the loss of all 4160V power. The PSW modification provides an alternate power path to safe shutdown equipment independent of the Turbine Building. PSW is the subject of a license condition described in the ONS NFPA-805 Safety Evaluation Report dated

December 29, 2010. Risk reduction associated with PSW has been previously estimated and communicated as 4E-05 /Rx-Yr in a Duke Energy letter to the NRC dated September 13, 2010 (refer to the response to RAI 5-70). Duke Energy concludes that installation of PSW will achieve the desired objective of reducing the risk associated with bus duct HEAFs.

The ONS bus duct risk evaluation specifically considered the following five elements in investigating the risk reduction and consequences associated with HEAFs:

1. Assess the reliability of the ONS bus duct with respect to HEAFs.

   As a result of its rugged design, the ONS bus duct system has been reliable with respect to HEAFs. Ruggedness of the Oconee design coupled with the PM program has been effective in preventing the occurrence of bus duct HEAF events at ONS. However, opportunities to improve both the MFB bolted joint design and the PM program have been identified. PM program enhancements are evaluated under Item 5 below. The following activities will be performed to improve reliability. Duke Energy does not consider these activities to be new regulatory commitments.

   a. Perform a refurbishment of non-segregated bus duct bolted joints. This effort is to include:
      I. As-found micro-ohm checks of the bolted joints
      II. Replacement of the existing bolted joint fasteners (silicon bronze) with improved stainless steel fasteners
      III. Disassembly, inspection, and cleaning of bolted joint faces, as necessary
      IV. As-left micro-ohm checks of the bolted joints

   b. Expand procedural documentation to more precisely identify individual bus duct joints to allow for more specific tracking and trending of any issues identified.

2. Evaluate the feasibility of protecting the cables under the bus duct from the consequences of HEAFs.

   Due to the proximity of some of the cables to the bus duct, it is not feasible to protect the cables. As part of the transition to NFPA-805, Duke Energy has developed and documented positions on the treatment of equipment located within the HEAF zone of influence. Using these it was determined that additional cable protection is not required.

3. Evaluate the feasibility of physically separating the cables that are driving the Probabilistic Risk Assessment (PRA) risk associated with a postulated HEAF in the bus duct.

   An evaluation has determined that physically separating (re-routing) cables to eliminate HEAF exposure is not feasible. This is due to cable tray fill, train separation requirements, and inability to avoid exposure to other events.

4. Evaluate replacing/modifying the existing Main Feeder Bus Ducts with welded bus ducts.

   An evaluation has determined that replacement of the bus duct bolted connections with welded segments is technically feasible. However, in light of the aforementioned joint refurbishment effort, the additional outage risk incurred to implement, and the scheduled implementation of PSW, this plant modification is not recommended.

5. Evaluate further improvements to the Main Feeder Bus Maintenance Strategy.

   An evaluation has determined that indirect thermal imaging will be added to the existing PM program. Indirect thermal imaging of the ONS MFBs was initially performed in June 2012. Moving forward, these inspections will be integrated into the PM program such that they will be performed on a six-month frequency. Performing these inspections is intended to identify problems prior to their degradation to a fault condition. Based on PM results and feedback obtained, this frequency may subsequently be adjusted to optimize the benefits. Duke Energy does not consider this to be a new regulatory commitment.

In addition to the deterministic evaluations performed for the five areas above, the risk impact of these actions was also evaluated by the Duke Energy PRA group. ONS has a rugged bus duct design and a strong PM program that makes its bus ducts significantly less susceptible to the failure modes that have been seen in the industry operating experience. Thus, a reduction factor of 0.1 is being applied to the initiating event frequency based on these strong defensive measures against failure. The resulting ONS bus duct HEAF frequency of 1.22E-04 /Rx-Yr is derived from a Bayesian update of the EPRI generic frequency (incorporated into NUREG/CR-6850 Supplement 1, Chapter 10) and then multiplied by the 0.1 reduction factor. The combined impact of these analysis changes, plant hardware upgrades and maintenance improvements provide for enhanced bus duct reliability and improved plant safety. Furthermore, bus duct HEAFs in the Turbine Building are no longer considered to be the dominant core damage risk factor for Standby Shutdown Facility performance issues.

In summary, as a result of the bus duct risk reduction evaluation, the aforementioned enhancement items will be placed in the corrective action program but are not considered regulatory commitments. Duke Energy has concluded that implementation of the PSW modification achieves the objective of reducing the risk associated with bus duct HEAFs. Implementation of the PSW modification is a license condition in the existing Facility Operating License for all three ONS Units. Consequently, this letter contains no new regulatory commitments and Duke Energy recommends closure of this CAL item.

If there are any questions regarding this submittal, please call Kent R. Alter of the Regulatory Compliance Group at (864) 873-3255.

Sincerely,

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