Follow-Up Question on GALL-SLR items related to electrical Insulation for inaccessible power, control and instrumentation cables and other components not subject to 10 CFR 50.49 Environmental Qualification Requirements

REFERENCES

TRP	TRP Name	AMP input	AMR input
59	Transmission Conductors and Switchyard Buses	**N/A**	Yes

BACKGROUND

By letter dated June 7, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Package Number ML21158A193), Duke Energy Carolinas, LLC Company, (the applicant), submitted a subsequent license renewal application (SLRA) for Oconee Nuclear Station Units 1, 2 and 3. As part of the SLRA review, NRC staff from the Long Term Operations and Modernization Branch (ELTB) had a virtual audit on August 18, 2021 to assess material condition and operating experience of installed equipment. During the audit, the staff noted some questions for further discussion. During the discussion with the applicant related to equipment in the switchyard, the NRC staff had several observations and needed further clarification on scoping and proposed aging management program:

On December 7, 2015, the “Y” phase power feed to the Unit 3 startup transformer power cable severed due to fatigue cracking caused by Aeolian vibrations. During the audit discussion on the broken conductor event, the NRC staff questioned the basis of the 10-year frequency replacement interval for the overhead dropline conductors associated with the startup transformers. In response to the staff’s request, the applicant responded in its e-portal that the original startup transformer CT3 Y-phase drop line conductor failed in December 2015 after over 40 years of service and all drop lines for start-up transformer CT1, CT2, and CT3 have been replaced and a 10-year replacement frequency has been established. It further stated that the startup transformer drop-line replacement frequency was conservatively selected based on 10 years being approximately 25% of the life of the original droplines. In the staff Integrated Inspection Report 05000269/2026002, 05000270/2016002, 05000287/2016002 (ADAMS Accession Number ML16217A009), the staff noted that the Unit 2 start-up transformer had also experienced broken strands in its dropline power cable in 2002. The applicant’s corrective actions for the Unit 2 issue included replacing the portions of these power cables which drop vertically down from the horizontally run lines from the Oconee 230kV switchyard.

Attachment 1 depicts a typical configuration of the onsite and offsite power systems using emergency diesel generators (EDGs) as safety related onsite power sources and each EDG connected to a separate 4kV safety related bus. The 230kV offsite power switchyard is a ‘breaker and half’ scheme (similar to the Oconee 230kV switchyard with yellow and red buses) with a 230kV North and a South bus. The plant operators can use either 230kV bus to provide offsite power source(s) to each safety related bus. The redundant 4kV safety related buses each have protective schemes required to protect safety related loads during perturbations in the onsite or offsite power systems. All the breakers, relays, potential transformers (PTs), current transformers (CTs), control and instrumentation systems etc. associated with the 4kV safety bus are generally within scope as they are either relied upon to remain functional during

and following design-basis events or their failure could prevent satisfactory accomplishment of any of the required safety functions. In such designs, the scope of equipment for SLRA considerations include cables and breakers in line from the 4kV safety related bus to the first 230kV breaker(s) (52-2, 52-3, etc. in the attachment) in the switchyard. At the 230kV level, the switchyard buses and other breakers are not in scope.

1. Describe other operating experience of startup transformer conductor droplines and corrective actions taken at Oconee. Confirm that the 10-year replacement frequency was conservatively selected.
2. In view of the unique design of the offsite and onsite power systems at Oconee, the equipment associated with 230kV yellow bus (safety bus) performs functions similar to the 4kV safety bus discussed above for a 'conventional' design and the scope of equipment to be considered for the SLRA extends beyond the 'first breaker' in the switchyard. The single line diagram depicting SBO related paths depicted limited in-scope equipment for the SLRA. From a scoping perspective:
    a) Please provide a discussion on all the major components associated with the 230kV bus that are either relied upon to remain functional during and following design-basis events or whose failure could prevent satisfactory accomplishment of any of the required safety functions. In your response, please include a discussion on equipment such coupling capacitor voltage transformers (CCVTs) that provide a low voltage signal for metering and protective relay circuitry.
    b) As discussed above, in a typical design of switchyard buses with a breaker-and-half scheme, one bus can be used to provide offsite power during maintenance activities on the second bus. The protective features for the safety related equipment are maintained by the 4kV safety bus. As such, the 230kV buses do not need to be considered for aging concerns. During the audit on August 18, 2021, the Oconee staff stated that the 230kV red bus is not used an alternate bus for offsite power when the yellow bus is not available, but the 100kV Switching station is used (Reference UFSAR section 8.2.1.4). Please provide a discussion on scope of equipment considered for the corresponding 100kV system bus that provides the protection afforded by the 230kV yellow bus or the 4kV bus in the typical design depicted in attachment 1.