UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 10, 2015

Mr. K. Henderson
Site Vice President
Catawba Nuclear Station
Duke Energy Carolinas, LLC
4800 Concord Road
York, NC 29745

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2: REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO IMPLEMENT A RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION PROGRAM (TAC NOS. MF2936 AND MF2937)

Dear Mr. Henderson:

By letter dated September 25, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13276A503), Duke Energy Carolinas, LLC (Duke) submitted a license amendment request to change its fire protection program to one based on the National Fire Protection Association (NFPA) Standard-805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition.

The U.S. Nuclear Regulatory Commission staff is continuing its review and has determined that additional information is needed in the fire modeling area as discussed in the Enclosure.

Sincerely,

/RMartin

Bob Martin, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

Enclosure: As stated

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION (RAI)

ADOPTION OF NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

STANDARD 805 FOR FIRE PROTECTION

DUKE ENERGY CAROLINAS, LLC (DUKE)

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413, 50-414

By letter dated September 25, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13276A503), Duke Energy Carolinas, LLC (Duke) submitted a license amendment request (LAR) to change its fire protection program to one based on the National Fire Protection Association (NFPA) Standard-805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition. The U.S. Nuclear Regulatory Commission (NRC) staff is continuing its review and has determined that additional information is needed in the fire modeling area as follows.

Fire Modeling (FM) RAI 01.i.(i).01

NFPA-805, Section 2.4.3.3, states, in part, that the probabilistic risk assessment (PRA) approach, methods, and data shall be acceptable to the NRC. LAR Section 4.5.1.2, "Fire Model Utilization in the Application," states, in part, that fire modeling was performed as part of the Fire PRA development.

In a letter dated January 28, 2015 (ADAMS Accession No. ML15029A697), the licensee responded to FM RAI 01.i.(i) and explained that the Catawba "Cable Use Restrictions Specification" went into effect in 1981 with the primary objective of limiting the quantity of combustible loading. The licensee further stated that the specification provides high confidence that any jacketed cable related to the Fire PRA is minimal. The licensee also quoted the following from the report that investigated the observations from the Duke Armored Cable Control Circuit Fire Test Program conducted in 2006: "Armored cables similar to the types used at Duke Energy nuclear power generating stations exhibit flame propagation characteristics consistent with cable types considered non-propagating or [Institute of Electrical and Electronic Engineers] IEEE 383 or equivalent 'qualified'."

The fact that cables behave as IEEE 383 qualified does not mean that they are not susceptible to fire propagation in accordance to the mechanisms described in NUREG/CR-6850, Appendix R. Although the "Cable Use Restrictions Specification" might support the assumption that jacketed cable need not be considered in the fire modeling analyses, in the response to FM RAI 02(a), the licensee indicated that more than 5% of the cabling in six Fire Areas is thermoplastic (i.e., armored or unarmored cable with a thermoplastic jacket).

There is an apparent inconsistency between the responses to FM RAIs 01(i).i and 02(a), so explain this inconsistency and provide additional justification for not considering the effect of fire propagation and the resulting Heat Release Rate (HRR) of secondary combustibles (cable trays) on the Zone of Influence (ZOI) determination and Hot Gas Layer (HGL) timing calculations.

FM RAI 01.I.01

In a letter dated March 30, 2015 (ADAMS Accession No. ML15091A339), the licensee responded to FM RAI 01.I and explained that the installed above-ground high-density polyethylene (HDPE) piping was the only non-cable intervening combustible identified at Catawba Nuclear Station, Units 1 and 2, with the potential to impact the Fire PRA, and provided two reasons to justify ignoring the contribution from the existing HDPE piping to any pertinent fire scenarios.

The NRC staff requests the following additional information:

(i) As part of the first reason the licensee stated that the HDPE piping in the Auxiliary Building is "primarily" located on the floor. This implies that the piping may be at a higher elevation in some areas in the Auxiliary Building. Provide justification for not postulating transient fires that may involve the HDPE piping in these areas of the Auxiliary Building.

(ii) Also pertaining to the first reason, provide a quantitative assessment to justify the statement that the HDPE piping in the Auxiliary Building "...would not contribute any significant amount of energy to increase the zone of influence of an already evaluated transient fire."

(iii) As part of the second reason, addressing the HDPE piping in the Turbine Building and the Service Building, provide technical justification for the statement that 50 kW/m^2 is "well within the flame zone of any potential ignition source," since the Generic Fire Modeling Treatments and Section 2-14 of the SFPE Handbook of Fire Protection Engineering, which are both cited in the licensee's response to FM RAI 01.I, list significantly higher heat fluxes to surfaces heated by an impinging flame or immersed in a flame. Moreover, an Electric Power Research Institute study of the fire performance of HDPE piping states that the HDPE starts to melt at approximately 235°F (115°C) and has an auto-ignition temperature of about 662°F (350°C). Since the piloted ignition temperature of a solid combustible is lower than the auto-ignition temperature, this indicates that unprotected HDPE piping may ignite and form a pool fire at much lower heat fluxes than those observed in a flame.

(iv) Also pertaining to the second reason, provide justification for the statement that the HDPE piping is not in the flame zone of any potential ignition source in the Turbine Building and the Service Building.

(v) Given the relatively low melting and ignition temperatures mentioned in part (iii), explain how the licensee will ensure that exposed HDPE piping in any areas in the plant where a fire may impact the Fire PRA will not be exposed to an ignition source that could heat the HDPE to ignition.

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