



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

July 2, 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.

On April 28, 2015, Duke submitted a response to requests for additional information. The U.S. Nuclear Regulatory Commission staff has determined that follow-up requests for information are necessary, as provided in the enclosure.

Sincerely,

A handwritten signature in cursive script that reads "Bob Martin".

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.

On April 28, 2015, Duke submitted a response to requests for additional information (RAI). The U.S. Nuclear Regulatory Commission (NRC) staff has determined that follow-up requests for information are necessary, as provided in the enclosure.

**Follow-up to April 28, 2015 Response to PRA RAI 03**  
**Probabilistic Risk Assessment (PRA) RAI 05.01**

The response to probabilistic risk assessment (PRA) RAI 05 provides the results of an uncertainty analysis on the total fire core damage frequency (CDF) and large early release frequency (LERF), that includes accounting for state of knowledge correlations, but no corresponding results are provided for delta risk. Provide the results of the uncertainty analysis impact on the mean delta risk results and discuss if the Regulatory Guide 1.174 risk guidelines are met using the mean results.

**PRA RAI 03.b.01**

The response to PRA RAI 03.b states that an updated Fire PRA (FPRA) model was created to incorporate the changes made to as described in the following RAI responses. The response further states that this model will become the self-approval post-transition model.

- PRA RAI 01.b.i
- PRA RAI 05
- PRA RAI 09
- PRA RAI 14
- PRA RAI 15
- PRA RAI 17.a, 17.b, and 17.c
- PRA RAI 20
- FM RAI 01.a through 01.f
- FM RAI 04

The response to PRA RAI 03.d states that analysis refinements that only required clarification or additional justification have been addressed in response to specific RAIs listed below and the original methods will be retained in the Fire PRA and will be used to estimate the change in risk of post-transition changes with no further adjustments or sensitivities to account for their use.

- PRA RAI 02.a, 02.b, 02.c
- PRA RAI 08
- PRA RAI 10
- PRA RAI 11
- PRA RAI 12
- PRA RAI 18
- PRA RAI 19
- PRA RAI 21
- FM RAI 01.i
- FM RAI 01.l

The NRC staff's interpretation of the response to some of the individual issues (i.e., RAIs) in the above response to PRA RAI 03.b is summarized in the table below. Please confirm or correct the Status of Resolution entries for both the transition aggregate PRA and the post transition PRA model in the following table.

	Licensee Response	Status of Resolution Transition aggregate PRA/post-transition PRA
PRA RAI 01.b regarding the Fire PRA HRA	The January 13, 2015 response to RAI 04.b on safety margins stated that the multiplier approach is used. The January 28, 2015 response to RAI 01.b states that the NUREG-1921 methodology has been reviewed and an application of this method with screening or detailed HRA, as appropriate, will be included in the updated risk results as part of the PRA RAI 03 response.	Unclear if multiplier method is no longer used. Confirm that the NUREG-1921 methodology has been followed in applying HEP and JHEP values and the impact has been assessed in response to PRA RAI 03.
PRA RAI 05 regarding application of SOKC	In support of the Catawba RAI PRA 03 response, the uncertainty analysis is being updated to account for SOKCs for circuit failure likelihood, hot short duration, severity factors, and non-suppression probabilities. SOKC would only need to be addressed for SFs and NSPs if there is more than one NSP or SF in a cut set.	Summarize actions taken in response to PRA RAI 05.01 regarding the results of the uncertainty analysis impact on the mean delta risk results
PRA RAI 09 regarding	a) The conditional hot short	Summarize actions taken in

reduced circuit failure probabilities	probabilities have been either updated to the appropriate circuit failure probabilities for single break or double break control circuits or have been confirmed to bound the NUREG/CR-7150 values, b) Option #2 of NUREG/CR-6850 was not used in the original Catawba FPRA for developing any of the conditional hot short probabilities, c) hot short duration probabilities have been updated to the new values of NUREG/CR-7150, d) the conditional hot short probabilities have been either updated to the appropriate aggregate circuit failure probabilities for single break or double break control circuits or have been confirmed to bound the NUREG/CR-7150 aggregate values, e) uncertainty values for circuit failure probabilities and spurious operation duration will be included into the updated SOKC analysis, and f) the conditional hot short probabilities for trunk cables and panel wiring have either been updated to the appropriate aggregate circuit failure probabilities or have been confirmed to bound the NUREG/CR-7150 values. Those updated values will be provided in response to RAI PRA 03.	response to RAI 17.b.01 regarding including hot short probabilities (referenced in RAI 09.f)
PRA RAI 11.c regarding main control room (MCR) abandonment on loss of habitability	c) Stated that the timing considerations will be prepared consistent with McGuire and the event will be quantified as part of RAI PRA 03.	Summarize action taken in response to PRA RAI 11.01.d that this intended evaluation has been completed.
PRA RAI 12 regarding treatment of recovery actions. (Licensee to replace with response to 12.02.)	A sensitivity study was performed to review the scenarios in Fire Areas 1, 2, 3, 4, 9, 10, 11, 18, and 22 for modeled actions taken outside the MCR that might be recovery actions.	Summarize action taken in response to PRA RAI 12.01 regarding identifying recovery actions.
PRA RAI 17.a regarding fire propagation from electrical cabinets and fire frequency allocation/screening	The impact on the total CDF/LERF and delta CDF/LERF due to fire propagating outside of well-sealed and robustly secured MCCs will be further assessed	Summarize action taken in response to PRA RAI 17.a.01 regarding use of the method described in the final version

	in the integrated analysis performed in response to RAI PRA 03, using the method outlined in Fire PRA FAQ 14-0009.	of FPRA FAQ 14-0009
PRA RAI 17.b regarding treatment of spurious actuation for cabinet fires	The targets impacted by the propagating fire will be evaluated for spurious operations using the aggregate hot short probabilities.	Summarize action taken in response to PRA RAI 17.b.01 regarding applying the guidance on conductor bundles within a cabinet in NUREG/CR- 7150
PRA RAI 17.c regarding well-sealed cabinets less than 440V in the Bin 15 count	The impact of the per-cabinet Bin 15 fire frequency on the Fire PRA results will be assessed in the integrated analysis performed in response to RAI PRA 03. Appropriate electrical cabinets will be removed from Bin 15 by following the guidance in NUREG/CR-6850. This revised Bin 15 count, along with the corresponding per-cabinet fire frequency, will be used in the final post-transition Fire PRA quantification.	Summarize action taken in response to PRA RAI 17.c.01 regarding the CDF and LERF associated with Bin 15 cabinet fires and the percentage of that CDF and LERF from cabinets that are less than 440V
PRA RAI 19 regarding modeling of multiple spurious operations (MSOs)	An MSO expert panel will be held to establish and document an official position regarding Fire PRA modeling impacts of new MSO Scenarios 14, 52, and 53. Any Fire PRA model impact, or justification of non-applicability as a result of this further evaluation, will be included in response to RAI PRA 03.	Unclear if work has been completed. Confirm that the MSO expert panel evaluation has been completed and explain whether PRA model was updated in response to RAI PRA 03 following the panel evaluation.
FM RAI 01.i regarding fire propagation from armored cable	Catawba specification CNS-1390.01-00-0086 provides high confidence that any jacketed cable related to the Fire PRA analysis is very minimal. 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 IEEE- 383 or equivalent "qualified".	Summarize action taken in response to RAI 01.i.(i).01
FM RAI 01.l regarding non-cable intervening combustibles	The only non-cable intervening combustible identified at Catawba with the potential to impact any fire scenario, is the installed above-ground high-density polyethylene (HDPE)	Summarize action taken in response to RAI 01.l.01

	pipng. The existing HDPE piping was evaluated as not contributing to any Fire PRA scenarios.	
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**PRA RAI 03.b.02**

The responses to PRA RAI 03.a and 03.b do not identify PRA RAIs 02.f.e and 22 which, according to their respective RAI responses, could result in changes to the PRA. Provide a summary of the disposition to PRA RAIs 02.f.e and 22 in the aggregate PRA and the post-transition PRA.

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**/RA/**

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