

Hon, Andrew

From: Hon, Andrew
Sent: Wednesday, June 04, 2014 12:19 PM
To: Murray, William R. (Bill) (Bill.Murray@duke-energy.com) (Bill.Murray@duke-energy.com)
Cc: Fields, Leslie; Wall, Scott; Miller, Barry
Subject: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING VOLUNTARY RISK INITIATIVE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805 (TAC NOS. ME9623 AND ME9624)

Mr. George T. Hamrick, Vice President
Brunswick Steam Electric Plant
Duke Energy Progress, Inc.
Post Office Box 10429
Southport, North Carolina 28461

Dear Mr. Hamrick:

By letter dated September 25, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12285A428), Duke Energy Progress, Inc. (the licensee) proposed to amend the operating license for the Brunswick Steam Electric Plant, Units 1 and 2, by adopting a new risk-informed performance-based fire protection licensing basis in accordance with National Fire Protection Association Standard 805.

The NRC staff has reviewed the licensee's application and responses to the NRC staff request for additional information (RAI) dated March 14, 2014, ADAMS Accession No. ML14079A233. We determined that further information is needed to complete our evaluation of the proposed change.

On May 7, 2014, the NRC staff and representatives of the licensee held a conference call to provide the licensee with an opportunity to clarify the proposed RAI related to probabilistic risk assessment and to discuss your response schedule. The NRC staff's finalized this set of RAIs is shown below. This request was discussed with Mr. Bill Murray of your staff on June 4, 2014, to confirm that these RAIs do not contain sensitive information that should be withheld from the public and you would respond by June 27, 2014.

The NRC staff considers that timely responses to RAIs help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. Please note that review efforts on this task are continuing and additional RAIs may be forthcoming.

If you have any questions regarding this letter, please contact me.

Andy Hon, PE

Project Manager (Brunswick Nuclear Plant 1 & 2, Sequoyah Nuclear Plant 1 & 2)

Plant Licensing Branch II-2

Division of Operating Reactor Licensing

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ADAMS Accession No.: ML14155A209

REQUEST FOR ADDITIONAL INFORMATION

VOLUNTARY FIRE PROTECTION RISK INITIATIVE

DUKE ENERGY PROGRESS

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

Probabilistic Risk Assessment (PRA) RAI 01.d.02

In a letter dated March 14, 2014, ADAMS Accession No. ML14079A233, the licensee responded to PRA RAI 1.d.01. The response to this RAI explains that, in addition to an in-depth review of a sampling of plant records for performance of the "Transient Fire Load Evaluation" procedure, the licensee assessed the last three years of transient combustible violations provided in the Fire Protection Program System Health Reports. A number of violations appear to be dismissed based on the following rationale: "Based on their fire procedure, this would likely not be a violation because Attachment 3 exempts this type of material from transient combustible controls for both 'No Storage' locations and 'Non-Intervening Combustible Zones'." These violations appear to represent circumstances in which quantities of combustible sources existed in the plant that could have contributed to a fire.

- a. Explain and justify how these violations were considered in the determination of reduced Heat Release Rates (HRRs) for transient fires. Include in this discussion explanation of whether these violations could have resulted in a transient fire exceeding the reduced HRR rates credited in the Fire PRA.

RAI 01.f.ii.02

In the same letter, the licensee responded to PRA RAI 1.f.ii.01. The response to this RAI explains that main control room (MCR) abandonment is only credited for loss of habitability (i.e., not loss of control/function), and that MCR fire scenarios were separately evaluated for loss of control/function that leads to core damage without crediting alternate shutdown. This approach is asserted to be conservative. Given that MCR abandonment appears to be evaluated as a single scenario using a single conditional core damage probability/conditional large early release probability (CCDP/CLERP) (though an event tree was used to calculate the single CCDP/CLERP values), it is still not clear how the abandonment scenario addresses the

possibility of different fire induced impacts like spurious failures that can accompany a fire that leads to abandonment.

- a. Explain how the single abandonment scenario addresses the various possible fire-induced failures. Specifically include discussion of how the following scenarios are addressed:
 - i. Scenarios where fire fails only a few functions aside from forcing MCR abandonment and successful alternate shutdown is straightforward
 - ii. Scenarios where fire could cause some recoverable functional failures or spurious operations that complicate the shutdown but successful alternate shutdown is likely
 - iii. Scenarios where the fire-induced failures cause great difficulty for shutdown by failing multiple functions and/or complex spurious operations that make successful shutdown unlikely.
- b. If fire-induced failures of MCR functions are not considered in abandonment scenarios, provide justification for their exclusion.
 - i. Describe whether credited abandonment actions from the abandonment procedure is correct for loss of function or spurious actions that may occur as a result of a fire leading to abandonment.
 - ii. If abandonment actions do not account for these effects then describe how fire-induced failures are considered in modeling of abandonment scenarios and include those failures as part of the integrated analysis performed in response to PRA RAI 23.

PRA RAI 01.f.iii.02

In the same letter, the licensee responded to PRA RAI 1.f.iii.01. The disposition to this RAI states that the large early release frequency (LERF) contribution from MCR abandonment due to habitability was estimated to be 10% of the core damage frequency (CDF) for MCR abandonment, based on the Internal Events PRA where LERF is 8% of CDF. Containment bypass scenarios, such as interfacing system loss-of-coolant-accident (ISLOCAs), are often major contributors to LERF.

- a. Justify that the relative likelihood/frequency of containment bypass scenarios for the Fire PRA, as compared to that for core damage scenarios, is not higher than for the Internal Events PRA.

PRA RAI 06.02

The disposition to PRA RAI 06.01 presents results of a sensitivity in which Main Control Board (MCB) scenarios are multiplied by the whole MCB ignition frequency rather than a fraction of the frequency. Given that this sensitivity study appears to only impact sequence frequencies, it is not clear why there is asymmetry between CDF and LERF sensitivity results. Similarly, the results of the integrated analysis provided in response to PRA 23 shows that, whereas change in (Δ) CDF, Δ LERF, and CDF increased as a result of the integrated analysis, the LERF decreased in a number of cases. It is not clear why LERF would trend in an opposite direction from CDF.

- a. Please explain and justify these seeming anomalies.

PRA RAI 22.c.01

In the same letter dated March 14, 2014, the licensee responded to PRA RAI 22.c. Regarding the final five bullets of part (c) of this RAI, on improvements made to facilitate fire modeling, two of the explanations are not clear.

- a. Explain more fully what the constant of 6 minutes was used for and the modeling with which it was replaced.
- b. Also, describe more fully how the hot gas layer (HGL) modeling basis changed, including how the “total energy released” is modeled in the updated HGL analysis.

PRA RAI 23.01

With respect to the response to RAI 01.d.02, if the transient combustible violations cited cannot be explained or justified to support use of reduced transient heat release rates (HRRs), then use another value for the HRR to

- a. Justify its use and incorporate that value in the integrated analysis provided in response to PRA RAI 23. In addition, based on the response to RAI 24.01 below, revise all estimates of the risk and delta-risk metrics to exclude the credit for the “panel methods” approach.

PRA RAI 24.01

In the same letter dated March 14, 2014, the licensee responded to PRA RAI 24. The disposition to this RAI presents a new implementation item (i.e., #13) that commits to replacing unacceptable methods with acceptable methods prior to self-approval in cases where impact was shown to be minimal in the current submittal, with one exception. That exception is stated to be replacing the “panel methods” approach (assumption that 10% of the electrical panels meet the definition of an open panel).

- a. Either provide justification for this, including a phenomenological basis beyond the historical fire events database, or
- b. Confirm how you will modify the new implementation item #13 to include removal of credit for use of the “panel factors” method.