DUKE ENERGY®

Letter Enclosures 7 and 8 Contain ~~Security-Related Information~~ - Withhold in Accordance with 10 CFR 2.390

George T. Hamrick
Vice President
Brunswick Nuclear Plant
P.O. Box 10429
Southport, NC 28461

o: 910.457.3698

March 14, 2014

Serial: BSEP 14-0029

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324
Response to Request for Additional Information Regarding Voluntary Risk Initiative National Fire Protection Association Standard 805 (NRC TAC Nos. ME9623 and ME9624)

References:

1. Letter from Michael J. Annacone (Carolina Power & Light Company) to U.S. Nuclear Regulatory Commission (Serial: BSEP 12-0106), *License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)*, dated September 25, 2012, ADAMS Accession Number ML12285A428

2. Letter from Michael J. Annacone (Carolina Power & Light Company) to U.S. Nuclear Regulatory Commission (Serial: BSEP 12-0140), *Additional Information Supporting License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)*, dated December 17, 2012, ADAMS Accession Number ML12362A284

3. Letter from Farideh Saba (USNRC) to George T. Hamrick (Duke Energy Progress, Inc.), *Request for Additional Information Regarding Voluntary Risk Initiative National Fire Protection Association Standard 805 (TAC Nos. ME9623 and ME9624)*, dated February 12, 2014, ADAMS Accession Number ML14028A178

Ladies and Gentlemen:

By letter dated September 25, 2012 (i.e., Reference 1), as supplemented by letter dated December 17, 2012 (i.e., Reference 2), Duke Energy Progress Inc. submitted a license amendment request (LAR) to adopt a new, risk-informed, performance-based (RI-PB) fire protection licensing basis for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2.

On February 12, 2014 (i.e., Reference 3), the NRC provided a request for additional information (RAI) regarding the license amendment request. During a telephone call conducted with the NRC staff on January 14, 2014, Duke Energy agreed to submit responses to the RAIs on the following schedule:

A006
NRR

When Enclosures 7 and 8 are removed, this document is no longer Security-Related

RAI Set	RAI Number	Planned Response Date
1	1.d.01, 1.f.ii.01, 1.f.iii.01, 14.01, 15.01, 16.01, 18.g.01, 22, and 24	March 14, 2014
2	1.i.01, 6.01, 8.01, and 23	April 14, 2014

Duke Energy's responses to the first set of RAIs are enclosed.

This document contains no new regulatory commitments.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager – Regulatory Affairs, at (910) 457-2487.

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on March 14, 2014.

Sincerely,

George T. Hamrick

Enclosures:

1. Response to Request for Additional Information Regarding Voluntary Risk Initiative National Fire Protection Association Standard 805
2. BNP-PSA-086, *BNP Fire PRA – Fire Scenario Data*, Attachment 25
3. FIR-NGGC-0009, *NFPA 805 Transient Combustibles and Ignition Source Controls Program*
4. Fourth Quarter 2013 Fire Protection Program Health Report
5. Fourth Quarter 2011 Fire Protection Program Health Report
6. Fourth Quarter 2012 Fire Protection Program Health Report
7. Updated License Amendment Request Attachment S, *Modifications and Implementation Items* **(Security-Related Information – Withhold from Public Disclosure)**
8. Updated License Amendment Request Attachment W, *Fire PRA Insights* **(Security-Related Information – Withhold from Public Disclosure)**

cc (with Enclosures 1 through 8):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Victor M. McCree, Regional Administrator
245 Peachtree Center Ave, NE, Suite 1200
Atlanta, GA 30303-1257

U. S. Nuclear Regulatory Commission
ATTN: Mr. Siva P. Lingam (Mail Stop OWFN 8G9A)
11555 Rockville Pike
Rockville, MD 20852-2738

U. S. Nuclear Regulatory Commission
ATTN: Ms. Michelle P. Catts, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

cc (with Enclosures 1 through 6):

Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-0510

Mr. W. Lee Cox, III, Section Chief **(Electronic Copy Only)**
Radiation Protection Section
North Carolina Department of Health and Human Services
1645 Mail Service Center
Raleigh, NC 27699-1645
lee.cox@dhhs.nc.gov

Response to Request for Additional Information Regarding Voluntary Risk Initiative National Fire Protection Association Standard 805

By letter dated September 25, 2012, as supplemented by letter dated December 17, 2012, Duke Energy Progress Inc. submitted a license amendment request (LAR) to adopt a new, risk-informed, performance-based (RI-PB) fire protection licensing basis for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2.

On February 12, 2014, the NRC provided a request for additional information (RAI) regarding the license amendment request. During a telephone call conducted with the NRC staff on January 14, 2014, Duke Energy agreed to submit responses to the RAIs on the following schedule:

RAI Set	RAI Number	Planned Response Date
1	1.d.01, 1.f.ii.01, 1.f.iii.01, 14.01, 15.01, 16.01, 18.g.01, 22, and 24	March 14, 2014
2	1.i.01, 6.01, 8.01, and 23	April 11, 2014

Duke Energy's responses to the first set of RAIs are provided below.

Probabilistic Risk Assessment (PRA) Request for Additional Information (RAI) 1.d.01

In letter dated July 15, 2013, the licensee responded to PRA RAI 01, but did not describe the results of its reviews regarding plant experience and records of violations of transient combustible controls per the request to augment justification for reducing the transient heat release rate (HRR) from 317 kW to 143 kW. Also, it was explained that the transient combustibles and ignition source controls program (i.e., FIR-NGGC-009) will be modified to support use of a lower HRR for specific areas of the plant, that change is not listed in license amendment request (LAR) Attachment S, Table S-2.

By letter dated September 30, 2013, the licensee presented the results of a sensitivity study showing factors of 3.4 and 3.1 increase in the fire core damage frequency (CDF) and factors of 1.8 and 1.9 increases in the fire large early release frequency (LERF) for Units 1 and 2, respectively. However, the changes-in-risk were not included; furthermore, it appears that the cited sensitivity results for CDF and LERF are based on a simplified calculation. The Fire PRA (FPRA) Sensitivities Report (BNP-PSA-095) states that assessment of sensitivity was performed by increasing the hot gas layer (HGL) conditional core damage probability/conditional large early release frequency by 10 percent for areas where the reduced HRR is credited; and explains that the basis for this simplification is a determination that the turbine building target set would increase by 10 percent if an HRR rate of 317 kilowatts (kW) were used (although BNP-PSA-095 states this is "[A]necdotally" derived). The staff notes that administrative controls should not be the sole basis to reduce the transient fire HRR, and reducing the transient fire HRR should not substitute for reducing the frequency of occurrence with appropriate transient fire weighting factors.

Provide the results of reviewing plant experience and records of violations of transient combustible controls and add an implementation item to LAR Attachment S, Table S-2, to

change the transient combustibles and ignition source controls program to support use of the lower transient fire HRRs used in the FPRA. Alternatively, demonstrate that the increase in total CDF and LERF and the increase in change-in-risk are acceptable based on using real plant and cable specific configurations and an HRR of 317 kW for transient fires.

Response

As described in Enclosure 2 of the July 15, 2013, RAI response (i.e., ADAMS Accession Number ML13205A016), "To support the use of a lower HRR in specific areas, an evaluation was performed as documented in BNP-PSA-086, *BNP Fire PRA – Fire Scenario Data*, Attachment 25." The use of a lower HRR for transient ignition sources in specific areas where supported by the evaluation is consistent with the clarified guidance in Section G.5 of NUREG/CR-6850, as endorsed by the NRC in a letter dated June 21, 2012 (i.e., ADAMS Accession Number ML12171A583). That evaluation included a review of plant records for the performance of 0FPP-013, *Transient Fire Load Evaluation*, covering a period of two years. From those records, a sample of 10 were selected for more in-depth review, which consisted of plant walk downs, operator interviews, interviews with the responsible engineer, and a verification of plant wide training. In the Service Water Building, where plant records repeatedly indicated elevated combustible material, the walkdown included the inspection of the actual burnable material to determine the lower HRR to be reasonably realistic and bounding. Where the higher HRR was determined to be more reasonably realistic and bounding for a particular fire compartment, the evaluation also considered whether the fire compartment contained equipment or targets that might be impacted by the higher HRR and whether further evaluation would be required. Where necessary, the evaluation identified specific fire compartments to be subjected to future administrative controls.

Those administrative controls are provided by FIR-NGGC-0009, *NFPA 805 Transient Combustibles And Ignition Source Controls Program* (i.e., provided in Enclosure 3). As described in the fourth quarter 2013 Health Report (i.e., provided in Enclosure 4), the implementation of FIR-NGGC-0009 will alleviate many housekeeping concerns for fire protection. Instead of the reactive approach of 0FPP-013 in monitoring and managing fire loads that exist around the plant, the permitting approach of FIR-NGGC-0009 is more proactive to ensure everything comes through the Work Control Center/Fire Protection personnel prior to being allowed into the protected area/critical areas. Since the attached FIR-NGGC-0009 was updated to support the use of the lower transient fire HRRs used in the Brunswick Fire PRA, and since FIR-NGGC-0009 superseded 0FPP-013 effective January 9, 2014, the addition of an implementation item to LAR Attachment S, Table S-2, is unnecessary.

Subsequent to the evaluation described in Attachment 25 of BNP-PSA-086, the Fire Protection Program System Health Reports covering the last three years were reviewed for violations of the transient combustible controls. These reports document and evaluate both internal plant records (e.g., Condition Reports) and NRC inspection records (e.g., by the NRC resident inspector or during triennial inspections). The fourth quarter 2011 Health Report (i.e., provided in Enclosure 5) noted no finding or open issue from the November 2011 triennial inspection, and the fourth quarter 2012 Health Report (i.e., provided in Enclosure 6) noted no external finding within the previous 36 months. The fourth quarter 2013 Health Report (i.e., provided in Enclosure 4) indicated several external findings from the NEIL inspection in June 2013, and nine associated Condition Reports are included for evaluation in the table below. For 2012 and 2013, specific indicators were established for External Findings and Transient Combustibles, and 16 and 26 internal Condition Reports were listed specifically for transient combustibles in

2012 and 2013, respectively. The table also includes three internal Condition Reports for evaluation as potential violations of the transient combustible controls in 2011. The response to these events can be characterized as find, document, and fix.

These 54 Condition Reports, as listed in the table below, were evaluated with regard to how administrative controls are credited in the Fire PRA relative to the use with a lower transient HRR. Condition Reports concerning events that occurred outside the Global Plant Analysis Boundary (GPAB) or during an outage were screened as not applicable to the Fire PRA. Condition Reports concerning events that occurred in the Turbine Building, where the higher HRR was used, or in Fire Compartments that were qualitatively screened in the Fire PRA, were also screened as not applicable to the use of a lower transient HRR. The evaluation also eliminated from further consideration those events where the corrective action was likely sufficient to preclude recurrence and those events that would likely not be considered a violation under FIR-NGGC-0009. For the remaining Condition Reports, the evaluation considers what administrative controls are applicable under FIR-NGGC-0009 and qualitatively what effect on risk a fire might have if those controls should fail.

NCR	Date	Description	Relevance to Fire PRA
453545	3/15/11	Hazardous Materials Within Hot Work Boundary	Screened: Occurred during an outage.
446682	2/8/11	Combustible Material In Transient Combustible Exclusion Area Yellow and black caution tape was used to identify a trip hazard in the Unit 1 Cable Spreading Room (CB-05, FC210).	Under FIR-NGGC-0009, 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."
467131	5/24/11	Temporary Cables Routed Through ASSD Separation Zone Unit 2 Four camera cables were routed across the U2 HPCI roof mezzanine (RB2-01N, FC341) for remote observation of work in HRA.	Under FIR-NGGC-0009, 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."
500910	11/22/11	0FPP-014, Section 4.1 Violations	Screened: Occurred during an outage.
519344	2/23/12	Flammable Paint Storage Without Fire Detection System	Screened: Occurred outside GPAB.
521653	3/5/12	Addressed non-compliant storage of drums of turbine oil near seal oil skid without containment	Screened: Occurred during an outage.
522190	3/6/12	Unit 1 Reactor Building Combustible Storage Under Stairs	Screened: Occurred during an outage.
524937	3/19/12	Combustibles Storage Under Stairwell, Unit 1 Reactor Building	Screened: Occurred during an outage.
526685	3/27/12	Addressed Storage of a Laptop Computer Under a Reactor Building Stairwell.	Screened: Occurred during an outage.
527398	3/29/12	Ladder stored under stairwell.	Screened: Occurred during an outage.
527750	3/31/12	HPCI Hoist Motor Stored in No Combustible Zone unattended.	Screened: Occurred during an outage.
527781	3/31/12	Combustible Material Stored Under Stairs	Screened: Occurred during an outage.
528328	4/3/12	Non-Compliance With 0FPP-014, 6.2.8.E	Screened: Occurred during an outage.

NCR	Date	Description	Relevance to Fire PRA
541320	6/5/12	Combustible Material Storage Of specific concern was the material that was being staged in the Service Water Building (SW-01A, FC377) for extended periods to support the concrete repair effort.	Under FIR-NGGC-0009, new staging locations can be analyzed and approved by Fire Protection Engineering for longer-term jobs and based on the amounts of combustibles. BNP-PSA-086, Attachment 25, evaluated the concrete repair issues in the Service Water Building to conclude the lower transient combustible HRR to be reasonably realistic and bounding.
547280	6/30/12	Unit 1 Cable Spread Fire Loading Exceeded A 20' ladder, a 4' step ladder, and 2 rubber cones were found in the Unit 1 Cable Spreading Room (CB-05, FC210). A rubber cone and a plastic stanchion were likewise found in the Unit 2 Cable Spreading Room (CB-06, FC211).	Provided the ladders are fiberglass and the incident combustibles are < 105,000 BTUs, this would likely not be a violation under FIR-NGGC-0009 because Attachment 3 exempts these types of material from transient combustible controls for "No Storage" locations.
547912	7/4/12	Combustibles Under Stairwell Trash bags, brooms, electric cords, clothing, fail protection, and a Staging Sign were found under the stairwell in the Unit 1 Reactor Building Southeast RHR Room (RB1-01D, FC270).	Except for approved Permanent Staging Locations, FIR-NGGC-0009 does not permit stairwells to be used for storage. A fire in this stairwell would likely not contribute much to risk due to a general lack of targets.
549297	7/14/12	Combustibles Blocking Hose Station Bags of hoses and cables used during the outage were found blocking the hose station on the Unit 1 Refueling Floor (RB1-01M, FC291).	FIR-NGGC-0009 does not permit access to firefighting equipment to be blocked. In general, fires on the refueling floor would likely not contribute much to risk because it is a large open area with few targets and away from important plant equipment.
554807	8/13/12	Housekeeping and Admin Noncompliances Housekeeping issues were identified with bundles of absorbent material in the Service Water Building and an overfilled clean trash can outside the door to the Diesel Generator Building.	FIR-NGGC-0009 requires housekeeping to be notified and containers to be emptied prior to exceeding capacity. BNP-PSA-086, Attachment 25, evaluated the concrete repair issues in Service Water Building to conclude the lower transient combustible HRR to be reasonably realistic and bounding.

NCR	Date	Description	Relevance to Fire PRA
560820	9/12/12	Combustibles Accumulated in the Service Water Building Material was staged in the Service Water Building (SW-01A, FC377) for extended periods to support the concrete repair effort.	Under FIR-NGGC-0009, new staging locations can be analyzed and approved by Fire Protection Engineering for longer-term jobs and based on the amounts of combustibles. BNP-PSA-086, Attachment 25, evaluated the concrete repair issues in the Service Water Building to conclude the lower transient combustible HRR to be reasonably realistic and bounding.
583124	2/12/13	Inadequate Posting and Adherence to Understair Storage	Screened: Occurred outside GPAB.
592271	3/1/13	Combustibles Staged With No Work Staging Sign in Unit 2 Turbine Building	Screened: The Fire PRA did not assume a lower transient HRR in the Turbine Building.
592275	3/2/13	Combustibles Under Stairwells	Screened: Occurred during an outage.
592555	3/4/13	Black Matting Stored Under Stairwell on 38' to 45'; Unit 2 Turbine Building	Screened: Occurred during an outage.
593096	3/6/13	Housekeeping in Unit 2 Turbine Laydown Combustibles Under Stairs	Screened: Occurred during an outage.
593394	3/6/13	Combustibles Under Stairwell Unit 2 EHC Room	Screened: Occurred during an outage.
595169	3/14/13	Air Compressor Staged Under Stairwell	Screened: Occurred during an outage.
595662	3/16/13	Combustibles Under Stairwell 50' Unit 2 Reactor Building SE Corner	Screened: Occurred during an outage.
595840	3/17/13	Improperly Staged Flammable Material Storage Locker	Screened: Occurred during an outage.
597171	3/24/13	Flammable Material Stored Under Stairwell	Screened: Occurred during an outage.
597944	3/27/13	Breaker Stored In No Transient Combustible Zone With Unit 2 in an outage and Unit 1 in Mode 1, the E7 breaker was staged within the floor area (DG-08, FC245) marked "No Transient Combustible During Mode 1, 2, and 3"	By removing "During Mode 1, 2, and 3" from the floor marking, the Corrective Action makes the event unlikely to recur. The confusing floor marking was thought not to apply because the Unit 1 loads supplied by E7 were not considered.
598545	4/1/13	Inadequate Storage of Flammable Liquids	Screened: Occurred outside GPAB.
599609	4/5/13	Acetylene Cylinder Not on Cylinder Cart and Not Tagged.	Screened: Occurred during an outage.
599637	4/5/13	Non-Fire Retardant Wooden Pallet Located in Unit 2 Turbine Building	Screened: Occurred during an outage.
599837	4/7/13	Unauthorized Combustibles in 2A Feedwater Heater Room	Screened: Occurred during an outage.

NCR	Date	Description	Relevance to Fire PRA
600364	4/10/13	Unattended Acetylene Cylinders Did Not Have ID Tags Two untagged cylinders were found outside (Yard, FC263) secured in an immobilized but unattended cart near the intake structure behind the insulations and coatings trailer.	Under FIR-NGGC-0009, acetylene would be tracked as a transient combustible if left unattended beyond the work shift. In general, fires in outside areas would likely not contribute much to risk because the area is large and open with few targets and much of the area is separated from important plant equipment.
603384	4/26/13	Flammable Cabinet Does Not Comply With Regulations The latch mechanism was missing from a chemical storage cabinet located in the Chemistry lab.	By replacing the cabinet with the defective latch, the Corrective Action makes the event unlikely to recur.
607006	5/16/13	Housekeeping Issue-Rope Found Hanging in -17' Unit 2 Residual Heat Removal Room	Screened: Occurred during an outage.
609254	5/30/13	Materials Stored in a No Combustible Storage Zone Combustible material was staged in a "No Combustible Storage Zone" under the stairwell in Service Water Basement (SW1-01B, FC378)	Except for approved Permanent Staging Locations, FIR-NGGC-0009 does not permit stairwells to be used for storage. A fire in this stairwell would likely not contribute much to risk due to a general lack of targets. BNP-PSA-086, Attachment 25, evaluated the concrete repair issues in the Service Water Building to conclude the lower transient combustible HRR to be reasonably realistic and bounding.
613120	6/20/13	NEIL: Housekeeping Unsatisfactory In Document Control Building	Screened: Area is qualitatively screened.
613331	6/21/13	NEIL: BNP Motor Containing >50 Gallons Oil in Warehouse H	Screened: Occurred outside GPAB.
613333	6/21/13	NEIL: Unsatisfactory Housekeeping in Temporary Power Storage Area Combustibles were found to clutter the temporary storage facility near the Babcock & Wilcox/Bartlett (BWB) Building (Yard, FC263).	Under FIR-NGGC-0009, waste, debris, scrap, and other combustibles are required to be removed following the completion of work or at the end of the shift, whichever comes first. Fires in outside areas with standalone buildings would likely not contribute much to risk due to separation from important plant equipment and a lack of targets.

NCR	Date	Description	Relevance to Fire PRA
613335	6/21/13	NEIL: Unsatisfactory Housekeeping in Security Building	Screened: Occurred outside GPAB.
613336	6/21/13	NEIL: Unsatisfactory Housekeeping Unit 2 Bartlett Cleaning Supply Area	Screened: The Fire PRA did not assume a lower transient HRR in the Turbine Building.
613338	6/21/13	NEIL: High Level of Combustibles in Work Staging Area	Screened: The Fire PRA did not assume a lower transient HRR in the Turbine Building.
613340	6/21/13	NEIL: Combustibles on Racks in Back Panel Simulator Area	Screened: Occurred outside GPAB.
613345	6/21/13	NEIL: Oil Found in Unit 2 Motor-Generator Set Rooms	Screened: The Fire PRA did not assume a lower transient HRR in the Turbine Building.
615486	7/30/13	NEIL: Over 50 Gallons of Oil in AFEB B5B Equipment	Screened: Occurred outside GPAB.
617692	7/18/13	Fire Hose Station Access Trash bags were found blocking access to the hose station on the Unit 2 Refueling Floor (RB2-01M, FC340).	FIR-NGGC-0009 does not permit access to firefighting equipment to be blocked. In general, fires on the refueling floor would likely not contribute much to risk because it is a large open area with few targets and away from important plant equipment.
618945	7/25/13	Mixed Basket of Corrosives	Screened: Occurred outside GPAB.
619052	7/25/13	0FPP-014 Discrepancy A hand pump and hoses were found in metal barrel (rather than a metal gang box or cabinet) under the stairway in the northeast corner of the Diesel Generator Building.	Under FIR-NGGC-0009, 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."
622340	8/13/13	Material Identified in DG Separation Zone An unattended scissor lift with rubber tires was found in the 23' southwest corner of the Diesel Generator Building (DG-08, FC245).	Under FIR-NGGC-0009, 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."
630442	9/14/13	Material Stored Under Stairwell A cart with mop heads was found under the Unit 1 Reactor Building south stairway (RB1-01A, FC267).	Except for approved Permanent Staging Locations, FIR-NGGC-0009 does not permit stairwells to be used for storage. A fire in this stairwell would likely not contribute much to risk due to a general lack of targets.

NCR	Date	Description	Relevance to Fire PRA
633024	10/4/13	Unsatisfactory Housekeeping in Unit 2 North Core Spray A no loitering sign, an oil absorbent cloth, a leather glove, and an air filter were found in the Unit 2 North Core Spray Room (RB2-01B, FC317).	Provided the incident combustibles are < 105,000 BTUs, this housekeeping issue would likely not be a violation under FIR-NGGC-0009 because Attachment 3 exempts these types of material from transient combustible controls for "No Storage" locations.
633297	10/7/13	Combustible Material Stored Under Stairs Work materials including a plastic work cart, a plastic tool box, an extension cord, tape, and a weld gas bottle were found under the Unit 1 Control Building stairway (CB-03, FC209).	Except for approved Permanent Staging Locations, FIR-NGGC-0009 does not permit stairwells to be used for storage. A fire in this stairwell would likely not contribute much to risk due to a general lack of targets.

PRA RAI 1.f.ii.01

By letter dated July 15, 2013, the licensee responded to PRA RAI 1.f.ii, but did not describe how the total available time (i.e., T_{sw}) or how the time to the initial cue to evacuate the Main Control Room (i.e., the initial Tdelay) was determined. The NRC staff notes that the bases and assumptions made about these times affect quantification of human error probabilities used to determine the failure probability of abandonment actions.

Describe the bases for calculating the total time available and how the time to the initial cue to evacuate the control room was determined, and how these timing assumptions include margin for potential delays.

Response

In the Brunswick Fire PRA, operator action during Main Control Room Abandonment (MCRA) is only credited for habitability concerns and not for a loss of control. Also, there is no attempt to split out those Main Control Room (MCR) fire scenarios that involve a loss of control from those that concern habitability. All MCR fire scenarios were evaluated for a loss of control that results in core damage, and no operator recovery action involving the alternate safe shutdown procedures is credited to reduce that risk. To that risk is added the separately determined MCRA risk associated with the operator failing to implement successfully the alternate safe shutdown procedures, having been driven out of the MCR due to habitability concerns. This approach is conservative because fires that drive the operator out of the MCR were also evaluated for a loss of control that results in core damage.

The bases for the total time available (i.e., T_{SW}) in the MCRA Human Reliability Analysis (HRA) is the Brunswick Safe Shutdown Timelines for cases involving the use of the Remote Shutdown Panel. These are summarized in Section H of BNP-E-9.004, *Safe Shutdown Analysis Report*, which references supporting thermo-hydraulic analyses. As documented in Attachment 10 of BNP-PSA-084, the MCRA HRA based the response times for individual operator actions on drill times and operator interviews. No time (i.e., initial T_{delay}) is assumed to the initial cue to evacuate the MCR because the initial cue to abandon the MCR is when MCR becomes uninhabitable. A fire may burn for some time before the MCR becomes uninhabitable, and the operator is likely aware of the fire and the degrading environmental conditions before the MCR actually becomes uninhabitable. Self-preservation is assumed to make the operator immediately aware of uninhabitable conditions and to prompt the necessary response to begin MCRA coincident with the realization that the environmental conditions are uninhabitable. Because the MCRA (i.e., habitability) risk is simply added to the MCR fire scenario (i.e., loss of control) risk, no margin for potential delays is necessary in these timing assumptions. If the operator delays in leaving the MCR when it becomes uninhabitable, the risk associated with the fire scenario progressing to core damage is already captured as a loss of control.

PRA RAI 1.f.iii.01

By letter dated July 15, 2013, the licensee responded to PRA RAI 1.f.iii and clarified that the failure probability to perform safe shutdown was determined by summing associated probabilities of individual core damage end states without regard to whether damage was early or late. In light of this assumption, explain how LERF was determined and provide justification that the result is a realistic or conservative representation of LERF.

Response

The LERF contribution from MCRA, due to habitability concerns, was estimated as 10% of the CDF for MCRA, due to habitability concerns. This treatment is considered a conservative representation of LERF. The factor of 0.1 was based on the relationship between LERF and CDF that is observed in the Internal Events PRA, where LERF is about 0.08 of CDF for initiators overall and is less for the turbine trip initiator in particular. The Internal Events PRA was considered a more realistic basis than the Fire PRA because the risk assessment of MCRA, due to habitability concerns, includes consideration of an operator action to scram the reactor and random equipment failures, like the Internal Events PRA, rather than fire-induced equipment failures. The risk associated with MCRA due to habitability concerns is in addition to the evaluation of Main Control Room fire scenarios for loss of control that results in core damage.

PRA RAI 14.01

By letter dated July 31, 2013, the licensee responded to PRA RAI 14 and stated that the determination of frequency of MCR abandonment scenarios is based on a "conservatively-selected time distribution, assuming that the control room boundary doors remain closed during the fire and assuming 1% unavailability for the control room HVAC system." It is not clear how 1 percent unavailability of the control room heating, ventilation, air conditioning (HVAC) system was incorporated into the calculation of abandonment times; whether modeling of the MCR boundary configuration is conservative; or if the 1 percent unavailability is based on plant experience. Clarify how control room HVAC system unavailability is addressed in abandonment scenarios; whether MCR boundary configuration") is conservatively modeled; and the basis for the control room HVAC unavailability of 1 percent.

Response

The Consolidated Fire Growth and Smoke Transport (CFAST) model, which was used to calculate MCRA times for habitability concerns, considered many possible configurations of control room HVAC and boundary door status and other variables, as described in the July 31, 2013, response (i.e., ADAMS Accession Number ML13220B041) to PRA RAI 14. This evaluation created tables of abandonment times for the various configurations. For example, Table 6-4 in Enclosure A of Attachment 16 to BNP-PSA-080, Revision 3, is entitled "MCR Abandonment Times from a Fire in Unit 1 Electrical Equipment Room or Northwest Office when the Mechanical Ventilation System Operates Normally and an MCR Envelope Boundary Door is Open Fifteen Minutes After the Start of the Fire."

From these abandonment times, non-suppression probabilities were determined as inputs to the frequency for MCRA based on fires creating habitability concerns prior to being suppressed. The inputs that were influenced by the availability or unavailability of the Control Room HVAC System were combined proportionally to an assumed unavailability of 1%. This assumption represents about three days per year and bounds plant experience, which was established by interviewing the System Engineer and reviewing Licensee Event Reports. The complete loss of control room HVAC has occurred once in the last three years (i.e., Licensee Event Report 2011-03). When the three control room HVAC subsystems are inoperable Technical Specification 3.7.4, Action E requires immediate entry into Limiting Condition for Operation (LCO) 3.0.3.

No attempt was made to account for different MCR boundary configurations, because no plant experience was available for the time between when the fire starts and when the door is opened. So, the frequency for MCRA was based on the abandonment times with the door closed during the fire, because the control room doors are normally closed and because the abandonment times, which are generally shorter for the higher heat release rate bins, were considered conservative.

PRA RAI 15.01

By letter dated July 31, 2013, the licensee responded to PRA RAI 15 and explained that "[T]ables W-4-1 and W-4-2 report "N/A" for the additional risk of recovery actions (RAs), because possible risk reductions for other RAs were not quantified." The meaning of this explanation is not clear. The additional risk of RAs should be calculated for fire areas where RAs are credited, unless they are only credited for defense-in-depth. By letter dated September 30, 2013, the licensee showed an entry in LAR Attachment W, Table W-4-2 for the Turbine Bay fire area in the "RAs" column that was changed from "Yes" in the original LAR Supplement dated December 17, 2012 (ADAMS Accession No. ML12362A284) to "No" in the response. LAR Attachment G indicates that RAs are credited in the Unit 2 Turbine Bay for defense-in-depth. Clarify which fire areas have RAs credited for risk reduction and provide or confirm that additional risk of RA values exist for these fire areas.

Response

The only Fire Area where RAs were credited for risk reduction is CB-23E, and the associated additional risk of RAs in that Fire Area is provided in Tables W-4-1 and W-4-2. For all other Fire Areas, "N/A" is listed in the "Additional Risk of RAs" column in Tables W-4-1 and W-4-2 to indicate that no RA was credited for risk reduction.

In the July 31, 2013, response to SSA RAI 15, LAR Attachment G was edited, and reconciling changes were made to Tables W-4-1 and W-4-2 in either this response or the September 30, 2013, response to be consistent with Attachment G. These changes included:

- DG-7 Unit 2 RAs changed from "No" to "Yes" for RA-DIDs added into Attachment G.
- TB1-1 Unit 2 RAs changed from "Yes" to "No" for RA-DIDs removed from Attachment G.

However, the information in the "RAs" column alone on the Tables W-4-1 and W-4-2 did not distinguish between the type of recovery action, either RA (i.e., credited for risk reduction) or RA-DID (i.e., credited for defense-in-depth). For Fire Areas where Tables W-4-1 and W-4-2 reported "N/A" for the "Additional Risk of RAs" and "Yes" for "RAs," the possible risk reductions for RAs were not quantified because the RAs in those Fire Area were RA-DID type recovery actions (i.e., credited for defense-in-depth). To provide greater clarity, Tables W-4-1 and W-4-2 have been further revised in this response to include a footnote to indicate where a "Yes" in the "RAs" columns identifies recovery actions that are credited for defense in depth, rather than for risk reduction. An updated copy of LAR Attachment W is provided in Enclosure 8 of this letter.

PRA RAI 16.01

By letter dated July 31, 2013, the licensee responded to PRA RAI 16 and explained that in accordance with the post-transition change process, an implementation item (i.e., Item 9) was added to provide for identification and evaluation of features that result in the as-built (i.e., after modifications are complete) change in risk exceeding LAR Attachment W, Table W-4-1 or W-4-2 values. Add an implementation item to evaluate the change in risk estimates due to completed implementation items (e.g., completion of fire procedures), and a plan of action if the as-operated change in risk exceeds risk acceptance guidelines.

Response

Implementation Item 14 has been added to Table S-2, as shown below.

Item	Unit	Description	LAR Section / Source
14	1, 2	Review the change in risk due to other completed implementation items (e.g., fire protection procedures). Specifically, Table S-2 Items 3, 4, 5, 6, 10, and 12 are applicable to this implementation item. The post transition NFPA 805 Change Impact Review Process, as described in Section 4.7.2 of LAR, will be used to perform these reviews and identify any necessary actions. This process is currently implemented in FIR-NGGC-0010 for Duke Energy Progress, Inc.	RAI PRA 16.01

Implementation Item 9 is a risk review of the as-built modifications to show that the result is as expected. This review cannot occur until after the modifications are complete. Therefore, in order to account for the timing of Implementation Item 9, a clarification has been added into the header of Table S-2.

An updated copy of LAR Attachment S is provided in Enclosure 7 of this letter. This supersedes in its entirety the version of Attachment S provided as part of Duke Energy's letters dated July 31, 2013, and February 28, 2014.

PRA RAI 18.g.01

In the disposition to Internal Events PRA Peer Review Findings on Flooding Supporting Requirements IFSN-A6 and IFQU-A9 (see LAR Attachment U, Table U-1), neither of which was originally met, the licensee cites "no impact on the Fire PRA [from Internal Flooding]." Both findings cite the need to address potential detrimental effects from spray rather than submergence or other flooding mechanisms. Since fire-induced flooding events, such as interfacing system loss of coolant accidents (ISLOCAs) that create spray effects, might be more likely than the same scenarios initiated randomly, the disposition needs to also address this possibility in order to justify the conclusion of "no impact on the Fire PRA." Provide a discussion regarding the potential increased likelihood, if any, for flooding-induced spray effects that could be detrimental to equipment as a result of fire-induced failures to justify the original disposition, including, but not limited to, ISLOCAs.

Response

Findings from the Peer Review of the Internal Flooding analysis were resolved in Revision 3 of BNP-PSA-035, *PRA Model Appendix F Internal Flooding Analysis*, which was issued August 29, 2011. The disposition of the Internal Events PRA Peer Review Findings in LAR Table U-1 cites no impact on the Fire PRA from Internal Flooding because the models were developed separately, on a hazard group basis, consistent with Section 1-1.2 of ASME/ANS-RA-Sa-2009. Consequently, the risk associated with fire-induced flooding events was captured in the Fire PRA with the frequency based on fire as the initiating event rather than random pipe break.

Potential fire-induced flooding events were considered during the Fire PRA disposition of Multiple Spurious Component Operations (MSOs) in Attachment 3 of BNP-PSA-085, *BNP Fire PRA – Component Selection*. The MSO Expert Panel specifically considered scenarios involving a high/low pressure interface, where a break in the low pressure boundary might create detrimental effects from submergence or spray or other flooding mechanisms. Other MSOs that were reviewed for potential flooding events postulated pipe failure caused by a water hammer following the spurious drain down of the keep fill line and subsequent start of the Emergency Core Cooling System pump. Those scenarios determined to be valid by the MSO Expert Panel were further evaluated for modeling in the Fire PRA. That evaluation credited other system features like check valves, pressure-reducing orifices, and pressure-relief valves; calculated human error probabilities for failing to remove power from the isolation valve; and included consideration for the internal flooding analysis, industry guidance on water hammers, and thermo-hydraulic analysis. As a result of this evaluation, the fire-induced pipe break scenarios modeled in the Fire PRA involve an ISLOCA in the Shutdown Cooling (SDC) suction line and water hammers in the pump discharge lines for Core Spray and Residual Heat Removal.

For SDC scenario, the event itself is sufficient to cause an unmitigated large ISLOCA. So additional equipment failures caused by detrimental spray effects due to a fire-induced flooding event were not modeled since the resulting cutsets would be subsumed as non-minimal. However, fire-induced SDC ISLOCA event is not a major contributor to risk because the inboard and outboard isolation motor-operated valves, which are powered from diverse sources, are closed while the reactor is at power, with the power removed from the inboard valve.

For the postulated water hammer scenarios, the Fire PRA modeled additional flood-induced equipment failures based simply on what equipment was in the same room with the pipe break when the pump started. This approach encompasses any potential increased likelihood of flooding-induced spray effects that could be detrimental to equipment, but there was no attempt to differentiate equipment failures due to spray effects from those due to other flood effects. Flooding-induced spray effects are not modeled to fail equipment outside the room with the pipe break because the rooms of interest on the -17' elevation of the Reactor Building are physically separated up to the 20' elevation, as described in BNP-PSA-035.

PRA RAI 22

By letter dated September 30, 2013, the licensee provided a set of CDF, LERF, ΔCDF, and ΔLERF values in LAR Attachment W, Tables W-4-1 and W-4-2 of Enclosure 4. As illustrated by the table below, these values are different from the values presented in Tables W-4-1 and W-4-2 of the LAR Supplement dated December 17, 2012 (ADAMS Accession No. ML12362A285). This is also true for the fire area values as well as the total values. The

source of these differences does not appear to be explained in any of the licensee's letters dated July 15, July 31, August 29, and September 30, 2013.

Source Document	Fire CDF (yr^{-1})	Fire LERF (yr^{-1})	Total CDF (yr^{-1})	Total LERF (yr^{-1})	ΔCDF (yr^{-1})	ΔLERF (yr^{-1})
Unit 1 – Dec 17, 2012	1.6E-5	4.0E-6	3.0E-5	4.6E-6	2.8E-6	4.7E-7
Unit 1 – Sep 30, 2013	2.1E-5	4.4E-6	3.5E-5	5.0E-6	2.1E-6	1.0E-7
Unit 2 – Dec 17, 2012	1.4E-5	1.5E-6	2.8E-5	2.1E-6	3.3E-6	5.2E-7
Unit 2 – Sep 30, 2013	2.1E-5	4.1E-6	3.5E-5	4.8E-6	3.6E-6	9.6E-8

In addition to the different risk values reported in Fire Area Risk Summary tables, LAR Attachment W, Tables W-2-1, W-2-2, W-3-1, and W-3-2 report, a different listing of dominant scenarios and, in some cases, different fire scenario construction. The change in the listing might be attributed to an unexplained modeling refinement that changed risk values across fire areas, but it is not clear why the HGL contribution was added to certain scenarios where HGL contribution to CDF or LERF was not originally considered (i.e., FC211_4568_BFM2 and FC230_4807_BFM2 in Table W-2-2, and FC211_4572_BFM2, FC211_4568_BFM2, and FC230_4807_BFM2 in Table W-3-2). In light of these observations:

a. Explain the reason for the differences in the fire area and plant risk values reported in LAR Attachment W included in the September 30, 2013, letter versus the original LAR Supplement dated December 17, 2012. Include an explanation for the asymmetries in the changes (i.e., CDF values went up in all cases and ΔCDF values went down for Unit 1, but went up for Unit 2. LERF values went up in all cases but ΔLERF went down for Units 1 and 2).

b. Explain why HGL contribution is determined differently for certain dominant scenarios between the original LAR submittal dated September 25, 2012 (ADAMS Accession No. ML12285A428) and in the letter dated September 30, 2013, and explain whether there are any other differences in quantification of scenarios reported in the September 30, 2013, letter versus the LAR supplement dated December 17, 2012. If there are differences, provide the rationale for those differences. (For example, in Table W-2-2 of the September 30, 2013, letter, scenario "FC211_4568_BFM2" includes HGL contribution, whereas this scenario, as described in the same table in the December 17, 2012, LAR submittal does not. Same for scenarios "FC211_4568_BFM2" and "FC230_4807 BFM2" in Table W-3-2.)

c. Identify the specific changes made to baseline FPRA since the time of the audit , the reason for those changes, and explanation of whether any of the changes represent application of a new method or a change in scope in application of a previously used method that constitute a model upgrade. Also, explain if further refinements to the FPRA will continue to be made and whether those changes may represent PRA model upgrades. Indicate which, if any, of these changes are considered a PRA upgrade as defined in the PRA standard. For those considered to be a PRA upgrade, provide a

proposed implementation item, that a focused-scope peer review will be performed, and any findings will be resolved, before self-approval of post transition changes.

Response

a. The reason that the fire area and plant risk values reported in 2013 differ from those reported in 2012 is primarily attributed to the incorporation of certain modeling refinements. These can be generally categorized as: (1) to improve model fidelity with the plant physical configurations, (2) to clarify what constitutes a variance from the deterministic requirements (VFDR), and (3) to improve the use of available fire modeling information. These changes are described in more detail in the response to PRA RAI 22.c. The cumulative effect of these changes results in small increases in the overall risk metrics (i.e., CDF and LERF) and, with the exception of ΔCDF for Unit 2, small decreases in the overall delta risk metrics (i.e., ΔCDF and ΔLERF). The apparent asymmetry in ΔCDF for Unit 2 occurs because the VFDRs are not uniformly distributed throughout the plant; changes in ΔCDF and ΔLERF reflect local effects driven by the spatial relationships between particular VFDRs and specific ignition sources. For example, oil fires on Control Rod Drive (CRD) pumps contribute to risk and delta risk more for Unit 2 (i.e., FC319_2018 and FC319_2019) than for Unit 1 (i.e., FC269_1014 and FC269_1015), primarily because Unit 2 reflects layers of conservatisms in fire modeling and circuit analysis which were treated more realistically on Unit 1. This is not the only difference between the two units, but it is sufficient by itself to account for the apparent asymmetry in ΔCDF for Unit 2. CRD pump oil fires on Unit 2 have been identified for further refinement as part of normal maintenance after implementation of NFPA 805.

b. The general approach for determining the HGL contribution is unchanged from the 2012 submittal to the 2013 submittal. However, the apparent difference between the 2012 submittal and the 2013 submittal arises because more scenarios were determined to have HGL contributions in 2013. This is due primarily to the correction of an error in the angle that was used to propagate fire upward to subsequent cable trays.

   The general approach considers the potential for an HGL contribution for each scenario, and the associated HGL contribution is added where the analysis indicates that an HGL is plausible. However, if an HGL is not plausible for any scenario in a particular Fire Compartment, then there is no associated HGL contribution. For simplicity, the HGL scenario is not quantified for a Fire Compartment with no plausible HGL. This can be seen, in Table W-2-2 of the 2012 submittal, as an HGL CCDP of 0.00E+00 and an HGL IF of 0.00+00 for FC211_4568_BFM, for example. By comparison, an HGL CCDP of 1.00E+00 and an HGL IF of 0.00+00 for FC230_4807_BFM, for example, indicates that scenario does not develop to an HGL, but some other scenario in that Fire Compartment does develop to an HGL.

   During implementation of the identified modeling refinements, an error was discovered in the angle that was used to propagate fire upward to subsequent cable trays. In 2012, the angle was incorrectly calculated as 35 radians and was corrected to 35 degrees in 2013. For certain borderline scenarios, the resulting additional combustible material was sufficient for the development of an HGL in the 2013 analysis, where none existed in the 2012 analysis. This can be seen, in Table W-2-2 of the 2013 submittal, as an HGL conditional core damage probability (CCDP) of 1.00E+00 and a non-zero HGL IF for

both FC211_4568_BFM2 and FC230_4807_BFM2, for example. A similar impact on LERF is shown for these scenarios in Table W-3-2 of the 2013 submittal. The 2013 analysis indicates that an HGL is plausible for each scenario.

More detail for this and other changes is provided in the response to PRA RAI 22.c.

c. The specific changes made to the baseline Fire PRA since the time of the audit include:

The following changes were made to improve the model fidelity with the plant physical configurations:

- The distance of the fire from the top of the cabinets was adjusted for certain MCR cabinets because walkdowns indicated that the vent locations had not been appropriately represented.
- The number of cable trays counted as targets for one ignition source was reduced because walkdowns indicated that certain cable trays had been double-counted.
- Superfluous targets were eliminated for one ignition source because walkdowns indicated that certain raceways had been misidentified as targets.

These changes are simple and fall under the category of completeness. The changes correct unintended errors and omissions and do not change the scope or capability.

The following changes were made to the list of VFDRs:

- Additional VFDR cables that were identified during the re-validation of the Safe Shutdown Analysis were added to the model.
- Three additional VFDRs, which were inadvertently omitted from the previous list, were added to the model.
- The lack of cable separation in the extended control room was not treated as VFDRs to be consistent with the definition of what constitutes a VFDR in an area for which alternate safe shutdown is credited.

These changes are simple and fall under the category of completeness. The changes correct unintended errors and omissions and do not change the scope or capability.

The following changes were made to improve the use of available fire modeling information:

- The constant 6 minutes, which was added to the time-to-damage determined from fire modeling, was replaced with the identification of time-dependent scenarios. The technical basis for using a constant 6 minutes was poorly documented.
- The angle at which fire propagates upward to subsequent cable trays was changed, from 35 radians to 35 degrees, to be consistent with accepted guidance.
- The basis for selection of the time-to-damage was changed to include consideration for walls and corners identified during the walkdowns and to use an effective diameter more representative of the ignition source rather than a single constant.

- The basis used to determine whether an HGL develops for a scenario was changed from an instantaneous HRR to the total energy released to be consistent with the fire modeling information.
- Credit was removed for manual activation of the fixed suppression.

These changes reconcile inconsistencies or make more extensive use of available scenario-specific fire modeling information. The changes use fire modeling information from the same computer code, were simple in concept, have a small net impact, and constitute neither new methodology nor significant changes in scope or capability

Consequently, none of these changes is considered to be a PRA upgrade.

No further model refinements are planned prior to issuance of the License Amendment. After that, the Fire PRA will be subjected to normal maintenance practices.

PRA RAI 24

By letter dated September 30, 2013, the licensee presented the results of the following sensitivity analyses for methods that have not been accepted by the NRC staff, but in doing so demonstrate that the effect of removing credit these methods have negligible impact on the risk estimates (i.e., ΔCDF, ΔLERF, CDF and LERF):

- Sensitivity analysis reported in Section 4.8.3.1 of the LAR addressing use of panel factors for motor control centers;
- Sensitivity analysis reported in Section 4.8.3.7 of the LAR addressing use of a fire HRR of less than 211 kW for motor pumps;
- Sensitivity analysis reported in Section 4.8.3.8 of the LAR addressing incorporation of a quantitative evaluation of potential sensitive electronics fire damage;
- Sensitivity analysis reported in Section 4.8.3.1 0 of the LAR addressing the assumption of multiple versus single bundle fires in the MCBs;
- Sensitivity analysis reported in Section 4.8.3.11 of the LAR addressing incorporation a maintenance influencing factor of 50.

While use of the methods addressed in these sensitivity analyses has negligible impact on the change in risk for the post-transition plant, they may have greater impact in future plant-change evaluations. Include a new implementation item in LAR Attachment 3, Table S-3 to make PRA model improvements necessary to incorporate acceptable modeling (e.g., the model adjustments from these sensitivity analyses), to inform the NRC if the change results in the risk metrics (i.e., CDF or LERF) exceeding the RG 1.205 criteria for changes requiring NRC review and approval, and that a focused scope peer review will be performed on changes that are PRA upgrades as defined in the PRA standard, and any findings will be resolved, before self-approval of post-transition changes.

Response

Implementation Item #13 will be added to Table S-2 in the LAR to read:

Item	Unit	Description	LAR Section / Source
13	1, 2	Prior to use of the Fire PRA to support self-approval of post-transition changes, where the change has been demonstrated to have more than a minimal risk impact, as described in the License Condition, the following improvements will be incorporated into the model: 1. The HRR for electrical pump fires will be changed to 211 kW. 2. The quantitative evaluation of potential fire damage to sensitive electronics will be incorporated consistent with FAQ 13-0004. 3. In determining the frequency for Main Control Room Abandonment, the fires in the Main Control Boards will be treated as multiple bundle fires. 4. A maintenance influence factor of 50 will be incorporated consistent with FAQ 12-0064. The NRC will be informed if the incorporation of these changes results in the risk metrics (i.e., CDF or LERF) exceeding the Regulatory Guide 1.205 criteria for changes requiring NRC review and approval.	4.8.3.7 4.8.3.8 4.8.3.10 4.8.3.11

An updated copy of LAR Attachment S is provided in Enclosure 7 of this letter. This supersedes in its entirety the version of Attachment S provided as part of Duke Energy's letter dated February 28, 2014.

No focused scope peer review is proposed because none of the changes represents a PRA upgrade.

No implementation item has been proposed for the sensitivity analysis reported in Section 4.8.3.1 of the LAR because the Brunswick Fire PRA uses the same method that was previously accepted by the NRC for the Shearon Harris Nuclear Power Plant (HNP) Fire PRA as a precedent.

As described in Section 3.4.7 of the Safety Evaluation accompanying the June 28, 2010, NFPA 805 License Amendment for the HNP (i.e., ADAMS Accession Number ML101750602), the HNP Fire PRA assumed that fires internal to a motor control center (MCC) do not result in damage outside the MCC itself. To access the sensitivity of the risk results to the assumption that arcing in the MCC does not result in damage outside the MCC cabinet, HNP performed two risk sensitivity calculations. The first was a bounding analysis which assumed that MCC fires always result in damage beyond the MCC cabinet, and the second was a more realistic assumption that only 10% of the fires result in damage beyond the MCC cabinet. The HNP Safety Evaluation described the second sensitivity as a reasonable basis for considering the

HNP MCCs as closed cabinets and concluded that the risk evaluations were reasonable and conservative and not significantly impacted by the specific modeling assumptions made. Since then, Supplement 1 of NUREG/CR-6850 has been issued, in which Section 4.2 reads, "Only MCCs with switchgear that is used to directly operate equipment such as load centers should be counted as HEAF sources." The HNP Fire PRA is being updated to incorporate the 10% sensitivity which was accepted in the Safety Evaluation.

As described in Section 9.6.1 of BNP-PSA-086, walkdowns were performed at Brunswick to identify certain 480V and 250VDC MCCs as closed panels based on particular configurations (i.e., no vents and secure metal construction). The project instructions for identifying closed MCCs are the same used to characterize ignition sources for HNP. Based on common walkdown directions; the similarity of equipment at HNP and Brunswick; and the need for consistent PRA modeling practices within Duke Energy, the Brunswick Fire PRA has already incorporated the 10% sensitivity that the NRC accepted for the HNP Fire PRA. The bounding sensitivity analysis reported in Section 4.8.3.1 of the LAR assumed that fires cause closed MCCs to open 100% of the time and to be capable of causing damage outside the MCC (i.e., not the sensitivity analysis that the NRC accepted for HNP Fire PRA and not consistent with the guidance in Supplement 1 of NUREG/CR-6850). Without the incorporation of the 100% sensitivity analysis, the existing Brunswick risk evaluation reasonably bounds the uncertainty.