



**Letter Enclosures 3 and 4 Contain
Security-Related Information -
Withhold in Accordance with 10 CFR 2.390**

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February 28, 2014

Serial: BSEP 14-0023

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 Second 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.), *Second Request for Additional Information Regarding Voluntary Risk Initiative National Fire Protection Association Standard 805 (TAC Nos. ME9623 and ME9624)*, dated January 14, 2014, ADAMS Accession Number ML13365A320

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 January 14, 2014 (i.e., Reference 3), the NRC provided a request for additional information (RAI) regarding the license amendment request. Duke Energy's response to the RAI is enclosed.

**When Enclosures 3 and 4 are removed,
this document is no longer Security-Related**

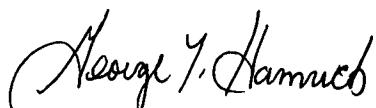
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NRR*

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 February 28, 2014.

Sincerely,



George T. Hamrick

Enclosures:

1. Response to Request for Additional Information Regarding Voluntary Risk Initiative National Fire Protection Association Standard 805
2. Replacement Pages for License Amendment Request Attachment A, Table B-1, *Transition of Fundamentals Fire Protection Program and Design Elements*
3. Replacement Pages for License Amendment Request Attachment C, *NEI 04-02 Table B-3 – Fire Area Transition*
4. Updated License Amendment Request Attachment S, *Modifications and Implementation Items*

cc (with all enclosures):

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**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 January 14, 2014, the NRC provided a request for additional information (RAI) regarding the license amendment request. Duke Energy's responses to the RAI are provided below.

Fire Protection Engineering (FPE) Request for Additional Information (RAI) 01.01

In its letter dated July 31, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13220B041), Duke Energy Progress, Inc. (the licensee) responded to FPE RAI 01 and stated "the code of record being used in the development of the very early warning fire detection system (VEWFDS) portion of BSEP [Brunswick Steam Electric Plant] Engineering Change, EC 50724, is National Fire Protection Association (NFPA) 72, National Fire Alarm Code." In addition, the licensee stated that "appropriate sections of NFPA 76, Standard for the Protection of Telecommunications Facilities" are being used for guidance in accordance with Frequently Asked Question (FAQ) 08-0046.

Provide the specific sections and editions of the standards that will serve as the Codes of Record for the design, installation, and maintenance of the VEWFDS.

Response

The code of record for design, installation, and maintenance of the new VEWFDS detection system is NFPA 72, *National Fire Alarm and Signaling Code*, 2010 Edition. For VEWFDS installed for in-cabinet applications (i.e., Reference Attachment "S," Table S-1, Item 1), NFPA 76, *Standard for the Fire Protection of Telecommunications Facilities*, 2009 Edition, is also being used as a part of the design basis with respect to transport time in order to ensure that the VEWFDS meets the performance goals for proper credit in the Fire Probabilistic Risk Assessment. Specifically, Section 8.5.3.1 from NFPA 76, for the maximum transport time of 60 seconds for the VEWFDS, is being used as a design basis, rather than the less conservative 120 second time requirement from NFPA 72, Section 17.7.3.6, Air Sampling-Type Smoke Detector, for air sampling detection systems.

FPE RAI 15.01

In its letter dated July 31, 2013, the licensee responded to FPE RAI 15 and provided clarification that the pyrocrete installations in diesel generator cell #1 are not credited for separation criteria in the safe shutdown analysis (SSA) or nuclear safety capability assessment (NSCA), but that they are credited for risk reduction purposes in the fire probabilistic risk assessment (PRA). NFPA 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants," 2001 Edition, Section 4.1 "Methodology," states: "Chapter 4 shall establish the methodology to determine the fire protection systems and features required to achieve the performance criteria outlined in Section 1.5. The methodology shall be permitted to be either deterministic or performance-based. Deterministic requirements shall be 'deemed to satisfy' the performance criteria and require no further engineering analysis. Once a determination has

been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design and qualification shall meet the applicable requirement of Chapter 3."

Through its analysis, the licensee determined that these installations are required to meet the performance criteria. Therefore, the design and qualification of the credited installations should meet the applicable requirements in NFPA 805, Chapter 3.

- a. Provide a detailed description of the credited configurations.
- b. Provide the fire resistance rating credited for each installation.
- c. Provide a justification or technical basis for the credited fire resistance ratings, including alignment with the appropriate NFPA 805 Chapter 3 attribute or attributes related to passive fire protection features (i.e., 3.11.2, 3.11.4, and 3.11.5).
- d. Provide updated License Amendment Request (LAR) Attachment A, Table B-1 entries for the appropriate NFPA 805 Chapter 3 attribute or attributes.
- e. Provide a revised LAR Attachment C that includes all fire protection features credited for risk reduction purposes.

Response

- a. Seven (7) conduits containing the credited circuits are routed through the north fire barrier wall separating Fire Area DG-4 Cell 2 (23 foot level) and Fire Area DG-5 Cell 1(23 foot level) and terminate in a 2'-6" x 2'-6" x 1'-6" deep ceiling mounted junction/pull box in Fire Area DG-5. The seven (7) conduits exit the east side of the junction/pull box and are routed along the ceiling of the fire area up and through the ceiling fire barrier into equipment located in Fire Area DG-11 (i.e., E-1 Switchgear Room 50 foot elevation). The conduits and the junction/pull box are encased with metal lath and a two inch thickness of Pyrocrete. Refer to drawing F-03519 for general configuration details. Refer to drawing F-03820 for configuration details on the junction/pull box.
- b. The seven (7) conduits, four 4-inch and three 2-inch diameter, contain circuits 0IF1/CB, 0IF2/CB, 0IF3/CB, 0IF4/CB, 0IA1/CB, 0IA2/CB, 0IA4/CB. These conduits and the junction/pull box are totally encapsulated with metal lath and a two inch thickness of Pyrocrete as described in Plant Modification (PM) No. 82-320. Drawing F-09115, Sheet 1 also details the general configuration of the protected circuits. A 2-inch thickness of Pyrocrete is noted in the Carboline Laboratory Test Report (i.e., included in PM No. 82-230 and evaluation 85-125-0-08-F) as providing fire resistance to limit the backside of a protected steel plate to 200°F at 180 minutes. The testing was conducted using the standard fire exposure curve as defined in ASTM E-119. It is reasonable to expect that potential cable damage within the conduits and the junction/pull box would be limited for at least a similar time period for these configurations. This is supported by the cable damage thresholds noted in NUREG/CR-6850, Table H-1, Damage Criteria for Electrical Cables, of 400°F (i.e., Thermoplastic) and 625°F (i.e., Thermoset). The protection provided by the Pyrocrete ensures a substantial margin prior to damage, up to at least 180 minutes.
- c. The encapsulation of the credited circuits within the conduits and junction/pull box is considered an extension of the fire barrier. As such, NFPA Chapter 3, Section 3.11.2

requirements apply. Since the Pyrocrete also acts as part of various penetration seal configurations where the conduits pass through rated fire barriers, Section 3.11.4 of NFPA Chapter 3 also applies. A "Complies via EEEE" compliance statement technical basis justification for both criteria is proposed.

While the Pyrocrete arrangement is not a tested and approved Electrical Raceway Fire Barrier System (ERFBS), in accordance with GL 86-10, Supplement 1, as an ERFBS, the installed Pyrocrete provides the identified conduits/circuits adequate protection to maintain the credited circuits free of fire damage conditions for an extended period of time and was considered to be similar to that of conduits protected through embedment within concrete structures. Evaluations 85-125-0-08-F and 85-125-0-10-F provide the technical basis justification for these positions. As such, it is concluded that it was qualitatively reasonable to assume the circuits will be unaffected by fire for in excess of one hour as was credited in the risk analysis for Fire Area DG-5.

The credited Pyrocrete configurations were also noted to be maintained through periodic tests conducted under 0PT-34.15.9.7, *Cable and Conduit Fire Barriers*. This inspection is completed once every 18 months.

- d. Section 3.11.2 of the B-1 Table has been revised to add evaluation 85-125-0-10-F as a reference document. Section 3.11.4 already includes reference to evaluations 85-125-0-08-F and 85-125-0-10-F. Replacements for the affected pages of LAR Attachment A, Table B-1 are provided in Enclosure 2 of this letter.
- e. Attachment C of the LAR has been revised to include discussion of a new Type 0 VFDR associated with the described credited circuits (i.e., Pyrocrete embedded). This feature is specifically described in LAR Attachment C, for Fire Area DG-5 Diesel Cell 1 Overview. Modification 5 detailed in the LAR Attachment S, Table S-1, which involves the installation of an ERFBS for circuit 16IL1/BA, is credited for risk reduction purposes. As mentioned in the response to SSA RAI 02.01, the ERFBS installation for Modification 5 has been identified in the Required Regulatory Systems table for Fire Area CB-23E in LAR Attachment C. The fire PRA typically includes other existing fire protection features in the Physical Analysis Units, such as dampers, penetration seals, fire doors, drains, curbs, and other barrier features, that are part of the as-built as-operated plant; however, not all of these features are significant. Fire protection systems and features found to be risk significant will be included in the NFPA 805 Monitoring Program (i.e., see Attachment S, Table S-2, Item 3).

FPE RAI 20.01

In its letter dated July 31, 2013, the licensee responded to FPE RAI 20 and continued to support the use of video cameras in lieu of a fire watch for hot work operations and the ability to use a single fire watch for multiple hot work activities. The RAI response and LAR Attachment A, Table B-1 indicate compliance with NFPA 805, Section 3.3.1.3.1 and NFPA 51B, "Standard for Fire Prevention during Welding, Cutting, and Other Hot Work."

NFPA 805, Section 3.3.1.3.1 , states that a hot work safety procedure shall be developed, implemented, and periodically updated as necessary in accordance with NFPA 51B, and NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations."

However, there is no exception for the use of video cameras, as equivalent to a hot work fire watch, identified in these standards. Additionally, there is no exception for the practice of a single fire watch managing multiple hot work locations identified in these standards. Finally, in neither case has the licensee provided a technical analysis that demonstrates equivalency to a conventional hot work fire watch.

These practices represent new and significant changes from the standards; therefore, the Nuclear Regulatory Commission (NRC) staff does not accept these practices as compliant with NFPA 805, NFPA 241, or NFPA 51B.

Provide a revised compliance statement, which demonstrates a compliance strategy in accordance with the requirements and intent of NFPA 805, Section 3.3.1.3.1.

Response

In response to the RAI regarding the current practice of allowing for a single fire watch managing multiple hot work locations, a new Attachment S, Table S-2 Implementation Item has been added to revise procedure FIR-NGGC-0003, *Hot Work Permit*, to disallow the use of a single fire watch for multiple hot work activities. This will support the original Compliance Statement of "Complies."

Regarding the use of video cameras, as equivalent to a hot work fire watch, as described in NFPA 805 Chapter 3, NFPA 51B and NFPA 241, and based on clarification teleconference with NRC staff on February 11, 2014, BSEP has provided additional clarification below regarding the type, location of hot work activities, conditions, and limitations under which video-type cameras are allowed to be used to supplement the hot work fire watch. Specific attention was given to alignment of the camera capabilities and limitations when considering the attributes of Prompt Detection and Suppression as described in NUREG/CR-6850, and applied in the Fire PRA analysis.

Hot Work activities in the power block are conducted in accordance with approved plant procedures, FIR-NGGC-0003, *Hot Work Permit*, and OFPP-005, *Fire Watch Program*. The following capabilities and limitations apply to the use of video cameras for single hot work applications:

- The need for supplemental cameras is typically limited to those plant areas where radiological conditions create a condition where dose is a major factor (i.e., Drywell, Reactor Water Cleanup rooms, Residual Heat Removal Area).
- The hot work job is pre-planned with camera equipment pre-staged to ensure the equipment is readily available and easy to use.
- Once a hot work activity is due to start, the fire watch and/or welding lead conduct a walk down of the work area, to ensure the work area conditions are appropriate for the use and capability of cameras.
- OFPP-005, Attachment 4 is completed to document the conditions and approval process. This also includes assurance that the work area and travel path are clearly understood, including an easy and fast access to work location prior to the start of work.
- Camera(s) is (are) then installed in work area, and the coverage area (i.e., viewed image) is verified to be satisfactory by the fire watch.
- Camera angles are adjusted to ensure both the safety of the welder and line of sight to cover the 35 foot area surrounding the weld location. If areas are blocked from view,

when using a single camera, more than one camera may be utilized to cover the individual weld activity.

- A fire extinguisher is staged at the job site, so that the fire watch can provide immediate response to the work area in the event of a fire or other incident.
- During the ongoing work evolution, the travel path/work area conditions are verified prior to each entry.
- The fire watch establishes communication with personnel performing the hot work activity.
- The fire watch is staged at the step-off pad (i.e., a low dose standby area), and is dressed in protective clothing for immediate response. (When using cameras, there is one fire watch for each weld activity.)
- If conditions change such that the fire watch cannot effectively observe the work or perform the required response, the fire watch relocates to the work location.

Finally, if the video camera or monitor becomes inoperable, the hot work is stopped by the fire watch, and a fire watch is posted in the area of the hot work until either: (1) the video camera or monitor is returned to service or (2) the fire watch remains posted in the area of the hot work.

With respect to the Prompt Detection and Prompt Suppression credit applied to Hot Work activities, the scenario is based largely on detection and extinguishment prior to the involvement of secondary combustibles. In accordance with FIR-NGGC-0003, combustible materials within 35 feet of the area of hot work must be removed or protected, thus eliminating the effect of secondary combustible ignition. The attribute of Prompt Detection is maintained consistent with the use of the camera(s) based on essentially the same time to recognize the fire event. Visual recognition of the event is the primary method for Prompt Detection, by either camera or fire watch person. The attribute of Prompt Suppression is consistently maintained based on rapid response by the fire watch. The fire watch is located at the nearest low dose standby area or at the step off pad to the area, dressed in appropriate protective clothing for immediate response. Travel time to the hot work location will be brief and aligns with the slowly developing fire expected in what is essentially a combustible free or protected area. A fire extinguisher is required by OFPP-005 to be located at the hot work location, for immediate use by the fire watch upon arrival. As an added means of assuring prompt notification, a means of communication is established and maintained between the fire watch and the welding crew, allowing capability to immediately stop work and summon the fire watch, should a fire occur or conditions change.

Based on the preceding discussion, use of video-type cameras provides an effective means to accomplish hot work fire watch activities and to ensure the fire prevention performance levels assumed in the analysis are maintained along with compliance to the fire protection requirements as described in NFPA 805, Chapter 3.

FPE RAI 21.01

In its letter dated July 31, 2013, the licensee responded to FPA RAI 21 and modified the compliance strategy to LAR Attachment A, Table B-1, Section 3.4.1(c). The staff noted that the licensee is not using a fire brigade operations advisor, but will utilize a fire brigade where, during every shift, the brigade leader and at least two brigade members shall have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance.

Describe how it is ensured that the brigade leader and additional members will possess the necessary "training and knowledge" to comply with NFPA 805 Section 3.4.1(c).

Response

The original response to RAI FPE 21 indicated:

Based upon further review, BSEP will utilize a fire brigade where during every shift, the brigade leader and at least two brigade members shall have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance. This is consistent with NFPA 805, Chapter 3 requirements and fleet procedure FIR-NGGC-0007, *NFPA 805 Fire Brigade Training Program*.

An equivalent knowledge of plant systems is provided for under procedure FIR-NGGC-0007, *NFPA 805 Fire Brigade Training Program*, Section 9.6.2 and Attachment 3. Attachment 3 specifies the plant systems, for either a Pressurized Water Reactor or Boiling Water Reactor, that represent the minimum plant knowledge for a Non-Licensed Operator (NLO) fire brigade member or leader to understand the effects of fire and fire suppressants on nuclear safety performance criteria (i.e., Reference NFPA 805, Section 3.4.1(c)).

Safe Shutdown Analysis (SSA) RAI 02.01

In its letter dated July 31, 2013, the licensee responded to SSA RAI 02 and indicated that raceway fire barriers in the main control room were installed, not for NFPA 805 deterministic compliance, but rather to reduce core damage frequency (CDF) and/or large early release frequency (LERF) by delaying fire damage.

The licensee stated that LAR Attachment S, Table S-1, Modification Item 5, will take the form of a 1-hour rated electrical raceway fire barrier system (ERFBS), however LAR Attachment S, Table S-1 Modification Item #7 will "protect the cables listed in the LAR by providing separation from ignition sources or 1-hour of fire rated protection." The staff noted that the second modification however, is not identified as ERFBS and is not listed in LAR Attachment C, Table B-3 under "Required Regulatory Systems - Fire Area CB-23E."

NFPA 805, Section 4.1 "Methodology," states: "Chapter 4 shall establish the methodology to determine the fire protection systems and features required to achieve the performance criteria outlined in Section 1.5. The methodology shall be permitted to be either deterministic or performance-based. Deterministic requirements shall be "deemed to satisfy" the performance criteria and require no further engineering analysis. Once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design and qualification shall meet the applicable requirement of Chapter 3."

Through its analysis, the licensee has determined that these installations are required to meet the performance criteria. Therefore, the design and qualification of the credited installations should meet the applicable requirements in NFPA 805, Chapter 3.

Provide justification why these should not both be treated as ERFBSs and identified as a required fire protection feature of the fire area, or make appropriate changes.

Response

BSEP has determined these two modifications, Table S-1, Numbers 5 and 7, are required to reduce risk in the area and, therefore, need to meet the requirements of Chapter 3 for any ERFBS installation that may be used. Modification 5 will use ERFBS and has been noted in the Required Regulatory Systems table. The approach to take with Modification 7 is still under development due to the need to validate cable routings during the upcoming outage. Options being considered are to reroute to provide added separation, protect with ERFBS, or use fire rated cable. If the installation of ERFBS is the direction taken, the Required Regulatory Systems table will be updated. An implementation item has been added to Attachment S, Table S-2, to update the program documentation as appropriate for the selected method of protection. An updated copy of LAR Attachment S is provided in Enclosure 4 of this letter.

SSA RAI 15.01

In its letter dated August 29, 2013 (ADAMS Accession No. ML13246A276) the licensee responded to SSA RAI 15 and revised LAR Attachment G, Recovery Actions Transition, and stated that "The assessment of the physical feasibility of new NSCA recovery actions and defense in depth recovery actions is contained in Change Package BNP-0246." The staff noted that numerous locations where an additional operator was needed for recovery actions in the service water building for valves such as 2-SW-V37 and 2-SW-V20 were identified.

Provide a description of the outcome of this change including adding the additional operator.

Response

Duke Energy reviewed the actions in question and determined that they are feasible, notwithstanding the notes in the walkdown sheets. Change Package BNP-0246 was used to store the data sheets from the field used as one of the inputs for evaluating the physical feasibility of particular recovery actions not otherwise addressed under the pre-transition licensing basis. In some cases, the checklists in Attachment C of the Change Package document actions that are used in multiple fire scenarios, so they contain field notes that may or may not have been germane to each fire area. While it is true that the annotations in the checklists for 2-SW-V37, 2-SW-V20, and 1-SW-V20 suggest that the required actions would require an additional operator in the Service Water Building, these notes were not applicable to the limited feasibility issues related to locally manipulating the breakers and valves. As noted above, an assessment of physical feasibility was performed for these actions as part of the Nuclear Safety Capability Assessment. A validation review that accounts for staffing, timing, and other factors will be performed as part of the BSEP procedure review and approval process per Section 9.3.2.5 of PRO-NGGC-0204, *Procedure Review and Approval*. An implementation item is being added to the LAR Attachment S, Table S-2, to update the calculation BNP-E-9.007, *ASSD Manual Action Feasibility*, and revise affected Alternate Safe Shutdown (ASSD) procedures per PRO-NGGC-0204.

For the actions in question, a determining factor for evaluating feasibility was that existing ASSD procedures used for various fire areas, including but not limited to CB-23E, RB-2-1N, and SW1-1, already post an operator in the Service Water Building to perform actions similar to those evaluated during the walkdowns for the purpose of aligning the Service Water system in preparation for establishing RHR in the Suppression Pool Cooling Mode. Moreover, all of the required components are located in this fire area, albeit on different levels, and these additional

recovery actions are physically within the capability of the Service Water Building operator; therefore, Duke Energy concluded that they were acceptable for those fire areas where these actions are required with only the posted Service Water Building Operator as the performer. This is consistent with evaluations for similar actions documented in calculation BNP-E-9.007, *ASSD Manual Action Feasibility*, that are performed by the operator who is assigned as part of normal BSEP shift staffing.

SSA RAI 15.02

In its letter dated August 29, 2013, the licensee responded to PRA RAI 15 and indicated that major changes have occurred in the analysis for fire areas CB-01 and CB-02, and that each fire area should have variances from deterministic requirements (VFDRs) addressed in the "VFDR Detail Table" for safe shutdown related unprotected cables.

However, the VFDRs do not appear to be included with the August 29, 2013 letter. The licensee references a "VFDR Detail Table" as being included with Enclosure 6 (Attachment C) in the August 29, 2013 letter, but these tables could not be located. By contrast fire areas CB-23E, DG-1, DG-4, DG-5, DG-7, DG-8, DG-11, DG-12, DG-13, DG-14, and DG-16E have detailed VFDR lists for both Units 1 and 2.

Provide a justification of this situation and an update, if necessary.

Response

The update that included the VFDR detail table for Fire Areas CB-01 and CB-02, in response to SSA RAI 15, addressed all of the VFDRs in a single line because they were dispositioned uniformly and in a manner that did not require them to be individually identified. While the assessment of the fire risk, characterization of the fire areas, and disposition for all of the affected components remain unchanged, Duke Energy has revised Attachment C of the LAR (i.e., previously submitted as part of Duke Energy's letter dated August 29, 2013, ADAMS Accession Number ML13260A252) by updating the existing VFDR List tables so that the affected components are addressed individually, consistent with other fire areas. Replacement pages for LAR Attachment C are provided in Enclosure 3 of this letter.

Fire Modeling (FM) RAI 1h.01

In its letter dated June 28, 2013 (ADAMS Accession No. ML13191B271), the licensee responded to FM RAI 1H and described how intervening combustibles were identified and accounted for in the FM analysis. However, the licensee's response did not describe how noncable intervening combustibles were identified and accounted for in the analysis.

Describe how noncable intervening combustibles were identified and accounted for in the FM analysis. If noncable intervening combustibles were not considered in the analysis, provide justification for neglecting the effect of these secondary combustibles in the analysis or quantify the effect on the risk (CDF, Delta CDF, LEAF and Delta LEAF) of scenarios that involve noncable secondary combustibles.

Response

The walk down instructions, FPIP-0200, considered the possibility of non-cable intervening combustibles and included provisions for recording any such observations. FPIP-0200 (i.e., BNP-PSA-083, Attachment 22) stated:

When collecting Zone of Influence (ZOI) data, cable tray information should be collected all the way to the ceiling if intervening combustibles which could contribute to propagation beyond the ZOI fire are present between the ignition source and the stack of cable trays. This data is collected regardless of whether a traditional ZOI or reverse walk down is being performed.

No non-cable intervening combustibles were observed during the actual walk downs. Consequently, cables were the only intervening combustibles that were accounted for in the analysis.

Note: Reverse walk downs are performed by first identifying the cables of interest to the project, and then performing walk downs to determine if the cables are within the ZOI of ignition sources in the area.

FM RAI 2d.01

In its letter dated August 29, 2013, the licensee responded to FM RAI 2d and stated that, "For Main Control Boards, the failure of sensitive electronics is mitigated by incipient detection" but did not state how the incipient detection system was credited in the analysis. The licensee also stated that, "For sensitive electronics not contained in enclosures, it is very likely that the cables to the components are already failed in the scenarios, even though they are not the limiting failure for the component" but did not elaborate on why such an assumption is valid given that the thermal damage criteria for sensitive electronics is lower than the damage criteria for cables.

Describe whether or how the incipient detection was credited in the main control board analysis and provide a technical justification for the assumption that incipient detection mitigates the failure of a piece of sensitive electronics. In addition, provide a technical justification for assuming that "For sensitive electronics not contained in enclosures, it is very likely that the cables to the components are already failed in the scenarios, even though they are not the limiting failure for the component."

Response

The previous response to FM RAI 2d reflected a qualitative analysis of a source of uncertainty which was used in the original Fire PRA. This Fire PRA did not address the risk associated with fire induced failure of sensitive electronics. Therefore, incipient detection in the main control boards was not credited in the Fire PRA with mitigating the failure of any sensitive electronics.

However, in response to the FPRA RAI 01.E, a quantitative sensitivity study was performed (i.e., BNP-PSA-095, Section 4.10) using a damage criteria as described in FAQ 13-0004 (i.e., ADAMS Accession Number ML13322A085). As documented in the sensitivity study, there are no instances of "sensitive electronics not contained in enclosures" at BSEP. The results of the sensitivity study were submitted for review in Section 4.8.3.8 of the September 30, 2013, response letter (i.e., ADAMS Accession Number ML13277A040). As requested in Fire PRA RAI 24, our response will address the incorporation of this sensitivity into the Fire PRA.

Replacement Pages for
License Amendment Request Attachment A, Table B-1,
Transition of Fundamentals Fire Protection Program and Design Elements

99-00428,Evaluate 2-FP-DG-2-340 for New Seal Design	ALL
0FP-0037,Exposed Rebar in Fire Barriers	ALL
704U-M-24,AOG Building Concrete Structures Evaluation	ALL
85-0186,Diesel Generator Pedestal Seal; Rodofoam Evaluation	ALL
85-125-0-33-F,Inaccessible Fire Barriers	ALL
90-0286,Downgrades Control Room Floor	ALL
0FP-0006,Acceptance Criteria for Block Wall Expansion	ALL
89-0010,Evaluate Fire Hazard of Existing Rodofoam 300 Used as Seismic Gap Filler	ALL
85-125-0-10-F,Diesel Gen. Bldg. Pyrocrete Enclosure Barriers of Pipe & Conduit	ALL

Table B-1 NFPA 805 Ch.3 Transition Details

Chapter 3 Reference: 3.11.3 Fire Barrier Penetrations.

Chapter 3 Requirement: 3.11.3* Fire Barrier Penetrations.

Penetrations in fire barriers shall be provided with listed fire-rated door assemblies or listed rated fire dampers having a fire resistance rating consistent with the designated fire resistance rating of the barrier as determined by the performance requirements established by Chapter 4. (See 3.11.3.4 for penetration seals for through penetration fire stops.) Passive fire protection devices such as doors and dampers shall conform with the following NFPA standards, as applicable:

(1) NFPA 80, Standard for Fire Doors and Fire Windows.

Compliance Statement

(1) Complies via EEEE

Compliance Basis

(1) BSEP complies with NFPA 80 as evaluated in ESR 97-00571.

Reference Document

ESR 97-00571,Fire Door Problem Resolution

Doc Details

ALL

FAQ 06-0020,Identification of "applicable NFPA standards"

ALL

NFPA 101,Life Safety Code, 2003 Edition

Sections 8.3.3.2.1(a) & 9.2.1

0FP-0091,Code Compliance Evaluation NFPA 90A, Code

ALL

Compliance Evaluation for NFPA 90A, Installation of Air Conditioning and Ventilating Systems - 1985 Edition

0FP-1058,Evaluation of the Equipment Hatch Located on El. 23'-0" of the Diesel Generator Building used to Cover Penetration Seal 2-FP-DG-2-025

ALL

90-0139,Evaluation of a Steel Plate Covering Penetration CB-1-066 in Battery Room 1A

ALL

94-00793,Evaluation of the Unit 1 and 2 Diesel Generator Building

ALL

Equipment Hatches Located on El. 50'-0" of the Diesel Generator Building,

704U-M-33,AOG Building Penetration No. AO-2-032 Evaluation	ALL
84-0615, Penetration Evaluation - SWIS West Wall	ALL
88-0449, Evaluation of Missing Thru-Bolt in Diesel Cell #4 Fire Barrier	ALL
85-125-0-54-F, Abandoned Hilti Bolt Shells in Concrete or Masonry Fire Barriers or Uncontained Holes in Concrete Fire Barriers.	ALL

Chapter 3 Requirement: (2) NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.

Compliance Statement **Compliance Basis**

(2) Complies via EEEE	(2) BSEP complies with NFPA 90A as evaluated in BSEP Calculation OFP-0091.
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Reference Document

Doc Details

ESR 97-00571, Fire Door Problem Resolution	ALL
FAQ 06-0020, Identification of "applicable NFPA standards"	ALL
NFPA 101, Life Safety Code, 2003 Edition	Sections 8.3.3.2.1(a) & 9.2.1
OFP-0091, Code Compliance Evaluation NFPA 90A, Code	ALL
Compliance Evaluation for NFPA 90A, Installation of Air Conditioning and Ventilating Systems - 1985 Edition	
OFP-1058, Evaluation of the Equipment Hatch Located on El. 23'-0" of the Diesel Generator Building used to Cover Penetration Seal 2-FP-DG-2-025	ALL
90-0139, Evaluation of a Steel Plate Covering Penetration CB-1-066 in Battery Room 1A	ALL
94-00793, Evaluation of the Unit 1 and 2 Diesel Generator Building Equipment Hatches Located on El. 50'-0" of the Diesel Generator Building,	ALL
704U-M-33,AOG Building Penetration No. AO-2-032 Evaluation	ALL
84-0615, Penetration Evaluation - SWIS West Wall	ALL
88-0449, Evaluation of Missing Thru-Bolt in Diesel Cell #4 Fire Barrier	ALL
85-125-0-54-F, Abandoned Hilti Bolt Shells in Concrete or Masonry Fire Barriers or Uncontained Holes in Concrete Fire Barriers.	ALL

Chapter 3 Requirement: (3) NFPA 101, Life Safety Code

Exception: Where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries, a performance-based analysis shall be required to assess the adequacy of fire barrier forming the fire boundary to determine if the barrier will withstand the fire effects of the hazards in the area. Openings in fire barriers shall be permitted to be protected by other means as acceptable to the AHJ.

Compliance Statement

Compliance Basis

(3) Complies with Clarification

(3) NFPA 101 is not a committed code for BSEP and as such is not part of the current licensing basis. Per FAQ 06-0020 the following guidance applies as to which NFPA standards referenced in Chapter 3 are applicable:

"Where used in NFPA 805, Chapter 3, the term, "applicable NFPA Standards" is considered to be equivalent to those NFPA standards identified in the current license basis (CLB) for procedures and systems in the Fire Protection Program that are transitioning to NFPA 805. New Fire Protection Systems would be subject to the most current code or standard."

NFPA 101, Section 8.2.3.2.1(a) with regards to rated fire door assemblies refers to NFPA 80. NFPA 101 Section 9.2.1 with regards to rate fire dampers refers to NFPA 90A. NFPA 101 compliance is achieved through compliance with NFPA 80 and NFPA 90A as described in sections (1) and (2) of this element.

<u>Reference Document</u>	<u>Doc Details</u>
ESR 97-00571,Fire Door Problem Resolution	ALL
FAQ 06-0020,Identification of "applicable NFPA standards"	ALL
NFPA 101,Life Safety Code, 2003 Edition	Sections 8.3.3.2.1(a) & 9.2.1
0FP-0091,Code Compliance Evaluation NFPA 90A, Code Compliance Evaluation for NFPA 90A, Installation of Air Conditioning and Ventilating Systems - 1985 Edition	ALL
0FP-1058,Evaluation of the Equipment Hatch Located on El. 23'-0" of the Diesel Generator Building used to Cover Penetration Seal 2-FP-DG-2-025	ALL
90-0139,Evaluation of a Steel Plate Covering Penetration CB-1-066 in Battery Room 1A	ALL
94-00793,Evaluation of the Unit 1 and 2 Diesel Generator Building Equipment Hatches Located on El. 50'-0" of the Diesel Generator Building,	ALL
704U-M-33,AOG Building Penetration No. AO-2-032 Evaluation	ALL
84-0615,Penetration Evaluation - SWIS West Wall	ALL
88-0449,Evaluation of Missing Thru-Bolt in Diesel Cell #4 Fire Barrier	ALL
85-125-0-54-F,Abandoned Hilti Bolt Shells in Concrete or Masonry Fire Barriers or Uncontained Holes in Concrete Fire Barriers.	ALL