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10 CFR 50.90

February 13, 2019

Serial: RA-19-0010

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

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

Subject: Response to NRC Request for Additional Information (RAI) Regarding Application to Adopt 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components (SSCs) for Nuclear Power Reactors"

References:

1. Duke Energy letter, *Application to Adopt 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components (SSCs) for Nuclear Power Reactors"*, dated January 10, 2018 (ADAMS Accession No. ML18010A344).

2. Duke Energy letter, *Response to NRC Request for Additional Information (RAI) Regarding Application to Adopt 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components (SSCs) for Nuclear Power Reactors"*, dated November 2, 2018 (ADAMS Accession No. ML18306A523).

3. NRC letter, *Second Round Requests for Additional Information Related to License Amendment Request to Adopt 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors"*, dated January 14, 2019 (ADAMS Accession No. ML19015A030).

Ladies and Gentlemen:

By letter dated January 10, 2018 (Reference 1), as supplemented by letter dated November 2, 2018 (Reference 2), Duke Energy Progress, LLC (Duke Energy) submitted a license amendment request (LAR) for Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed amendment would modify the licensing basis, by the addition of a License Condition, to allow for the implementation of the provisions of Title 10 of the Code of Federal Regulations (10 CFR), Section 50.69, "Risk-informed categorization and treatment of structures, systems, and components for nuclear power reactors."

By letter dated January 14, 2019 (Reference 3), the Nuclear Regulatory Commission (NRC) staff requested a second round of additional information from Duke Energy that is needed to complete the LAR review.

The enclosure to this letter provides Duke Energy's response to the second NRC RAI related to this amendment request. Attachment 1 contains PRA implementation items which must be completed prior to implementation of 10 CFR 50.69 at BSEP. Attachment 2 contains proposed markups of the BSEP Renewed Facility Operating License for both Units 1 and 2. The markups supersede those provided in Reference 2.

The conclusions of the original No Significant Hazards Consideration and Environmental Consideration in the original LAR are unaffected by this RAI response.

There are no regulatory commitments contained in this letter.

In accordance with 10 CFR 50.91, Duke Energy is notifying the State of North Carolina of this LAR by transmitting a copy of this letter and enclosure to the designated State Official.

Should you have any questions concerning this letter and its enclosure, or require additional information, please contact Art Zaremba at (980) 373-2062.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 13, 2019.

Sincerely,

Steve Snider
Vice President - Nuclear Engineering

JLV

Enclosure: Response to NRC Request for Additional Information

cc: Ms. C. Haney, NRC Regional Administrator, Region II
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Mr. G. Smith, NRC Sr. Resident Inspector, BNP
Mr. W. L. Cox, III, Section Chief, N.C. DHSR (Electronic Copy Only)
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File: (Corporate)

Serial: RA-19-0010

Brunswick Steam Electric Plant, Units 1 and 2
Docket Nos. 50-325 and 50-324 / Renewed License Nos. DPR-71 and DPR-62

Response to NRC Request for Additional Information (RAI) Regarding Application to Adopt 10 CFR 50.69, “Risk-Informed Categorization and Treatment of Structures, Systems, and Components (SSCs) for Nuclear Power Reactors”

Enclosure

Response to NRC Request for Additional Information

NRC Request for Additional Information

By letter dated January 10, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18010A344), as supplemented by letter dated November 2, 2018 (ADAMS Accession No. ML18306A523), Duke Energy Progress, LLC, (Duke Energy, the licensee), submitted a license amendment request (LAR) for Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed amendment would modify the licensing basis to allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.69, "Risk-informed categorization and treatment of structures, systems, and components for nuclear power plants," and provide the ability to use probabilistic risk assessment (PRA) models, namely the internal events PRA, internal flooding PRA (IFPRA), internal fire PRA (FPRA), high winds PRA (HW PRA), and external flooding PRA (XF PRA) for the proposed 10 CFR 50.69 categorization process.

Regulatory Guide (RG) 1.201, Revision 1, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to their Safety Significance," May 2006 (ADAMS Accession No. ML061090627), endorses, with regulatory positions and clarifications, the Nuclear Energy Institute (NEI) guidance document NEI 00-04, Revision 0, "10 CFR 50.69 SSC [Structure, System, and Component] Categorization Guideline," July 2005 (ADAMS accession No. ML052910035), as one acceptable method for use in complying with the requirements in 10 CFR 50.69. Both RG 1.201 and NEI 00-04 cite RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," February 2004 (ADAMS Accession No. ML040630078), which endorses industry consensus PRA standards, as the basis against which peer reviews evaluate the technical acceptability of a PRA. Revision 2 of RG 1.200 issued March 2009 is available at ADAMS Accession No. ML090410014.

Section 3.1.1 of the LAR states that Duke Energy will implement the risk categorization process of 10 CFR 50.69 in accordance with NEI 00-04, Revision 0, as endorsed by RG 1.201. However, the licensee's LAR does not contain enough information for the U.S. Nuclear Regulatory Commission (NRC) staff to determine if the licensee has implemented the guidance appropriately in NEI 00-04, as endorsed by RG 1.201, as a means to demonstrate compliance with all of the requirements in 10 CFR 50.69, including technical adequacy of the PRA models. The NRC staff has developed the following requests for additional information (RAIs) in order to complete its assessment.

PRA RAI 8-1 – Addition of FLEX to the PRA Model:

The response to PRA RAI 8 confirmed that FLEX equipment, specifically diesel generators, cooling pumps, and instrument air compressors are incorporated in the PRA models to be used for the 10 CFR 50.69 SSC categorization process. The response identified that the failure rates for these components use the generic NUREG/CR-6928 (ADAMS Accession No. ML070650650) data for other components, that each component requires operator action(s) to meet its functional requirement, and that the failure rates for the associated actions are calculated using the Electric Power Research Institute (EPRI) human reliability analysis (HRA) calculator. In addition, the licensee stated that the addition of FLEX modeling moved the station blackout (SBO) accident sequence from the risk-significant category (top 95% contributor to core damage) to the non-risk significant category.

As noted in PRA RAI 8, the NRC memorandum dated May 30, 2017, “Assessment of the Nuclear Energy Institute 16-06, ‘Crediting Mitigating Strategies in Risk-Informed Decision Making,’ Guidance for Risk-Informed Changes to Plants Licensing Basis” (ADAMS Accession No. ML17031A269), provides the NRC’s staff assessment of challenges to incorporating FLEX equipment into a PRA model used for risk-informed applications. This memorandum provides specific guidance related to FLEX equipment failure rates, operator action probability calculations, and PRA upgrades when used for risk-informed applications.

Please address following:

a. Regarding component failure data the November 2, 2018, response states that NUREG/CR-6928 generic parameter estimates were used for the FLEX diesel generators (FLEX-DGs), FLEX pumps, and FLEX air compressors since plant-specific data is limited. For the FLEX-DGs, the response states that these components use the failure rates of the safety-related emergency diesel generators (EDGs) since, “they are expected to be as reliable as the EDGs.”

   The ASME/ANS PRA Standard Capability Category II (CC-II) for supporting requirement (SR) DA-D2 that “if neither plant-specific data nor generic parameter estimates are available for the parameter associated with a specific basic event, USE data or estimates for the most similar equipment available, adjusting if necessary to account for differences. Alternatively, USE expert judgment and document the rationale behind the choice of parameter values.” The NRC staff notes EDGs conduct several test runs in a year and operate for several hours with substantial electrical load to verify their reliability. It is unclear if the FLEX-DGs conduct the same rigorous testing as the EDGs to verify their reliability and therefore it is unknown whether the FLEX-DGs are sufficiently similar to EDGs to warrant uses of EDG generic data. If it cannot be demonstrated in the response to PRA RAI 8-1, subpart c, below, that the uncertainty associated with crediting the flex equipment is not expected to impact the categorization, provide the following:

i. A justification that the failure rates for safety-related diesel generators can be used for the FLEX-DGs. Include in this discussion the similarities between EDGs and FLEX-DGs regarding installation, training, operation, maintenance, environmental controls, and testing, and how each of these items impact the reliability of the diesel generator.

ii. Develop a failure rate estimate that meets the requirements of the ASME/ANS PRA Standard (e.g., SR DA-D2). Include in this discussion any adjustments made to the generic failure rates due to differences and the rationale used to base those adjustments (provide actual FLEX component failure rates used in the PRA model).

iii. Alternatively to part I and ii, propose a mechanism to develop the FLEX component failure rates in accordance with the ASME/ANS PRA Standard and incorporate them into the PRA models used for the 10 CFR 50.69 SSC categorization process, provide a sensitivity study as part of the suite of sensitivity studies that are included in the categorization process described in NEI 00-04 (e.g., Table 5-2) that can address this uncertainty, or remove credit for the FLEX DGs in the PRA model used for the 10 CFR 50.69 categorization.

Duke Energy Response to PRA RAI 8-1.a:

Plant-specific data on FLEX diesel generators (DG) has been compiled across the Duke Energy fleet (Brunswick, Robinson, Harris, McGuire, Oconee and Catawba). FLEX DGs across the sites are very similar machines. The current data set contains the results from over 200 tests of varying scope (i.e., full load, 50% load, 20% load, other load, no load) and frequency (i.e., monthly, quarterly, yearly, biennial, triennial). Thus, for the FLEX DGs, the plant-specific failure rate has been determined in accordance with the PRA standard. The failure rate is presented in the table below and will be used for the FLEX DG start failure rate. Note that this value includes both 'fail to start' events and 'fail to load' events. This start failure rate of the BNP FLEX DGs is between that of generic emergency DGs (EDG) and station blackout (SBO) DGs per 2015 SPAR Component Unreliability Data, as shown below.

However, due to relatively short run times during testing, the current data results are not considered sufficient for computing a plant-specific run failure rate. Thus, the SPAR SBO EDG run failure rate will be used as the plant-specific run failure rate. Duke Energy concludes that this is a bounding but realistic approach since run failure rates for EDGs and SBO DGs are very similar.

Diesel Failure Probabilities

Failure Mode	SPAR EDG	SPAR SBO DG	BNP FLEX DG
Fails to Start	2.88E-03/demand	2.98E-02/demand	1.26E-02/demand
Fails to Load	3.72E-03/hour	--	--
Fails to Run	1.52E-03/hour	1.50E-03/hour	1.50E-03/hour

The failure rate data above will be incorporated into the applicable models prior to implementation of 10 CFR 50.69 (see Attachment 1 of this submittal).

Due to the relatively low number of tests included in the plant-specific data, a sensitivity study was performed to assess the impact of the FLEX DG failure rates on categorization results. The Internal Events CDF was calculated using the plant-specific data in the above chart. The failure data was then increased by a factor of 3 and the CDF was recalculated. The increase in CDF was less than 2E-10 for each unit. The process was repeated for LERF, where there was no increase for either unit. Based on the negligible increase in CDF and no increase in LERF, changes in the failure rate values for the FLEX DGs have a negligible impact on the importance measures used in categorization.

b. Regarding the methodology used to determine the human failure event (HFE) probabilities the, November 2, 2018, response stated that they were evaluated per ASME/ANS PRA Standard SR HR-G3. The licensee stated that the EPRI HRA Calculator was used to quantify the events, explicitly addressing all performance shaping factors identified in HR-G3. However, the EPRI HRA calculator has no directly applicable options explicitly to cover actions like transportation of equipment, or installation of portable hoses and cables. The NRC staff notes that using surrogates for specific actions or engineering judgment to estimate the failure probability does not adequately address the elements needed for a technically acceptable human reliability analysis described in the ASME/ANS PRA Standard. Until gaps in the human reliability analysis methodologies are addressed by improved industry guidance, human error probabilities (HEPs) associated with actions for which the existing approaches are not explicitly applicable should be submitted to the NRC for review. If it cannot be demonstrated in the response to PRA RAI 8-1, subpart c, below, that the uncertainty associated with crediting the flex equipment is not expected to impact the categorization, provide the following:

   i. The HEP analysis for the operator actions related to the employment of FLEX equipment. Include in this discussion how each HFE was adjusted to address the gaps in the methodology and the rationale for each judgment, and a discussion of how the FLEX HFE probabilities compare to similar operator actions performed outside the main control room with the same number of execution steps.

   ii. Alternatively to part i, propose a mechanism to develop the FLEX operator HEP values that reflect the gap in methodology and incorporate them into the PRA models used for the 10 CFR 50.69 SSC categorization process, provide a sensitivity study as part of the suite of sensitivity studies that are included in the categorization process described in NEI 00-04 (e.g., Table 5-2) that can address this uncertainty, or remove credit for FLEX operator HEPs in the PRA model used for 10 CFR 50.69 categorization.

Duke Energy Response to PRA RAI 8-1.b:

As part of the 50.69 categorization process, NEI 00-04 requires sensitivity studies for each BSEP system categorized to “Decrease all human error basic events to their 5th percentile value and increase all human error basic events to their 95th percentile value.” The FLEX operator HEPs will be included in these BSEP sensitivity studies to determine the impact that these FLEX operator actions have on equipment importance. Results of the sensitivities are provided to the IDP in accordance with NEI 00-04.

Furthermore, Duke Energy will continue to stay informed of ongoing industry initiatives associated with modeling of FLEX operator actions. As new methodologies become available for industry use, they will be reviewed and implemented in accordance with Duke Energy's PRA model update process.

c. Regarding the impact of FLEX to the risk insights the November 2, 2018, response stated that the inclusion of FLEX in the PRA model moved the SBO sequence from the risk-significant category to the non-risk significant category. In order for any new risk-informed application that has incorporated mitigating strategies (FLEX) to meet the guidance of RG 1.200, the licensee should either perform a focused-scope peer review of the PRA model or demonstrate that none of the following criteria is satisfied:

   (1) Use of a new methodology,
   (2) Change in scope that impacts the significant accident sequences or the significant accident progression sequences, or
   (3) Change in capability that impacts the significant accident sequences or the significant accident progression sequences.

   The addition of mitigating strategies into a PRA model is considered a change in scope/capability. Based on the licensee's response to PRA RAI 8, subpart d, the addition of mitigating strategies to the Brunswick internal events PRA impacted a significant accident sequence (SBO drops out of top 95% contributor and would no longer be considered a significant accident sequence) and therefore would be considered an upgrade in accordance with the ASME/ANS PRA standard as endorsed by RG 1.200. Provide the following:

   i. Clarify how including FLEX in the PRA is expected to impact the categorization. Specifically, whether and how including FLEX will change the risk-significance of non-FLEX SSCs and whether the FLEX SSCs will be categorized as parts of other systems or as a stand-alone system.

   ii. If a significant impact is expected and the FLEX models are retained in the PRA, propose a mechanism to ensure that a focused-scope peer review is performed on the model changes associated with incorporating mitigating strategies, and associated facts and observations (F&Os) are resolved to Capability Category II prior to implementation of the 10 CFR 50.69 SSC categorization process. The peer review should address the issues raised in parts (a) and (b) of this RAI.

   iii. Alternatively, remove credit for FLEX equipment and strategies in the PRA models used for the 10 CFR 50.69 SSC categorization process.

Duke Energy Response to PRA RAI 8-1.c:

As summarized in Duke Energy's response to BSEP RAI 8 (ADAMS Accession No. ML18306A523), Brunswick installed small diesel generators (called SAMA diesels). The SAMA diesels' primary risk significant function was to charge the batteries during a station blackout. The SAMA diesels were incorporated into the PRA model prior to the last full scope internal events peer review in June of 2010. Inclusion of the SAMA diesels was within the scope of that internal events peer review. Implementation of the SAMA diesels into the PRA model reduced the contribution to CDF for the top SBO sequence from 1.2% down to 0.3%. This moved the sequence from the risk significant category to the non-risk significant category. In the last internal events model update which occurred in 2017, the function for charging the batteries during an SBO was shifted from the SAMA diesel to the FLEX diesel to reflect modifications completed at BSEP. The FLEX DGs have been modeled in the PRA using the same methods that were previously utilized for the SAMA diesels.

During the same internal events model update in 2017, portable FLEX equipment was also added to the model as described in the Duke Energy response to BSEP RAI 8. The overall model update changed the Unit 1 CDF by less than 1% and the Unit 2 CDF by approximately 2.5%, while both the Unit 1 and Unit 2 LERF values changed by less than 2%. These changes to the CDF and LERF metrics are considered by Duke Energy to be insignificant. Additionally, importance measures (Fussell-Vesely and risk achievement worth) for basic events were reviewed. Some basic event importance measures changed due to the 2017 internal events model update and as a result some of the basic events that were originally above the HSS thresholds before the internal events model update are now below the thresholds (i.e., are now LSS) based on CDF importance measures. In total, there are 18 basic events affecting 17 components that are below the HSS thresholds (i.e., are now LSS) due to the 2017 model update.

When categorizing components and/or systems within 10 CFR 50.69, portable equipment will be credited for the functions modeled in the PRA. The FLEX DGs will continue to be modeled as well, as described above. FLEX equipment (installed DGs and portable equipment) are considered to all be in one system at Brunswick. If FLEX equipment were to be categorized in the 10 CFR 50.69 process, then the SSCs would be categorized as a stand-alone system.

Further, as described in the Duke Energy response to BSEP RAI 8-1.b above, FLEX HEPs are within the scope of the sensitivity studies performed for each system categorization. When the HEPs are set to their 95th percentile value (including FLEX related HEPs), that will essentially have the effect of not having the FLEX portable equipment available since an operator action is required to use the portable equipment.

As described above, incorporation of the SAMA diesels into the model has been peer reviewed. Changing that function to the FLEX DG does not constitute a significant change in scope or capability of the model. Incorporation of portable equipment into the model does not significantly impact CDF and LERF metrics. Therefore, no model upgrades have been implemented and a peer review is not required.

PRA RAI 17-1 – External Flood and High Winds Key Assumptions and Sources of Uncertainty:

The licensee's response to PRA RAI 17.a includes an external flooding (XF) event associated with the 23 feet (ft.) still water flood as an assumption for the licensee's XF PRA and the response to PRA RAI 17.b considers it to be a "key" assumption. The response to PRA RAI 17.b discusses the use of the sensitivity study discussed in Section 8.1 of NEI 00-04 and performance monitoring of LSS SSCs as required by 10 CFR 50.69(e)(3) as being appropriate to address key uncertainties and assumptions. The licensee's response to PRA RAI 24.a states that the sensitivity will be performed by increasing the random failure probability of all LSS components in the XF PRA by a factor of 3. Therefore, events associated with the 23 ft. still water flood will not be included as part of the XF PRA.

PRA RAI 16 requested a description of how sufficient data points for the XF hazard were determined to capture the plant response at different flooding elevations. The licensee's response states that a cliff-edge effect, which is caused by the failure of diesel generators, in the plant response occurs at an elevation of 23 ft. and that the majority of plant risk in response to external flood events occurs at an elevation at and above 20 ft. but below 23 ft. As noted by the licensee's response, the plant response will be different at 23 ft. as compared to 20 ft. Further, the failure of the diesel generators at 23 ft. can affect this application (e.g., SSCs, such as the Severe Accident Mitigation Alternatives (SAMA) diesel generators, becoming high safety significant) which can be missed if that flood elevation is not quantified as part of the base XF PRA.

In light of the above discussion and in the context of this application, discuss why excluding the 23 ft. flood does not identify unique risk significant SSCs and consequently does not impact this application. Alternately, justify how changes to the random failure probability of LSS components will address the "key" assumption related to the plants response at the 23 ft. flood in the context of this application. The response should propose, as appropriate, how two different importance measures for an SSC that would result from the quantification of the PRA model at the 20 ft. and 23 ft. flood elevations will be combined to develop representative importance measures.

Duke Energy Response to PRA RAI 17-1:

As noted in the Duke Energy response to BSEP RAI 16 (ADAMS Accession No. ML18306A523), the BSEP external flood model includes evaluation of two cliff-edge impacts. For a 20ft flood, an unrecoverable loss of offsite power is modeled as well as loss of the circulating water pumps and fire pumps (both diesel and electric pumps). For a 23ft flood, the model also fails the emergency diesel generators and the operator action to start the SAMA diesels. Note, the SAMA diesel function is to charge the station batteries. The operator action to start the SAMA diesels is failed because operators would not be able to access the area to start the diesels. As such, with unrecoverable loss of offsite power and no onsite emergency power, suppression pool cooling and wetwell venting become unavailable. With no means to address long term decay heat removal, the plant will not be able to achieve a safe and stable condition. With the additional equipment above assumed to be failed for a 23ft flood, there are no unique risk insights to be gained by including the 23ft flood evaluation in the 50.69 categorization process. Thus, the 23ft flood does not impact the 10 CFR 50.69 application.

PRA RAI 22-1 – Importance Measure Calculation and Categorization of Non-Aligned Components

PRA RAI 22.b requested information on how the integrated importance measures will be calculated for HW and XF basic events that may not align directly with basic events in other PRA models. A discussion of the treatment of implicitly modeled components in the HW and XF PRA models in the categorization process was also requested (item ii in PRA RAI 22.b). The licensee's response included a discussion of the importance measure calculation for a component that is credited in one hazard model, but not in all (or any) of the other models. However, the licensee did not provide any discussion on the treatment of implicitly modeled components in the response.

Discuss how implicitly modeled components in the HW and XF PRA models will be captured and treated in the categorization process.

Duke Energy Response to PRA RAI 22-1:

As stated in section 5.1 of NEI 00-04, the assessment of importance for an SSC involves the identification of PRA basic events that represent the SSC. Some of the identified basic events implicitly model a SSC (e.g., some human actions, initiating events, etc.). In addition to the human actions and initiating events examples of implicitly modeled components, SSCs can also be implicitly modeled if they are a subcomponent of an explicitly modeled SSC in the PRA. The process for addressing implicitly modeled components for the three types described above is provided as follows.

<u>Initiating Events:</u>

In NEI 00-04, the process for "other external hazards" (i.e., other than fire and seismic, which are explicitly described in their own sections of NEI 00-04) is described in section 5.4. As stated in section 5.4, the generalized safety significance process for plants with an external hazard PRA is the same as the process for an internal events PRA. The internal events process for addressing SSCs which are implicitly modeled within an initiating event is shown graphically in the flow chart in Figure 5-2 of NEI 00-04 for internal events models. Any SSC which can directly cause a complicated initiating event that has a Fussell-Vesely importance greater than the criterion of 0.005 is considered a candidate safety-significant SSC and the attributes that could influence that role as an initiating event are to be identified. A complicated initiating event is considered an event that trips the plant and causes an impact on a key safety function. However, as stated in section 5.4 of NEI 00-04, plant components cannot initiate external events such as tornadoes, high winds or external floods. Therefore, by definition, there are no SSCs which are implicitly modeled as part of initiating events for the high winds and external flood models.

<u>Subcomponents:</u>

Some SSCs are not explicitly modeled in the PRA because they are considered subcomponents of other SSCs which are explicitly modeled. In the case where SSCs are not explicitly modeled, for all hazard models, importance measures are not developed for the subcomponents, but the subcomponents are given the same risk categorization as the highest risk component that is required to support the function of the explicitly modeled component in accordance with

NEI 00-04 Section 7.1. This determination is made after the integrated assessment is performed for the explicitly modeled components. Note that at a later point in the categorization process (section 10.2 of NEI 00-04), the subcomponent can be downgraded to a lower risk category if it is demonstrated that it is not required to support the modeled function. For implicitly modeled SSCs which are not a subcomponent of an explicitly modeled component but which must perform their function in order for that explicitly modeled component to perform its function (for example, a floor drain that must remove water during an external flooding event to prevent failure of another component within the room), the implicitly modeled component is given the same risk significance as the explicitly modeled component that it supports. That is, as stated in NEI 00-04, by focusing on the significance of system functions and then correlating those functions to specific components that support the function, implicitly modeled components are addressed.

Human Reliability Events:

Similar to initiating events, it is possible that an SSC is implicitly modeled within an HRA event (i.e., the SSC is necessary for the human action to be successful). If the failure of the SSC by itself will prevent the successful completion of a risk significant human action, the SSC will become candidate HSS, regardless of the hazard model. Note that this same conclusion will be drawn during the deterministic assessment for LSS components (in section 9.2.2 of NEI 00-04) of whether the function/SSC is implicitly depended upon to maintain safe shutdown capability, prevent of core damage and maintain containment integrity. Item 4 of that section asks the question as to whether the active function/SSC is called out or relied upon in the plant Emergency/Abnormal Operating Procedures or similar guidance as the sole means for the successful performance of operator actions required to mitigate an accident or transient. This also applies to instrumentation and other equipment associated with the required actions. If the function/SSC is the sole means, it becomes HSS. If the failure of the SSC by itself will not prevent successful completion of the human action, it is considered LSS.

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Attachment 1

Brunswick 50.69 PRA Implementation Items

The table below identifies the items that are required to be completed prior to implementation of 10 CFR 50.69 at Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The issues identified below will be addressed and any associated changes made, focused scope peer reviews performed on changes that are PRA upgrades as defined in the PRA standard (ASME/ANS RA-Sa-2009, as endorsed by RG 1.200, Revision 2), and findings resolved and reflected in the PRA of record prior to implementation of 10 CFR 50.69.

Brunswick 50.69 PRA Implementation Items	
Description	Resolution
i. The BSEP external flood (XF) model hazard is being updated with more detailed analytical modeling as described in response to RAI 11 in Duke Energy letter dated November 2, 2018. The additional details need a focused scope peer review.	Duke Energy will complete a focused scope peer review of the BSEP External Flood PRA model hazard development prior to implementation of 10 CFR 50.69. Any findings from the focused scope peer review will be resolved and closed per an NRC approved process prior to implementing 10 CFR 50.69.
ii. The BSEP FLEX diesel generator (DG) failure rates will be updated using plant-specific data as described in response to RAI 8-1 in Duke Energy letter dated February 13, 2019.	Duke Energy will update the applicable PRA models with FLEX DG failure rates as described in the RAI 8-1 response.

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Attachment 2

Markup of Proposed Renewed Facility Operating License

Amendment Number	Additional Conditions	Implementation Date
282	During the extended EDG Completion Times authorized by Amendment No. 282, designated NLOs will be briefed, each shift, regarding cross-tying 480 V E7 bus to the 480 V E8 bus per 0AOP-36.1, *Loss of Any 4kV OR 480V Bus*.	Upon implementation of Amendment No. 282.
282	During the extended EDG Completion Times authorized by Amendment No. 282, designated NLOs will be briefed, each shift, regarding starting and tying the SUPP-DG to 4160 V emergency bus E4 per plant procedure 0EOP-01-SBO-08, *Supplemental DG Alignment*.	Upon implementation of Amendment No. 282.
282	During the extended EDG Completion Times authorized by Amendment No. 282, designated NLOs will be briefed, each shift, regarding load shed procedures and alignment of the FLEX diesel generators.	Upon implementation of Amendment No. 282.
282	During the extended EDG Completion Times authorized by Amendment No. 282, a continuous fire watch shall be established for the Unit 1 Cable Spread Room and for the Balance of Plant busses in the Unit 1 Turbine Building 20 foot elevation.	Upon implementation of Amendment No. 282.
285	The licensee shall not operate the facility within the MELLLA+ operating domain with Feedwater Temperature Reduction (FWTR), as defined in the Core Operating Limits Report.	Upon implementation of Amendment No. 285

INSERT UNIT 1

INSERT UNIT 1

Amendment Number	Additional Conditions	Implementation Date
[NUMBER]	Duke Energy is approved to implement 10 CFR 50.69 using the processes for categorization of Risk Informed Safety Class (RISC)-1, RISC-2, RISC-3, and RISC-4 structures, systems, and components (SSCs) using: Probabilistic Risk Assessment (PRA) models to evaluate risk associated with internal events, including internal flooding, internal fire, high winds, and external flood; the shutdown safety assessment process to assess shutdown risk; the Arkansas Nuclear One, Unit 2 (ANO-2) passive categorization method to assess passive component risk for Class 2 and Class 3 SSCs and their associated supports; and the results of non PRA evaluations that are based on the IPEEE Screening Assessment for External Hazards, i.e., seismic margin analysis (SMA) to evaluate seismic risk, and a screening of other external hazards updated using the external hazard screening significance process identified in ASME/ANS PRA Standard RA-Sa-2009; as specified in Unit 1 License Amendment No. [XXX] dated [DATE]. Duke Energy will complete the implementation items list in Attachment 1 of Duke letter to NRC dated February 13, 2019 prior to implementation of 10 CFR 50.69. All issues identified in the attachment will be addressed and any associated changes will be made, focused-scope peer reviews will be performed on changes that are PRA upgrades as defined in the PRA standard (ASME/ANS RA-Sa-2009, as endorsed by RG 1.200, Revision 2), and any findings will be resolved and reflected in the PRA of record prior to implementation of the 10 CFR 50.69 categorization process. Prior NRC approval, under 10 CFR 50.90, is required for a change to the categorization process specified above (e.g., change from a seismic margins approach to a seismic probabilistic risk assessment approach).	Upon implementation of Amendment No. [XXX].

Amendment Number	Additional Conditions	Implementation Date
310	During the extended EDG Completion Times authorized by Amendment No. 310, dedicated non-licensed operators (NLOs) shall be briefed, each shift, regarding cross tying the 4160 V emergency bus E2 to 4160 V emergency bus E4 per plant procedure 0AOP-36.1, *Loss of Any 4kV OR 480V Bus*.	Upon implementation of Amendment No. 310.
310	During the extended EDG Completion Times authorized by Amendment No. 310, dedicated NLOs will be briefed, each shift, regarding cross-tying 480 V E7 bus to the 480 V E8 bus per 0AOP-36.1, *Loss of Any 4kV OR 480V Bus*.	Upon implementation of Amendment No. 310.
310	During the extended EDG Completion Times authorized by Amendment No. 310, dedicated NLOs will be briefed, each shift, regarding starting and tying the SUPP-DG to 4160 V emergency bus E4 per plant procedure 0EOP-01-SBO-08, *Supplemental DG Alignment*.	Upon implementation of Amendment No. 310.
310	During the extended EDG Completion Times authorized by Amendment No. 310, designated NLOs will be briefed, each shift, regarding load shed procedures and alignment of the FLEX diesel generators.	Upon implementation of Amendment No. 310.
310	During the extended EDG Completion Times authorized by Amendment No. 310, a continuous fire watch shall be established for the Unit 2 Cable Spread Room and for the Balance of Plant busses in the Unit 2 Turbine Building 20 foot elevation.	Upon implementation of Amendment No. 310.
310	During the extended EDG Completion Times authorized by Amendment No. 310, the FLEX pump and FLEX Unit 2 hose trailer shall be staged at the south side of the Unit 2 Condensate Storage Tank to support rapid deployment in the event the FLEX pump is needed for Unit 2 inventory control.	Upon implementation of Amendment No. 310.
313	The licensee shall not operate the facility within the MELLLA+ operating domain with Feedwater Temperature Reduction (FWTR), as defined in the Core Operating Limits Report.	Upon implementation of Amendment No. 313.

INSERT UNIT 2

INSERT UNIT 2

Amendment Number	Additional Conditions	Implementation Date
[NUMBER]	Duke Energy is approved to implement 10 CFR 50.69 using the processes for categorization of Risk Informed Safety Class (RISC)-1, RISC-2, RISC-3, and RISC-4 structures, systems, and components (SSCs) using: Probabilistic Risk Assessment (PRA) models to evaluate risk associated with internal events, including internal flooding, internal fire, high winds, and external flood; the shutdown safety assessment process to assess shutdown risk; the Arkansas Nuclear One, Unit 2 (ANO-2) passive categorization method to assess passive component risk for Class 2 and Class 3 SSCs and their associated supports; and the results of non PRA evaluations that are based on the IPEEE Screening Assessment for External Hazards, i.e., seismic margin analysis (SMA) to evaluate seismic risk, and a screening of other external hazards updated using the external hazard screening significance process identified in ASME/ANS PRA Standard RA-Sa-2009; as specified in Unit 2 License Amendment No. [XXX] dated [DATE]. Duke Energy will complete the implementation items list in Attachment 1 of Duke letter to NRC dated February 13, 2019 prior to implementation of 10 CFR 50.69. All issues identified in the attachment will be addressed and any associated changes will be made, focused-scope peer reviews will be performed on changes that are PRA upgrades as defined in the PRA standard (ASME/ANS RA-Sa-2009, as endorsed by RG 1.200, Revision 2), and any findings will be resolved and reflected in the PRA of record prior to implementation of the 10 CFR 50.69 categorization process. Prior NRC approval, under 10 CFR 50.90, is required for a change to the categorization process specified above (e.g., change from a seismic margins approach to a seismic probabilistic risk assessment approach).	Upon implementation of Amendment No. [XXX].