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U.S. Nuclear Regulatory Commission
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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
Clarification of Responses for Requests for Additional Information
License Amendment Request for Relocation of Specific Surveillance Frequency Requirements to a Licensee-Controlled Program

References:

1. Letter from William R. Gideon (Duke Energy) to U.S. Nuclear Regulatory Commission, *Application For Technical Specification Change Regarding Risk-Informed Justification for the Relocation of Specific Surveillance Frequency Requirements to a Licensee-Controlled Program*, dated December 21, 2015, ADAMS Accession Number ML16004A249

2. NRC E-mail Capture, *Brunswick Unit 1 and Unit 2 Request for Additional Information related to LAR to Relocation of Specific Surveillance Frequency Requirements to Licensee Controlled Program (CAC Nos. MF7206 and MF7207)*, dated June 15, 2016, ADAMS Accession Number ML16167A174

3. Letter from William R. Gideon (Duke Energy) to U.S. Nuclear Regulatory Commission, *Response to Request for Additional Information Regarding License Amendment Request for Relocation of Specific Surveillance Frequency Requirements to a Licensee-Controlled Program*, dated July 13, 2016, ADAMS Accession Number ML16209A225

4. Letter from William R. Gideon (Duke Energy) to U.S. Nuclear Regulatory Commission, *Response to Request for Additional Information Regarding License Amendment Request to Relocation of Specific Surveillance Frequency Requirements to a Licensee-Controlled Program*, dated August 15, 2016, ADAMS Accession Number ML16238A152

Ladies and Gentlemen:

By letter dated December 21, 2015 (i.e., Reference 1), Duke Energy Progress, LLC (Duke Energy), submitted a license amendment request (LAR) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed amendment would modify the Technical Specifications (TSs) by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04-10, "Risk-Informed Technical Specification Initiative 5b, Risk-Informed Method for Control of Surveillance

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Frequencies." Additionally, the change would add a new program, the Surveillance Frequency Control Program, to TS Section 5.5, "Programs and Manuals." The changes are consistent with Nuclear Regulatory Commission (NRC) approved Technical Specification Task Force (TSTF) Standard Technical Specifications (STS) Change TSTF-425, "Relocate Surveillance Frequencies to Licensee Control - RITSTF Initiative 5b," Revision 3.

On June 15, 2016, by electronic mail (i.e., Reference 2), the NRC provided a request for additional information (RAI) regarding the LAR. Duke Energy's responses to these RAIs were provided on July 13, 2016 (i.e. Reference 3) and August 15, 2016 (i.e., Reference 4). These RAI responses were discussed, by telephone, with the NRC on September 27, 2016. It was agreed that clarifying information would be provided for several of the responses. The clarifying information is provided in Enclosure 1 of this letter.

A revised regulatory commitment, as described in Enclosure 2, is contained in this letter.

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 11-1-16.

Sincerely,

Karl Moser for

William R. Gideon

MAT/mat

Enclosures:

1. Clarifying Information Regarding Response to Request for Additional Information
2. List of Regulatory Commitments

cc (with Enclosures):

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Clarifying Information Regarding Response to Request for Additional Information

By letter dated December 21, 2015, Duke Energy submitted a license amendment request (LAR) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed amendment would modify the Technical Specifications (TSs) by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04-10, "Risk-Informed Technical Specification Initiative 5b, Risk-Informed Method for Control of Surveillance Frequencies." Additionally, the change would add a new program, the Surveillance Frequency Control Program, to TS Section 5.5, "Programs and Manuals." The changes are consistent with Nuclear Regulatory Commission (NRC) approved Technical Specification Task Force (TSTF) Standard Technical Specifications (STS) Change TSTF-425, "Relocate Surveillance Frequencies to Licensee Control - RITSTF Initiative 5b," Revision 3.

On June 15, 2016, by electronic mail, the NRC provided a request for additional information (RAI) regarding the LAR. Duke Energy's responses to these RAIs were provided on July 13, 2016, and August 15, 2016. These RAI responses were discussed by telephone with the NRC on September 27, 2016. It was agreed that clarifying information would be provided for several of the responses. The clarifying information is provided below.

NRC RAI 1.b Required Clarification:

The response to RAI 1.b states that "No credit for equipment survivability or human actions in adverse environments is taken that would satisfy [supporting requirement] SR LE-C10 or LE-C12."

a. Confirm that this statement means that the equipment is assumed to fail and any human actions to be unsuccessful.

b. The assumption that the equipment is failed could potentially underestimate the change in risk due to changing the surveillance frequencies. Confirm that there is no equipment in the Surveillance Frequency Control Program (SFCP) that would be affected by this assumption and justify why that is the case.

Clarification:

1.b.a

After containment failure, injection sources within the reactor building are assumed failed due to NPSH concerns in the suppression pool, harsh environmental conditions, and the potential failure of equipment or injection lines disrupted by containment failure. Human actions in these areas are also assumed failed. Equipment and human actions external to the reactor building (i.e., condensate, service water, fire protection) are still credited.

1.b.b

This assumption does not impact the SFCP since containment failures provide a direct release path for core damage events.

NRC RAI 1.e Required Clarification:

In resolution to internal events Findings & Observations (F&O) 1-3 the licensee stated that, as a result of an analysis performed using updated pipe break frequencies, Main Steam Line Break (MSLB) should be included as an initiator. In response to RAI 1.e the licensee stated that MSLB is not included because "a conservative assessment of a MSLB outside containment that causes a high energy line break (HELB)-induced loss of offsite power (LOOP) demonstrated that the risk increase due to inclusion of the MSLB initiator is on the order of 1E-10/year." This justification does not appear to be consistent with SR IE-C6 of the PRA standard ASME/ANS RA-Sa-2009, endorsed by RG 1.200 Revision 2. The initiating event screening criteria contained in SR IE-C6 are that the frequency of the initiating event is less than a specified value (criterion a or b) or that the initiating event does not result in an immediate reactor shutdown (criterion c). Justify how the exclusion of the MSLB initiator is consistent with SR IE-C6, or modify the PRA to include this initiator.

Clarification:

The MSLB initiator is currently included as part of our in-process model of record update in accordance with the PRA Standard.

NRC RAI 1.f Required Clarification:

In response to RAI 1.f the licensee provided a summary of model uncertainties and limitations in the Large Early Release Frequency (LERF) analysis and stated that "[n]o limitations were identified that would impact the BSEP Surveillance Frequency Control Program (SFCP) as changes in surveillance test intervals do not affect the LERF phenomena identified by these limitations." The risk impact for these uncertainties is assessed qualitatively in response to the RAI.

a. Clarify whether any of the LERF uncertainties or limitations listed in Table 1 of the response to RAI 1.f are non-conservative. If yes, justify why they don't have any meaningful impact on the SFCP.

b. Description of uncertainty item 6 in Table 1 states: "Loss of adequate in-vessel injection coupled with inadequate containment heat removal results in moderately high temperatures and also conditional probability of leakage versus rupture" and the basis states that "[t]he temperature failure regime is intermediate." Confirm and explain how the "intermediate" temperature failure regime is well above the "moderately high temperatures" that could result from loss of adequate in-vessel injection coupled with inadequate containment heat removal.

c. Description of uncertainty item 9 in Table 1 assesses that "for unmitigated ATWS sequences, the primary cause of containment failure is judged to be torus dynamic loads." The basis states that "containment failure is found to be in the torus a large percentage of time." Confirm that this percentage is high enough to cover any additional contribution from the unmitigated ATWS sequences.

Clarification:

1.f.a

No uncertainties were identified that would be considered non-conservative.

1.f.b

The intent of this qualitative statement is to indicate that the temperatures expected from a loss of in-vessel injection with inadequate containment heat removal results in containment temperatures which fall into the intermediate temperature failure range as it is defined for the LERF analysis. For this intermediate temperature failure range (i.e., 350°F to 600°F), there are conditional probabilities assigned for containment leakage versus rupture failures.

1.f.c

The LERF model considers both drywell and torus failures in unmitigated Anticipated Transient Without Scram (ATWS) sequences. The contribution of failures in the torus is 99.3% of the total unmitigated ATWS LERF contribution. The contribution for failures in the drywell is 0.7% of the total unmitigated ATWS LERF contribution. The contributions from these two failure modes adequately address the range of expected outcomes from unmitigated ATWS sequences.

NRC RAI 2 Required Clarification:

The response to RAI 2 stated that "Duke Energy will conduct a focused-scope peer review to close the resolved F&Os in accordance with RG 1.200, Revision 2, for the internal flooding technical elements based on the enhancement made since the 2010 peer review." The licensee proposed a commitment with a due date of 7/13/2017. Confirm that the intent is to delay implementation of the SFCP until the peer review of the internal flooding PRA is conducted in accordance with RG 1.200, Revision 2, and all Finding-level F&Os identified during the peer review are closed or dispositioned; and include these additional restrictions in the proposed commitment wording.

Clarification:

Duke Energy will conduct a focused-scope peer review in accordance with Regulatory Guide 1.200, Revision 2, for the internal flooding technical elements based on the enhancements made since the 2010 peer review. All finding-level F&Os from the 2010 peer review not closed out by the new focused-scope peer review, as well as any finding-level F&Os from the new focused-scope peer review itself, will be resolved prior to implementation of the SFCP.

The wording of the proposed commitment has been revised accordingly and is included in Enclosure 2.

NRC RAI 4.a Required Clarification:

In RAI 4.a related to fire PRA F&Os 1-19 and 1-20 the NRC staff asked the licensee to justify the exclusion of batteries as transient fire targets. The response to RAI 4.a states that "there is no industry guidance identifying batteries as targets and establishing damage criteria or ignition criteria from which to determine the applicable Zones of Influence (ZOIs) for a transient fire." It

further states that "Operating Experience does not support a trend of transient fires damaging or igniting batteries." The NRC staff notes that the guidance in NUREG/CR-6850 provides HRRs for transient combustibles, from which zones of influence can be estimated via fire phenomenological modeling (e.g., Fire Dynamics Tools) to determine whether or not targets, such as batteries or their cables, etc., might be damaged. Additional guidance on "weighting factors" associated with transient combustible fires is provided in FAQ 12-0064, "Hot work/transient fire frequency: influence factors." A priori dismissal of transient fires in the Battery Room is not justified, although operating experience showing rare events can be used when assigning appropriate weighting factors for the physical analysis unit as per the FAQ. Before dismissing transient-fire-induced damage to batteries, provide a bounding estimate demonstrating that any contribution from transient fires affecting batteries would be negligible compared to that from battery fires themselves, or postulate and analyze transient fires consistent with the guidance in the FAQ

Clarification:

The response to RAI 4.a was limited to an explanation for the exclusion of batteries as transient fire targets (i.e., separate from cables), because that was the context of F&Os 1-19 and 1-20.

More broadly, the methodology used to identify targets for transient ignition sources satisfies the guidance in NUREG/CR-6850 and provides for the use of influence factors as described in FAQ 12-0064. In particular, this methodology postulated transient ignition sources where cables would be impacted and was applied in the battery rooms in the same manner as elsewhere in the plant. This methodology is consistent with the guidance in Section H.2 of NUREG/CR-6850 where fire vulnerability is "...assumed to be limited to the vulnerability of the power, control, and/or instrument cables supporting the component." This methodology also bounds the guidance, in Section 11.5.1.6 of NUREG/CR-6850, to postulate transient ignition sources based on "... 'pinch points' where targets from two different safety divisions can be damaged by the same fire." Although the battery rooms are divisionally separated by rated fire barriers, a transient ignition source was postulated based on this methodology and was analyzed.

NRC RAI 4.c Required Clarification:

The truncation sensitivity study provided in response to RAI 4.c showed that the current fire PRA truncation of 1E-09/year for Core Damage Frequency (CDF) and 1E-10/year for LERF does not meet supporting requirement QU-B3 of the ASME/ANS PRA standard. The RAI response also states that "the SFCP [...] is not affected by the chosen truncation levels because the fire PRA can be quantified at truncation levels where convergence is similar to internal events." Confirm that the licensee intends to use a fire PRA truncation no higher than 1E-11/year in the SFCP as shown to be needed by the truncation convergence study provided in response to the RAI, i.e., consistent with SR QU-B3, and propose a license condition to capture this commitment.

Clarification:

When used in support of the SFCP, the Fire PRA will satisfy Supporting Requirement FQ-B1, which references QU-B3 for establishing truncation limits to achieve convergence.

A license condition specifying a particular truncation limit is not appropriate. The truncation study showed that convergence was not achieved at a preordained truncation level but was instead very model dependent. For example, while Unit 1 CDF and Unit 2 CDF satisfied the convergence criterion for Supporting Requirement QU-B3 at truncation levels between 1E-10/yr and 1E-11/yr, Unit 1 LERF and Unit 2 LERF achieved acceptable convergence at truncation levels between 1E-8/yr and 1E-9/yr and between 1E-9/yr and 1E-10/yr, respectively. Also, the truncation level required for a particular model to satisfy the convergence criterion in the future can be expected to change as the models themselves change.

NRC RAI 4.I Required Clarification:

Resolution to F&O 6-1 related to SR CS-B1 states that three raceways in the Unit 2 electrical equipment room that could not be routed are identified as a source of uncertainty. It further states that the risk associated with the assumed failure of these raceways is "qualitatively addressed as a non-conservative assumption [...] that is *likely mitigated* in the HGL scenarios by other failures for the respective power supplies." In RAI 4.I the staff asked the licensee to assess the impact of this assumption on the SFCP, confirming it is conservative. In response to RAI 4.I the licensee stated that "the fire PRA would provide acceptable estimates of the risk impact of the proposed STI adjustment because the same fire-induced failures of the cables in raceways in the Unit 2 electrical equipment room would be applied to both the base and the adjusted PRA." The NRC staff notes that even if present in both the base and adjusted cases in the same way, an underestimate of the risk change (unless zero) would result from maintaining this non-conservatism. Either justify that the effect is negligible or provide a stronger basis than "likely mitigated."

Clarification:

The qualitative assessment of the risk impact of the missing information for the three raceways of interest was based on several mitigating considerations. First, the three raceways only comprised a portion of the routing for two cables, and the associated equipment failures were already included in the target set for the hot gas layer (HGL). There would be no increase in HGL risk, and HGL was the only risk contributor for Unit 1 scenarios. Second, the missing information involved only one cable in one raceway that was identified as a target in the ZOI for any ignition source. There would be no increase in ZOI risk for the other two raceways. Third, the ZOI target set of one ignition source already included the equipment failure associated with the one remaining raceway of interest. There would be no increase in ZOI risk for those scenarios. Fourth, solid bottom cable trays were credited for each ZOI ignition source affecting the one remaining raceway of interest.

To support the clarification of this RAI response, a sensitivity study was performed in which the associated equipment failure was added to the affected scenarios, which were then quantified at a truncation level no higher than 1E-11/yr. The resulting risk increases were:

Unit 1		Unit 2	
CDF(1/yr)	LERF (1/yr)	CDF (1/yr)	LERF (1/yr)
0E+00	0E+00	0E+00	< 3E-11

This substantiates the qualitative assessment that the risk increases are considered negligible.

NRC RAI 5.d Required Clarification:

The response to RAI 5.d describes the sources of uncertainty for the high winds PRA and states that "[n]one of these sources of uncertainty will impact the results of the SFCP as a high wind event affects both the base and modified cases." The NRC staff does not find this justification acceptable, as the change in risk could be underestimated by underestimating the probability associated with any basic event present in the cutsets. Justify how it was concluded that for the sources of uncertainty listed in response to RAI 5.d their "assessed impact is negligible on any STI."

Clarification:

The change in risk for each surveillance test interval (STI) considered in the SFCP will be assessed for the impact of the identified uncertainties in the high wind analysis.

List of Regulatory Commitments

The following table identifies the actions in this document to which the Brunswick Steam Electric Plant (BSEP) has committed. Statements in this submittal, with the exception of those in the table below, are provided for information purposes and are not considered commitments.

Please direct questions regarding these commitments to Mr. Lee Grzeck, Manager - Regulatory Affairs, at (910) 457-2487.

Commitment	Type (Check One)		Scheduled Completion Date/Event
	One-Time Action	Continuing Compliance	
1. Duke Energy will conduct a focused-scope peer review in accordance with Regulatory Guide 1.200, Revision 2, for the internal flooding technical elements based on the enhancements made since the 2010 peer review. All finding-level F&Os from the 2010 peer review not closed out by the new focused-scope peer review, as well as any finding-level F&Os from the new focused-scope peer review itself, will be resolved prior to implementation of the SFCP.	X		Prior to implementation of the SFCP.