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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
Supplement to Response to Request for Additional Information Regarding Request for Risk-Informed Exigent License Amendment - Technical Specification 3.8.1, *AC Sources – Operating,* One-Time Extension of Emergency Diesel Generator Completion Times and Suspension of Surveillance Requirements

References:

1. Letter from William R. Gideon (Duke Energy) to the U.S. Nuclear Regulatory Commission Document Control Desk, *Request for Risk-Informed Exigent License Amendment - Technical Specification 3.8.1, AC Sources – Operating, One-Time Extension of Emergency Diesel Generator Completion Times and Suspension of Surveillance Requirements*, dated November 28, 2017, ADAMS Accession Number ML17332B024

2. Letter from William R. Gideon (Duke Energy) to the U.S. Nuclear Regulatory Commission Document Control Desk, *Response to Request for Additional Information (Probabilistic Risk Assessment and Human Performance Branches) Regarding Request for Risk-Informed Exigent License Amendment - Technical Specification 3.8.1, AC Sources – Operating, One-Time Extension of Emergency Diesel Generator Completion Times and Suspension of Surveillance Requirements*, dated December 6, 2017, ADAMS Accession Number ML17340A457

Ladies and Gentlemen:

By letter dated November 28, 2017 (i.e., Reference 1), Duke Energy Progress, LLC (Duke Energy), submitted a one-time, risk-informed exigent license amendment request (LAR) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendment would extend the current Completion Time of Technical Specification (TS) 3.8.1, Required Action D.5, from the original 14 days to 44 days, and a commensurate change to extend the maximum Completion Time associated with discovery of failure to meet TS 3.8.1.a or b (i.e., from the original 17 days to 47 days).

These changes are being requested in order to avoid an unnecessary shutdown of both Unit 1 and Unit 2. In addition, consistent with defense-in-depth philosophy, Duke Energy also requested to suspend monthly testing of Emergency Diesel Generators (EDGs) 1, 2, and 3 per

Surveillance Requirement (SR) 3.8.1.2, SR 3.8.1.3, and SR 3.8.1.6 during the proposed extended Completion Times, if applicable.

By letter dated December 6, 2017 (i.e., Reference 2), Duke Energy submitted responses to questions from the NRC's Probabilistic Risk Assessment and Human Performance Branches. Enclosed is a revised response to NRC Question PRA-RAI-7c (i.e., PRA Model of Record) and additional information to supplement the response to NRC Question PRA-RAI-9 (i.e., Supplemental Equipment and Compensatory Actions).

This document contains no new regulatory commitments.

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on December 7, 2017.

Sincerely,

William R. Gideon

WRM/wrm

Enclosure: Revised Response for NRC Question PRA-RAI-7c and Supplemental Information for NRC Question PRA-RAI-9

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Revised Response for NRC Question PRA-RAI-7c and Supplemental Information for NRC Question PRA-RAI-9

By letter dated November 28, 2017, Duke Energy Progress, LLC (Duke Energy), submitted a one-time, risk-informed exigent license amendment request (LAR) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendment would extend the current Completion Time of Technical Specification (TS) 3.8.1, Required Action D.5, from the original 14 days to 44 days, and a commensurate change to extend the maximum Completion Time associated with discovery of failure to meet TS 3.8.1.a or b (i.e., from the original 17 days to 47 days). These changes are being requested in order to avoid an unnecessary shutdown of both Unit 1 and Unit 2. In addition, consistent with defense-in-depth philosophy, Duke Energy also requested to suspend monthly testing of Emergency Diesel Generators (EDGs) 1, 2, and 3 per Surveillance Requirement (SR) 3.8.1.2, SR 3.8.1.3, and SR 3.8.1.6 during the proposed extended Completion Times, if applicable.

By letter dated December 6, 2017, Duke Energy submitted responses to questions from the NRC's Probabilistic Risk Assessment and Human Performance Branches. A revised response to NRC Question PRA-RAI-7c (i.e., PRA Model of Record) and additional information to supplement the response to NRC Question PRA-RAI-9 (i.e., Supplemental Equipment and Compensatory Actions) follows.

Revised Response to Question PRA-RAI-7c:

MOR16 includes two operator actions for aligning the Supplemental Diesel Generator (SUPP-DG): (1) one given that an EDG is in maintenance, and (2) a second given that there are no EDGs in maintenance. Both of these operator actions are included in the PRA base case as well as in the LAR evaluation. However, since EDG 4 is actually in maintenance, the probability associated with operator action (2) to start the SUPP-DG, given that no EDGs are in maintenance, could have been set to zero since the action is not applicable. This modeling refinement was not pursued and represents an analysis conservatism.

Supplement to Question PRA-RAI-9a:

Concerning the table in response to RAI-9a, the following information explains in more detail the "Other FLEX Equipment" credited in the Internal Events PRA and how it is used.

In addition to the FLEX diesel generators, FLEX diesel-driven portable pumps and FLEX diesel-driven air compressors have been added to the internal events PRA model. These were added based on a review of FLEX equipment added at the plant in order to recognize additional accident mitigation capability for late failures in slow, long-term accident sequences, such as Extended Loss of AC Power (ELAP) scenarios. Additional information on this equipment and associated actions for their use is provided below.

FLEX Portable Pumps

PRA Functions	Provide injection flow from the Condensate Storage Tank (CST) to the Reactor Pressure Vessel and Spent Fuel Pools to provide core cooling and spent fuel pool cooling.
Design	The FLEX Portable Pumps are a set of two trailer mounted Hale model FP3000DJ pumps driven by a John Deere model 6135 diesel engine with a Hale 80FCK Series pump. There is also an "n+1" pump, to be used in case of failure of either of the unit-specific pumps. The n+1 pump is the B.5.b pump, a trailer mounted Hale model RSD150-21 pump driven by an IVECO F2CE9687A diesel engine.
Success Criteria	One pump/unit
Flow Rate	300 gpm/pump
Normal Operation	The FLEX Portable Pumps are standby components, stored in the FLEX Dome. All alignment actions are manual. The pumps can be aligned to either the primary or alternate flow path and take suction from either the CST (i.e., preferred) or discharge weir.
Accident Operation	If required per the FLEX Support Guidelines, around three hours after an initiator, staging will begin. The FLEX pumps will be transported out of the FLEX Dome on their trailers via pickup truck or bulldozer and staged near the suction source.
Operator Action	OPER-FLEX-PUMP, "FAILURE TO STAGE AND ALIGN FLEX PORTABLE PUMP." Scenario: The plant has an Extended Loss of AC Power or otherwise failure of all other injection sources Timing Analysis: T_{delay} = 1 hour. This corresponds to the time at which the ERO should be manned. This is the entry condition for the staging order. T_{cog} = 1 minute. The need to stage equipment should be readily apparent upon entry into 0EOP-01-FSG-01. Since information gathering occurs while waiting for plant conditions or the ERO, it should only take a very short amount of time to give the order. T_{exe} = 2.5 hours. This is an estimate of the amount of time to stage the pump, route hoses, and align valves. T_{sw} = 5.4 hours. According to FLEX program documentation (CSD-EG-BNP-8888, Rev. 1), the pump is sized and rated for use roughly 5.4 hours after event start. This is used as a conservative bound for the system window.

FLEX Air Compressors

PRA Functions	Provide pressurized air to supply the Backup Nitrogen bottles after they have depleted. They allow for operation of the Safety Relief Valves (SRVs) and the Hardened Containment Vent (HCV) late in a sequence following equipment failures that necessitate depressurizing the reactor vessel.
Design	The FLEX Air Compressors are a set of three trailer-mounted engine-driven Sullair air compressors, which includes an "n+1" compressor that can be used to supply either unit.
Success Criteria	One compressor/unit
Flow Rate	300 cfm of air at 200 psig
Normal Operation	The FLEX Air Compressors are standby components, stored in the FLEX Dome. All alignment actions are manual.
Accident Operation	If required per the FLEX Support Guidelines, around three hours after an initiator, staging will begin. The compressors will be transported out of the FLEX Dome on their trailers via pickup truck or bulldozer and staged near the Reactor/Turbine Building Rattle Space.
Operator Action	OPER-FLEX-COMP, "FAILURE TO STAGE AND ALIGN FLEX AIR COMPRESSORS." Scenario: The plant has an Extended Loss of AC Power or otherwise series of equipment failures that necessitates use of the SRVs and the HCV. Timing Analysis: T_{delay} = 3 hours. According to FLEX Program documentation, the staging order goes out around this time; the compressor staging should occur after the FLEX Pump staging, which credits a 1 hour T_{delay}. T_{cog} = 1 minute. There should be only a short time between when ready to stage and when the staging order goes out for the compressors. T_{exe} = 3 hours. This is an estimation. T_{sw} = 19 hours. This is approximately the point at which the nitrogen bottles will empty.

Supplement to Question PRA-RAI-9b:

The response to RAI 9b indicates that generic failure data was used for the FLEX equipment. FLEX equipment is expected to have a higher failure rate compared to standard equipment. The following information documents the results of a sensitivity study to show the impact of high failure rates for the FLEX equipment.

A sensitivity study was performed to look at the impact that the FLEX equipment failure probabilities have on this application. The failure probability for the FLEX equipment (i.e., FLEX DG, FLEX Portable Pumps, B.5.b Pumps, and FLEX Air Compressors) was set to one in both the base case and EDG out-of-service case. The result for each hazard is presented in the tables below:

Table 3 - Core Damage Results (Unit 2)

Hazard	Base		EDG 4		ICCDP (44 days)	
	with FLEX	without FLEX	with FLEX	without FLEX	with FLEX	without FLEX
Internal Events	3.31E-06	3.76E-06	4.91E-06	7.46E-06	1.9E-07	4.5E-07
Internal Flood	1.80E-06	1.82E-06	1.92E-06	1.99E-06	1.4E-08	2.1E-08
Fire[1]	2.40E-05	2.54E-05	2.46E-05	2.61E-05	7.2E-08	8.4E-08
High Winds (Tornados)	8.49E-09	1.13E-08	3.90E-08	6.02E-08	3.7E-09	5.9E-09
Total	2.91E-05	3.10E-05	3.15E-05	3.56E-05	2.9E-07	5.6E-07

Note 1: Includes adjustment of "breaching factor" from 0.1 to 0.23

Table 4 - Large Early Release Results (Unit 2)

Hazard	Base		EDG 4		ICLERP (44 days)	
	with FLEX	without FLEX	with FLEX	without FLEX	with FLEX	without FLEX
Internal Events	1.20E-07	1.20E-07	1.26E-07	1.37E-07	7.2E-10	2.1E-09
Internal Flood	7.05E-08	8.88E-08	7.06E-08	8.89E-08	1.2E-11	1.2E-11
Fire[1]	4.70E-06	4.76E-06	4.74E-06	4.81E-06	4.8E-09	6.0E-09
High Winds (Tornados)	2.89E-11	3.99E-11	2.89E-11	3.99E-11	0.0E+00	0.0E+00
Total	4.89E-06	4.97E-06	4.94E-06	5.04E-06	5.6E-09	8.1E-09

Note 1: Includes adjustment of "breaching factor" from 0.1 to 0.23

The above results demonstrate that removing credit for the FLEX and B.5.b equipment in the PRA models is still below the acceptance criteria of Regulatory Guide 1.177.