

## **NRR-DMPSPEm Resource**

---

**From:** Galvin, Dennis  
**Sent:** Tuesday, February 26, 2019 4:34 PM  
**To:** Arthur.Zaremba@duke-energy.com  
**Cc:** Mark Turkal (Mark.Turkal@duke-energy.com); Grzeck, Lee (Lee.Grzeck@duke-energy.com); Shoop, Undine  
**Subject:** Draft Brunswick RAIs – LAR to Revise Allowable Value for TS 3.3.8.1 Time Delay on Loss of Voltage (EPID L 2018-LLA-0281)  
**Attachments:** Brunswick EDG UV Time Delay Draft RAI L-2018-LLA-028 2019-02-26.pdf

Mr. Zaremba,

By letter dated October 18, 2018 (Agencywide Document Access and Management System (ADAMS) Accession No. ML18291A628), Duke Energy Progress, LLC (the licensee) submitted a license amendment request (LAR) for the Brunswick Steam Electric Plant (Brunswick), Unit Nos. 1 and 2. The LAR proposes a revision to Function 1.b of Technical Specification (TS) 3.3.8.1, "Loss of Power Instrumentation," related to the bus undervoltage time delay settings for Emergency Bus Undervoltage (Loss of Voltage (LOV)) – Time Delay setting and the consequential emergency bus diesel generator start signal. The proposed change revises the Allowable Values for the Time Delay Loss of Voltage relays to resolve a design vulnerability impacting the Emergency Diesel Generator (EDG) output breaker logic. Under certain conditions, it is possible that the EDG output breaker could close and then immediately trip and lockout. This outcome is not desirable due to potential safety concerns. The proposed change eliminates the identified design vulnerability.

To complete its review, the NRC staff has prepared the attached requests for additional information (RAIs) in DRAFT form. To arrange a clarification call for the attached draft RAIs and to discuss the due date for the RAI responses, please contact me at (301) 415-6256.

Respectfully,

Dennis Galvin  
Project Manager  
U.S Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation  
Division of Operating Reactor Licensing  
Licensing Project Branch 2-2  
301-415-6256

Docket No. 50-325, 50-324

**Hearing Identifier:** NRR\_DMPS  
**Email Number:** 831

**Mail Envelope Properties** (Dennis.Galvin@nrc.gov20190226163400)

**Subject:** Draft Brunswick RAIs – LAR to Revise Allowable Value for TS 3.3.8.1 Time Delay on Loss of Voltage (EPID L 2018-LLA-0281)  
**Sent Date:** 2/26/2019 4:34:14 PM  
**Received Date:** 2/26/2019 4:34:00 PM  
**From:** Galvin, Dennis

**Created By:** Dennis.Galvin@nrc.gov

**Recipients:**

"Mark Turkal (Mark.Turkal@duke-energy.com)" <Mark.Turkal@duke-energy.com>  
Tracking Status: None  
"Grzeck, Lee (Lee.Grzeck@duke-energy.com)" <Lee.Grzeck@duke-energy.com>  
Tracking Status: None  
"Shoop, Undine" <Undine.Shoop@nrc.gov>  
Tracking Status: None  
"Arthur.Zaremba@duke-energy.com" <Arthur.Zaremba@duke-energy.com>  
Tracking Status: None

**Post Office:**

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>	
MESSAGE	1574	2/26/2019 4:34:00 PM	
Brunswick EDG UV Time Delay Draft RAI L-2018-LLA-028 2019-02-26.pdf			138023

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

REQUEST FOR ADDITIONAL INFORMATION  
RELATED TO LICENSE AMENDMENT REQUEST TO REVISE  
ALLOWABLE VALUE FOR TS 3.3.8.1 TIME DELAY ON LOSS OF VOLTAGE  
DUKE ENERGY PROGRESS, LLC  
BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-325 AND 50-324

By letter dated October 18, 2018 (Agencywide Document Access and Management System (ADAMS) Accession No. ML18291A628), Duke Energy Progress, LLC (the licensee) submitted a license amendment request (LAR) for the Brunswick Steam Electric Plant (Brunswick), Unit Nos. 1 and 2. The LAR proposes a revision to Function 1.b of Technical Specification (TS) 3.3.8.1, "Loss of Power Instrumentation," related to the bus undervoltage time delay settings for Emergency Bus Undervoltage (Loss of Voltage (LOV)) – Time Delay setting and the consequential emergency bus diesel generator start signal. The proposed change revises the Allowable Values for the Time Delay Loss of Voltage relays to resolve a design vulnerability impacting the Emergency Diesel Generator (EDG) output breaker logic. Under certain conditions, it is possible that the EDG output breaker could close and then immediately trip and lockout. This outcome is not desirable due to potential safety concerns. The proposed change eliminates the identified design vulnerability.

The Nuclear Regulatory Commission (NRC) staff has reviewed the license amendment request and determined that additional information is required to complete the review.

**Applicable Regulatory Requirements/Criteria**

Section 3.1 of the Brunswick Updated Final Safety Analysis Report (UFSAR) (ADAMS Accession No. ML18250A015) describes Brunswick conformance with NRC General Design Criteria (GDC). Section 3.1 states in part that the "General Design Criteria for Nuclear Power Plants," listed in 10 CFR 50, Appendix A, as amended July 7, 1971<sup>1</sup>, were used as the basis for an audit of the design features of Brunswick. The NRC staff has determined that the following GDC are applicable to this review.

Criterion 17, "Electric power systems," requires, in part, that an onsite electrical power system and an offsite electrical power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that:

- a. Specified acceptable fuel design limits and design conditions of the RCPB [Reactor Coolant Pressure Boundary] are not exceeded as a result of anticipated operational occurrences, and

---

<sup>1</sup> While Section 3.1.1 of the Brunswick UFSAR indicates that the GDC as amended July 7, 1971, were used as the basis for an audit of the design features of Brunswick, the criteria identified in the Section 3.1.2 of the Brunswick UFSAR are based on the GDC published in the *Federal Register* on February 20, 1971.

- b. The core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

Criterion 13, "Instrumentation and Control," requires that Instrumentation and control shall be provided to monitor variables and systems over their anticipated range for normal operation and accident conditions, and to maintain them within prescribed operating ranges, including those variables and systems which can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary (RCPB), and the containment and its associated systems.

Section 50.36 of 10 CFR, "Technical specifications," provides the requirements for the content required in the TSs. As stated in 10 CFR 50.36, the TSs include, among other things, Limiting Conditions for Operation (LCO) and Surveillance Requirements (SR) to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

NRC Regulatory Guide (RG) 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation," December 1999 (ADAMS Accession No. ML993560062), describes a method that the NRC staff considers acceptable for complying with the agency's regulations for ensuring that setpoints for safety-related instrumentation are initially within and remain within the TS limits. RG 1.105 endorses Part 1 of Instrument Society of America (ISA) Standard 67.04-1994, "Setpoints for Nuclear Safety-Related Instrumentation," subject to NRC staff clarifications.

### **Requests for Additional Information (RAIs)**

#### RAI-1

The LAR Section 3 states: "Time Delay shall be less than the assumed time for the emergency diesel generator (EDG) restoring bus voltage and frequency. The time assumed for 4.16 kV [kilovolt] emergency bus restoration is 13 seconds. Calculation 04KV-0001 conservatively uses 3.5 seconds as the Upper Design Limit."

The LAR provides details on the setpoint methodology but does not discuss the consequences of an additional time delay in starting the EDGs and the required accident mitigation equipment. Brunswick UFSAR Section 8.3.1.1.6.5.1 'Automatic Starting' states in part, "The diesels are capable of achieving rated speed and voltage within ten seconds of receipt of a start signal. The analytical limit for restoring bus voltage and frequency is based on supporting accident analyses and design basis calculations. The 13 seconds for bus restoration assumed in the Reactor Building Environmental Report (Reference 8-11) is more limiting than the 15 seconds assumed in the LOCA [Loss of Coolant Accident] analyses (References 8-10, 8-12, and 8-13)."

If the EDG start time is 10 seconds and the calculation assumes 3.5 seconds for the instrument actuation lag time to initiate the EDG start signal, then the analytical limit of 13 seconds assumed in accident analysis is exceeded. Alternatively it can be considered that if the EDG restoration time is 10 seconds and the calculation assumes 3.5 seconds for the instrument actuation lag time to initiate the EDG that would leave only 9.5 seconds for restoring the diesel voltage and frequency, which is less than the required 10 seconds.

- a) Please describe the purpose of the 13 seconds bus restoration time assumption in the Reactor Building Environmental Report.
- b) Please address the discrepancy between the 13.5 seconds and the 13 seconds total response time for instrumentation and diesel restoration.

- c) If the 15 second time delay for LOCA analyses has been revised, please include a discussion on how the proposed time of 13.5 seconds impacts the existing licensing basis for response time of equipment (pumps and valves), as assumed in accident analyses, sequenced after the 4.16 kV bus is re-energized.

RAI-2

TS 3.3.8.1-1, "Loss of Power Instrumentation" has setpoints for 4.16 kV Emergency Bus Degraded Voltage relays (DVRs). The time delay associated with actuation of these relays is  $\geq 9$  seconds and  $\leq 11$  seconds. Considering the upper analytical limit for DVR actuation, please provide a discussion on how the proposed time delay of 3.5 seconds impacts the existing licensing basis for total response time of 1) LOV instrumentation and 4.16 kV bus re-energization and 2) the response time of equipment (pumps and valves), as assumed in accident analyses, sequenced after the 4.16 kV bus is re-energized.

RAI-3

The LAR proposes a change to the 'Allowable Value' for the LOV relay time delay from  $\geq 0.5$  seconds and  $\leq 2.0$  seconds to  $\geq 1.35$  seconds and  $\leq 3.0$  seconds. The NRC staff notes that the change to a minimum time delay of  $\geq 1.35$  seconds should resolve the design vulnerability impacting the EDG output breaker logic. It is not clear what the reason for the change in the upper allowable time delay is. Please provide a discussion on the need to change in the upper allowable time delay from  $\leq 2.0$  seconds to  $\leq 3.0$  seconds and why this proposed change is acceptable.

RAI-4

The calculation references include RG 1.105; ISA Standard S67-04.01-2000, "Setpoints for Nuclear Safety-Related Instrumentation"; and ISA Standard S604-02-2000, "Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation." All three of these documents are listed in the references section of the calculation as "Information Only" documents. It is not clear if Calculation 04KV-0001 follows the guidance of RG 1.105. The licensee is requested to confirm that it follows the guidance of RG 1.105 to prepare the setpoint calculations. If the guidance of RG 1.105 is not followed, then please describe the methodology and the basis for the methodology. In addition, please confirm that the guidance of Regulatory Information Summary (RIS) 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, "Technical Specifications," Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels" (ADAMS Accession No. ML051810077), is also followed.

RAI-5

Section 5.1.2 of calculation 04KV-0001 has calculated the primary element accuracy (PEA) error as  $\pm 0.303$  VAC. However, total device uncertainty (TDU) in Section 5.2.1.19 actually uses the PEA error as  $\pm 0.294$  VAC instead of the calculated value of  $\pm 0.303$  VAC. The calculation does not provide any explanation for this discrepancy. Please explain the rationale for using two different numbers for the same error.

RAI-6

Section 5.2.1.2 of calculation 04KV-0001 discusses uncertainty due to drift for the undervoltage function. The calculation uses a drift duration of 1 year with 25% margin. Please note the NRC approved the 24-month surveillance frequencies to support a 24-month fuel cycle as part of the Brunswick improved standard (TSS) amendments, issued on June 5, 1998 (ADAMS Accession No. ML12047A393). Please confirm that the current calibration interval of 1 year is not impacted due to change in refueling outage.