



RS-15-264

10 CFR 50.90

October 9, 2015

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

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Response to Request for Additional Information Regarding the License Amendment Request to Install New Low Degraded Voltage Relays and Timers on the 4.16 kV Engineered Safety Features (ESF) Buses

- References:**
- (1) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Install New Low Degraded Voltage Relays and Timers on the 4.16 kV Engineered Safety Features (ESF) Buses," dated April 24, 2014
 - (2) Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer (Exelon Generation Company, LLC), "Preliminary Request for Additional Information Regarding Braidwood and Byron New Low Degraded Voltage Relays and Timers (MF4051, MF4052, MF4053, and MF4054)," dated October 23, 2014
 - (3) Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer (Exelon Generation Company, LLC), "Preliminary Request (2nd Set) for Additional Information Regarding Braidwood and Byron New Low Degraded Voltage Relays and Timers (MF4051, MF4052, MF4053, and MF4054)," dated November 10, 2014
 - (4) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "Supplement and Response to Request for Additional Information Regarding the License Amendment Request to Install New Low Degraded Voltage Relays and Timers on the 4.16 kV Engineered Safety Features (ESF) Buses," dated April 30, 2015
 - (5) Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer (Exelon Generation Company, LLC), "Preliminary Follow Up RAIs Regarding LAR to Install New Degraded Voltage Relays and Timers," dated August 12, 2015

In Reference 1, Exelon Generation Company, LLC, (EGC) requested an amendment to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2. This amendment request proposed to revise Technical Specifications (TS) 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation." Specifically, LCO 3.3.5 would be revised to add a new "low degraded voltage" Function. In addition, the associated Surveillance Requirement (SR) 3.3.5.2 would be revised to add a CHANNEL CALIBRATION to verify the specified values for the new low degraded voltage Allowable Value and time delay setting.

In References 2 and 3, the NRC requested that EGC provide additional information to support their review of the subject License Amendment Request (i.e., Reference 1). The response to these requests was provided in Reference 4. In Reference 5, the NRC requested additional information related to the responses provided in Reference 4. During a follow-up clarification call to discuss the information requested in Reference 5, one minor revision was made to Question 1. It was also agreed that EGC would provide the requested information to the NRC on or before October 9, 2015. The subject response is provided in Attachment 1.

EGC has reviewed the information supporting the No Significant Hazards Consideration and the Environmental Consideration that was previously provided to the NRC in Reference 1. The additional information provided in this submittal does not affect the conclusion that the proposed license amendment does not involve a significant hazards consideration. This additional information also does not affect the conclusion that neither an environmental impact statement nor an environmental assessment need be prepared in support of the proposed amendment.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this additional information by transmitting a copy of this letter and its attachment to the designated State Official.

This letter contains no new regulatory commitments. If you have any questions concerning this letter, please contact Joseph A. Bauer at (630) 657-2804.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 9th day of October 2015.

Respectfully,



David M. Gullott
Manager – Licensing
Exelon Generation Company, LLC

Attachment 1: Response to Request for Additional Information

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector, Braidwood Station
NRC Senior Resident Inspector, Byron Station
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1
Response to Request for Additional Information

In Reference 1, Exelon Generation Company, LLC, (EGC) requested an amendment to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2. This amendment request proposed to revise Technical Specifications (TS) 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation." Specifically, LCO 3.3.5 would be revised to add a new "low degraded voltage" Function. In addition, the associated Surveillance Requirement (SR) 3.3.5.2 would be revised to add a CHANNEL CALIBRATION to verify the specified values for the new low degraded voltage Allowable Value and time delay setting.

In References 2 and 3, the NRC requested that EGC provide additional information to support their review of the subject License Amendment Request (i.e., Reference 1). The response to these requests was provided in Reference 4. In Reference 5, the NRC requested additional information related to the responses provided in Reference 4. During a follow-up clarification call to discuss the information requested in Reference 5, one minor revision was made to Question 1. The requested information is provided below.

Electrical Engineering Branch (EEB)
Request for Additional Information (RAI)

During normal plant operation, the Class 1E safety-related buses should automatically separate from the power supply within a short interval if sustained degraded voltage conditions are detected. The time delay chosen should be optimized to ensure that permanently connected Class 1E loads are not damaged under sustained degraded voltage conditions (such as a sustained degraded voltage below the DVR [Degraded Voltage Relay] voltage setting(s) for the duration of the time delay setting).

RAI 1

In response to the NRC staff's RAI Question No. 2 concerning safety-related loads to start and run without damaging and actuating their protective devices, your response dated April 30, 2015, stated the following in Section F.

BTP PSB-1, "Adequacy of Station Electric Distribution System Voltages," Section B.1.b.2 states in part, "The second time delay should be of a limited duration such that the permanently connected Class 1 E loads will not be damaged." The BTP does not specifically require that loads be capable of starting under low degraded voltage conditions; therefore, the Byron Station and Braidwood Station low degraded voltage evaluations did not specifically analyze the potential starting of loads under low degraded voltage conditions.

To complete its review of Exelon's application dated April 24, 2015, the NRC staff requires information that addresses the capability of safety-related loads to start under degraded voltage conditions. The staff position is that for a time delay period of 340 seconds, for Byron and Braidwood Stations, the licensee must demonstrate that safety-related loads will have adequate voltage to start and run without damaging or actuating protective devices that can disable safety related equipment. The staff position and requirements have been further clarified in Regulatory Issue Summary 2011-12, "Adequacy of Station Electric Distribution System Voltages," Revision 1. Therefore the staff requests that the licensee provide a summary of the analysis to show that all safety-related loads can start and run without actuating their protective devices, including control circuit fuses, and none of the safety-related loads will be degraded with the proposed degraded voltage relay setpoints (voltage and time delay).

ATTACHMENT 1
Response to Request for Additional Information

Response to RAI 1

The original degraded voltage logic was developed in accordance with the guidance provided by BTP PSB-1. The existing Degraded Voltage Relay (DVR) setpoint was developed to provide protection (i.e., to ensure voltage requirements are met) for Class 1E safety-related buses and components from sustained degraded voltage conditions on the offsite power system coincident with an accident as well as during non-accident conditions. The Class 1E buses will separate from the offsite power system immediately if an accident occurs coincident with sustained degraded voltage conditions (i.e., degraded voltage condition exists for at least 10 seconds) below the DVR setpoint. The development of the setpoint is consistent with the discussion of DVR Setting Design Calculations provided in RIS 2011-12, Revision 1. Specifically, division specific degraded voltage analyses were performed for each Byron Station and Braidwood Station safety-related distribution system to determine the existing DVR setpoint and analytically demonstrate that adequate voltage exists for starting and running all safety-related equipment at or above the DVR setpoint value.

The plant changes to install the new Low Degraded Voltage Relay (LDVR) and the associated License Amendment Request (LAR) to include the LDVR setpoint in the Technical Specifications (TS) do not impact the existing DVR function, setpoints, or analysis as described above.

Prior to the installation of the LDVR and associated TS setpoints, EGC could not demonstrate that the permanently connected loads to the Class 1E buses would operate without actuation of protective devices if subjected to a degraded voltage condition below the DVR setpoint, all the way down to the loss of power (LOP) setpoint, for the entire 340 second time delay. Therefore, as described in the LAR (Reference 1), the LDVRs and the associated setpoints are analyzed to limit the degree of undervoltage during the 340 second time delay to ensure that permanently connected Class 1E loads are not damaged under the sustained degraded voltage conditions. As stated in RIS 2011-12, Revision 1, this is a sustained degraded voltage below the DVR voltage setting for the duration of the time delay setting.

The intent of our previous RAI response was to clarify that analyses for the permanently connected loads have been performed down to the LDVR setpoint. However, consistent with the requirements of BTP PSB-1 and RIS 2011-12, Revision 1, analyses of the startup and operation of non-permanently connected loads during the time delay is not postulated or analyzed.

Therefore, the analyses performed to support the LDVR setpoints demonstrate that any permanently connected load (i.e., any load that would be expected to be operating at the start of a degraded voltage condition) would continue to operate throughout the 340 second time delay without sustaining damage or actuating protective devices that would prevent the component from performing its intended safety function.

ATTACHMENT 1
Response to Request for Additional Information

RAI 2

In response to the NRC staff's RAI Question No. 3.c concerning evaluations to show that a momentary voltage dip lasting approximately 3 seconds to a value marginally above the loss of voltage relay setpoint, with a recovery to the reset point of the LDVR [Low Degraded Voltage Relay] will not adversely impact any important to safety equipment which may be required to operate for more than 5 minutes, in its response dated April 30, 2015, the licensee stated the following:

Valves were not evaluated because they are not continuous loads and are not expected to operate during a degraded voltage condition. Therefore, valves were considered outside the scope of the BTP PSB-1 requirements.

To complete its review of Exelon's application dated April 24, 2015, the NRC staff requires information regarding the evaluation of valves for the degraded voltage condition. In accordance with the guidance delineated in Generic Letter No. 89-10: "Safety Related Motor-Operated Valve Testing and Surveillance," licensees demonstrated that all safety-related motor operated valves (MOV) can perform key safety functions at the degraded voltage relay setpoint. The response to RAI 3.c indicates that voltages at MOV terminals may drop below the LDVR setpoint for approximately 3 seconds. Provide a summary of the evaluation for the motor operated valves including any impact due to momentary voltage dips lasting 3 seconds.

Response to RAI 2

Consistent with the guidance delineated in Generic Letter No. 89-10 "Safety Related Motor-Operated Valve Testing and Surveillance," Byron Station and Braidwood Station MOV motor terminal voltage calculations were performed to demonstrate that all safety-related MOVs can perform key safety functions at the existing Degraded Voltage Relay (DVR) setpoint. The response provided to RAI Question 3.c was related to the position that MOVs are not considered permanently connected loads and, as such, were not included in the analyzes performed to show that running motors were not damaged by sustained operation below the DVR setpoint for the maximum time period (i.e., 340 seconds) allowed by the DVR logic.

Consistent with the requirements in BTP PSB-1, the Byron Station and Braidwood Station DVR logic consists of two time delay periods. The first time delay is 10 seconds and confirms the existence of a sustained degraded voltage condition (i.e., a period longer than a motor-starting transient). During the first time delay period, an external grid event is postulated to occur resulting in the degraded Class 1E bus voltage. An additional, independent plant transient or accident occurring within the short duration of the first time delay is not, and has historically not been, an event required to be analyzed. During the subsequent second time delay (i.e. after the 10 second initial time delay) the BTP PSB-1 guidance explicitly postulates the occurrence of a safety injection (SI) actuation signal. The SI actuation signal results in the immediate separation of the Class 1E safety-related buses from the offsite power system.

The guidance provided in BTP PSB-1 and RIS 2011-12, Revision 1 did not require analysis of other abnormal operational occurrence or accident loads during the second time delay. Therefore, since MOVs are not normally connected loads and are started only in response to a plant accident or transient, evaluation of the MOVs below the DVR setting, including any impact due to momentary voltage dips below the LDVR lasting 3 seconds, is considered outside the design guidance and requirements.

ATTACHMENT 1
Response to Request for Additional Information

REFERENCES

1. Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Install New Low Degraded Voltage Relays and Timers on the 4.16 kV Engineered Safety Features (ESF) Buses," dated April 24, 2014
2. Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer (Exelon Generation Company, LLC), "Preliminary Request for Additional Information Regarding Braidwood and Byron New Low Degraded Voltage Relays and Timers (MF4051, MF4052, MF4053, and MF4054)," dated October 23, 2014
3. Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer (Exelon Generation Company, LLC), "Preliminary Request (2nd Set) for Additional Information Regarding Braidwood and Byron New Low Degraded Voltage Relays and Timers (MF4051, MF4052, MF4053, and MF4054)," dated November 10, 2014
4. Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "Supplement and Response to Request for Additional Information Regarding the License Amendment Request to Install New Low Degraded Voltage Relays and Timers on the 4.16 kV Engineered Safety Features (ESF) Buses," dated April 30, 2015
5. Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer (Exelon Generation Company, LLC), "Preliminary Follow Up RAIs Regarding LAR to Install New Degraded Voltage Relays and Timers," dated August 12, 2015