

RS-12-199  
November 19, 2012

10 CFR 50.90

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-001

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 Related to License Amendment Request to Revise Technical Specifications to Exclude Solid State Protection System (SSPS) Input Relays from Channel Operational Test Surveillance For Functions With Installed Bypass Test Capability

- References:
- 1) Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "License Amendment Request To Revise Technical Specifications (TS) 3.3.1, 'Reactor Trip System (RTS) Instrumentation,' and TS 3.3.2, 'Engineered Safety Feature Actuation System (ESFAS) Instrumentation,' To Exclude Solid State Protection System (SSPS) Input Relays from Channel Operational Test Surveillance For Functions With Installed Bypass Test Capability,' dated June 6, 2012
  - 2) Letter from M. Mahoney (U. S. Nuclear Regulatory Commission) to M. J. Pacifico (Exelon Generation Company, LLC), 'Byron Station, Unit Nos 1 and 2, and Braidwood Station, Units 1 and 2 – Request for Additional Information Related to License Amendment Request For Revise Technical Specifications (TS) 3.3.1, 'Reactor Trip System (RTS) Instrumentation,' and TS 3.3.2, 'Engineering Safety Feature Actuation System (ESFAS) Instrumentation,' (TAC Nos. ME8881, ME8882, ME8883, and ME8884),' dated September 24, 2012

In Reference 1, Exelon Generation Company, LLC, (EGC) submitted a license amendment request to add a Note to specific Surveillance Requirements in Technical Specifications (TS) 3.3.1, 'Reactor Trip System (RTS) Instrumentation,' and TS 3.3.2, 'Engineered Safety Feature Actuation System (ESFAS) Instrumentation,' for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2. The proposed change will exclude the solid state protection system (SSPS) input relays from the channel operational test (COT) surveillance for RTS and ESFAS Functions with installed bypass test capability.

In Reference 2, the U. S. Nuclear Regulatory Commission (NRC) requested additional information to complete its review of the proposed license amendment request. EGC is providing the attached information in response to the request.

EGC has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration that were previously provided to the NRC in Attachment 1 of Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendments do not involve a significant hazards consideration. In addition, the additional information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

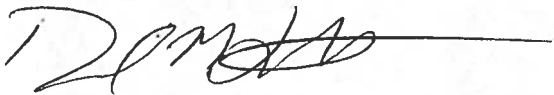
In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), a copy of this letter and its attachments are being provided to the designated State of Illinois official.

There are no regulatory commitments contained in this submittal.

Should you have any questions concerning this letter, please contact Ms. Lisa A. Simpson at (630) 657-2815.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 19th day of November 2012.

Respectfully,



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

**Attachments:**

- 1) Response to Request for Additional Information
- 2) SSPS Input Relay Survey
- 3) Summary of Industry Survey

cc: NRC Regional Administrator, Region III  
NRC Senior Resident Inspector, Bradwood Station  
NRC Senior Resident Inspector, Byron Station  
NRC Project Manager, NRR – Bradwood and Byron Station  
Illinois Emergency Management Agency – Division of Nuclear Safety

**ATTACHMENT 1**  
**Response to Request for Additional Information**

**NRC Question:**

By letter to the U. S. Nuclear Regulatory Commission (NRC) dated June 6, 2012 (Agencywide Document Access and Management System (ADAMS) Accession No. ML12159A304), Exelon Generation Company, LLC (the licensee), submitted a license amendment request (LAR) to revise the technical specifications (TS) of Byron Station, Unit Nos 1 and 2, and Braidwood Station, Units 1 and 2.

The proposed amendment will add a Note to Surveillance Requirements (SR) 3.3.1.7, 3.3.1.8, and 3.3.1.12 in TS 3.3.1, Reactor Trip System (RTS) Instrumentation, and SRs 3.3.2.2 and 3.3.2.6 in TS 3.3.2, Engineered Safety Features Actuation System (ESFAS) Instrumentation, to exclude the Solid State Protection System (SSPS) input relays from the channel operational test (COT) surveillance for RTS and ESFAS functions with installed bypass capability which the NRC approved by letters dated March 30, 2012, and April 9, 2012 (ADAMS Accession Nos. ML120660494 and ML120950371, respectively).

The SSPS input relays are currently tested during a COT that is performed in accordance with the licensee's surveillance frequency control program (SFCP) at a frequency of 184 days or 6 months.

The licensee states in the LAR that the proposed change is needed to support utilization of bypass test capability that is being installed to reduce the potential for unnecessary reactor trips or engineered safeguards actuation due to a failure or transient in a redundant channel. The licensee further states that cycling of the complete channel with associated SSPS input relays could result in a partial trip of the actuation logic (i.e., from a two-out-of-four to one-out-of-three logic; or from two-out-of-three to one-out-of-two logic).

The licensee states that SRs 3.3.1.10, 3.3.1.11, and 3.3.2.10 require the performance of a channel calibration, and cycling the SSPS input relay. The SSPS input relay will be cycled during the performance of these SR's in accordance with the SFCP, on an 18-month frequency. These surveillances will verify operability of the SSPS input relays and provide assurance that there are no failures that would prevent the actuation of a required RTS or ESFAS function.

General Design Criteria (GDC) 21, "Protection system reliability and testability," in Title 10 of the *Code of Federal Regulations*, Part 50, Appendix A, states: "The protection systems shall be designed for functional reliability and inservice testability commensurate with the safety functions to be performed."

The NRC staff requests the following information to complete its review:

Provide a plant-specific analysis and/or technical basis that demonstrates how changes in the proposed LAR will comply with the functional reliability and inservice testing, as specified in GDC 21.

**ATTACHMENT 1**  
**Response to Request for Additional Information**

**EGC Response:**

As discussed during conference calls with the NRC on August 13 and September 10, 2012, Exelon is providing functional reliability data from Braidwood and Byron station-specific performance data from testing at the 6-month frequency. Exelon is also providing performance history compiled from an industry survey.

**Braidwood and Byron Performance Data**

On January 29, 2008, the NRC approved Amendments 148 and 153 for the Braidwood Station and the Byron Station, respectively (Reference 1). The amendments revised the Braidwood Station and Byron Station TS in order to extend the RTS and ESFAS completion times, bypass test times, and surveillance test intervals for certain TS 3.3.1 and TS 3.3.2 functions. As part of these amendments, the protection loop analog channel operational tests (COT) were revised from a 92-day to a 184-day frequency (i.e., from an approximate 3-month to an approximate 6-month frequency).

**Braidwood Station**

Since 2008 there have been approximately eight tests performed (184-day frequency) on each input relay for the functions that provide an SSPS input, with no occurrence of a failed relay. (Note that typically when due, the 6-month analog COT is performed at the same time as the 18-month calibration so this would typically not result in an additional cycling occurrence of these relays.)

A comprehensive review of the usage history dating back to 2000 was conducted for SSPS logic input relays, and only one SSPS logic input relay failure was found to have occurred on May 2, 2002 during an outage. The failed relay was for the N31 bypass function. No additional SSPS input relay failures were identified. There are greater than 500 input relays per unit at Braidwood.

Therefore, for the time period since extending to a 6-month frequency in 2008, there have been no identified failures; therefore, the reliability of the SSPS input relays at Braidwood Station has been 100%.

**Byron Station**

Since 2008 there have been approximately eight tests performed (184-day frequency) on each input relay for the functions that provide an SSPS input, with no occurrence of a failed relay. (Note that typically when due, the 6-month analog COT is performed at the same time as the 18-month calibration so this would typically not result in an additional cycling occurrence of these relays.)

A comprehensive review of the usage history dating back to 2000 was conducted for SSPS logic input relays, and Byron Station has had one SSPS input relay fail to return to a non-tripped state following the Byron Unit 1 spring 2011 refueling outage (i.e., B1R17). There are greater than 500 input relays per unit at Byron.

Byron Station has had no other SSPS input relays fail on Unit 1 or Unit 2 either during normal operation or during functional testing.

**ATTACHMENT 1**  
**Response to Request for Additional Information**

**Plant Survey**

Information related to the performance history of the SSPS input relays was collected from the industry via a survey. A copy of the survey is located in Attachment 2. The table in Attachment 3 provides a summary of the results of the industry survey.

**Other**

During the conference call with the NRC on September 10, 2012, Westinghouse described a recent Failure Modes and Effects Analysis (FMEA) completed that justified 18-month testing for relays for the PWR Owners Group. This FMEA is documented in WCAP-17013-P (Reference 2).

After further evaluation, Exelon has determined that WCAP-17013-P applies to the master relays rather than the SSPS input relays. Therefore, WCAP-17013-P does not specifically apply to this licensing activity.

**Conclusion**

The request to add a Note to specific Surveillance Requirements in TS 3.3.1 and TS 3.3.2 for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, will reduce the required testing on the RTS and ESFAS SSPS input relays without impacting their overall reliability.

A survey conducted of the industry shows that of the six plants that are testing the SSPS input relays every 18 months during the performance of a Channel Calibration, none of the plants identified SSPS input relay failures during the 18-month test. This indicates the SSPS input relays remain reliable for longer periods of time and justify the proposed reduced frequency. Three plants have experienced a total of four SSPS input relay failures during the last three cycles; however, these were most likely self-revealing at the time of failure and not related to testing frequency.

Functional reliability data from Braidwood and Byron station-specific performance data for the time period since extending to a 6-month frequency in 2008 shows that there have been no identified failures at Braidwood, and only one SSPS input relay fail to return to a non-tripped state following a refueling outage for Byron Unit 1.

This empirical evidence supports the request to test the SSPS input relays on an 18-month frequency since these SSPS input relays have been demonstrated to be very reliable.

**ATTACHMENT 1**  
**Response to Request for Additional Information**

**References**

- 1) Letter from M. M. Thorpe-Kavanaugh (U. S. NRC) to C. Pardee (Exelon Generation Company, LLC), "Byron Station, Unit Nos. 1 and 2, and Braidwood Station, Units 1 and 2 – Issuance of Amendments Re: Technical Specification Request to Extend Reactor Trip System and Engineered Safety Features Actuation System Completion Times, Bypass Test Times, and Surveillance Test Intervals (TAC Nos. MD4009, MD4010, MD4011, and MD4012)," dated January 29, 2008
  
- 2) WCAP-17013-P, Revision 0, "Risk-Informed Evaluation of Surveillance Test Interval Extensions to the Westinghouse Solid State Protection System Actuation Logic and Master Relays," dated June 2011

## ATTACHMENT 2 SSPS Input Relay Survey

**Subject:** Exelon Requests ICWG Assistance - Brief Survey

**ICWG Members,**

Andrew Brewer and Terry Odette from Exelon are asking for ICWG input. If at all possible please respond to their request by answering the 5 questions below. **Please respond to all, or to the people in the cc'd section above.**

Earlier this year the NRC approved amendments for Exelon to revise Required Action Notes in the Braidwood and Byron Technical Specifications (TS) to allow certain Functions in the RTS and ESFAS instrumentation to be tested in bypass following installation of the bypass test instrumentation modification.

Exelon has since submitted a license amendment request (LAR) for Braidwood and Byron that proposes to only test the SSPS input relays during the performance of a Channel Calibration, which is performed every 18 months. The TS changes associated with this LAR would exclude testing the SSPS input relays during the performance of a Channel Operational Test, which is performed every 6 months (3 months, if WCAP-15376 has not been implemented).

This change was approved for Vogtle and South Texas when they installed their bypass test instrumentation.

The NRC is requesting additional information that justifies this change to only test the SSPS input relays every 18 months during the performance of the Channel Calibration.

**Please respond to the following questions:**

1. Site:
2. At what frequency are you performing routine periodic testing of your SSPS input relays? (Pick one below or specify)
  - 2.1 Every 18 months during Channel Calibrations
  - 2.2 During your COTs / ACOTs which are performed every 6 months (3 months, if WCAP-15376 has not be implemented)
  - 2.3 During your COTs / ACOTs which are performed every 6 months (3 months, if WCAP-15376 has not be implemented) and during 18 months during Channel Calibrations
3. If you are only testing the SSPS input relays every 18 months during the performance of a Channel Calibration, can you provide 3 cycles of data that identifies if any failures of SSPS input relays have been identified during the testing?
4. Have you had any SSPS input relay failures in the last 3 cycles?
  - 4.1. If you have had an input relay failure in the last 3 cycles, please provide a brief explanation.
5. Any other comments or information on this topic?

**ATTACHMENT 3  
Summary of Industry Survey**

**Results from Industry Survey Regarding SSPS Input Relay Failure Data**

<b>Site</b>	<b>Frequency of SSPS Input Relay Testing</b>	<b>Failures During Test (Applicable to 18-month testing only)</b>	<b>SSPS Relay Failures During Last 3 Cycles</b>
Plant A	18 months	0	2
Plant B	18 months	0	1
Plant C	18 months	See NOTE	0
Plant D	18 months	0	0
Plant E	18 months	0	0
Plant F	18 months	See NOTE	0
Plant G	3 months	N/A	0
Plant H	3 months	N/A	0
Plant I	6 months	N/A	0
Plant J	6 months	N/A	1
Plant K	6 months	N/A	0

**NOTE:** Plant C and Plant F have Eagle 21 for Process Protection System that feeds SSPS and perform "Trip Overlap Testing" between Eagle 21 and SSPS. Once every 18 months they manually trip the Eagle 21 bistables into the SSPS input relays and verify SSPS status lights (ice cube lights/first outs), annunciators, and computer points.