

Limerick Generating Station Digital Modernization Project LAR Technical Specifications Changes

NRC Pre-submittal Meeting
January 11, 2022



Agenda / Opening Remarks

- Introductions
- Response to NRC feedback from December 7, 2021 presubmittal meeting
- Follow-up item from December 7, 2021 presubmittal meeting
- Changes from December 7, 2021 presentation
- Next Steps

Introductions – Exelon Project Team

- Licensing
 - Darani Reddick, Licensing Director
 - Dave Helker, Licensing Manager
 - Frank Mascitelli, Licensing Lead
 - George Budock, LGS Regulatory Assurance
 - Pareez Golub, Digital Licensing SME
 - Brian Mann, Technical Specifications SME
- Engineering
 - John Connelly, Central Design Organization (CDO) Manager
 - Mark Samselski, CDO - Lead Responsible Engineer
 - George Bonanni, CDO - Senior Staff Engineer
 - Mike Foote, CDO - Senior Staff Engineer
 - Scott Schumacher, Systems Engineering

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Introductions – Exelon Project Team

- Project Management
 - Steve Hesse, Project Director
 - Dave Molteni, Senior Manager and Station Lead
 - Jerry Segner, Principal Project Manager
 - Kayla Marriner, Project Manager
- Operations
 - Paul Krueger, Operations

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Introductions – Westinghouse Project Team

- Project Management
 - Tom Pietryka, Program Manager
- Engineering
 - Terry Tuite, PPS Lead – Engineering
 - Warren Odess-Gillett, Lead – Licensing
 - Cal Tang, BWR Technical Advisor

***Response to NRC feedback
from Dec 7, 2021
Presubmittal Meeting***

Item 1

How 3 channels (2 out of 3 channel logic vs. 2 out of 4) meets all design requirements. The NRC staff agrees that the 2 of 3 condition represents a system that is capable of performing its safety functions however, there remains a question of whether a system in this state continues to meet all design requirements. In particular, the single failure criteria of IEEE 603 or IEEE 279 in conjunction with surveillance testing requirements does not appear to be satisfied with a system in this condition. Refer to IEEE 279 clause 4.11, “During such operation the active parts of the system shall of themselves continue to meet the single failure criterion.” Bullet 4 on slide 21 of Exelon’s December 7th presentation states:

“Only three channels are needed to meet all design requirements for voted channels.”

Please explain how a system in this state meets single failure criteria when a channel is out of service for surveillance testing purposes. Under the new TS, one channel can be removed for testing or otherwise be inoperable within entering an Action (as stated on 7th bullet of slide 21).

Single Failure Criterion (SFC)

- IEEE Std 603-1991, Clause 5.1
 - *The safety systems shall perform all safety functions required for a design basis event in the presence of: (1) any single detectable failure within the safety systems concurrent with all identifiable but non-detectable failures; (2) all failures caused by the single failure; and (3) all failures and spurious system actions that cause or are caused by the design basis event requiring the safety functions.*
- The PPS is designed to meet the SFC with 3 channels
 - Channel 1: Detectable Failure – Channel defaults to trip condition on failure
 - Channel 2: Undetectable Failure – Channel may not respond to trip condition
 - Channel 3: Functioning Channel
 - 3 Operable Channels with 2oo3 logic meets design requirements for SFC (e.g., Channels 1 and 3 trip the reactor with single failure)

Item 2.a

Demonstrating three channels provides lowest functional capability of the system.

- In absence of a limiting condition for operability, operation of the system with only three functioning channels would need to demonstrate not only functional capability but would also have to show compliance with the performance criteria of IEEE 279 or IEEE 603 which include maintaining single failure criteria during periodic surveillance testing activities during which only two channels would remain operable. The NRC staff referred to several TS examples for plants with similar designs that include limiting conditions for operability that must be considered during the time in which the safety system is in a 2 of 3 logic condition. Though the LCO times vary significantly between plants, all of the example TSs include descriptions of conditions of operation that must be considered when the system is in a 2 of 3 configuration.

Test Capability with 3 channels

- IEEE Std 603-1991, Clause 5.7
 - *Capability for testing and calibration of safety system equipment shall be provided while retaining the capability of the safety systems to accomplish their safety functions. The capability for testing and calibration of safety system equipment shall be provided during power operation and shall duplicate, as closely as practicable, performance of the safety function.*
- The PPS is designed to meet this criterion with 3 channels
 - Channel 1 inoperable (bypassed)
 - Channels 2 – 4 required and operational (i.e., LCO is met)
 - For example, to test Channel 2:
 - Channel 1 is placed into the trip condition and TS Action is entered,
 - Channel 2 bypassed for testing,
 - A trip signal from Channel 3 or 4 initiates a reactor trip (2003)

TS Actions represent a temporary relaxation of the single failure criteria.

Item 2.b

Please provide a description using a staged approach to loss of protection channels, and associated example Action Statements for required actions to take in the event of a loss of one of the four channels, and then for a loss of two channels, and then for a loss of two or more of the four channels of the Plant Protection System. Describe the minimum number of channels that are required to be operable for each of the Modes of Operation. Demonstrate how the design meets the requirements of IEEE 603. For example, for operations with three operable channels, describe how the design requirements of IEEE 603 are still being met if one more channel becomes inoperable.

Response to Item 2.b

The required number of channels will be specified in the TS for each Operating Condition.

The LAR will describe the Actions for loss of one or more TS required channels and why the Actions are appropriate for the condition.

Item 3

Reestablish basis for continued elimination of previously removed response times from the TS. The NRC staff pointed out that if the licensee wants to retain the existing exemption from time response testing provisions, they will need to review the bases for these exemptions. If the replacement system diagnostic functions are to be credited in lieu of the current calibration and functional test surveillance tests as described in the licensee's presentation, then a new basis for these time response test exemptions may need to be established. If a basis for these exemptions is not reestablished in the LAR, then the TR test exemptions may become invalid and new test requirements would be needed.

Please discuss how the proposed relocation satisfies Criterion 2 and 3 of 10CFR 50.36(c)(2)(ii), which require an LCO to be included in the TSs:

- Criterion 2- A process variable, design feature, or operating restriction that is an initial condition of a design basis accident (DBA) or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier; and
- Criterion 3 - A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Response to Item 3

No response time testing is being eliminated in the LAR. All functions that currently require response time testing will continue to be tested.

The current TS permits using assigned response times for some components in a function. The LAR will describe the basis for the existing allocated times and justify that the basis is still valid. Credit for existing TS surveillance tests that verify sensor functionality is one of the bases for allowing this exclusion. Although Channel Check, Channel Functional Testing, and Logic System Functional Testing are being eliminated by PPS self-diagnostics, the PPS application diagnostic Channel Comparison performs the same automatic function as the manual Channel Check. This PPS application diagnostic can detect sensor malfunction by comparing sensors across four channels and annunciating when a channel sensor is deviating. The LAR will describe that the application diagnostic, Channel Comparison, and the new Sensor Channel Calibration provide sufficient verification of the operability of the sensors currently eliminated from response time testing.

The LAR will also justify using assigned response times for additional portions of the tested functions performed by the digital platform.

The relocation of the response time limits to licensee control follows the NRC guidance in Generic Letter 93-08, “Relocation of Technical Specification Tables of Instrument Response Time Limits.”

Criterion 2 and 3 of 10 CF 50.36(c)(2)(ii) describe requirements for establishing LCOs. The proposed change does not alter the LCO requirement that structures, systems, and components respond within the assumed response time.

Item 4

Please describe any potential impact on each ESFAS Actuation System LCOs/surveillance requirements and ECCS System-Level LCOs/surveillance requirements (i.e., RCIC, ECCS and NSSSS system) based on operability of the Plant Protection System. For example, what will be the limiting conditions for operation of HPCI, RCIC, ADS, Core Spray A, Core Spray B, NSSSS Isolation, etc. based on the operability condition of the Plant Protection System with one or more, and then two or more channels INOP?

Response to Item 4

The proposed TS 3.3.2, "Plant Protection System Divisions," will contain TS Actions that recognize the impact of inoperable divisions on actuated equipment. The LAR will describe and justify that the TS contain appropriate mitigating actions for the specific degradation.

No changes to the actuated system TS (HPCI, RCIC, ADS, Core Spray, Primary Containment Isolation Valves, etc.) will be proposed.

Item 5

Please describe any potential impact associated with the surveillance testing requirements for each of the Manual Initiation Functions at the system level for each subsystem of the ECCS/NSSSS systems. Which portions of the circuits for manual initiation are covered by these surveillance tests?

Response to Item 5

The LTR SR Elimination Appendix will include the analysis of those manual actuations credited in the Safety Analysis.

For those manual actuations credited in the safety analysis:

- The LTR will evaluate the equipment in the manual actuation path and the self-diagnostics that cover that equipment
- Equipment not covered by the self-diagnostics will require some periodic test that will confirm operability

***Follow-up item from
December 7, 2021
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Additional Allowable Value Limits

NRC/Summer Sun question:

NRC described that in some ITS conversions for ECCS, licensee added additional Allowable Values associated with the relocation of the trip setpoints or added a new upper or lower Allowable Value. NRC asked if Limerick, similarly, intended to do add Allowable Values.

Exelon response:

We discussed the question with the Excel Services ITS conversion team and reviewed four of the most recent ITS conversions that relocated trip setpoints to licensee control. Excel could not recall, nor could we find any instances in which a licensee added additional Allowable Values associated with the relocation of the trip setpoints or added a new upper or lower Allowable Value.

We reviewed the LGS TS and did not discover any instrumentation functions with a two-sided limit for the trip setpoint and a single-sided limit for the Allowable Value.

A review of the Standard TS for BWR/4 plants (NUREG-1433) did not discover any functions with two-sided Allowable Values that had an equivalent function in the LGS.

Therefore, we do not believe this is an issue for the LSG LAR.

***Changes from
December 7, 2021
Presentation***

Changes from December 7, 2021 Presentation

In the December presentation on Slides 18 and 25, we stated that the new TS would include a specification 3.3.3, "Reactor Trip Units," which would provide requirements on the trip system from the division reactor trip matrix through the scram valves. On further review, we've determined that a new TS is not required and the existing requirements in Specification 3.1.3.1, "Control Rod Operability," and a new SR in the new TS 3.3.2, "Plant Protection System Divisions," will provide "end-to-end" verification of the operability of the reactor trip system.

Next Steps

Next Steps

- Determine any follow-up topics for the next NRC presubmittal meeting.

Thank you