Prairie Island License Amendment Request to Modify Technical Specifications Definitions and Approve Plant-Specific Methods for Response Time Testing

03.06.2024

Agenda

- Purpose
- Background
- Proposed Licensing Action
  - Technical Specifications Changes
  - Site-specific Methodology
- Schedule
- Closing Remarks

Purpose

The purpose of this meeting is to discuss proposed License Amendment for Prairie Island Nuclear Generating Plant (PINGP) Units 1 and 2 to:

- Revise the Technical Specifications (TS) definition of REACTOR TRIP SYSTEM (RTS) RESPONSE TIME by implementing a plant-specific methodology for allocating response times.
    - This includes a request to approve a proposed plant-specific methodology for allocating response times.
- Revise TS Table 3.3.1-1 to apply TS Surveillance Requirement 3.3.1.16 Response Time Testing to those RTS functions that have an assumed time delay in the accident analyses.

Background

- TSTF-569 permits licensees, in lieu of measurement, to verify the Reactor Trip System (RTS) response times of certain component types by using the methodology contained in TSTF-569 and WCAP-14036.
  - NSPM evaluated adopting TSTF-569 to more efficiently use Instrument & Control maintenance staff during refueling outages.
  - NSPM determined that TSTF-569 does not apply to the PINGP Process Protection System (PPS) portion of the RTS. The PINGP PPS was not among those listed in WCAP-14036 and associated NRC Safety Evaluation.
  - Thus, a plant-specific method (like the one approved with TSTF-569) for allocating response times will be proposed with the LAR.

Proposed Licensing Action

Technical Specifications Changes

- NSPM will propose a method like that of TSTF-569, Revision 2, for allocating response times to PINGP RTS.
- The scope of the LAR will vary from the TSTF:
  - PINGP TS do not include a definition of ESFAS Response Time.
  - PINGP TS specifically exclude sensors from the scope of RTT.

Proposed Licensing Action

Technical Specifications Changes (continued)

- The definition of RTS Response Time will be revised.
- Table 3.3.1-1 will be revised to apply SR 3.3.1.16, Response Time Testing, to only those RTS Functions with assumptions of time delays in the accident analyses.
  - SR 3.3.1.16 will be added to the SR requirements of four functions
  - SR 3.3.1.16 will be removed from the SR requirements of two functions

Proposed Licensing Action

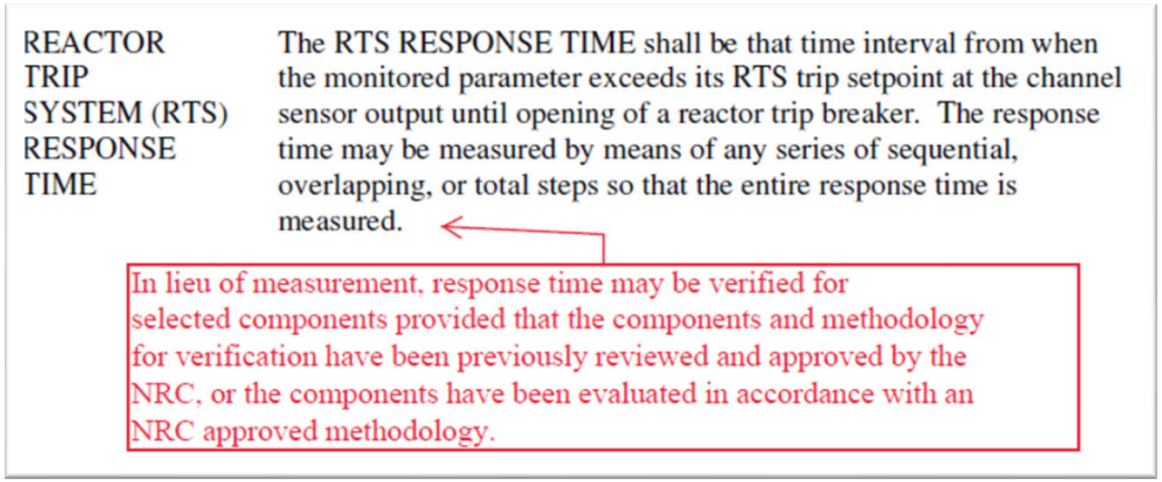
Technical Specifications Changes (continued)

- SR 3.3.1.16 will be added to the SR requirements of four functions:
  - 8.a. Pressurizer Pressure – Low
  - 8.b. Pressurizer Pressure – High
  - 10. Reactor Coolant Flow – Low
  - 13. SG Water Level – Low Low
- SR 3.3.1.16 will be removed from the SR requirements of two functions:
  - 3.b. Power Range Neutron Flux Rate – High Negative Rate
  - 5. Source Range Neutron Flux

Proposed Licensing Action

Technical Specifications Changes (continued)

NSPM Proposed mark up



REACTOR TRIP SYSTEM (RTS) RESPONSE TIME	The RTS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RTS trip setpoint at the channel sensor output until opening of a reactor trip breaker. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC, or the components have been evaluated in accordance with an NRC approved methodology.

Proposed Licensing Action

Technical Specifications Changes (continued)

NSPM Proposed mark up

3. Power Range Neutron Flux Rate					
a. High Positive Rate	1, 2	4	D	SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 6% RTP with time constant ≥ 2 sec
b. High Negative Rate	1, 2	4	D	SR 3.3.1.7 SR 3.3.1.11 ~~SR 3.3.1.16~~	≤ 8% RTP with time constant > 2 sec

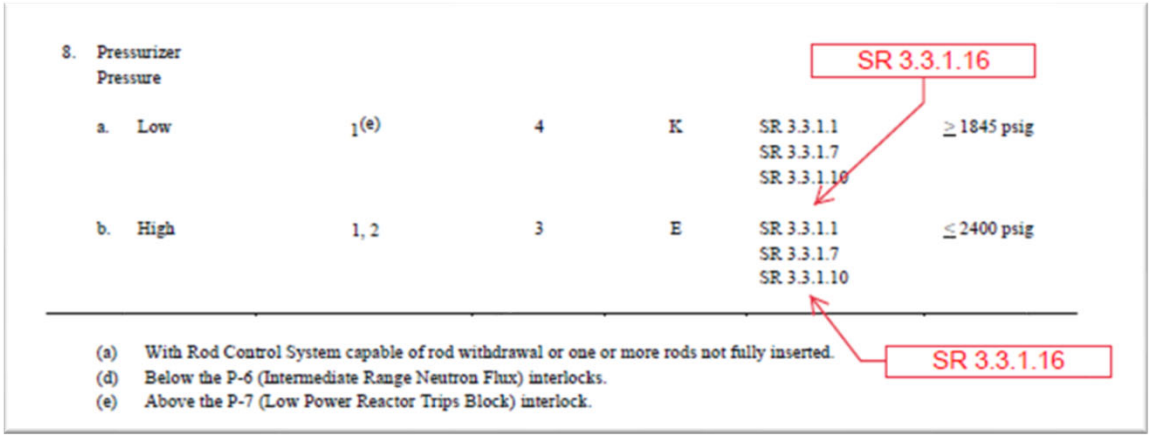
Table 3.3.1-1 (page 2 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
5. Source Range Neutron Flux	2(d)	2	H, I	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 ~~SR 3.3.1.16~~	≤ 1.0E6 cps
	3(a), 4(a), 5(a)	2	I, J	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11 ~~SR 3.3.1.16~~	≤ 1.0E6 cps

Proposed Licensing Action

Technical Specifications Changes (continued)

NSPM Proposed mark up



8.	Pressurizer Pressure					
a.	Low	1[(e)]	4	K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≥ 1845 psig
b.	High	1, 2	3	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 2400 psig

SR 3.3.1.16

SR 3.3.1.16

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.
(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

Proposed Licensing Action

Technical Specifications Changes (continued)

NSPM Proposed mark up

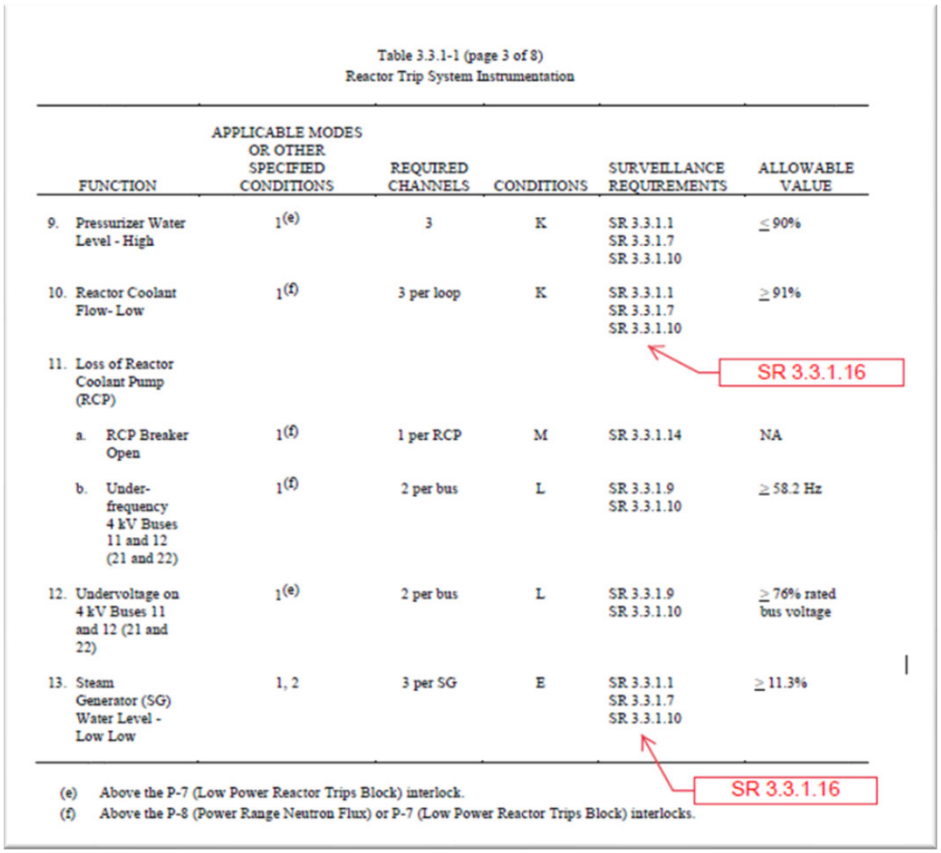


Table 3.3.1-1 (page 3 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
9. Pressurizer Water Level - High	1(e)	3	K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 90%
10. Reactor Coolant Flow- Low	1(f)	3 per loop	K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≥ 91%
11. Loss of Reactor Coolant Pump (RCP)					
a. RCP Breaker Open	1(f)	1 per RCP	M	SR 3.3.1.14	NA
b. Under-frequency 4 kV Buses 11 and 12 (21 and 22)	1(f)	2 per bus	L	SR 3.3.1.9 SR 3.3.1.10	≥ 58.2 Hz
12. Undervoltage on 4 kV Buses 11 and 12 (21 and 22)	1(e)	2 per bus	L	SR 3.3.1.9 SR 3.3.1.10	≥ 76% rated bus voltage
13. Steam Generator (SG) Water Level - Low Low	1, 2	3 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≥ 11.3%

SR 3.3.1.16

SR 3.3.1.16

(e) Above the P-7 (Low Power Reactor Trips Block) interlock.
(f) Above the P-8 (Power Range Neutron Flux) or P-7 (Low Power Reactor Trips Block) interlocks.

Proposed Licensing Action

Technical Specifications Changes (continued)

Bases for removing SR 3.3.1.16 from Function 3b:

- Function 3b (negative rate trip) is discussed in the dropped rod analysis, but that analysis assumes no reactor trip; therefore no assumptions about time delays.

Proposed Licensing Action

Technical Specifications Changes (continued)

Bases for removing SR 3.3.1.16 from Function 5:

- Function 5 (source range trip) is not credited in the rod withdrawal from subcritical (RWFS) analysis and no time delay assumption is included in the accident analysis for the source range trip.

Proposed Licensing Action

Site-Specific Methodology

- NSPM has developed and will submit for approval with the LAR a site-specific methodology for allocating response times to the PINGP RTS components that are subject to Response Time Testing.
- The proposed methodology will be modeled on TSTF-569, Revision 2, Attachment 1, Methodology 2 (hereafter Methodology 2) but will account for the specific PPS components installed in PINGP Units 1 and 2.

Proposed Licensing Action

Site-Specific Methodology (continued)

- **Nuclear Instrumentation System (NIS) and Relay Reactor Protection System (RRPS)**: Methodology 2 applies directly to PINGP.
  - The bounding response times for NIS and RRPS as shown in WCAP-14036-P-A will be evaluated in accordance with the NRC-approved methodology as discussed in TSTF-569, Attachment 1.

Proposed Licensing Action

Site-Specific Methodology (continued)

- **PPS**: Foxboro H-Line/Curtiss-Wright Scientech NUS and the Hagan 7100 Line (previously approved) of equipment are similar
  - NSPM proposes to use Methodology 2
    - Analyze the system modules for contribution to protection function
    - Perform failure modes and effects analysis (FMEA) on modules that perform protection function
    - Determine bounding response times for components
    - Evaluate impact of components on system response time
    - Compare FMEA bounding time delay to USAR assumed time delay

Proposed Licensing Action

Site-Specific Methodology (continued)

Reactor Trip Function	Time Delay (USAR) seconds	FMEA Bounding Time Delay* seconds
Function 2.a, Power Range High Neutron Flux	0.45	0.266
Function 2.b, Power Range Low Neutron Flux	0.45	0.266
Function 3.a, Power Range High Positive Rate	0.60**	0.401
Function 3.b, Power Range High Negative Rate	N/A	N/A
Function 5, Source Range High Neutron Flux	N/A	N/A
Function 6, Overtemperature Delta Temperature	6.0	0.513
Function 7, Overpower Delta Temperature	6.0	0.378
Function 8.a, Low Pressurizer Pressure	1.0	0.256
Function 8.b, High Pressurizer Pressure	1.0	0.206
Function 10, Low Reactor Coolant Loop Flow	1.2	0.206
Function 13, Low Low Steam Generator Level	1.5	0.206

N/A indicates Not Credited in Accident Analysis

*Response time of the Reactor Trip Breaker of ≤100msec is not accounted in the Bounding Time Delay above.

**NF-XCEL-23-060, Revision 1 Xcel Energy Prairie Island Nuclear Generating Plant Positive Neutron Flux Rate Reactor Trip Analysis - November 14, 2023

LAR will propose to remove SR 3.3.1.16 for functions 3.b and 5

LAR will propose to add SR 3.3.1.16 for functions 8.a, 8.b, 10 and 13

Schedule

NSPM plans to submit the LAR and Methodology by April 10, 2024, and request NRC approval 12 months from acceptance with a goal of implementation with the 2025 Unit 2 refueling outage.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