



Duke Energy/NRC Observation Meeting: Robinson LAR to Adopt TSTF-577, Rev. 1

September 14, 2022



Duke Energy Attendees

Mike Classe (GM Nuclear Engineering, Robinson)

Ryan Treadway (Director, Nuclear Fleet Licensing)

Etienne Fonteneau (Manager, Steam Generator Programs Engineering)

Dan Mayes (Principal Engineer, Steam Generator Programs Engineering)

Jordan Vaughan (Lead Nuclear Engineer, Nuclear Fleet Licensing)

Chris Courtenay (Lead Nuclear Engineer, Nuclear Fleet Licensing)

Tim Thulien (Lead NDE Specialist (ECT Level III), Materials Integrity)

- Introduction (Desired Meeting Outcomes)
- Technical Justification for SG Tube Integrity Until R2R35 (2026)
- Application of Robinson Technical Specifications for Exceeding Plugging Criteria

Technical Justification for SG Tube Integrity Until R2R35 (2026)

- B SG, Tube Row 3 Colum 5 (R3C5) has a 38% through wall (TW) indication at the top of cold leg tubsheet +0.14 inches. The indication length is 0.18 inches. A foreign object caused this indication, with the part no longer present.
 - Indication History:2014:35%TW, 2017:38%TW, 2020:38%TW.
- *The calculated Condition Monitoring (CM) limit for foreign object wear with a bounding length of 1.5 inches is 50.5% TW. Therefore, condition monitoring is met for the population of foreign object wear flaws. (Section 3.3 of the CMOA)*
- *For the Operational Assessment (OA), None of the indications that were left in service were found to have a possible loose part (PLP) present that would represent a continued mechanism for wear on the tube. As such, growth on these indications is assumed to be zero over the next inspection interval. Therefore, by virtue of meeting CM, which includes all uncertainties, OA is met for three cycles for this population of flaws. (Section 4.3 of the CMOA)*

Technical Specifications Application for Unplugged Tube

- Proposed Change in LAR: Perform next 100% eddy current inspection of SG tubes during Refuel 35 (targeted to begin November 2026)
- Although recent inspection history demonstrates no wear growth for B SG tube R3C5, TS 5.5.9.c projected plugging limit criteria will be exceeded prior to Refuel 35.
- Specifically, after applying TS 5.5.9.c's 2% per year reduction to the 47% plugging criteria, R3C5's 38% through-wall (TW) indication exceeds the calculated 72-month criteria of 37% TW. The projection from Dec. 2020 is represented as follows:

0-12 months – 47% Plugging limit 2020-2021
12-24 months – 45% Plugging limit 2021-2022 R233
24-36 months – 43% Plugging limit 2022-2023
36-48 months – 41% Plugging limit 2023-2024 R234
48-60 months – 39% Plugging limit 2024-2025
60-72 months – **37%** Plugging limit 2025-2026 R235

Technical Specifications Application for Unplugged Tube

- Robinson TS 3.4.18, “Steam Generator (SG) Tube Integrity,” provides a Limiting Condition for Operation (LCO) and Action (i.e., Condition and Required Actions) for satisfying the SG tube plugging criteria of TS 5.5.9.c and not plugging the tube in accordance with the SG Program
 - LCO: “All SG tubes satisfying the tube plugging criteria shall be plugged in accordance with the Steam Generator Program.”
 - Condition A: “One or more SG tubes satisfying the tube plugging criteria and not plugged in accordance with the Steam Generator Program.”
 - Required Action A.1: “Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or SG tube inspection.” Completion Time: within 7 days

AND

- Required Action A.2: “Plug the affected tube(s) in accordance with the Steam Generator Program.” Completion Time: prior to entering MODE 4 following the next refueling outage or SG tube inspection

Technical Specifications Application for Unplugged Tube

- Once the 37% plugging limit of TS 5.5.9.c is exceeded, Robinson would:
 - Declare the LCO for TS 3.4.18 not met because tube 'R3C5' would exceed the plugging criteria and would not be plugged
 - Enter Condition A and comply with BOTH Required Actions A.1 and A.2
 - Required Action A.1: tube integrity is maintained for tube 'R3C5' until the next SG tube inspection during Refuel 35 (2026), as previously discussed.
 - Required Action A.2: Duke Energy will plug tube 'R3C5' prior to entering Mode 4 after the inspection during Refuel 35
- The TS 3.4.18 Bases state:

“If the evaluation determines that the affected tube(s) have tube integrity, Required Action A.2 allows plant operation to continue until the next refueling outage or SG inspection provided the inspection interval continues to be supported by an operational assessment that reflects the affected tubes. However, the affected tube(s) must be plugged prior to entering MODE 4 following the next refueling outage or SG inspection. This Completion Time is acceptable since operation until the next inspection is supported by the operational assessment.”
- The existing operational assessment supports operation until Refuel 35

Technical Specifications Application for Unplugged Tube

- If Duke Energy cannot verify SG tube integrity (Required Action A.1) or if tube 'R3C5' is not plugged during Refuel 35 (Required Action A.2), then Condition B of TS 3.4.18 applies
- Required Action B.1 is to be in Mode 3 in 6 hours and Required Action B.2 is to be in Mode 5 in 36 hours
- Thus, Robinson would be prohibited from entering Mode 4 following Refuel 35 unless tube integrity exists, and tube 'R3C5' is plugged.

