



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

June 24, 2021



Duke Energy Attendees

Art Zaremba (Manager, 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)

- Introduction (Desired Meeting Outcomes)
- License Amendment Request Overview
- Justification for Technical Variation from TSTF-577
- Timeline for LAR Submittal/Closing Remarks

License Amendment Request

- Based on TSTF-577, “Revised Frequencies for Steam Generator Tube Inspections”
- Existing Robinson Technical Specifications requirements are based on TSTF-510
- Robinson steam generators (SGs) have Alloy 600 thermally treated tubes
- Propose to credit the 100% inspection of all SGs in December 2020 as the initial inspection in the first inspection period for Robinson
 - For the proposed change, the initial inspection period began December 8, 2020
- Technical Variation from TSTF-577:
 - TSTF-577 provides a 54 effective full power months (EFPM) inspection period; if no cracking has been experienced except for portions of the tube that are exempt AND the SG inspection was performed using enhanced probes, then a 72 EFPM may be applied
 - 100% inspection of all 3 Robinson SGs in December 2020 did not use enhanced probes
 - However, due to Robinson being on 24-month refueling cycles, Duke Energy is proposing a 72 EFPM inspection period for the period that began December 2020.

License Amendment Request

Proposed Change (variation verbiage is bold/italicized):

“After the first refueling outage following SG installation, inspect 100% of the tubes in each SG at least every 54 effective full power months, which defines the inspection period. If none of the SG tubes have ever experienced cracking other than in regions that are exempt from inspection by alternate repair criteria and the SG inspection was performed with enhanced probes, the inspection period may be extended to 72 effective full power months. ***Additionally, the inspection period that began December 8, 2020, may be 72 effective full power months without prior performance of a SG inspection using enhanced probes....***”

Justification for Technical Variation from TSTF-577

- Robinson is a three loop plant with Westinghouse Model 44 F steam generators. The Alloy 600 TT tubes are 0.875 inch in diameter by 0.050 inch wall. The tube bundles were replaced in 1984 and have operated for 29.6 EFPY at the last inspection at EOC 32. Cycle 32 was 1.86 EFPY, the first nominal 24 month cycle
- The T_{hot} is less than 605 degrees Fahrenheit in all loops.
- The most recent EOC 32 inspection results are discussed in the inspection report (ADAMS Accession No. is ML21147A263)
- The existing degradation mechanism are tube wear at anti-vibration bars (AVB), support plate locations and a presumed foreign object.
- None of the Robinson SG tubes have ever experienced cracking other than in regions that are exempt from inspection by the alternate repair criteria in Technical Specifications

Justification for Technical Variation from TSTF-577

- Foreign Object Search and Retrieval (FOSAR) was performed in the in all three steam generators. There were six metallic objects identified. Two objects were removed, one (machine curl) was previously plugged around the identified tube during EOC 30, three were left in place as is and were evaluated. The wear evaluation concluded that the metallic objects can remain in the steam generator for 6 EFPY (three cycles) of operation.
- The foreign material exclusion program is discussed
- Deposit loading is discussed
- The current operational assessment was projected for 6 EFPY or three cycles. The existing mechanisms considered in the operational assessment were tube wear from AVB's, broached and drill tube support plates and presumed foreign objects. All were projected deterministically. No potential mechanisms were considered due to the low T_{hot} .
- There are 42 high stress tube remaining in service. In 2020, the data was rereviewed by Westinghouse, no additional tubes were identified. The EOC 32 inspection of the 42 tubes was performed full length with an array probe and no degradation was identified.

Justification for Technical Variation from TSTF-577

- There are no administrative limits on primary to secondary leakage (mitigating strategies) planned for the proposed change. The Technical Specification primary to secondary leakage limit through any one steam generator is 75 gpd.
- In conclusion, after 29.6 EFPY the tube degradation is minimal, predictable, and easily detected by the bobbin coil. Corrosion is not expected due to the low T_{hot} . The existing degradation mechanisms have been projected deterministically to meet the structural and leakage performance criterion for three cycles or six EFPY or until the end of cycle 35.
- Duke Energy is requesting 72 effective full power months without an enhanced probe inspection for the Robinson inspection period that began December 8, 2020 and finds that such a period is acceptable based on the low amount of degradation, the low T_{hot} , the history of cracking in the Alloy 600 TT fleet, and projecting to meet the structural and leakage performance criterion deterministically for 6 EFPY for existing degradation mechanisms.

Closing Remarks

- Duke Energy targeting to submit Robinson TSTF-577 LAR by early August 2021

