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# Watts Bar Nuclear Plant Unit 2

Pre-Submittal Teleconference for Proposed License Amendment to Revise the Updated Final Safety Analysis Report (UFSAR) to use a Tube Support Plate Locking/Displacement Analysis

September 8, 2021

# Agenda

## (Open Portion of Meeting)

- Opening Remarks and Purpose of the Proposed License Amendment Request (LAR)
- Introduction
- Mitigation Strategy
- Proposed UFSAR Section 5.5.2.4 Change
- Regulatory Precedent
- Schedule for Submittal
- Path Forward

## (Closed portion of Meeting)

- Watts Bar Nuclear Plant (WBN) Unit 2 Tube Support Plate (TSP) Locking/Displacement Analysis Technical Discussion

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# Opening Remarks and Purpose of the Proposed LAR

- Purpose of the meeting is to discuss the potential WBN Unit 2 License Amendment Requests (LARs) for either Tube Support Plate (TSP) Displacement Analysis at elevation H02 or TSP Locking for elevations H02, H03, H04 and H05 following the WBN Unit 2 mid-cycle steam generator (SG) inspection commencing September 11, 2021.
- One of these LARs would only be submitted if the Operational Assessment (OA) does not support operation of WBN Unit 2 until the Unit 2 Cycle 4 refueling outage (U2R4) in Spring 2022 when the SGs will be replaced.
- Timing for submittal of one of the LARs (if needed) and NRC approval will depend on the results of the OA

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# Introduction

- The WBN Unit 2 cycle 3 refueling outage (U2R3) was the third inservice inspection (ISI) for the Unit 2 Model D3 SGs (Alloy 600MA).
- This was the first outage to implement Generic Letter (GL) 95-05 voltage-based repair criteria (ARC).
- Significant in-service inspection scope was performed.
- Condition monitoring requirements met for all degradation mechanisms except for GL 95-05 conditional burst probability in SG3 [WBN, Unit 2 Technical Specification (TS) 5.9.9 Item 5]
- During the mid-cycle inspection scheduled for September 11, 2021, WBN 2 will be implementing a similar scope of eddy current inspection that was implemented during the U2R3 outage.

# Mitigation Strategy

- Apply Alternate Probability of Detection (ML21027A167)
  - POD of 0.6 for less than 3.2 volts
  - POD of 0.9 for greater than or equal to 3.2 volts and less than 6.0 volts
  - POD of 0.95 for indications greater than or equal to 6.0 volts
- Apply Temperature Adjustment to Voltage Growth Rate for GL 95-05 alternate repair criteria (ARC) (ML21161A239)
  - Maximize temperature and power reduction to achieve necessary days of operation until U2R4 within the limits of the WBN Unit 2 safety analyses
  - As noted in TVA letter CNL-21-043 (ML21134A225), “Prior to entering Mode 4 following the WBN Unit 2 Cycle 4a SG inspection, TVA will make available to the NRC any single temperature change that will be applied to the OA during Cycle 4b and its impact on the operating interval for Cycle 4b. Additionally, if TVA does apply a temperature change during Cycle 4b, the effects on the OA would be addressed in the GL 95-05 90-day report following the WBN Unit 2 Cycle 4a SG inspection outage”

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## Supporting Documents

- To support the technical evaluation for the proposed LAR(s), Westinghouse Electric Company (Westinghouse) is preparing the following technical documents one of which would be enclosed in the LAR:
  - WCAP-18681-P addresses H02 plate only w/o TSP locking
  - WCAP-18628-P addresses H02, H03, H04 and H05 plates w/w/o TSP locking
- These reports will be discussed in further detail in the closed portion of the meeting

# Proposed WBN Unit 2 UFSAR Section 5.5.2.4 Change

## Unit 2 Only

As discussed in WCAP-18681-P<sup>(29)</sup> (replace with WCAP-18628-P if TSP locking is implemented), Unit 2 has set a tube burst probability of  $1.0E-5$  for the condition monitoring and operational assessments for all tube support plates (TSPs), which are limited in displacement during a postulated steam line break (SLB). This probability of burst is based on the conservative assumption that all intersections in all TSPs have through-wall cracks extending throughout the total thickness of the TSP of which a limited length would be exposed during a postulated main SLB (MSLB). WCAP-18681-P (replace with WCAP-18628-P if TSP locking is implemented), shows that if the exposed length remains an acceptable value, the tube burst probability is negligible. Considering that the TSP displacements will be limited to less than an acceptable length as defined in WCAP-18681-P (replace with WCAP-18628-P if TSP locking is implemented) in the Unit 2 Steam Generators at TSP Elevation(s) H02 (replace with H02, H03, H04 and H05 if TSP locking is implemented) as shown by analysis and with TSP locking (if TSP locking is implemented), the likelihood of an axial burst failure at any intersections at these elevations, given a MSLB, exceeding the burst probability of  $1.0E-5$  is extremely low. On this basis, the burst probability calculation methodology for the 1-volt ARC at TSP elevations with limited displacements due to tube expansions is not needed in the condition monitoring and operational assessments and a conservative reporting burst probability of  $1.0E-5$  is adequate. With the exception of all TSPs which are limited in displacement during a postulated SLB, it should be noted that the tube burst probability for those ODS/CC indications covered under the remainder of the intersections for the 1-volt ARC at TSP elevations without tube expansions will continue to be calculated as free span ODS/CC in the condition and operational assessments. The tube burst probability of  $1.0E-5$  at TSP Elevation(s) H02 (replace with H02, H03, H04 and H05 if TSP locking is implemented) with limited displacements is combined with the tube burst probability calculated using the GL 95-05 methodology for indications at the rest of the TSP elevations. The total burst probabilities must be lower than the reporting threshold of  $1.0E-2$  as specified in GL 95-05. Tube indications at TSP elevations with or without limited displacements due to tube expansions will continue to be considered in the projected EOC voltage distribution results for estimated primary-to-secondary leakage in the faulted loop during a postulated SLB. This exception only applies until the Unit 2 Steam Generators are replaced<sup>(30)</sup>.

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## Proposed WBN, Unit 2 UFSAR Section 5.5.2.4 Change

- Additionally, the Reference Section in UFSAR Section 5.5 will be revised to add new Reference 29 for WCAP-18681-P(29) (replace with WCAP-18628-P if TSP locking is implemented) and new Reference 28 to reflect the NRC approval of this LAR.
- There are no corresponding TS changes required to apply the proposed TSP displacement analysis or tube locking.



# Regulatory Precedent

- The implementation of TSP locking and the corresponding revised method for calculating SG conditional tube burst probability described in WCAP-18628-P proposed for application at WBN Unit 2 has been previously approved by the NRC for the South Texas Project (STP), Unit 2 on March 8, 2001.
- In Amendment No. 114 (ML010710090) NRC approved a revision to the STP, Unit 2 Technical Specifications approving the application of a 3.0 volt repair criteria for SG tubes experiencing OD SCC at hot leg intersections at TSP elevations with locked tubes that would experience limited displacement during a postulated SLB for one cycle of operation.
- However, TVA does not plan to revise the current plugging limit for TSP elevation ODSCC upwards from 1.0 volt to 3.0 volts for WBN Unit 2. Also, no change to the primary-to-secondary SLB leakage calculation methodology is planned as was implemented at STP, Unit 2. TVA only plans to take credit for the conditional probability of burst w/w/o TSP locking of  $1E-05$  that is calculated for all indications of ODSCC due to the limited deflection of the TSPs during a postulated SLB. Additionally, the proposed method for calculating conditional probability for tube burst will only be applied until SG replacement.

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# Schedule for Submittal

- September 8, 2021 – Pre-submittal teleconference with NRC
- TBD - Submit LAR to NRC (contingent upon result of SG inspection during the WBN Unit 2 Cycle 4 refueling outage and preliminary OA results)
- TBD - NRC requested approval date NRC (contingent upon result of SG inspection during the WBN Unit 2 Cycle 4 refueling outage and preliminary OA results)

**TVA**

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