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PWROG-NRC Meeting to Discuss Extending the Hydrogen-Based Transient Cladding Strain Limit to AXIOM® Cladding

Agenda

- Introductions
- Purpose of the Meeting
- Background
- Technical Justification
- Approach
- Proposed Schedule
- Open Discussion

Purpose of the Meeting

- The purpose of this meeting is to discuss applying the hydrogen-based transient cladding strain limit that was approved in PWROG-21001-P-A, "Hydrogen-Based Transient Cladding Strain Limit," for ZIRLO® and **Optimized ZIRLO™** cladding to AXIOM® cladding based on [ ]a,c

Background

- The current 1% transient cladding strain limit does not consider [

  ]^{a,c}
- A hydrogen-based strain limit for ZIRLO® and **Optimized ZIRLO™** cladding was approved by the NRC in PWROG-21001-P-A
  - The hydrogen strain limit for ZIRLO® and **Optimized ZIRLO™** cladding was based on [ ]^{a,c}
  - [ ]^{a,c} is a conservative parameter that was used to be consistent with the strain definition in the PNNL Stress/Strain Correlation for Zircaloy report (PNNL-17700)

Technical Justification

- **Revising the limit from [ ]a,c to [ ]a,c is more appropriate:**
  - [ ]a,c
    - Chapter 4.2 in the NRC Standard Review Plan (NUREG-0800) discusses that the transient cladding strain limit is comprised of both plastic and elastic components
    - Using [ ]a,c as the basis for AXIOM® cladding hydrogen-based strain limit is [ ]a,c
  - [ ]a,c
  - [ ]a,c
    - This confirms that margin exists for cladding integrity under PCMI loading at strains beyond [ ]a,c
  - Testing data and literature research indicated that [ ]a,c of cladding is predominantly impacted by the % of recrystallization annealing (RXA) and the pellet-cladding interaction; and therefore, [ ]a,c is a more accurate measure of cladding strain capability during transient conditions

Illustration of [ ]a,c

[a,c]

Approach

[ ]a,c

- The same hydrogen-based strain limit approved for ZIRLO® and **Optimized ZIRLO**™ cladding in PWROG-21001-P-A will be used
- The hydrogen-based strain limit in PWROG-21001-P-A is [

  ]a,c
- This figure includes [

  ]a,c

Proposed Schedule

- A draft Supplement to PWROG-21001-P-A will be transmitted to the NRC to support a Robust Pre-submittal meeting in June 2026

Open Discussion