



# BORAL® Five Year Accelerated Corrosion Test

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**NRC Neutron Absorber Material Degradation Meeting**

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# Outline

- Background
- Test plan
- Status

# Background

- Develop strategy for managing long term use of BORAL® in SFPs
  - Detect onset of degradation
  - Formulate a defense-in-depth mitigation plan
- Development of strategy
  - Identify and analyze degradation mechanisms
  - Identify and analyze material surveillance techniques
  - Identify R&D and laboratory opportunities

# Background – BORAL® Management Strategy

- Defense in depth strategy

- 1<sup>st</sup> Level

- Surveillance

- 2<sup>nd</sup> Level

- Measurement

- 3<sup>rd</sup> Level

- Mitigation

# Background - BORAL® Management Strategy

- Areas identified as having R&D potential
  - Long-term accelerated corrosion test
  - Destructive exam of used BORAL® panels
  - SFP chemistry
  - Predictive models
  - Others

# Background – BORAL® Management Strategy

- Conclusions from development of strategy
  - Overall performance to date has been very good
  - In 25 years of service, no significant loss of B-10
  - No mechanism identified that would cause sudden degradation or reconfiguration of B-10
  - Safety concerns (criticality/loss of B-10) and operational concerns (blistering) are two separate issues
  - Current challenge is to assure very long Boral efficacy
  - BORAL® is not Boraflex

**EPRI Report 1025204, “Strategy for Managing the Long Term use of BORAL® in Spent Fuel Storage Pools,” July 2012**

Available at : [http://my.epri.com/portal/server.pt?Abstract\\_id=0000000000001025204](http://my.epri.com/portal/server.pt?Abstract_id=0000000000001025204)

# BORAL® 5 Year Test Plan - Overview

- Accelerated corrosion test
  - 5 year test
  - Remove and test coupons each year
- BWR and PWR conditions
- Encapsulated and Un-encapsulated
- Test coupons
  - AAR
  - Ceradyne
  - Ceradyne-AAR

Appendix A to EPRI Report 1025204, “Strategy for Managing the Long Term Use of BORAL® in Spent Fuel Storage Pools”

# **BORAL® 5 Year Test Plan – Inspections & Tests**

- Visual inspection
- High resolution photography
- Dimensions
- Dry weight
- Neutron attenuation
- Surface characterization
  - Oxide film
  - Pit size and depth

# BORAL® 5 Year Test Plan – Outcome

- Confirmatory nature
  - Needed due to long term use of BORAL®
  - Corrosion only mechanism that could lead to safety concern
  - Determine corrosion performance over time
  - Expect to confirm corrosion rate is low and self-limiting

# 5 Year Test – Current Status

## Coupons

- All coupons received
- Coupon pre-characterization to begin once procedures approved

## Test

- Test baths partially received
- Test to begin – Fall 2012
- Test completion – Fall 2017

## Reporting

- Annual updates to NAUG
- Final report – Dec 2017

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