



Neutron Absorber Materials Degradation Issues – Ongoing & Planned R&D Projects

NRC-Industry Meeting
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Topics

Past R&D

- NRC Information Meeting on Neutron Absorber Materials (February 27, 2009)
- 2009 EPRI-sponsored Publications

EPRI Reference Materials

2010 EPRI-sponsored Projects

R&D Trends

Conclusion

Past R&D – NRC Information Meeting on Neutron Absorber Materials (February 27, 2009)

- Neutron Absorbing Material Technology (Ray Lambert)
 - In-Service Performance of Boraflex (Ken Lindquist)
 - In-Service Performance of BORAL® (Ken Lindquist)
 - New Materials (Ken Lindquist)
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- Degradation of B_4C Plates at Palisades (Tom Woody)
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Other relevant interaction(s) with NRC

- Neutron Transmission Through Boral™: Impact of Channeling on Criticality (EPRI Report 1011819)
 - Presented to NRC in March 2005

Past R&D – 2009 EPRI-sponsored Publications

- Report 1018911 *Accelerated Corrosion Testing of BORAL®*
- Report 1019110 *Handbook of Neutron Absorber Materials for Spent Nuclear Fuel Transportation and Storage Applications – 2009 Edition*
- Annual Workshop #25 (Warrenville, IL) in August '09
 - Annual forum for utilities to exchange operational experience and lessons learned relative to neutron absorber materials

EPRI Reference Materials/Products

- Report 1019110 *Handbook of Neutron Absorber Materials for Spent Nuclear Fuel Transportation and Storage Applications – 2009 Edition* (November 2009)
 - Report 1013723 *Qualification Testing for Metal Matrix Neutron Absorber* (November 2006)
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- TR-107335 BADGER, a Probe for Non-destructive Testing of Residual Boron-10 Absorber Density in Spent Fuel Storage Racks – Development and Demonstration (December 1997)
 - TR-107333 The Boraflex Rack Life Extension Computer Code – RACKLIFE: Theory and Numerics (September 1997)
 - Latest version: RACKLIFE 2.1.1 (1020265, September 2009)

2010 EPRI-sponsored Projects

- Characterization of BORAL® Pore Size Distribution
 - Experimental determination
 - Theoretical modeling
- Data Analysis of BORAL® in Wet Storage Applications
 - Compilation of results from BORAL surveillance coupons (~100 coupons from ~20 pools)
- Annual Workshop #26 (August 3-4, 2010 in Warrenville, IL)

Trends

- Operational Issues
 - BORAL Performance
 - Blistering
 - Open porosity
 - Pitting corrosion
- Safety Issues
 - Potential loss of moderation due to formation of large blisters
 - (Not observed: loss of B₄C)
 - License renewal
 - Industry-wide coordination of collecting BORAL performance data
 - Development of set of recommendations
 - Awareness of recent ISG in the context of license renewal (LR-ISG-2009-01) and Info Notice (IN 2009-26)

Conclusion

- R&D on Neutron Materials Absorber Performance
 - Through the end of 2009, work was performed under sponsorship by a subset of utilities
 - Initially motivated by Boraflex degradation
 - But, expanded to other neutron absorbers materials
 - Starting in 2010: generic activity of EPRI's “Used Fuel and HLW Management” program

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