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Fuels – Cladding Behavior for Regulatory Applications

Industry Perspective on Proposed LOCA Criteria

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Industry Collaborates Closely With NRC

- Fuel Reliability Program (FRP) Working Group 2 is the industry focal point on interaction with NRC on generic fuel licensing issues
 - Through NEI, on interactions with NRR
 - Directly with RES, on experiments related to LOCA & RIA criteria
 - Members include U.S. and international utilities, fuel vendors, and NEI

Industry Collaborates Closely With NRC (cont'd)

- FRP has been actively participating in the LOCA tests at Argonne National Laboratory, since 1998
 - Supplying irradiated high-burnup BWR & PWR fuel rods for LOCA tests
 - H.B. Robinson rods (PWR, Zircaloy-4) at ~70 GWD/T
 - Limerick rods (BWR, Zircaloy-2) at ~60 GWD/T
 - TMI rods (PWR, low-tin Zircaloy 4) at 52 GWD/T
 - M5 rods (PWR advanced alloy) at 70 GWD/T (2006)
 - Providing analytic support for design and qualification of LOCA and mechanical property tests
 - Contributing independent evaluations of results

Industry Position On Proposed LOCA Criteria

- The industry is supportive of NRC's overall objective with regards to new LOCA criteria
 - Endorses performance-based approach
 - Expects the new criteria will allow for cladding advances without need for rule exemptions
- Qualified support for the NRC-RES proposed approach (described at the 7/27/05 ACRS Reactor Fuels Subcommittee meeting):
 - Completion of ANL tests to confirm the proposed criteria
 - Clarification of relevant and representative test conditions
 - Clarification of application details

What We Like About RES Proposal

- Consistent with current regulation
- Requires minimum change to implement new criteria into current LOCA licensing methods
 - The new rule is simple and can be implemented quickly
- Represents appropriate conservatism to protect public health & safety
 - More conservative with respect to quench survivability
- Performance-based criteria allow for easier transition to new cladding types

Data Needed & Issues To Address

- ANL should complete the following tests:
 - Ring compression tests (RCTs) on irradiated Robinson (PWR) samples that have been quenched
 - RCTs on irradiated ZIRLO and M5 (advanced alloys currently in use)
 - Integral LOCA tests using irradiated PWR cladding to confirm the overall LOCA behavior

Conclusions

- The industry is supportive of NRC's overall objective with regards to the new LOCA criteria
- The industry will continue to work closely with NRC on tests at ANL
- The industry will continue to analyze the results from ANL and international programs to confirm the proposed criteria as the LOCA rule making progresses