EPRI | ELECTRIC POWER RESEARCH INSTITUTE

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Session T1BC

Fuels – *Cladding Behavior for Regulatory Applications*

Industry Perspective on Reactivity Initiated Accidents (RIA) Criteria

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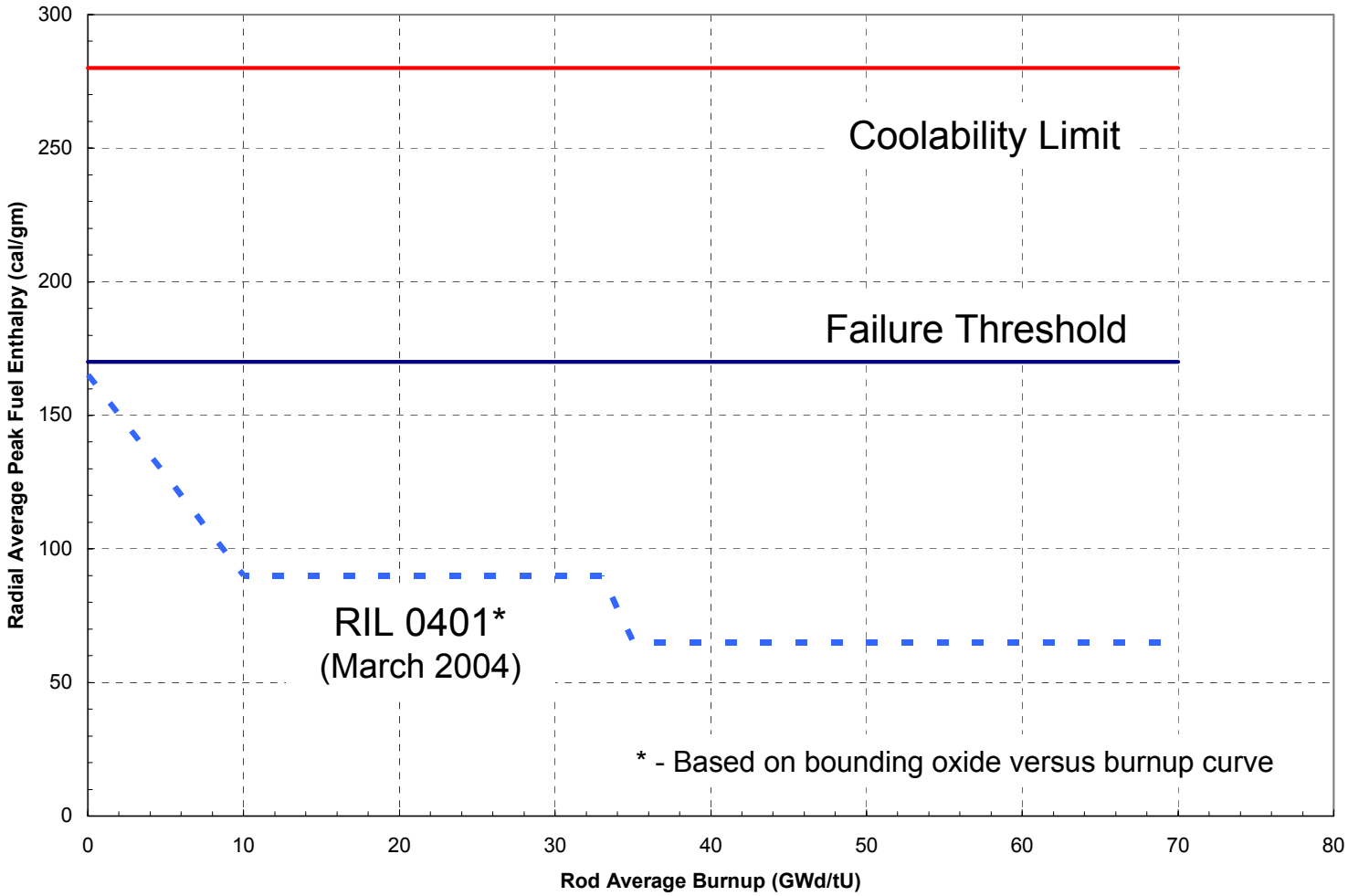
Limits On fuel behavior During An RIA

- Current regulations have separate limits for fuel rod failure and reactor safety
  - Fuel rod failure threshold for dose consequence assessment
  - Maintain reactor vessel integrity and core coolability
- Experimental data suggests fuel failure threshold becomes lower for high burnup rods
- Low probability of the event allows for more realistic approach
  - Collapsing the two limits as proposed in RIL 0401 is overly conservative and not consistent with experimental data
  - ACRS is supportive of retaining two separate limits

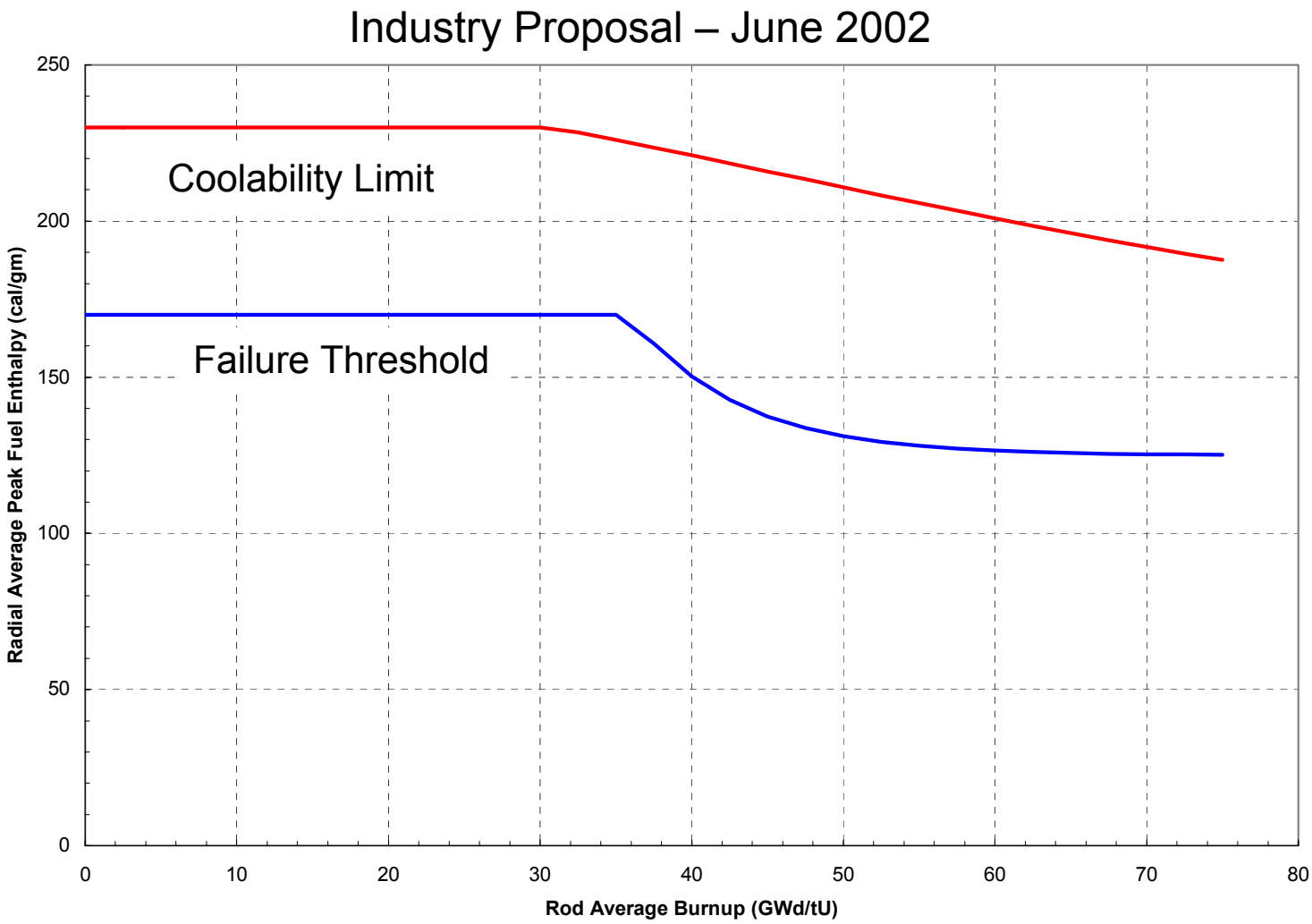
Current US RIA Acceptance Criteria



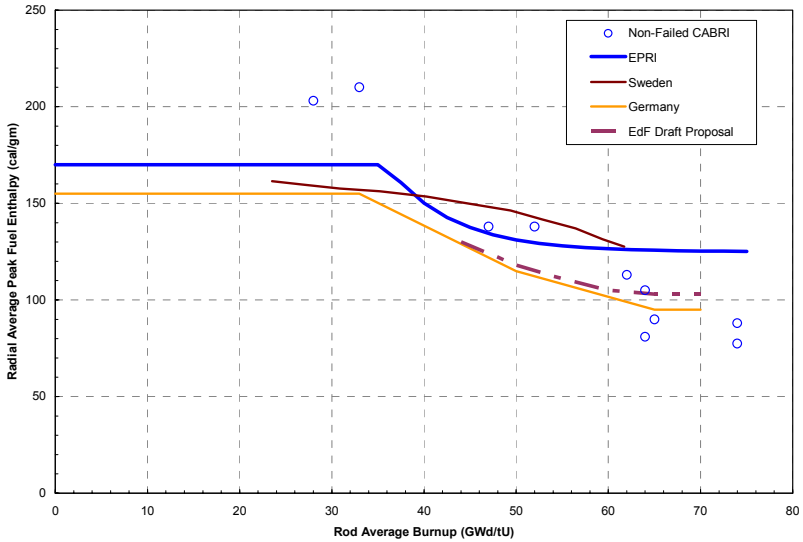
Assessment Of Low Enthalpy Failures In High Burnup Fuel

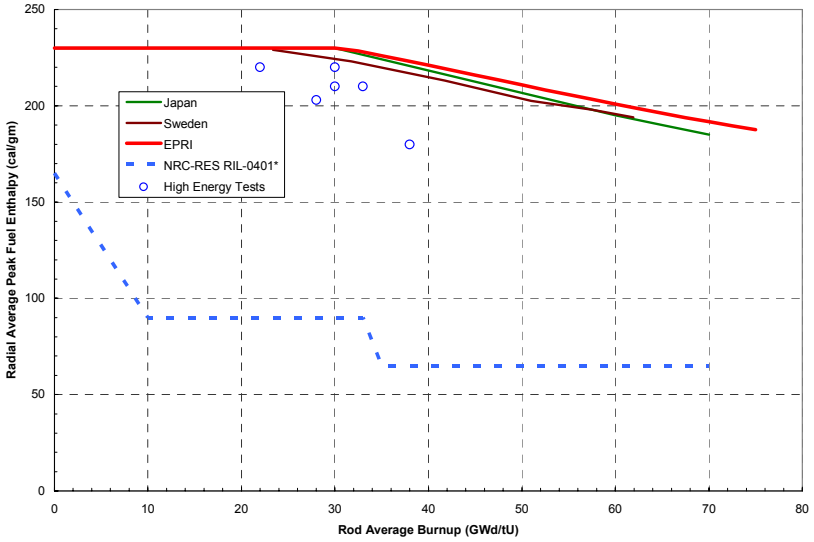
- Conclusions from regulatory and industry evaluations
  - No significant impact on public health and safety: low probability of occurrence and low power of high burnup fuel
  - Increase in fuel damage fraction and radiological consequences are possible
- While there is no immediate safety significance, RIA criteria need to be revised at high burnup to reflect current understanding and experimental data

Revised RIA Acceptance Criteria



Industry Proposal is Technically Sound

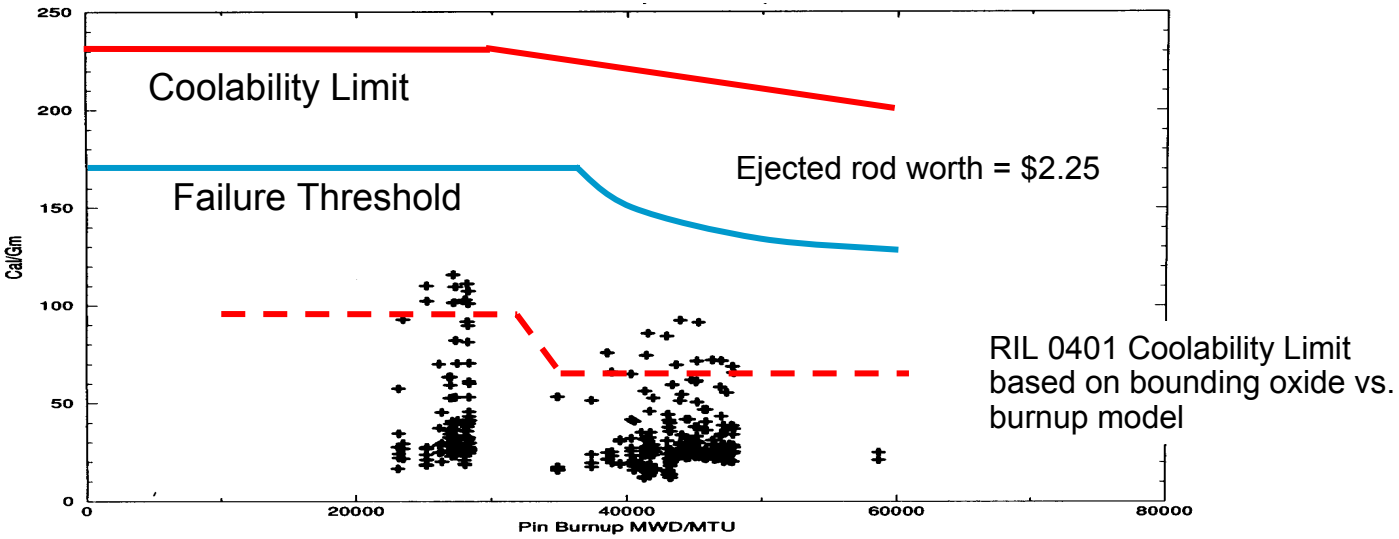




- Based on integral experiments and separate effects tests
- Consistent with experiments performed using applicable samples and test conditions
- Consistent with criteria developed in other countries using mechanistic approach (Sweden, Switzerland, France, Japan, etc.)

Application Of Revised Acceptance Criteria

- Collapsing Coolability limit to failure threshold will restrain/restrict flexibility of core reload designs



Conclusions

- The industry proposed criteria is based on experimental data and analytical approach which are widely used by technical experts and regulators worldwide
- RIA is a low probability event
  - Rod ejection is a localized event – consequences are limited
  - High burnup rods have limited reactivity – less impact on safety concerns
- Overly conservative criteria will limit core designs
  - Economic penalty without commensurate increase in safety benefit