2nd Public Workshop on the RIA Interim Acceptance Criteria

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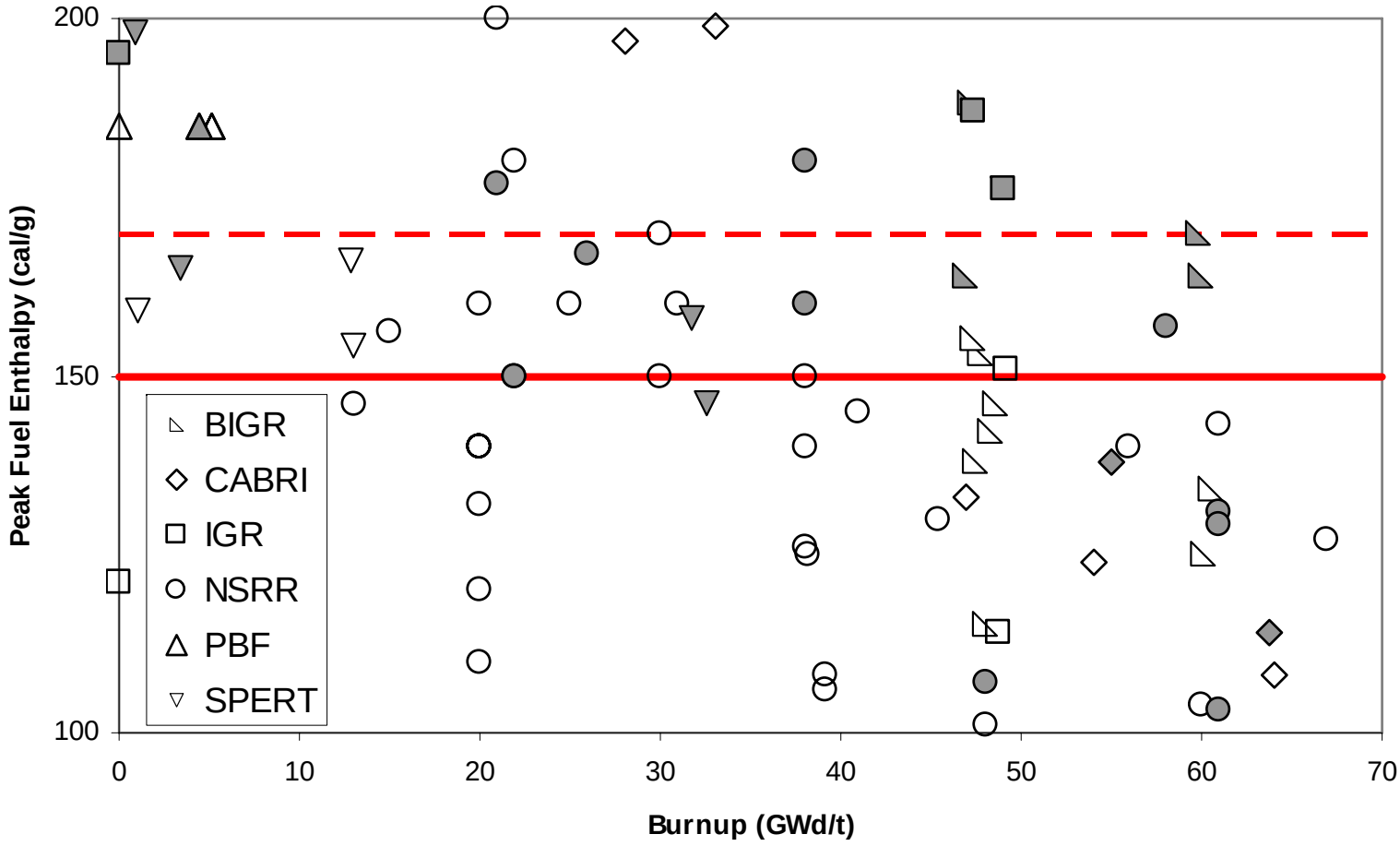
December 19, 2006

Workshop Agenda

1. Fuel Cladding Failure Interim Criteria
2. Core Coolability Interim Criteria
3. Fission-Product Inventory for Dose Calculations

Non-PCMI Failure Criteria

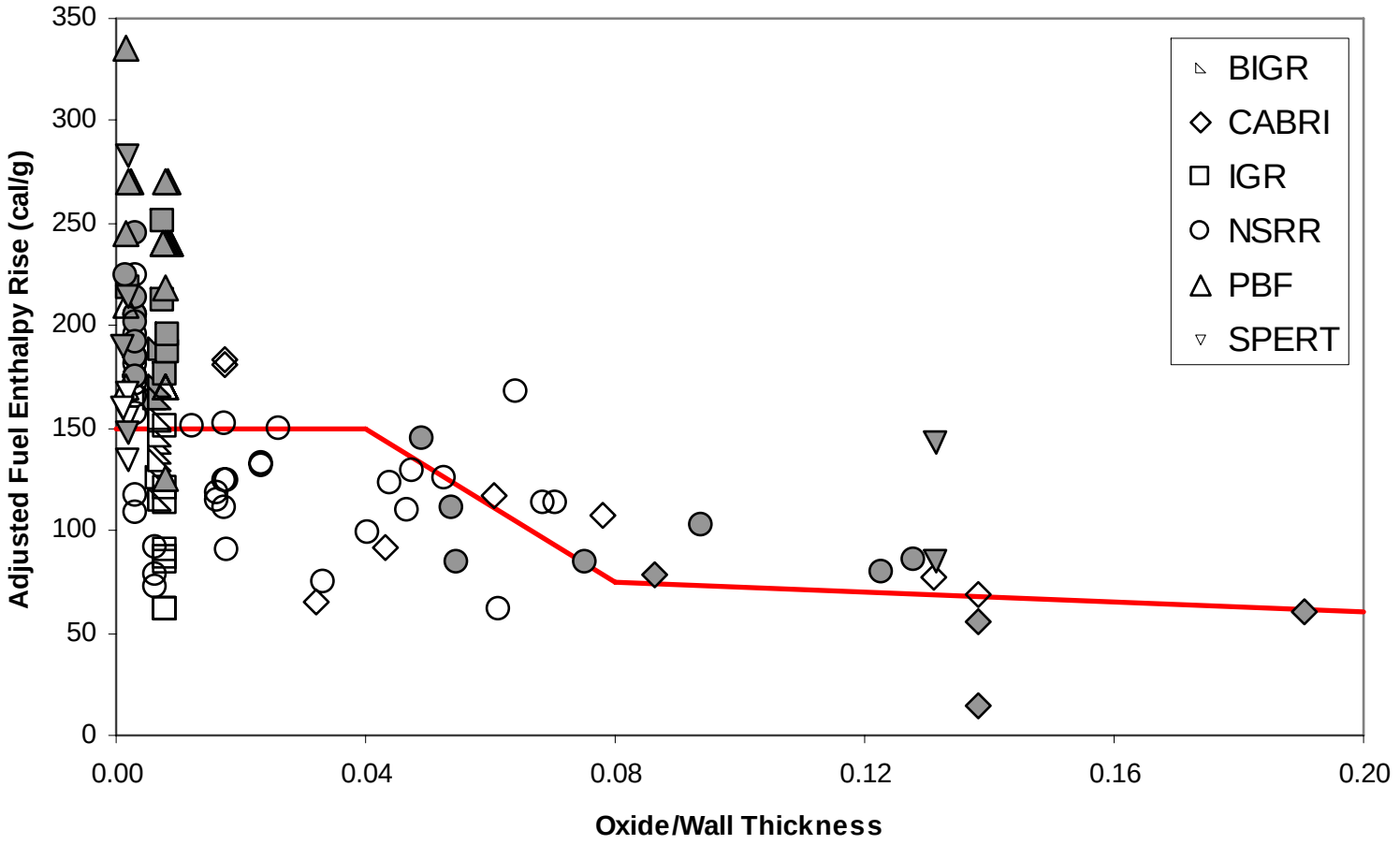


Non-PCMI Failure Criteria

Industry Comments:

- Maintain 170 cal/g
- Not applicable to at-power conditions
- Define zero enthalpy temperature

PWR PCMI Failure Criteria

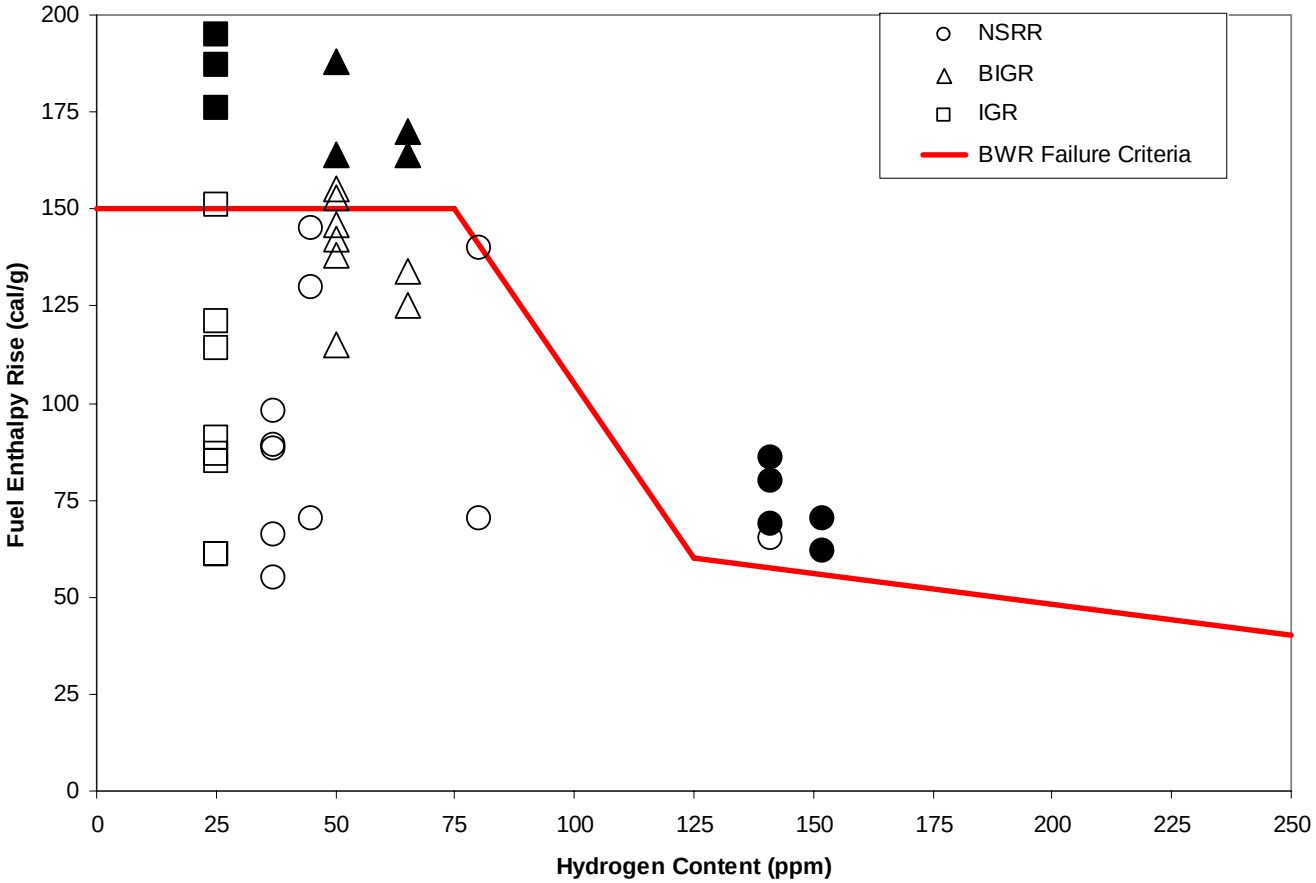


PWR PCMI Failure Criteria

Industry Comments:

- Allow alternative criteria
- Remove REP Na-7 MOX test
- Remove low corrosion NSRR tests
- Re-word text to state hydrogen is key factor
- Use nominal cladding thickness
- Prompt fuel enthalpy rise vs. delayed rise

BWR PCMI Failure Criteria



BWR PCMI Failure Criteria

Industry Comments:

- Allow alternative criteria
- Excess hydrogen vs. hydrogen
- Scale NSRR tests for pulse width
- Prompt fuel enthalpy rise vs. delayed rise

Staff Comments:

- Measured vs. predicted hydrogen content
- Availability of NSRR and Cabri hydrogen

Coolable Geometry

1. Peak radial average fuel enthalpy must remain below 230 cal/g.
2. Peak fuel temperature must remain below incipient fuel melting conditions.
3. Mechanical energy generated as a result of (1) non-molten fuel-to-coolant interaction and (2) fuel rod burst must be addressed with respect to reactor pressure boundary, reactor internals, and fuel assembly structural integrity.
4. No loss of coolable geometry due to (1) fuel pellet and cladding fragmentation and dispersal and (2) fuel rod ballooning.

Coolability Strategy

No Cladding Failure

- Demonstrate that fuel cladding failures are not predicted. In this case, coolability criteria associated with non-molted FCI and fuel rod burst (pressure pulse) and fuel dispersal (coolable geometry) need not be dispositioned.

No Fuel Pellet Fragmentation and Dispersal

- Demonstrate that the characteristics of the power pulse and/or change in fuel enthalpy will not yield fuel fragmentation and dispersal. In this case, coolability criteria associated with non-molted FCI (pressure pulse) and fuel dispersal (coolable geometry) need not be dispositioned.

No Dispersal of Finely Fragmented Rim Structure

- Demonstrate that PCMI fuel cladding failure will not occur at a point in burnup where the pellet is susceptible to fragmentation (e.g. no high burnup structure). In this case, coolability concerns associated with non-molted FCI (pressure pulse) are reduced to evaluating the potential dispersal of larger pellet fragments.

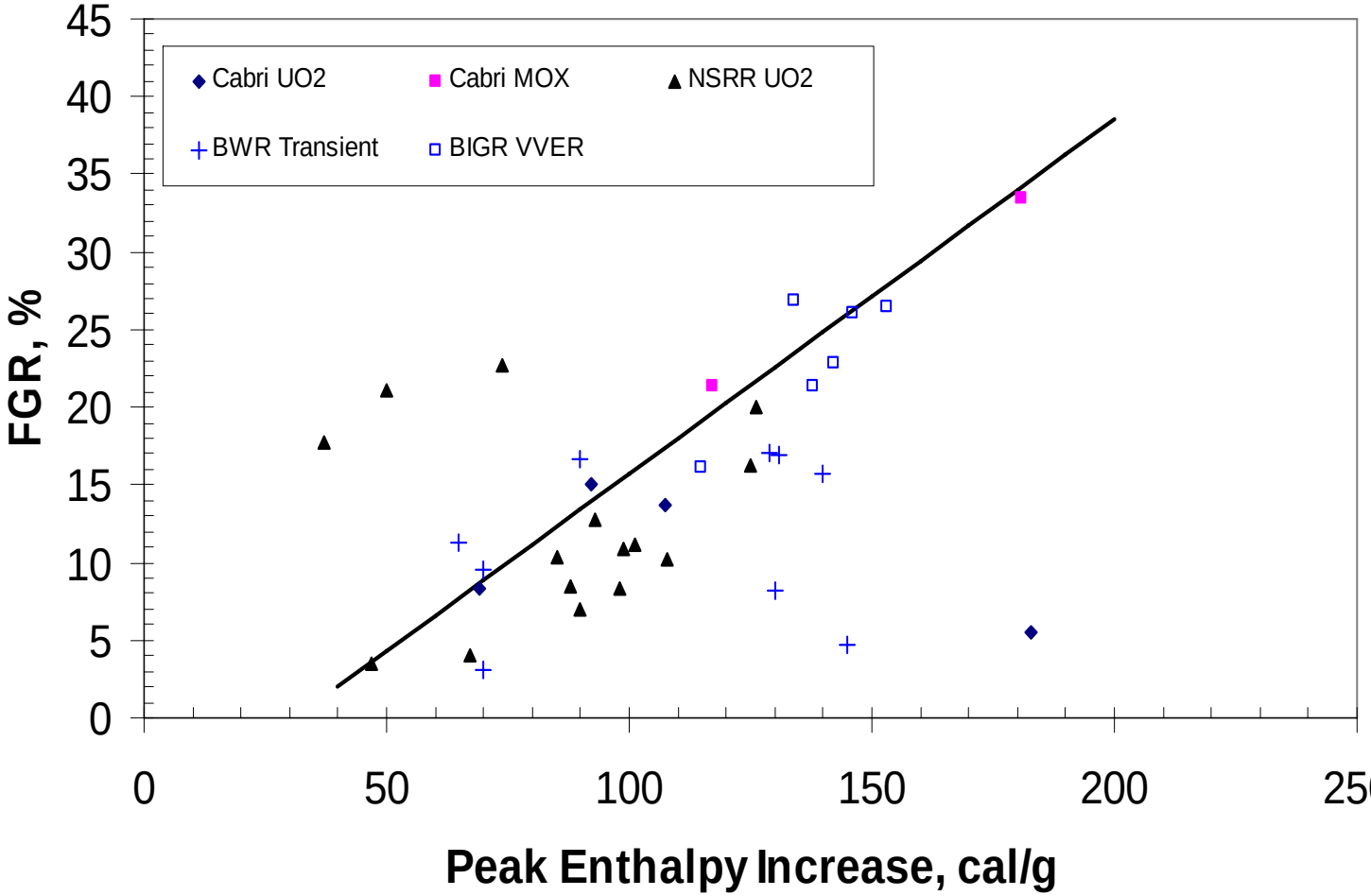
Long-term Cooling Bounded By Another Event

- Demonstrate that long-term cooling criteria:(1) fuel fragmentation with respect to flow blockage, (2) transport of dispersed fuel fragments within the primary coolant system, and (3) rod ballooning are bounded by another event of equal or higher probability. Short-term coolability phenomena related to rod geometry (230 cal/g) and non-molten FCI and pressure pulse need to be addressed.

Coolability Strategy

- **Strategies for addressing coolability criteria provided as guidance.**
- **In all cases, the burden of proof is with the applicant.**
- **Limited empirical database with regard to fuel dispersal.**

Fission Product Inventory



Fission Product Inventory

- Total fission-product inventory available for release upon cladding failure equals the steady-state gap inventory (from the applicable RG) plus the transient release (calculated with the correlation).
- The transient release from each axial node which experiences the power pulse may be calculated separately and combined to yield the total transient FGR for a particular fuel rod.
- The combined steady-state gap inventory and transient FGR from every fuel rod predicted to experience cladding failure (all failure mechanisms) should be used in the dose assessment.

Conclusions

1. Interim criteria incorporated into update to NUREG-0800 SRP.
2. COL applicants will need to address interim criteria.
3. Application timeline to current fleet undecided.