

Regulatory Requirements for Transient Testing



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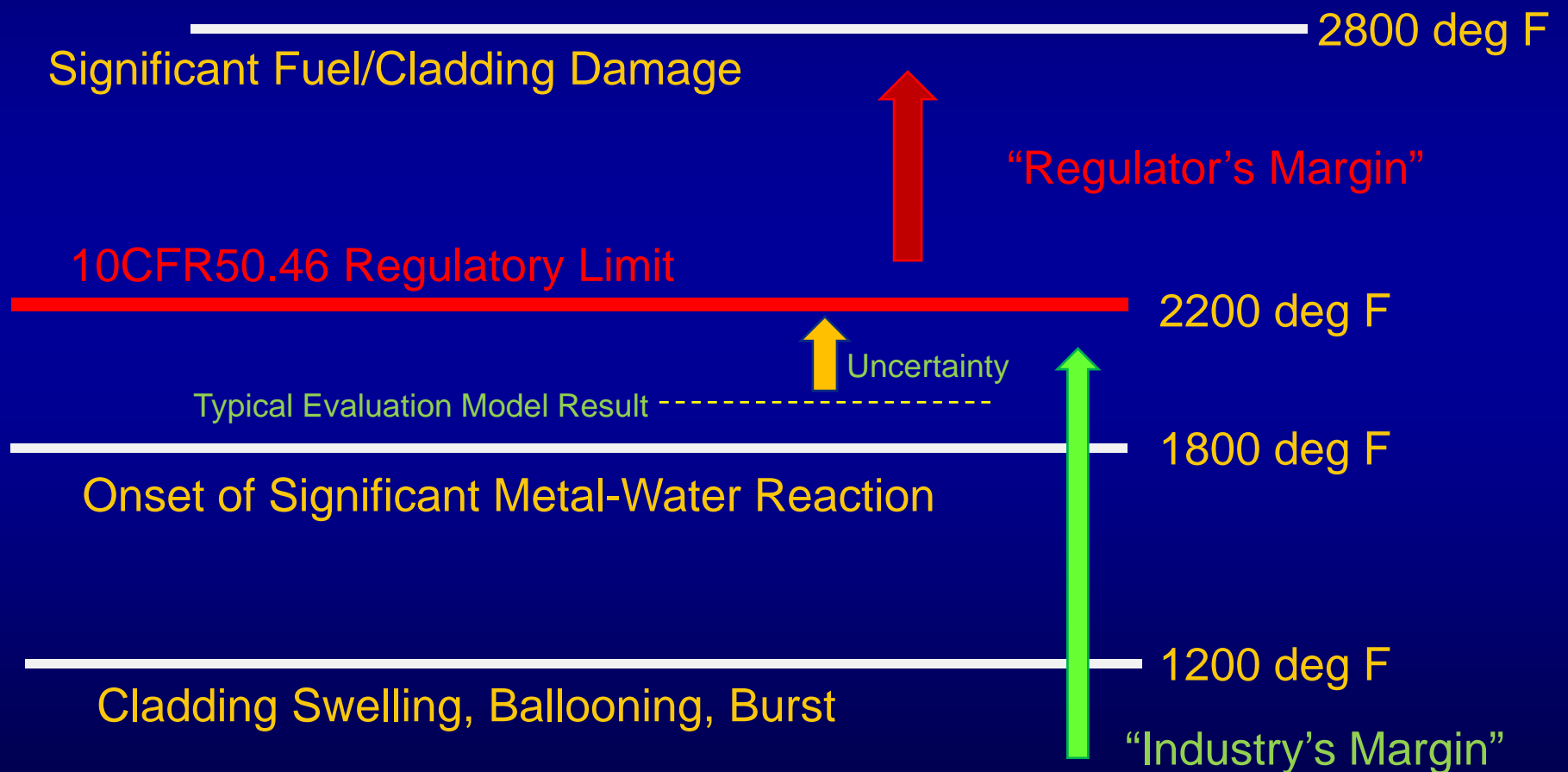
Regulatory Guidance

- **Licensing of fuel for non-LWR applications:**
 - (Draft) Advanced Reactor Design Criteria
 - Prior experience in LWR fuel & cladding
 - Undercooling Events (LOCA)
 - Overpower Events (RIA)
- **With respect to research and fuel development:**
 - Understanding damage mechanisms
 - Quantification of safety margins
 - Development of simulation tools



Safety Margins

(Conventional Fuel and Conventional LWRs)





Research Needs

- **Fuel licensing (as well as economic optimization) for new fuel, cladding and range of operation need:**
 - Fuel damage mechanisms (initial damage - - > release of FP)
 - Fuel swelling & relocation
 - Fission gas release
 - Burnup effects on thermal and mechanical properties
 - Cladding performance
 - Benchmarks for $5\% < \text{enrichment} < 20\%$
 - Defining “fuel qualification” (MSR)
 - CHF & Wall drag (ATF)
- **NRC Policy: Applicant is responsible for data and information necessary to license their design.**



Summary

- **Transient testing is an important part of fuel development and licensing. Significant testing will be needed to qualify new fuel/cladding (both LWRs and non-LWRs).**
- **Regulatory requirements & guidance for LWR fuel exists, and path forward is generally well-known.**
- **Regulatory guidance for non-LWRs is under development. ARDC (draft) available.**
- **Licensing these new concepts is doable!**
 - Significant capability exists at the National Labs.
 - Early engagement & identification of issues helps.