

Thermal Margins RIRP Crosswalk, Prioritization, and Links to PIRTs

Performance Margins Recommendations

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Workshop on Spent Fuel Performance Margins

June 23, 2020



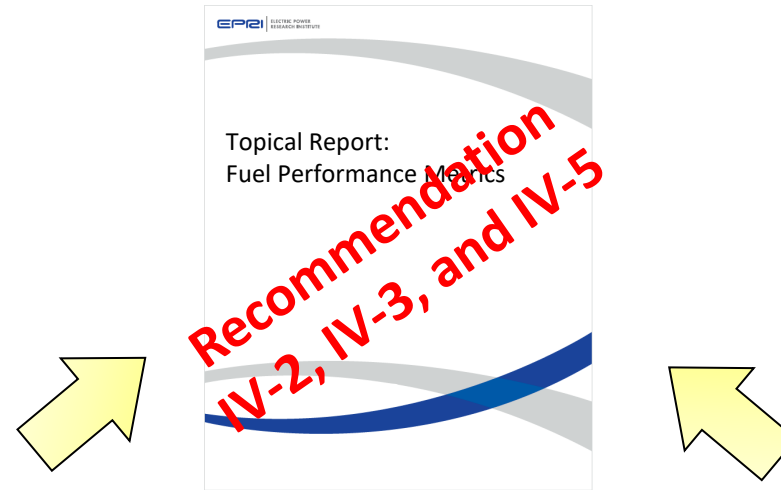
NUCLEAR

Overarching Thermal Margins RIRP Objectives

- Objectives:
 - Develop technically defensible consensus-based regulatory guidance to:
 - Establish durable and up-to-date fuel performance metrics to meet NRC regulations requiring protection of cladding from gross ruptures
 - Create a risk-informed graded approach for systems loaded to less than approved licensed limits for operational worker safety improvements
 - Gross rupture PIRT to provide clarity to regulatory expectations prior to loading and for unexpected contingencies during short term operations
- Overall Benefits:
 - Streamlined and more efficient licensing with alternative metrics
 - Greater operational flexibilities with safety enhancements

Thermal Margins RIRP Objectives and Crosswalk to PIRTs

Regulatory Implementation – Topical Report



Technical Basis Documents

NRC/DOE/EPRI Reports

Managing Aging P in Storage (MAPS)
Draft Report for Comment

Dry Storage and Transportation of High Burnup Spent Nuclear Fuel
Draft Report for Comment

Thermal Modeling of the TN-32B Cask for the High Burnup Spent Fuel Data Project
Spent Fuel and Waste Disposition

Prepared for
U.S. Department of Energy
Spent Fuel and Waste Science and Technology

JA Fort
DJ Richmond
JM Cuta
SR Suffield

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PNNL-28915

PIRT Reports

Decay Heat PIRT

Thermal PIRT

Fuel Performance PIRT

Recommendation IV-1

Gross Rupture Expert Panel

Definition of Gross Rupture Expert Panel

Recommendation IV-1

Alternative Fuel Performance Metrics Expert Panel

Alternative Fuel Performance Metrics Expert Panel

Recommendation IV-4

Thermal Margins RIRP: Licensing vs. Operations

- Develop technically defensible consensus-based topical report to:
 - Licensing: establish durable and up-to-date fuel performance metrics to meet NRC regulations requiring protection of cladding from gross ruptures
 - Operations: create a risk-informed graded approach for systems loaded to less than approved licensed limits for operational worker safety improvements
- Objective not to make licensing more complicated with additional analyses, but, develop a risk-informed and graded approach based on how far the loaded canisters are from design basis limits:
 - How to credit loaded systems with less than design basis heat loads to improve worker safety, e.g. additional shielding blankets, etc.?
 - Minimize delays in loading campaigns for unexpected contingencies during loading and short term operations, e.g. IN 2018-01 events, etc.?

Thermal Margins RIRP Path Forward: Value of PIRTs

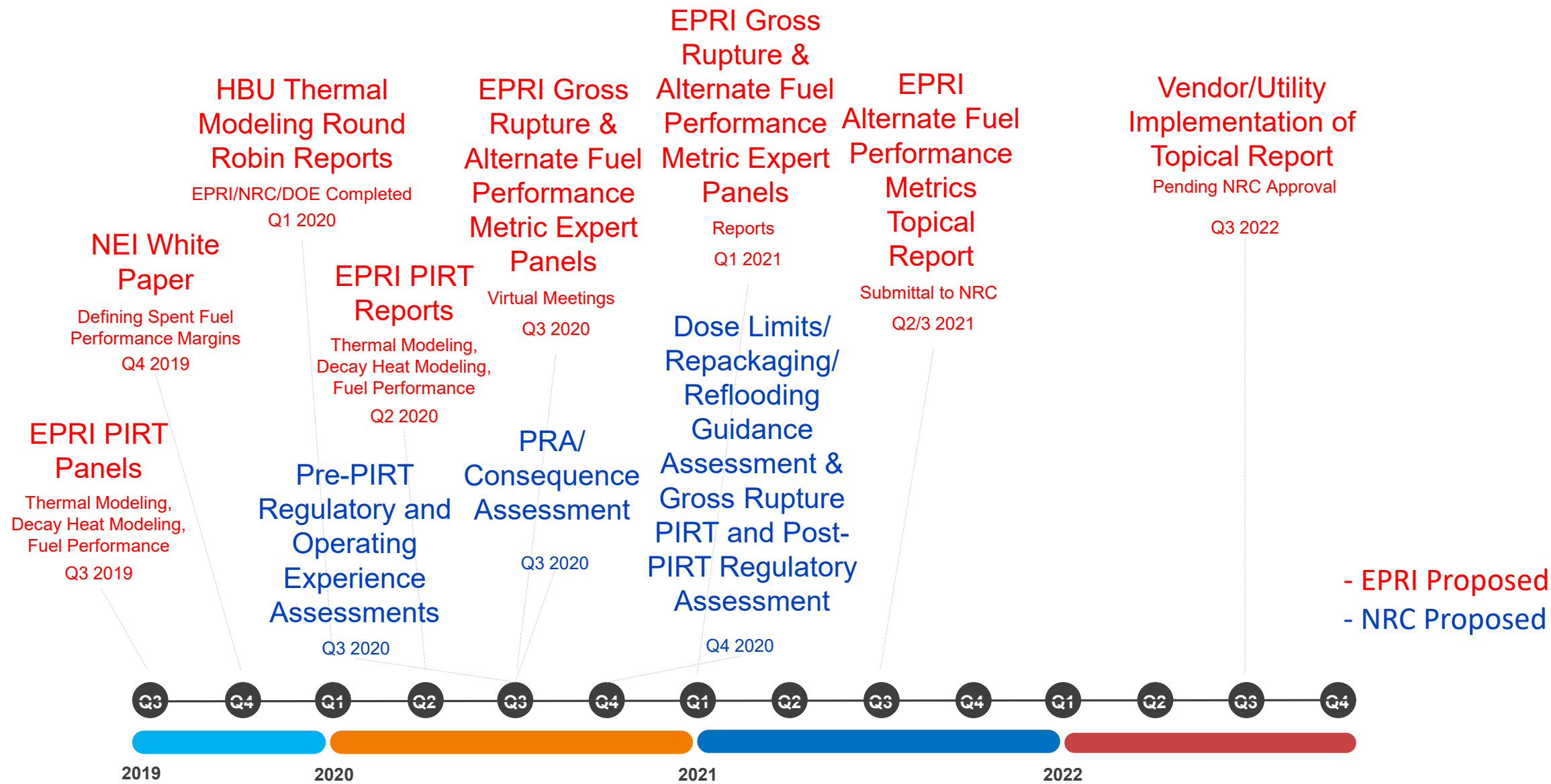
- Phenomena Identification and Ranking Table (PIRT)
 - Structured Expert Elicitation process to identify and rank knowledge gaps
- NRC: White Paper Guidance for Expert Elicitation*
 - Decisions to be made or to develop a decision support model
 - Advantageous to perform an expert elicitation to accelerate development
- To reduce burden, EPRI led the Thermal Modeling, Decay Heat, and Fuel/Cladding Performance PIRTs with NRC and DOE support
 - Followed past NRC established methodology for PIRT expert elicitation
 - Process, structure, and experts vetted by the ESCP Steering Committee
 - EPRI PIRT reports to be publicly available at publication

*NRC, “White Paper: Practical Insights and Lessons Learned on implementing Expert Elicitation,” ML16287A734, October 13th, 2016

Thermal Margins RIRP Path Forward: Gross Rupture PIRT

- Clarification:
 - EPRI and industry seeking clarity on a durable regulatory definition of “gross rupture” for the purpose of establishing up-to-date spent fuel performance criteria to protect the cladding from “gross rupture”
 - Current metric non-actionable with evolving regulatory interpretation
- Benefits of the Gross Rupture PIRT:
 - Inputs to Alternative Fuel Performance Metrics PIRT and topical report
 - Provide clarity to regulatory expectations prior to loading (IN 2018-01) and for unexpected contingencies during short term operations
- To reduce burden, EPRI proposes to moderate the PIRT with the same accepted process to prior PIRTs with NRC and DOE support

High-Level Roadmap



- EPRI Proposed
- NRC Proposed

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