

Stakeholder Outcomes: Task 3

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Task 3 Summary

Goals:

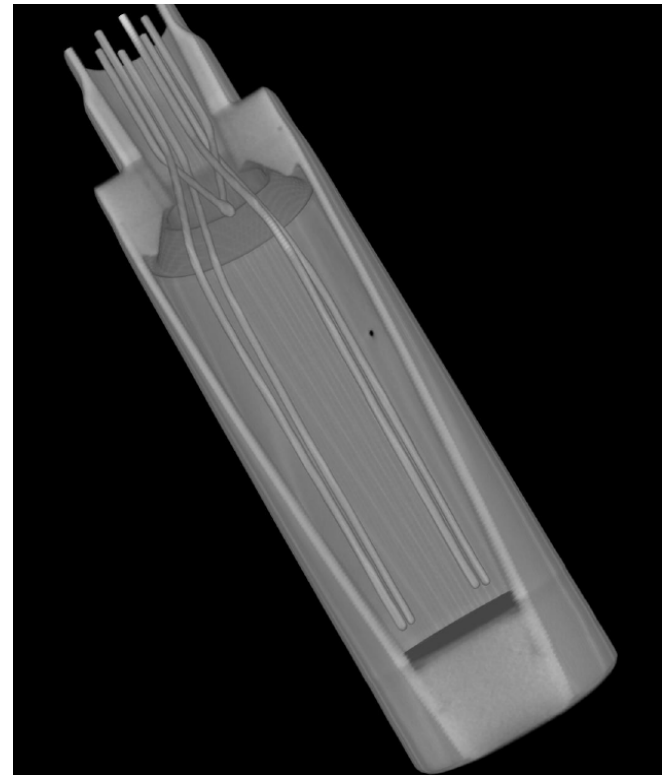
- Develop Core Instrumentation Plan for TREAT
 - Instrumentation Plan – Draft Completed (FY16)
 - Instrumentation assembly for in-pile tests to be designed – Ongoing (04/2017)
- Perform initial benchmarking evaluations
 - Experiment Locations and Transient Selections – Completed (FY16)
 - Reactor Safety Analysis for Proposed Transients – Ongoing
 - Safety Evaluation Report (SER) for MITR Experiments (06/2017)
 - Performing Instrumentation Test Experiments at MITR (07/2017)

Important Considerations:

- Not required for restart – cannot interfere with current TREAT systems
- Driven by model validation needs (temporal, spatial, spectral)
- Ultimate goal is characterization of test specimen conditions

Discussion on Instrument Selection

- General strategy of using state-of-the-art with next generation device comparisons – in-core instrumentation
- Flux and Fluence (spectral, temporal, spatial)
 - Dosimetry - used extensively in TREAT historically and in future
 - Miniature gamma detectors - interest for material heat rates
 - Micro-pocket fission detector (TBD) – high priority instrument for TREAT experiments program
 - Self-powered neutron detector (TBD) – used in historical tests for online flux measurement
- Temperature
 - Thermocouples
 - Optical fiber-based IR pyrometer (TBD – lower temperature limit)
 - Distributed temperature optical fiber sensor (TBD)



3D Computed Tomography Image of High Temperature MPFD – showing internal wiring

Opportunities & Challenges

Opportunities:

- Measurement uncertainty quantification and comparisons
- Instrumentation benchmark evaluations in TREAT in 2018
 - Possibilities for low power steady-state to high power transients
 - Deviation from proposal of OSTR tests
- Potential instrument testing in the IGR reactor in Kazakhstan with coordination through coordination with INL (summer 2017)
- Potential deployment of MIT-built instrument testing assembly in TREAT

Challenges:

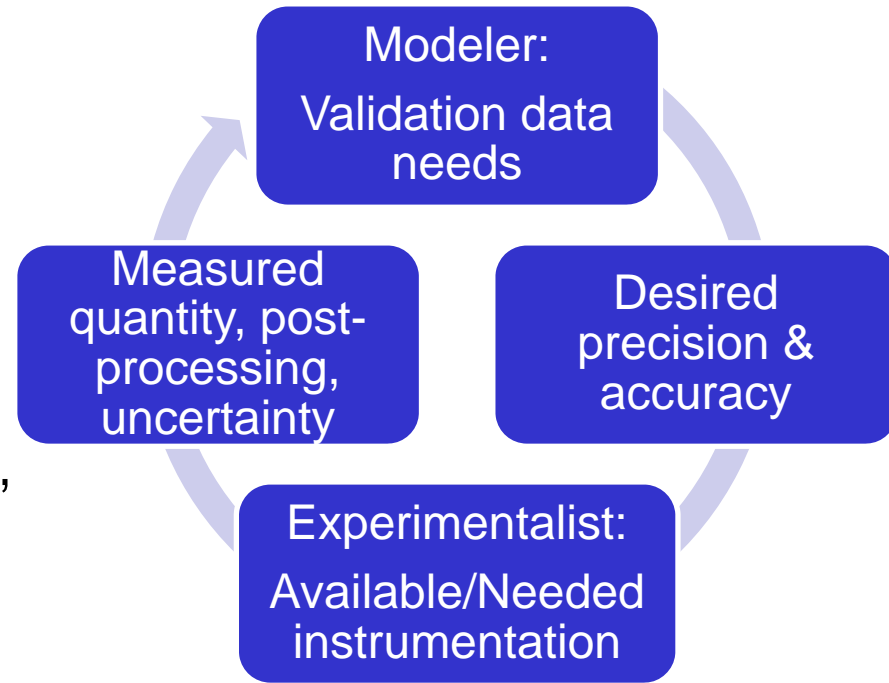
- Schedule
- Instrument procurement & preparations
- Integration with INL-TREAT for experiment deployment



IGR Facility

General Recommendations

- Incorporate input from other IRP tasks (Task 1), Mammoth team, etc., into instrumentation plan – TREAT physics model validation
 - Identify validation data gaps and instrumentation needs (even those that cannot be addressed by current proven instruments)
- Though coordination and complementary work is strongly encouraged, do not be “constrained” to physics testing methods being developed by INL
- Increasing coordination and communication with INL will be critical to successfully overcoming the challenges listed on previous slide



“Ideal” Experiment

Action Items for “Stakeholder”

Followup from May meeting:

- INL provided TREAT transient data output for core measurements and experiments DAS information
- TREAT ion chamber availability for testing by MIT

Current INL action items:

- INL will review draft of instrumentation plan
- INL will assist in possible acquisition of instruments including: wires & foils, MPFD, SPND, IR pyrometer