

Accelerated Irradiations for Reactor Structural Materials – Virtual Meeting

September 14-18, 2020

Meeting Objective:

This workshop/meeting will provide a snapshot look at current international, in-reactor testing and irradiation capabilities. Gaps will be identified, and where possible, mitigation strategies and recommendations will be created.

Background:

As new material innovations are being developed for in-reactor applications for reactor life extension long-term operation, and advanced reactor technologies, there is an increased need for materials qualification and assessment programs. In-reactor testing capabilities are vital to the on-going success of these DOE-NE programs and initiatives. In recent years, multiple international research reactors have been placed in a permanent shut-down state and have begun full decommissioning. These activities have created new risks in the delivery of on-going and/or expected research programs.

Beyond performing simple irradiations in test reactors, few facilities exist internationally which can perform instrumented, in-situ irradiations on structural materials, and with the recent shut down of facilities hosted at Halden and NRU (example: instrumented fatigue loop, and in-situ creep), there are further gaps in the industry left un-filled. A new focus is being placed on the use of accelerator-based technologies to fill in some of these gaps, but these must be viewed as supplemental, and not surrogates to in-reactor capabilities.

Takeaways from the meeting include providing a discussion centered around the current state of accelerated irradiations for structural materials, to identify gaps, and where possible mitigation strategies and recommendations. This includes, but not limited to:

- (i) Experimental test reactors
- (ii) Ion and proton accelerator technologies
- (iii) In-Core test capabilities
- (iv) Passive, real-time in-core instrumentation
- (v) Standardization of in-reactor capsule designs

Host: Colin Judge
Admin: Janice Crank

Revision Number 1
Date agenda revised: 08/30/2020

Monday, September 14, 2020

8:00 am – 12:00 pm

8:00 Introductions and Keynote Speaker..... *Colin Judge*

8:15 *Challenges in Designing & Qualifying New Materials for Advanced Reactors*..... *Allen Roach*

Experimental Test Reactors

8:45 *Session Chair*..... *Colin Judge*

Shut Down Reactors and Capabilities

9:00 *National Research Universal (NRU) Reactor*..... *Grant Bickel*

9:20 *Halden Reactor*..... *Scott Holcomb*

9:40 *Break*

Operating Reactors

10:00 *Advanced Test Reactor (ATR)*..... *Nick Woolstenhulme*

10:20 *High-Flux Isotope Reactor (HFIR)* *Jeremy Busby*

10:40 *Massachusetts Institute of Technology Reactor (MITR)*..... *Gordan Khose / Lance Snead*

11:00 *Transient Reactor Test (TREAT) Facility* *Dan Wachs*

11:20 *Open Discussions*

12:00 *Adjourn*

Tuesday, September 15, 2020

9:00 am – 12:00 pm

Ion and Proton Irradiations

- 9:00 *Session Chair*..... Gary Was
- 9:10 *Designing Accelerated Irradiations with Light or Heavy Ions*..... Simon Pimblott

Applications

- 9:30 *Down Selection for Subsequent Reactor Irradiations*..... Mike Burke
- 9:50 *Understanding Physical Processes through Isolation of Single Parameters*..... Stephen Taller
- 10:10 *In-Situ Experiments: Microstructure, Creep, and Corrosion* Marcus Parry
- 10:30 *Break*

ATLAS

- 10:50 *ATLAS Beamlines for Structural Materials Irradiations*..... Abdellatif Yacout

Assessment

- 11:10 *Assessment of Successes, Limitations, and Potential*..... Steve Zinkle
- 11:30 *Open Discussions*
- 12:00 *Adjourn*

Wednesday, September 16, 2020

9:00 am – 12:00 pm

In-Core Test Capabilities

9:00 Session Chair.....Michael McMurtrey

Halden

9:10 Re-instrumentation of Irradiation Materials Colby Jensen

MITR Capabilities for In-Core Material Properties Test

9:30 In-Core Sample Assembly (ICSA) and Pressurized Water Reactor (PWR)
Boiling Water Reactor (BWR) Loops Gordon Khose / Lance Snead

9:50 Crack GrowthDavid Carpenter

10:10 Break

INL Capabilities

10:20 Instrumented Test for Tristructural Isotopic (TRISO) Fuel in Advanced Test Reactor
(ATR).....Joe Palmer

10:40 I-Loops..... Tom Maddock

11:00 Linear Variable Differential Transformer (LVDT) Based Creep Test..... Malwina Wilding

FIDES

11:20 FIDES Proposals.....Ben Parks

11:40 Open Discussions

12:00 Adjourn

Thursday, September 17, 2020

9:00 am – 11:00 am

Passive, Real Time In-Core Instrumentation

- 9:00 *Session Chair*.....*Patrick Calderoni*
- 9:10 *ASI Program Overview*.....*Patrick Calderoni*
- 9:30 *Fuel Materials Characterization*..... *Dave Hurley*
- 9:50 *Thermocouples**Richard Skifton*
- 10:10 *Local Flux Measurement* *Kevin Tsai*
- 10:30 *Passive Monitors*..... *Troy Unruh*
- 10:50 *Open Discussions*
- 12:00 *Adjourn*



Friday, September 18, 2020

9:00 am – 12:00 pm

Standardization of In-Reactor Capsule Designs

- 9:00 *Session Chair*..... *Brenden Heidrich*
- 9:10 *ATR Nuclear Science User Facility (NSUF) Standard Capsule*..... *Tom Maddock*
- 9:30 *ATR Nuclear Materials Discovery and Qualification Initiative (NMDQi) Standard Capsule*
..... *Boone Beausoleil*
- 9:50 *HFIR – Standard Rabbit Capsules* *Chris Petri*
- 10:10 *HFIR – Instrumented Irradiations*..... *Joel McDuffee*
- 10:30 *TREAT – MARCH System*..... *Nick Woolstenhulme*
- 10:50 *Open Discussions* *Brenden Heidrich*
- 11:10 *Break*

Mitigation Strategies and Recommendations

- 11:20 *Session Chair*..... *Colin Judge*
- 11:30 *Open Discussions*
- 12:00 *Adjourn*