July 26, 2023

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ASME Code Development - Nonmetallics

Status 2023

DOE ART Gas-Cooled Reactor (GCR) Review Meeting

Virtual Meeting July 25 – 27, 2023



ASME is now one of the largest areas in program

Behavior models

- Predicts irradiated material properties and potential degradation issues
- Irradiation behavior for continued safe operation

Licensing & Code

- Establishes an ASME approved code (for 1st time)
- Develops property values for initial components and irradiation induced changes

Grephite R&D Program

Defines the safe working envelope for nuclear graphite and protection of fuel

As-Fab'd Properties

- (Statistically) Establishes asreceived material properties
- Baseline data used to determine irradiation material properties

Mechanisms and Analysis

- Data analysis and interpretation
- Understanding the damage mechanisms is key to interpreting data

Irradiation

- Determines irradiation changes to material properties
- Irradiation behavior for continued safe operation

FY22 ASME Activities

> Irradiation Response

Design Rules

Molten Salt

Oxidation

Definition of Failure

RIM

Composites

ASME Task Groups

- Task Groups within the ASME Section III, Division 5, Subsection HHA/HHB
 - Based upon identified gaps in the code
 - Main activity of Nonmetallic Working Group
- Task Groups:
 - Component Failure (Martin Metcalfe)
 - Section III-5 (Component Failure)
 - Section XI-2 (Component Inspection)
 - Ceramic Composites (Wilna Geringer)
 - Design (Andrea Mack)
 - Degradation:
 - Irradiation behavior (Will Windes)
 - Oxidation behavior (Cristian Contescu retired)
 - Molten salt interactions (Nidia Gallego)



ASME Task Groups – discussion today

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Where do they fit in?

- Irradiation behavior (Will Windes)
 - "All graphite behaves similarly"
- Ceramic Composites (Wilna Geringer)
 - Addressing critical issues in ceramic composites code rules (HHB)
- Design (Andrea Mack)
 - Probability of Failure (POF) questions
 - Needed "right now" for initial HTR designs
 - An ASME priority for 2025 version of BPVC
- Component Failure (Martin Metcalfe)
 - What is failure in graphite?
 - Damage tolerant material



