

AGR-5/6/7 PIE Updates

July 2021

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Major PIE Objectives

- 1. Evaluate and characterize unexpected Capsule 1 behavior.
- 2. Determine if there was acceptable performance and behavior of the fuel under normal irradiation conditions (Capsules 2, 4, and 5).
- 3. Evaluate performance and characterize behavior of fuel under high irradiation temperatures (Capsule 3: TAVA 1380°C, TA Peak 1480°C).
- Conduct post-irradiation high-temperature testing in helium to verify acceptable fuel performance under conduction cool-down accidents. (CCCTF and FACS)
- 5. Perform oxidation testing to characterize fuel behavior during exposure to air or moisture at nominal and accident temperatures. (AMIX)

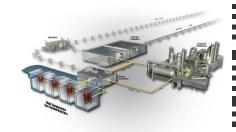
Document ID: PLN-6110 Revision ID: 0 Effective Date: 08/11/2020 INL/EXT-20-59111

Plan

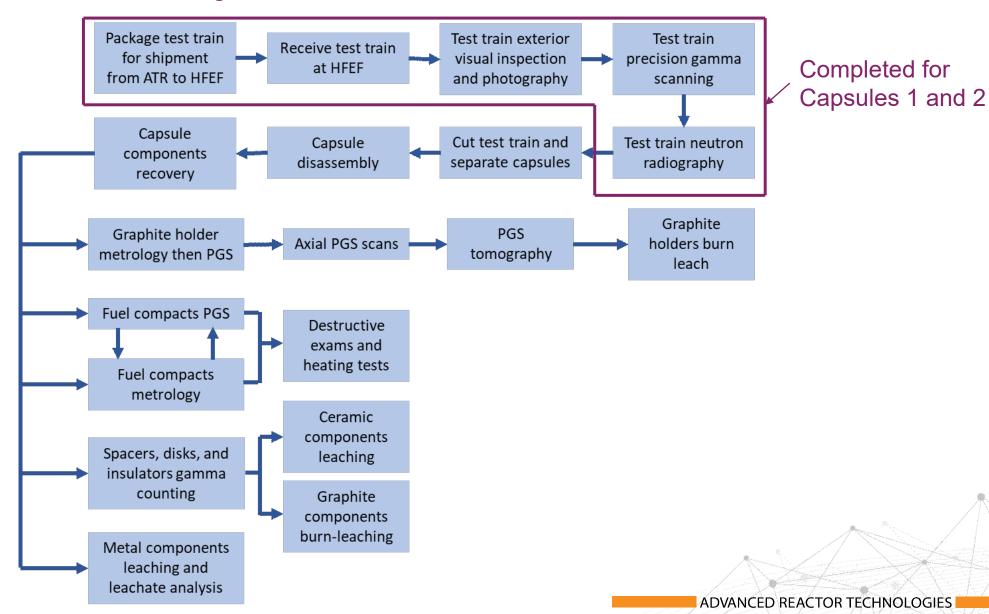
Project No. 29412, 23841

AGR-5/6/7 Post-Irradiation Examination Plan

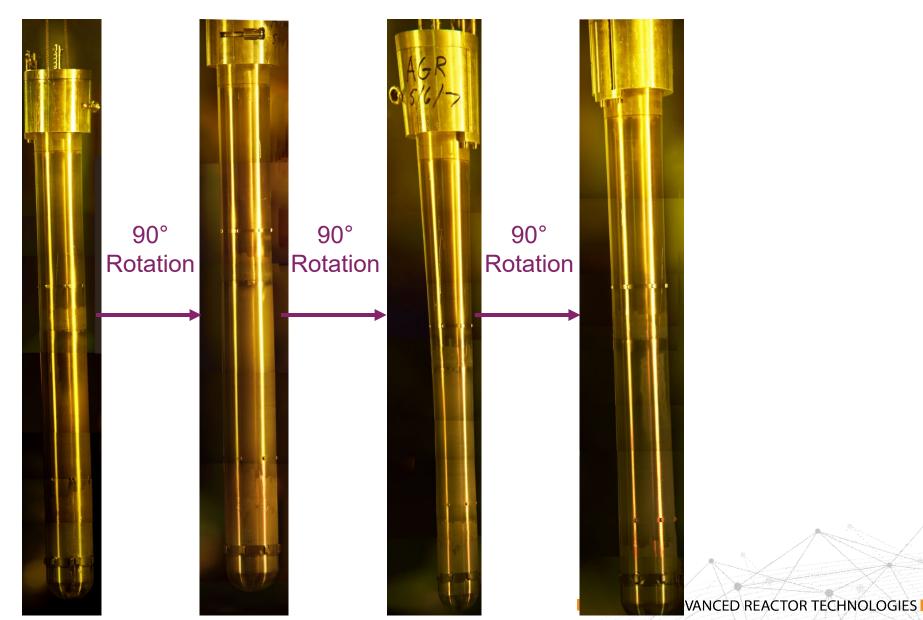




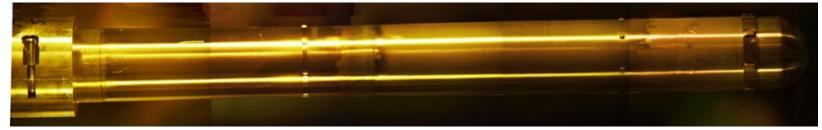
Process Flow of Major PIE Activities

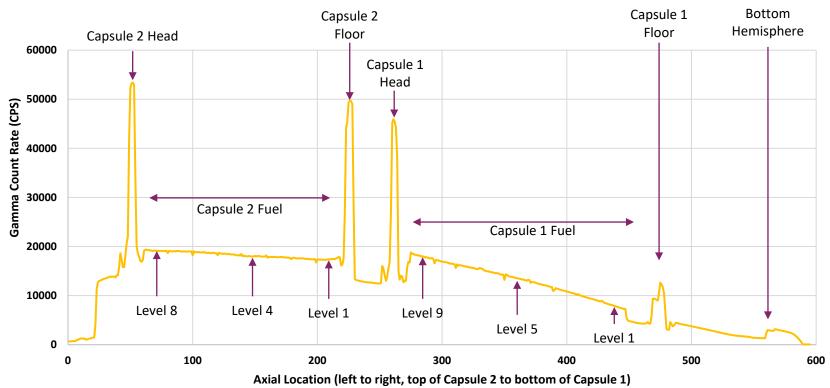


Capsules 1 and 2 Exterior Visual Exams

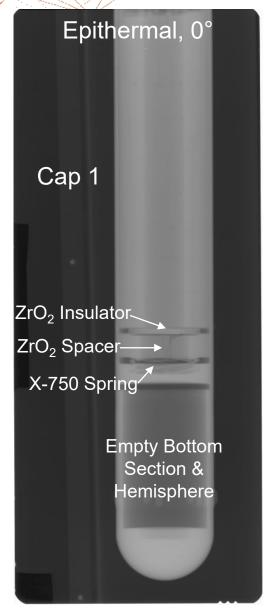


Capsules 1 and 2 Precision Gamma Scanning





Capsule 1 Neutron Radiography

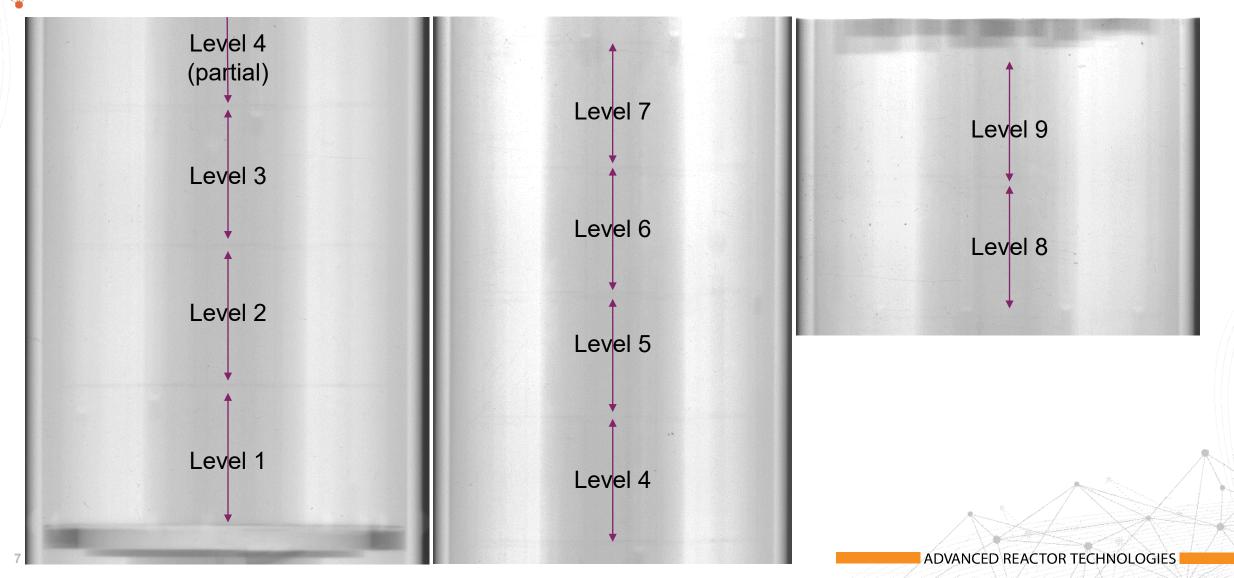




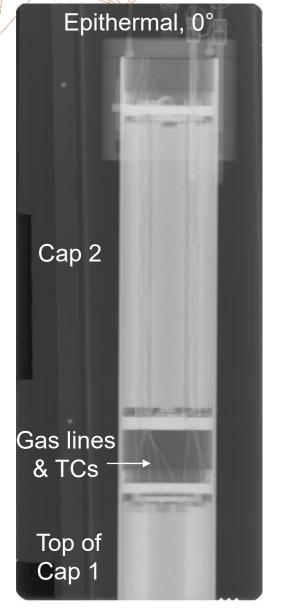




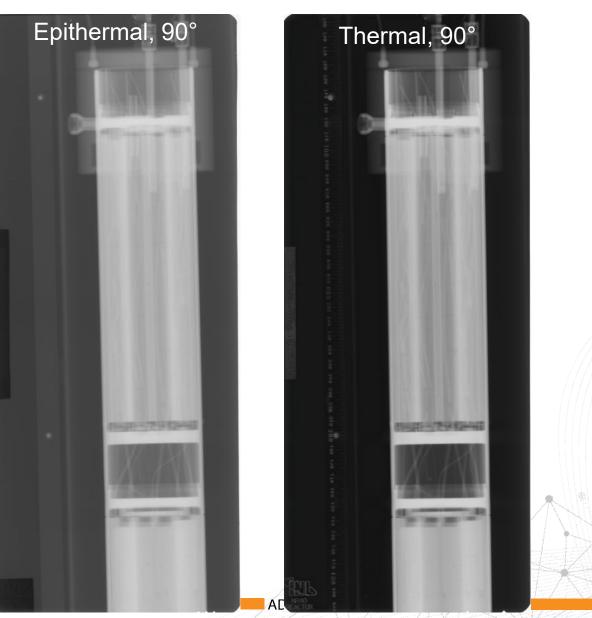
Capsule 1 Neutron Radiography Closeup: No obvious signs of fuel damage



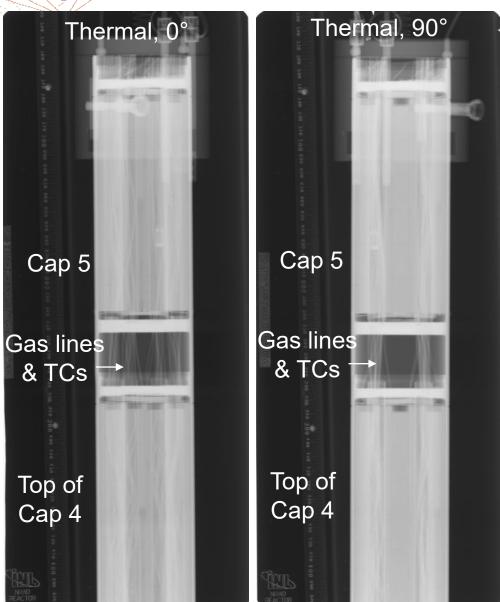
Capsule 2 Neutron Radiography

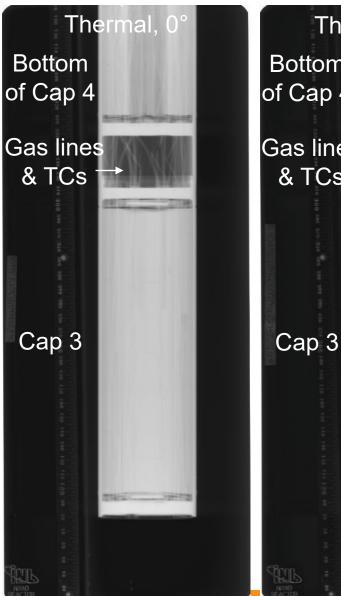


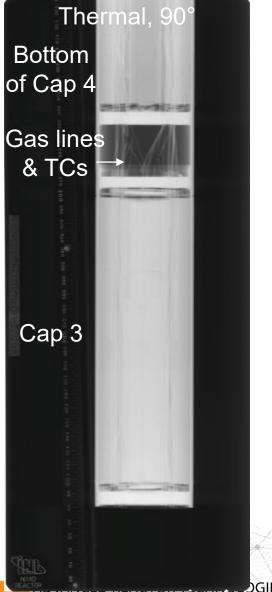




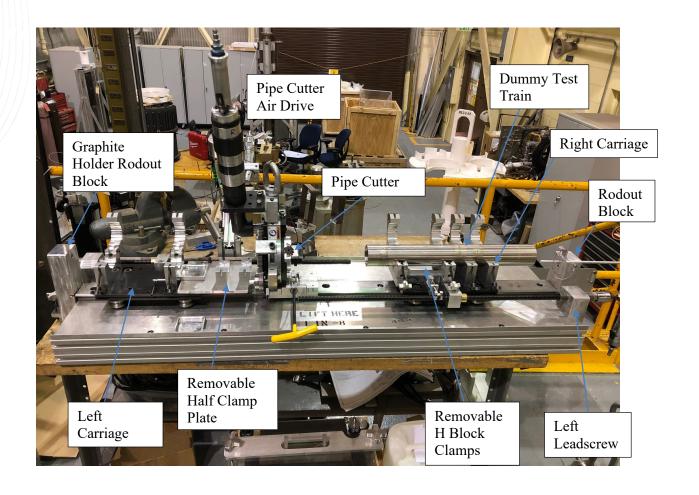
Capsules 3, 4, and 5 Neutron Radiography

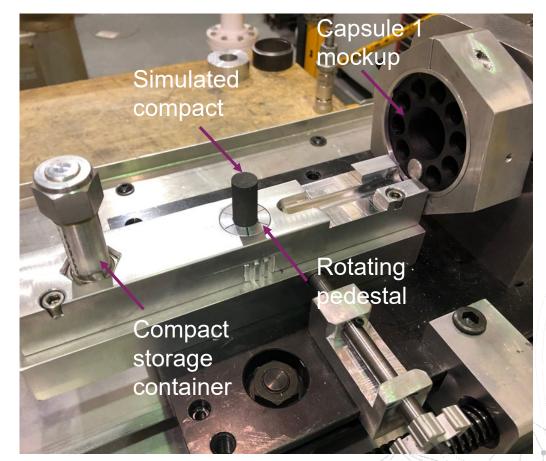






AGR-5/6/7 Capsule Disassembly Equipment Qualifications

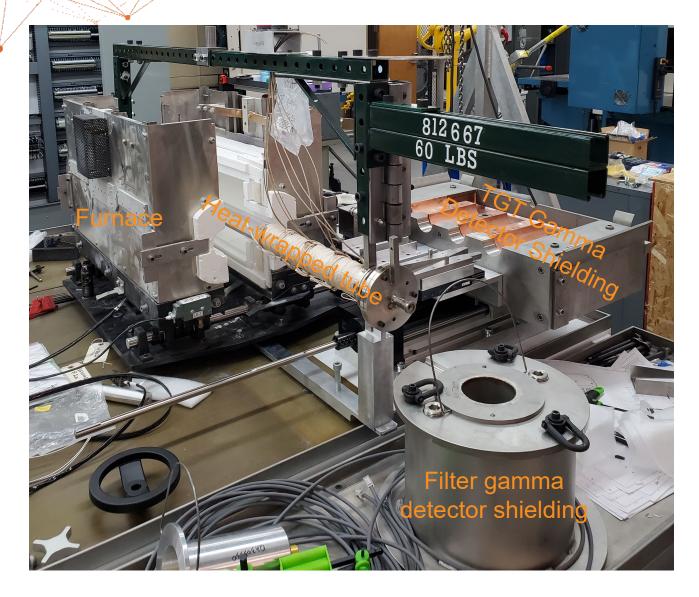




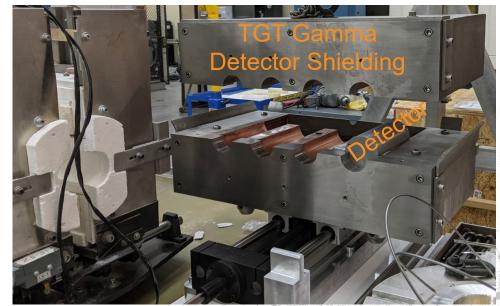
Air/Moisture Ingress Experiment (AMIX) - Goals

- To date, safety testing AGR fuel compacts has only been conducted under helium. AMIX
 will test irradiated TRISO fuels in oxidizing environments representative of air and
 moisture ingress accidents in HTGRs
- Measure fission product releases as a function of time
- Relate fission product releases and release rates to fuel irradiation history, test conditions, and extent of fuel oxidation
- Use collected data for:
 - Fuel qualification and licensing
 - Input to and comparisons with predictive models and simulations
 - Reactor accident source term analysis (design-basis and/or beyond-design-basis)

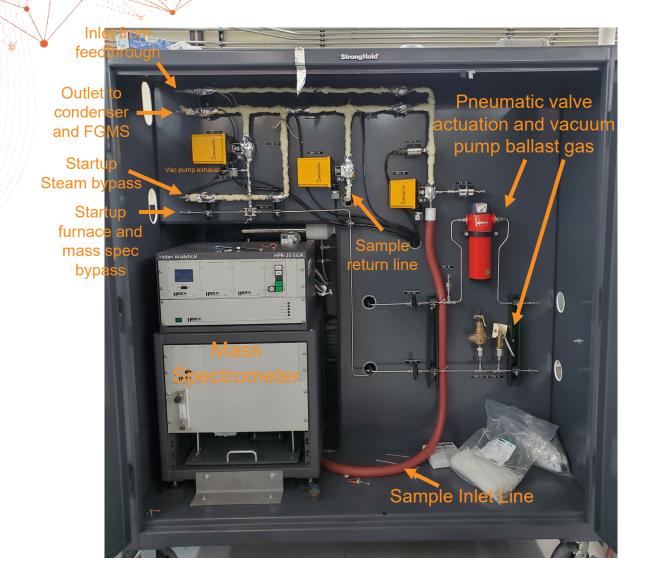
Furnace with TGT and Filter Gamma Systems

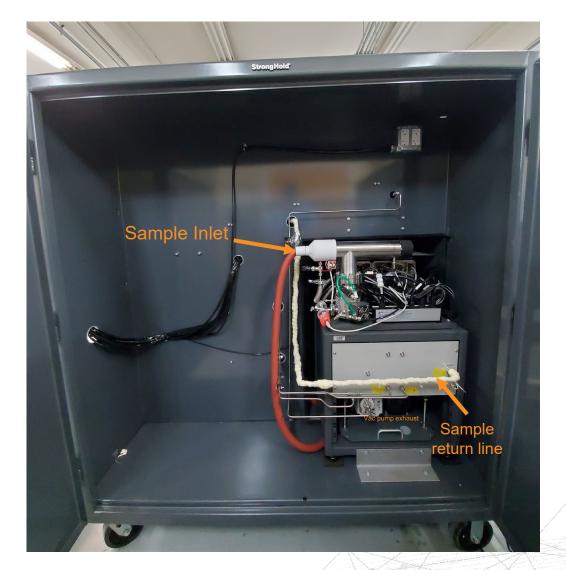






Completed Mass Spectrometer System





Updated AMIX Schedule

• \$1 million budget cut in 2019 and supplier delays in 2020 have pushed estimated AMIX testing start date to early 2023.

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. L2 milestone to complete by 9/15/17																																																			

3. L2 milestone completed 7/7/2018

4. L2 milestone completed 8/2019 to complete construction of gas supply system and receive furnace

5. 12 milestone to complete Phase I qualifications at NHL shifted from 9/2019 to 9/2020 to 9/2021 (first shift was due to \$1 million budget cut, second shift is due to pandemic and supplier issues.)



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