



# AGR-5/6/7 PIE Updates

July 2021

*Changing the World's Energy Future*

John D Stempien



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# **AGR-5/6/7 PIE Updates**

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**July 2021**

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**Prepared for the  
U.S. Department of Energy  
Under DOE Idaho Operations Office  
Contract DE-AC07-05ID14517**

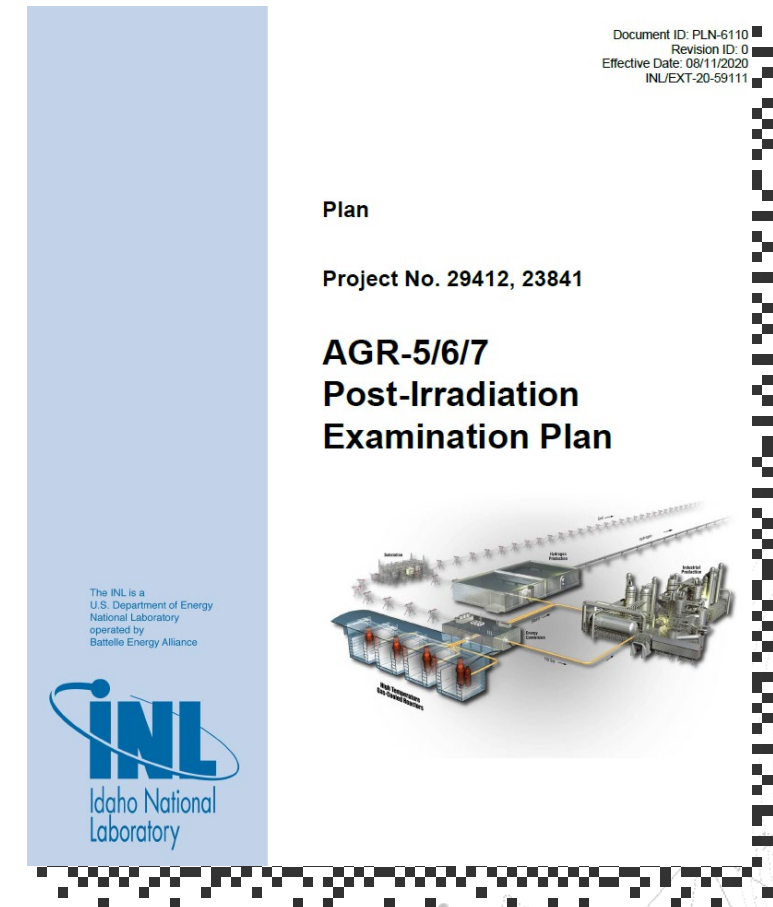
July 13, 2021

**John Stempien, Ph.D.**  
AGR PIE Technical Lead

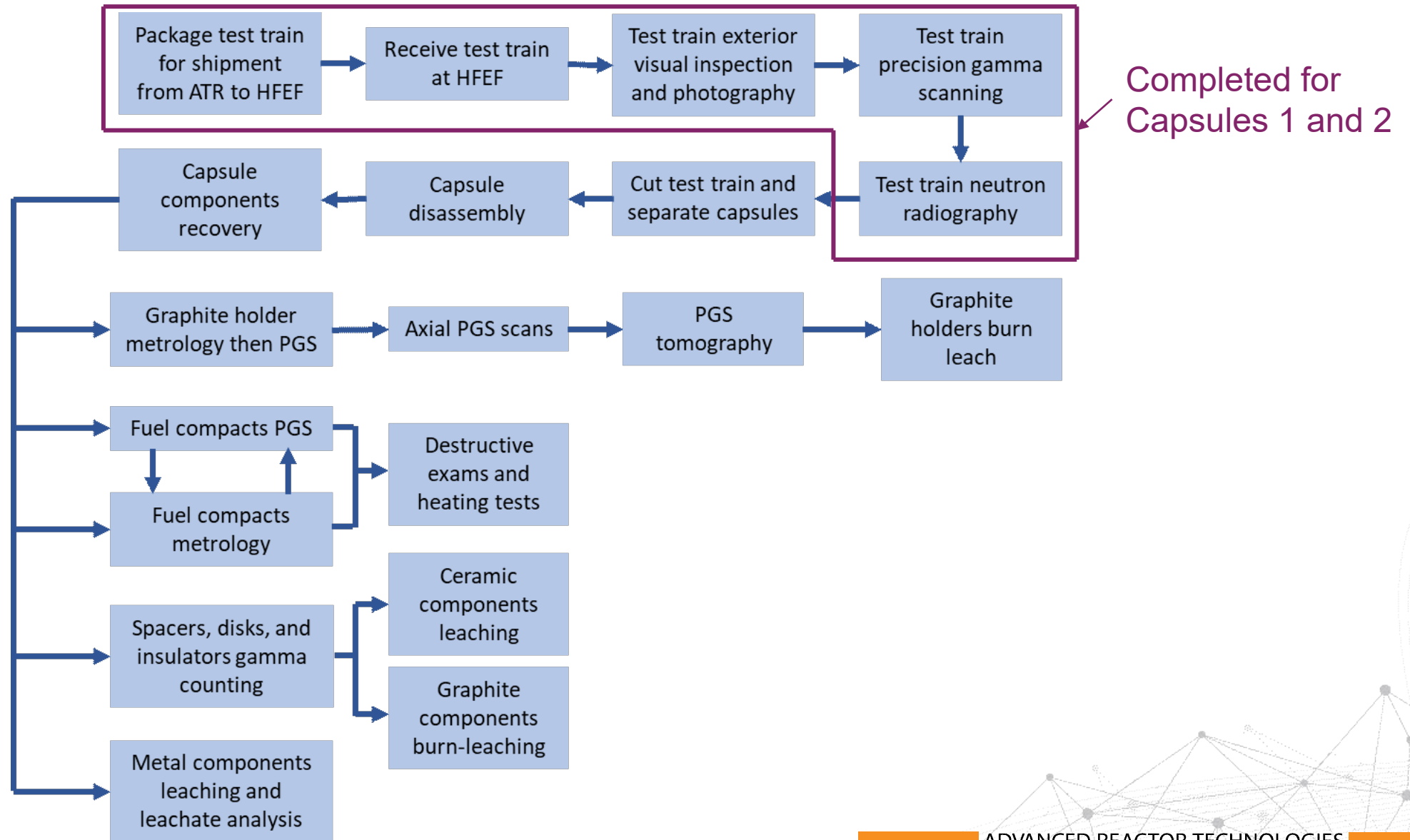
# AGR-5/6/7 PIE Updates

# Major PIE Objectives

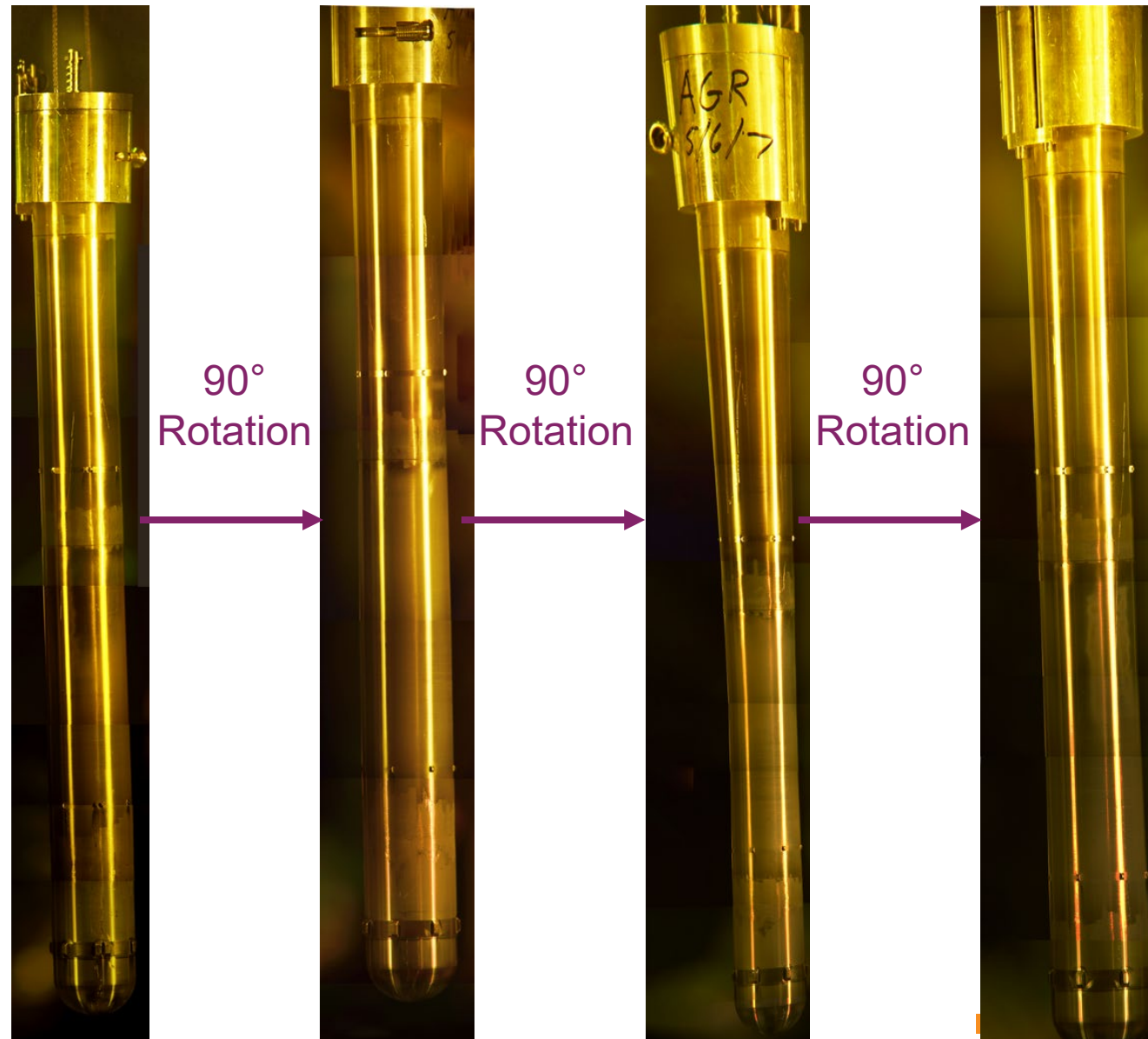
1. Evaluate and characterize unexpected Capsule 1 behavior.
2. Determine if there was acceptable performance and behavior of the fuel under normal irradiation conditions (Capsules 2, 4, and 5).
3. Evaluate performance and characterize behavior of fuel under high irradiation temperatures (Capsule 3: TAVA 1380°C, TA Peak 1480°C).
4. 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)



# Process Flow of Major PIE Activities

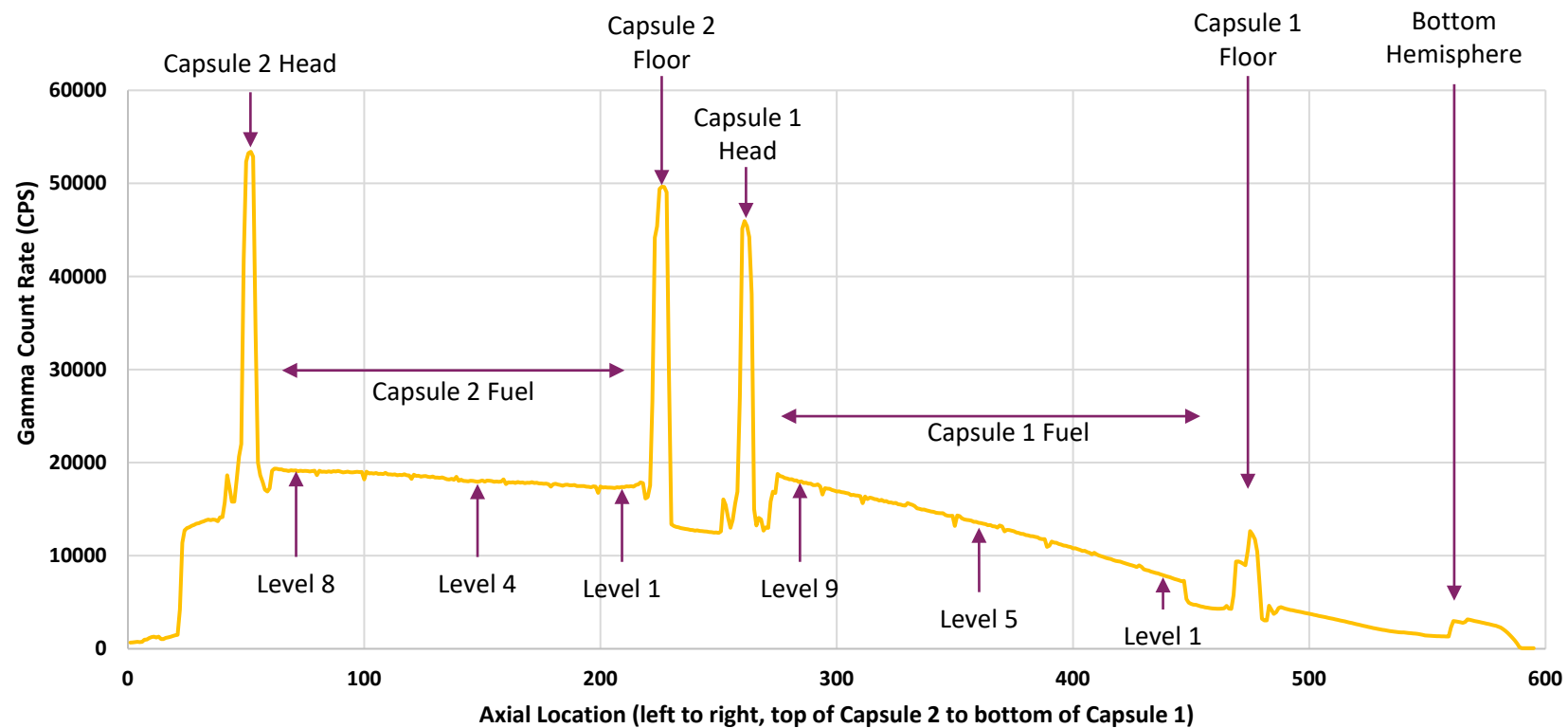
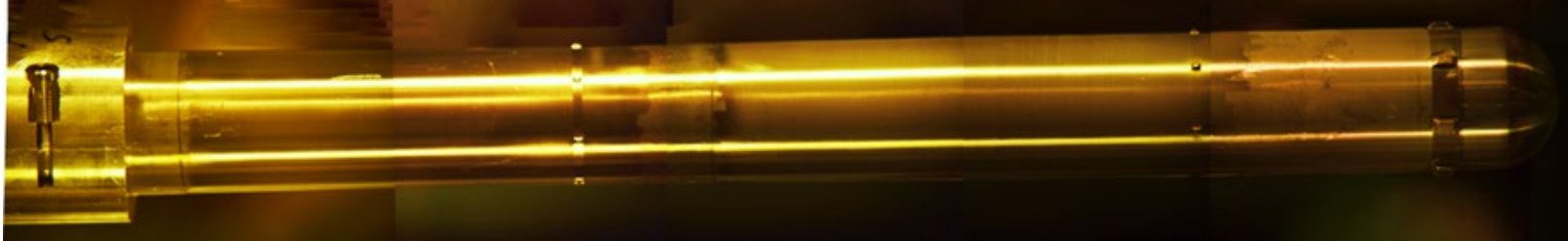


# Capsules 1 and 2 Exterior Visual Exams



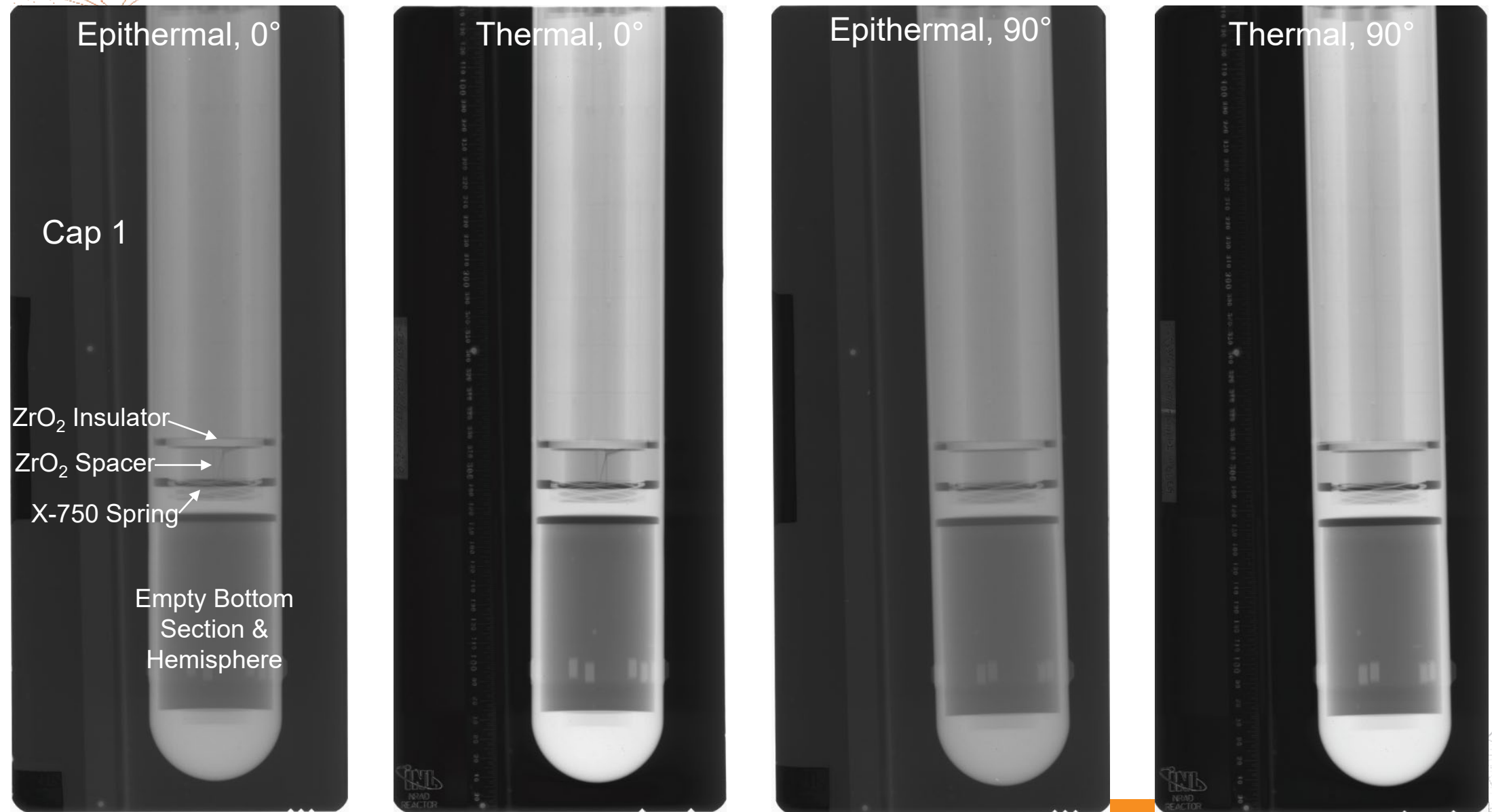


# Capsules 1 and 2 Precision Gamma Scanning

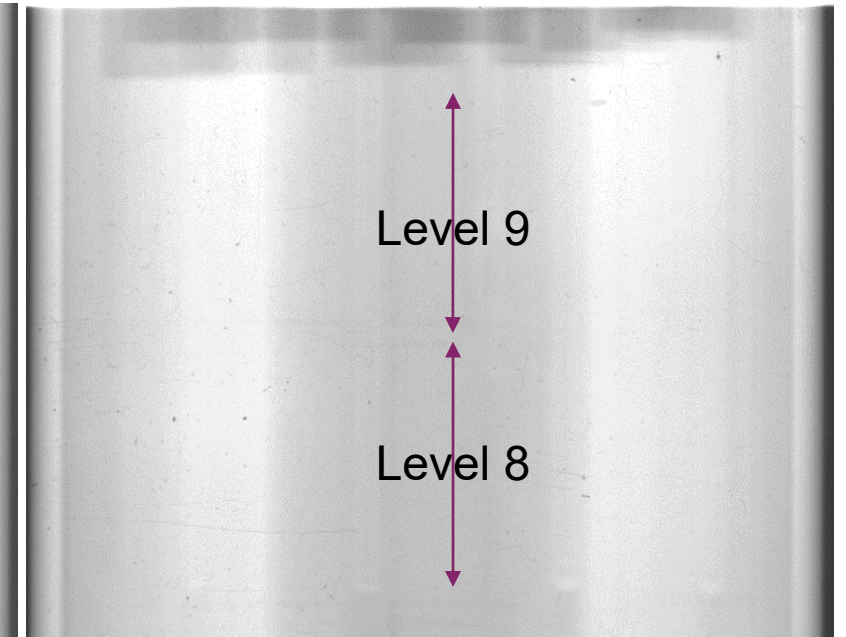
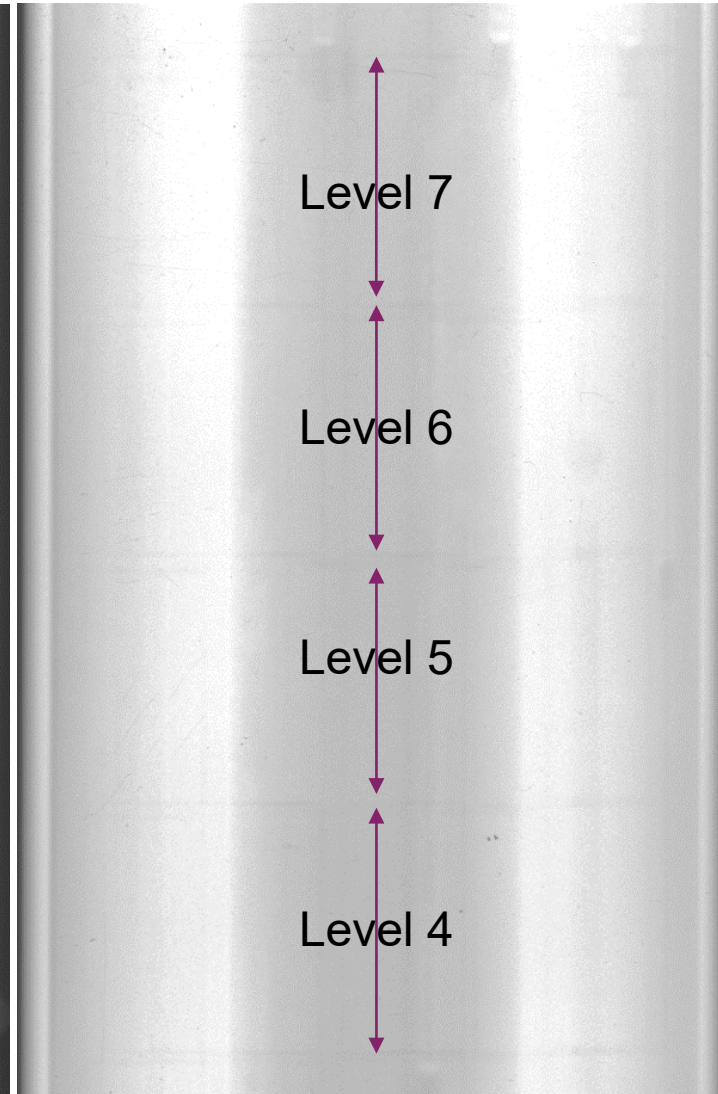
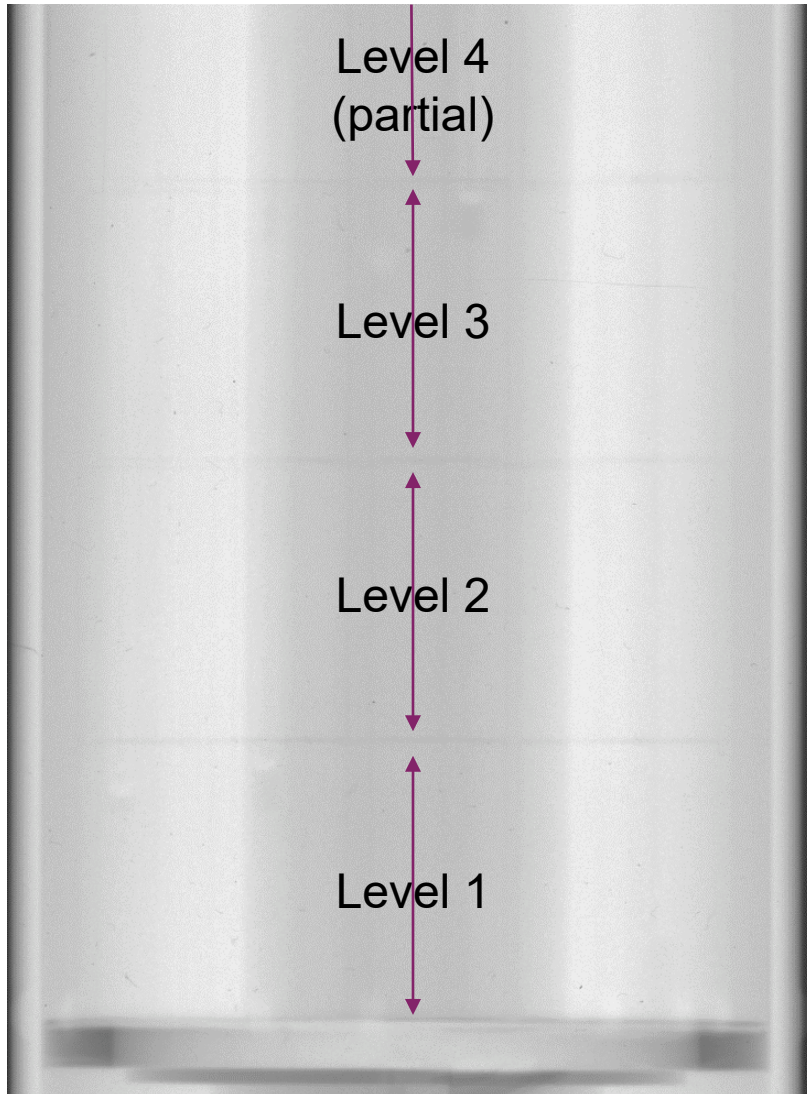




# Capsule 1 Neutron Radiography

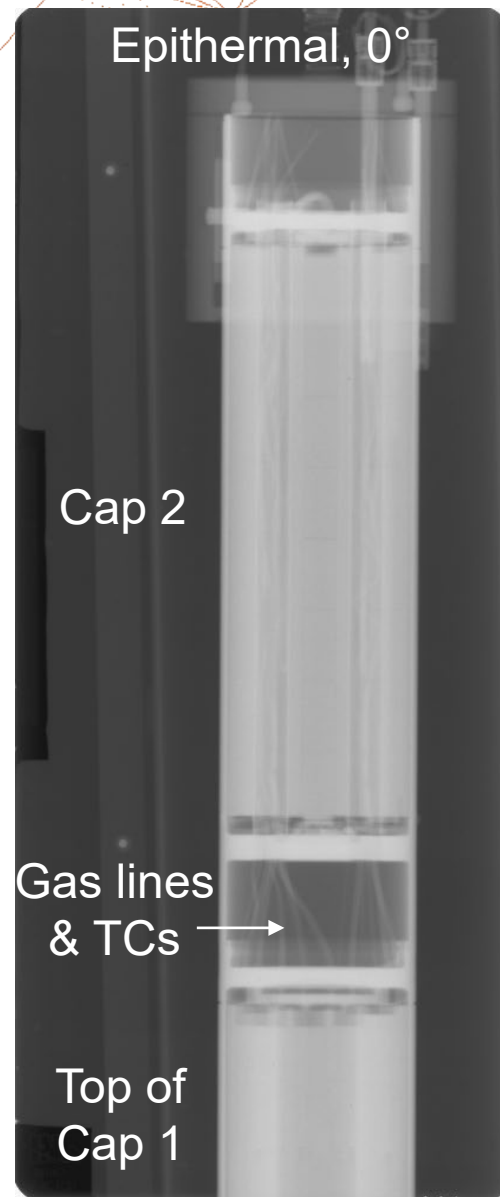


# Capsule 1 Neutron Radiography Closeup: No obvious signs of fuel damage

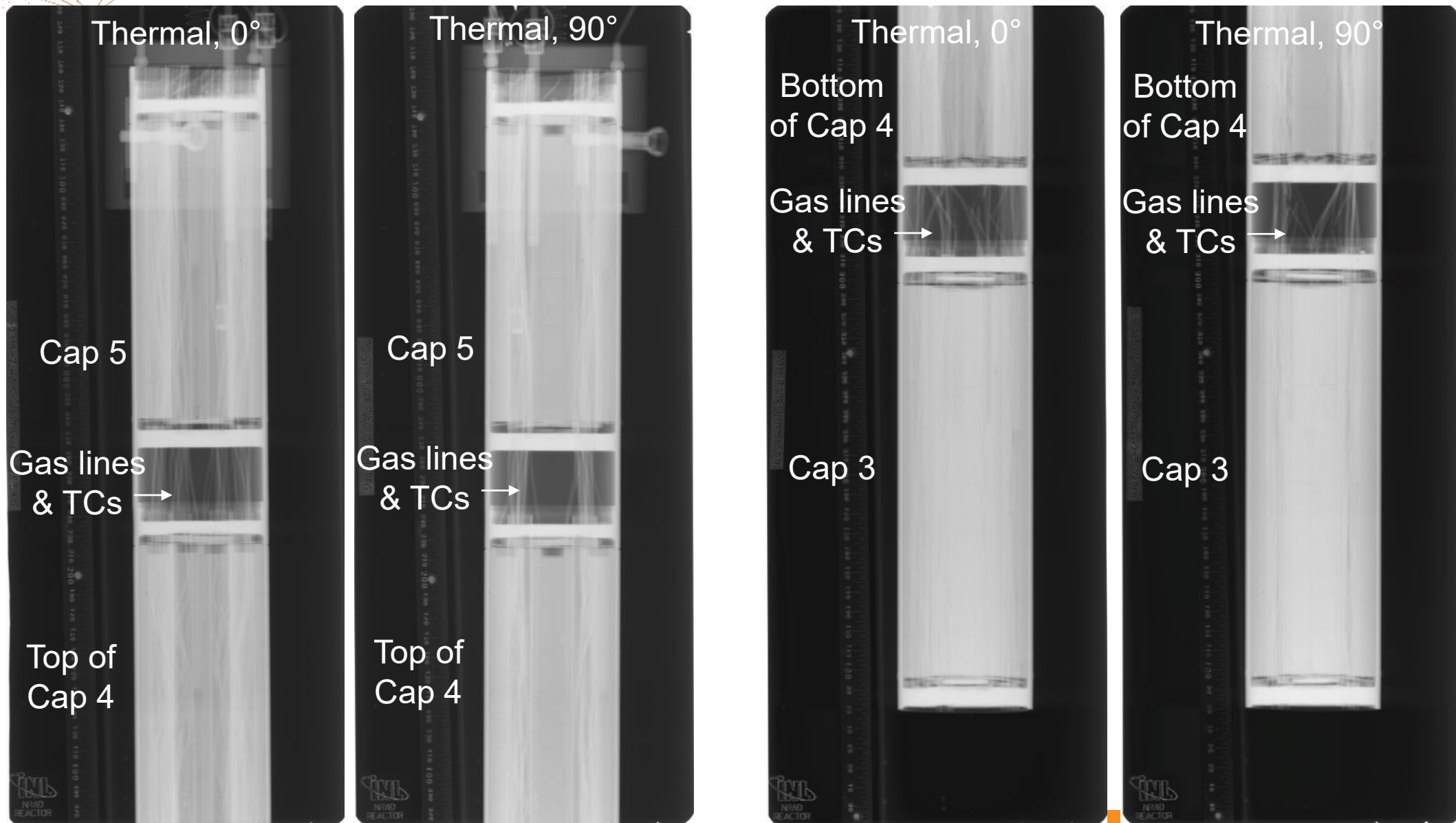




# Capsule 2 Neutron Radiography

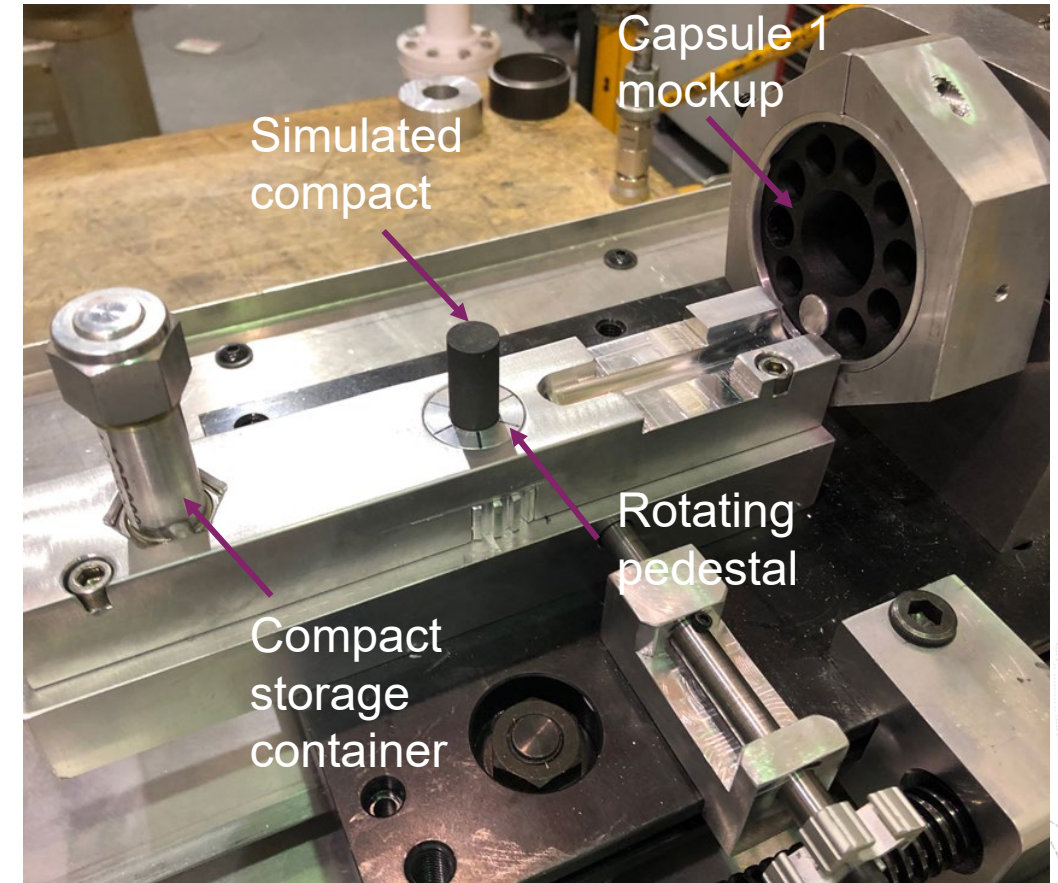
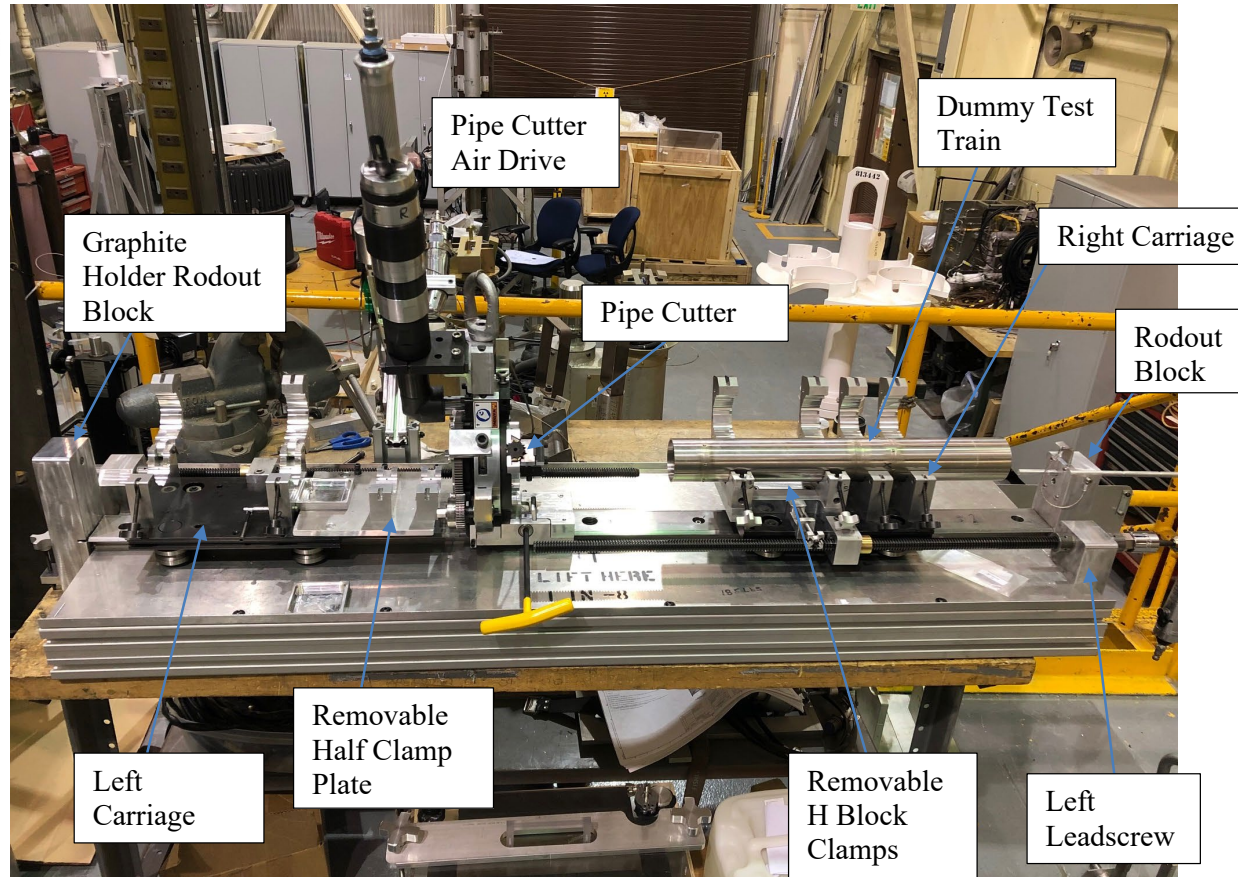


# Capsules 3, 4, and 5 Neutron Radiography





# AGR-5/6/7 Capsule Disassembly Equipment Qualifications

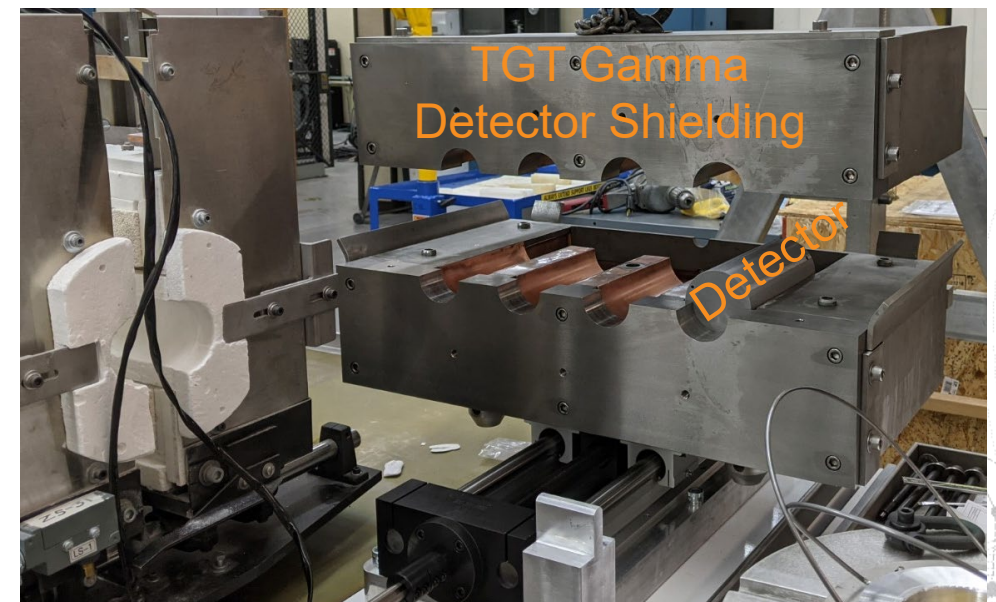
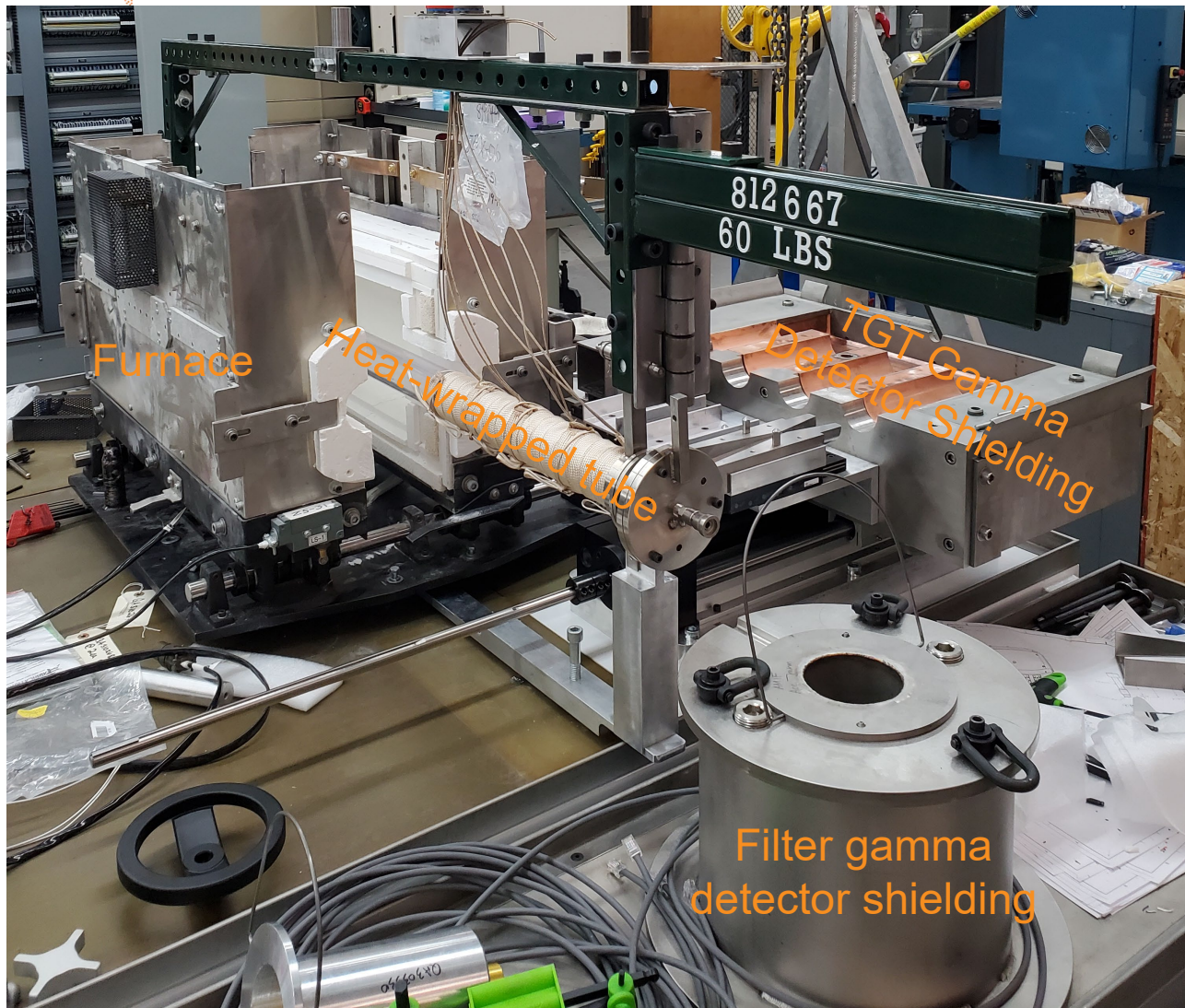


# Air/Moisture Ingress Experiment (AMIX) - Goals

- 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)

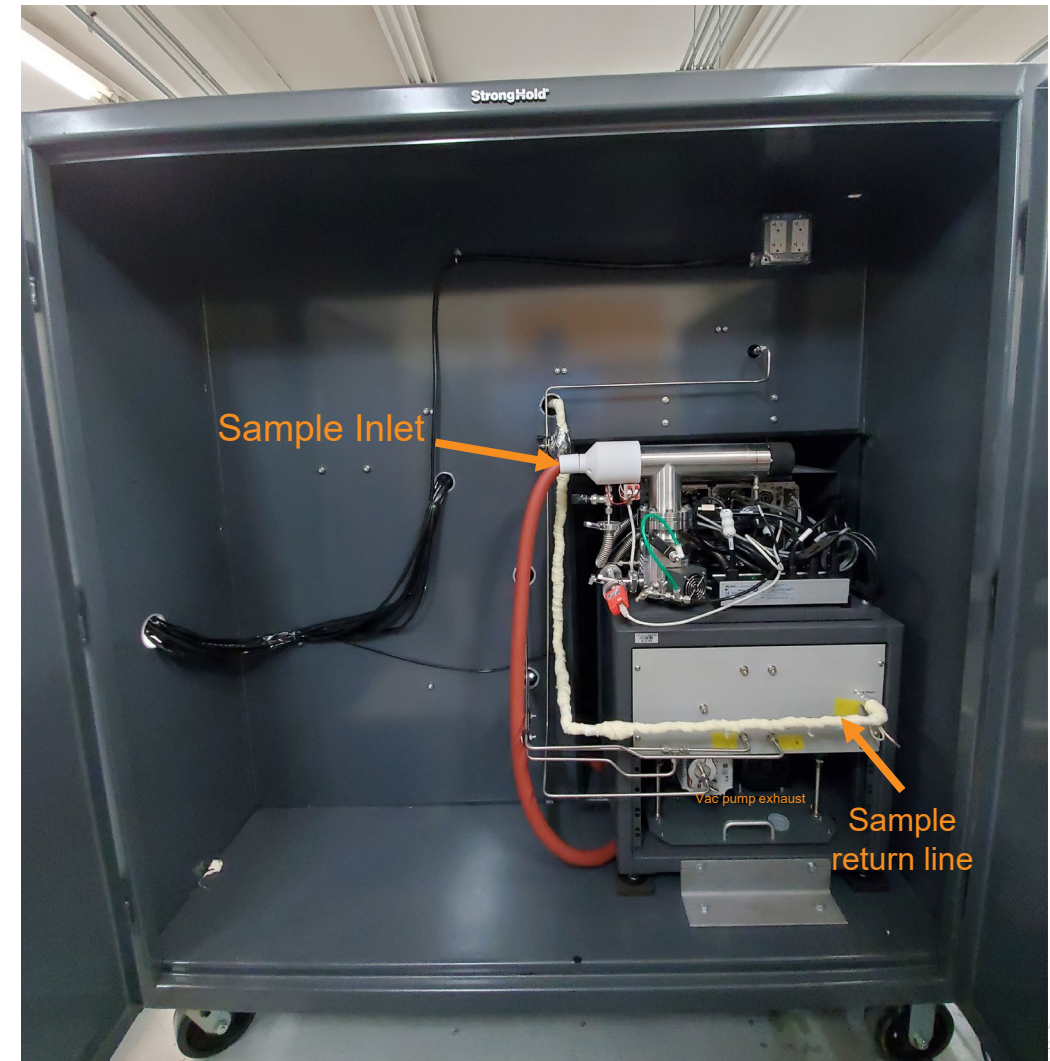
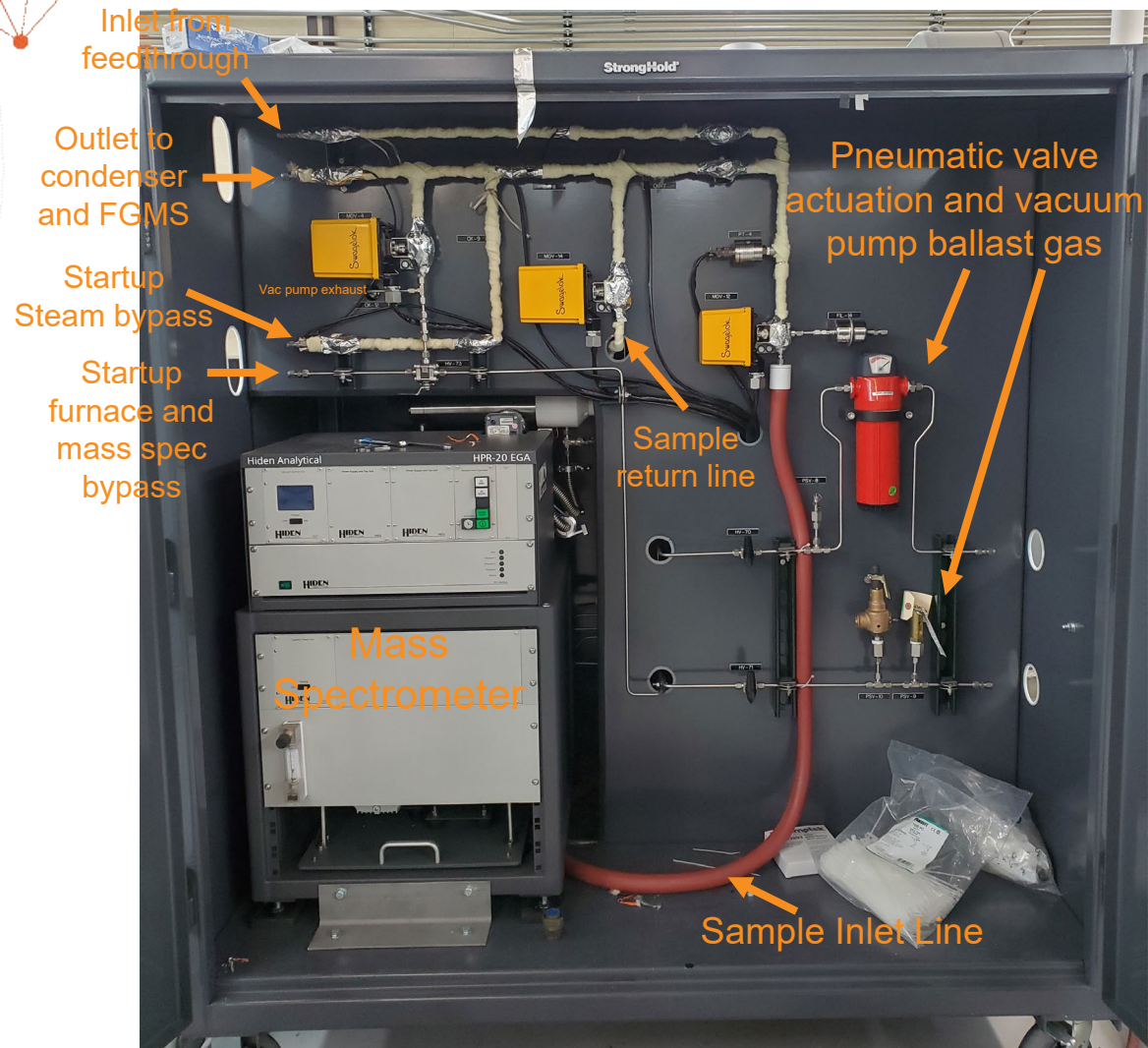


# Furnace with TGT and Filter Gamma Systems





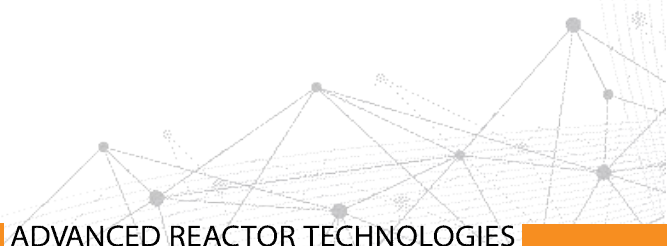
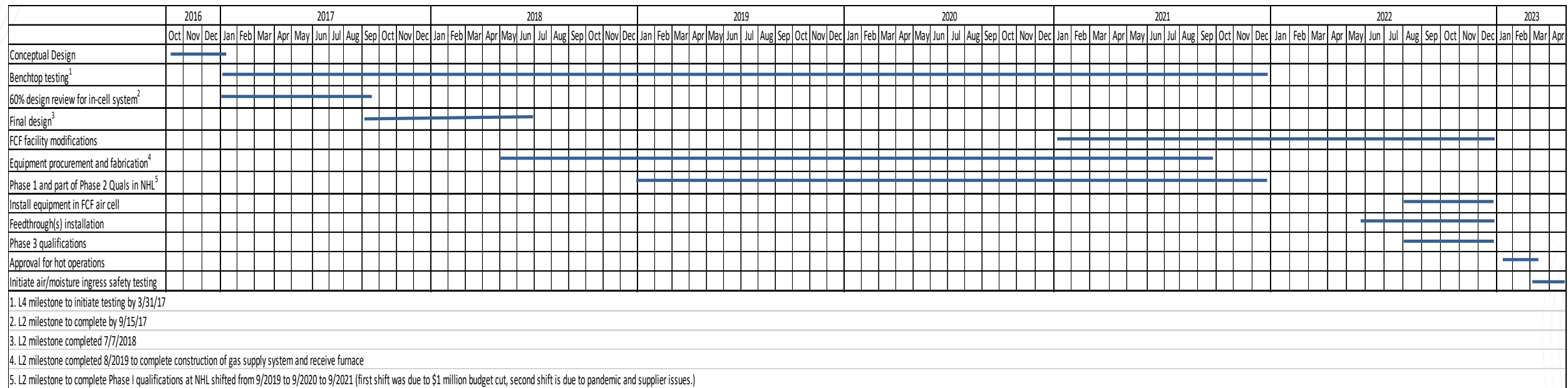
# Completed Mass Spectrometer System





# Updated AMIX

- \$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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