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Non-Aluminum Spent Nuclear Fuel Program

James Therrell
Environmental Management Operations Mission Planning Manager

Citizens Advisory Board – Augusta, Ga.

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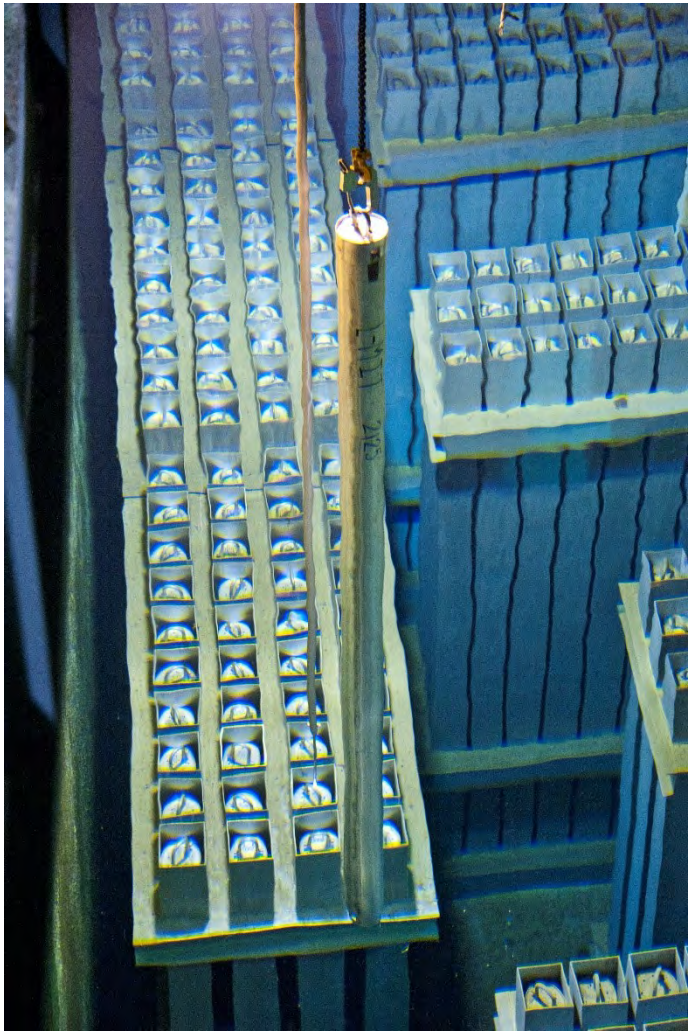
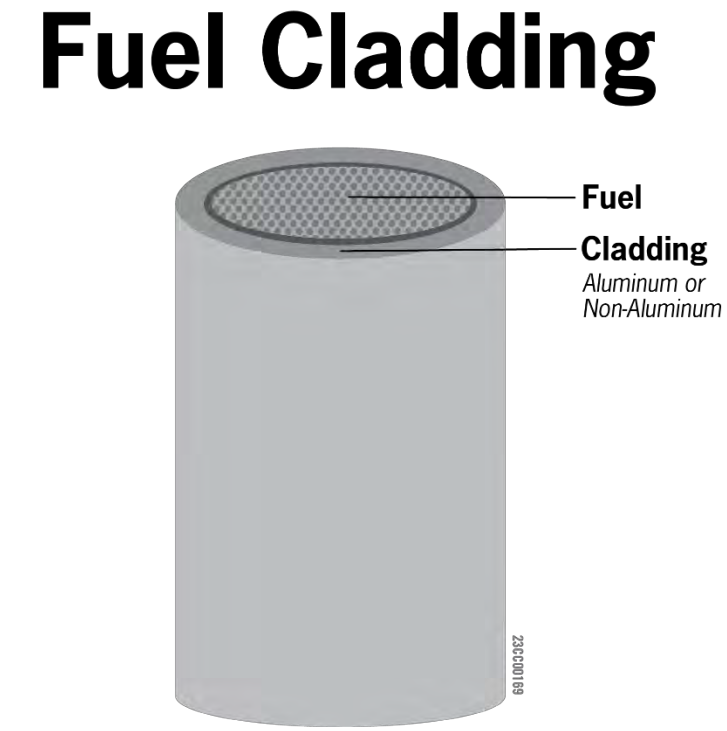
Non-Aluminum Spent Nuclear Fuel

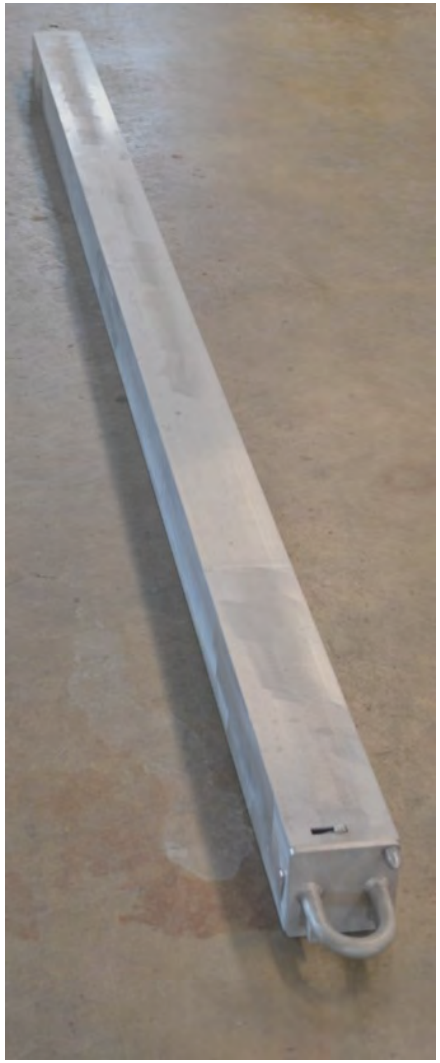
- Explain what NASNF is and how it is different from the fuels H-Canyon currently processes
- Describe the organization of the fuel inventory and highlight the major characteristics
- Explain how a future opportunity is opening to process a portion of the fuel and give a status of the program
- Give a feel for some of the technical challenges associated with this fuel
- Discuss some of the long-term activities ongoing for the more difficult fuels



What is NASNF?

- Non-Aluminum Spent Nuclear Fuel (NASNF) is fuel that has cladding (and sometimes the fuel itself) constructed of materials other than aluminum-based alloys.
  - Examples: zirconium, stainless steel, etc.
  - These materials do not dissolve chemically in nitric acid, but will dissolve electrolytically

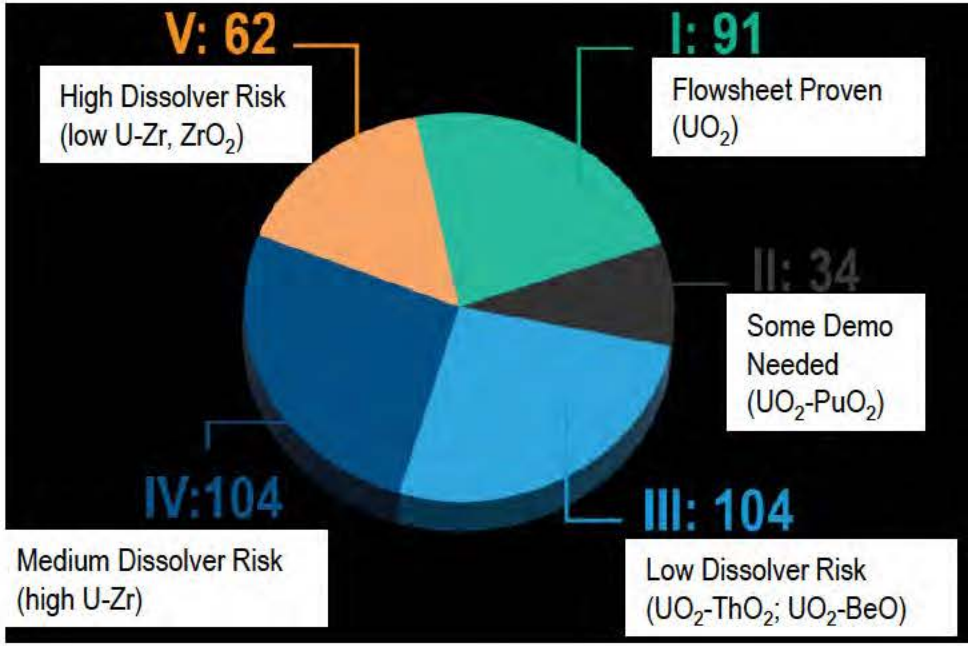




NASNF Scope

NASNF represents roughly 10% (by item) of the Accelerated Basin De-inventory (ABD) mission scope but presents unique disposition challenges compared to Aluminum Spent Nuclear Fuel (ASNF).

- Unlike ASNF, NASNF inventory consists of a variety of shapes, sizes, cladding, fuel composition, and integrity conditions.
- Unlike ASNF, much of the NASNF requires additional research and development to evaluate dissolver chemistry compatibility
- Proven SRNL Flowsheet Development Process



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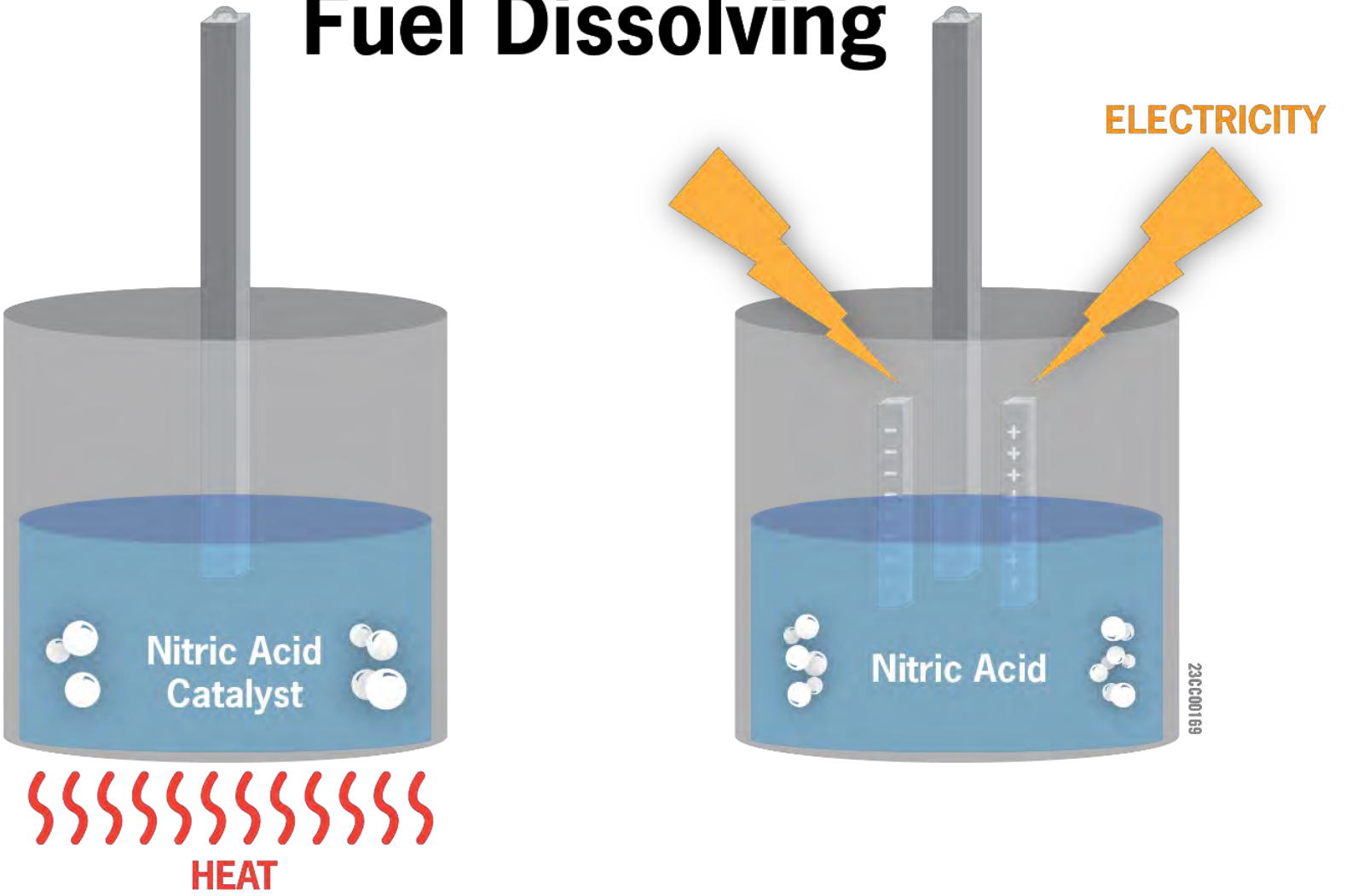
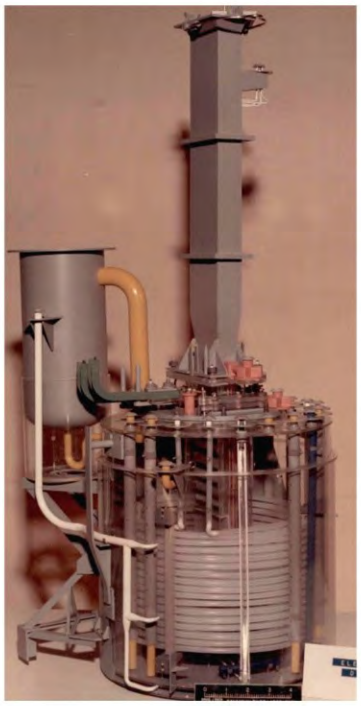
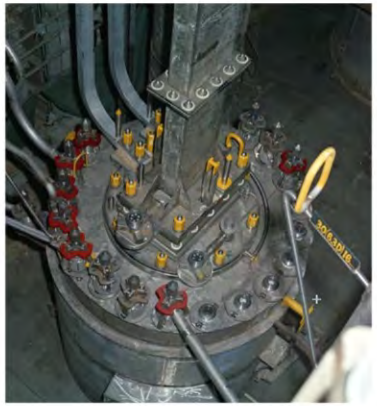
Fuel Dissolving

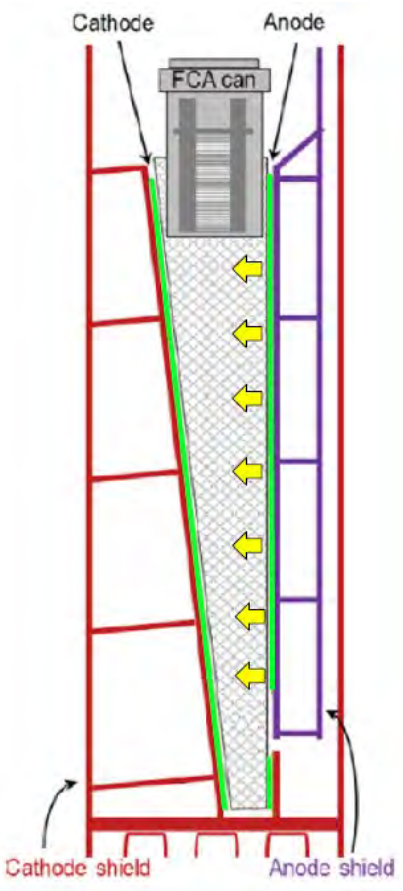


NASNF Disposition Opportunity

- From April 1969 to February 1980, the 6.3D Electrolytic Dissolver processed fuel that could not be readily dissolved in the chemical dissolvers (such as NASNF).
- Fast Critical Assembly (FCA) – Stainless Steel-Clad fuel from Japan
  - Campaign FY2024-FY2025
  - Dissolver becomes available for NASNF processing FY2026

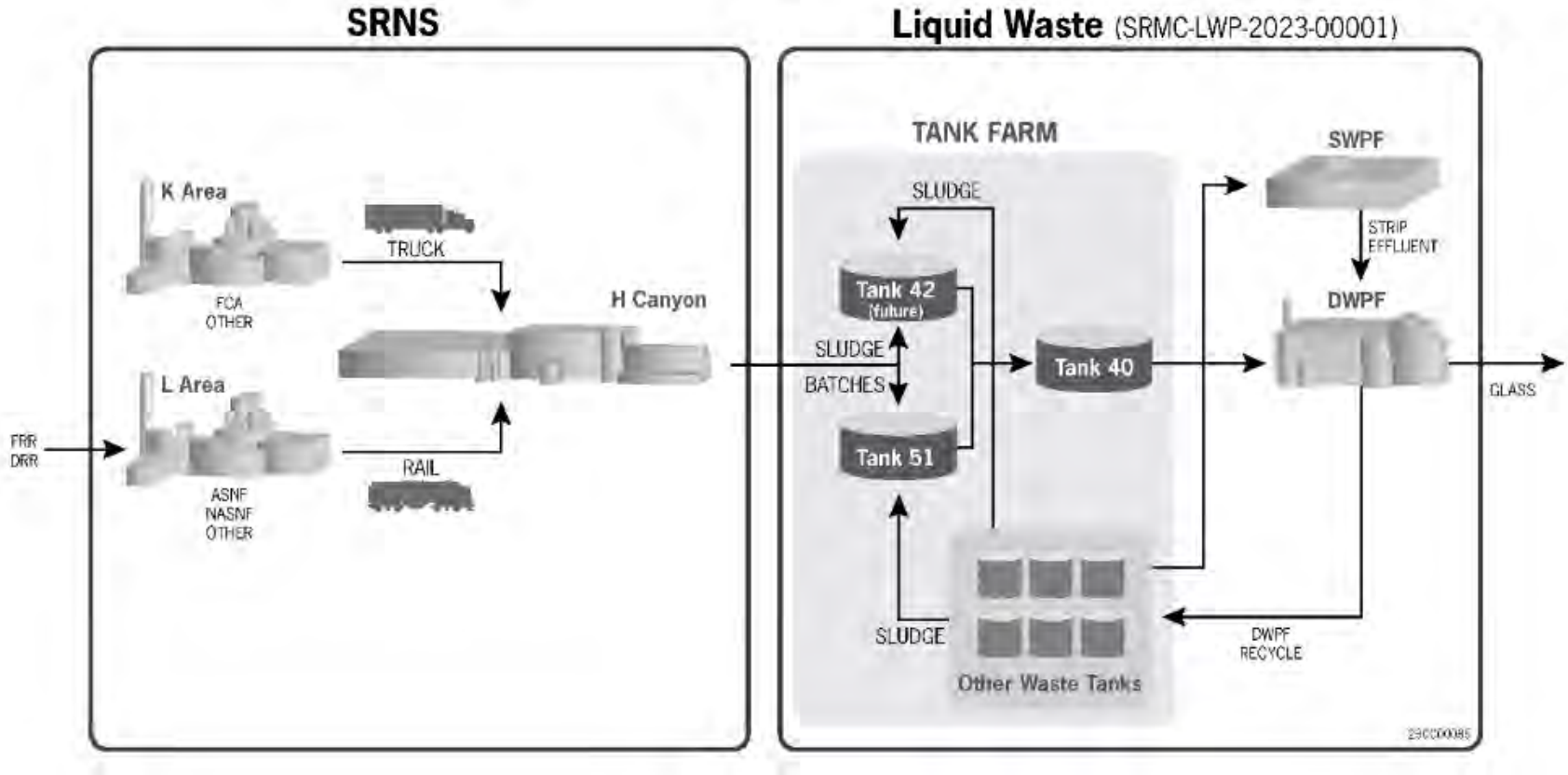




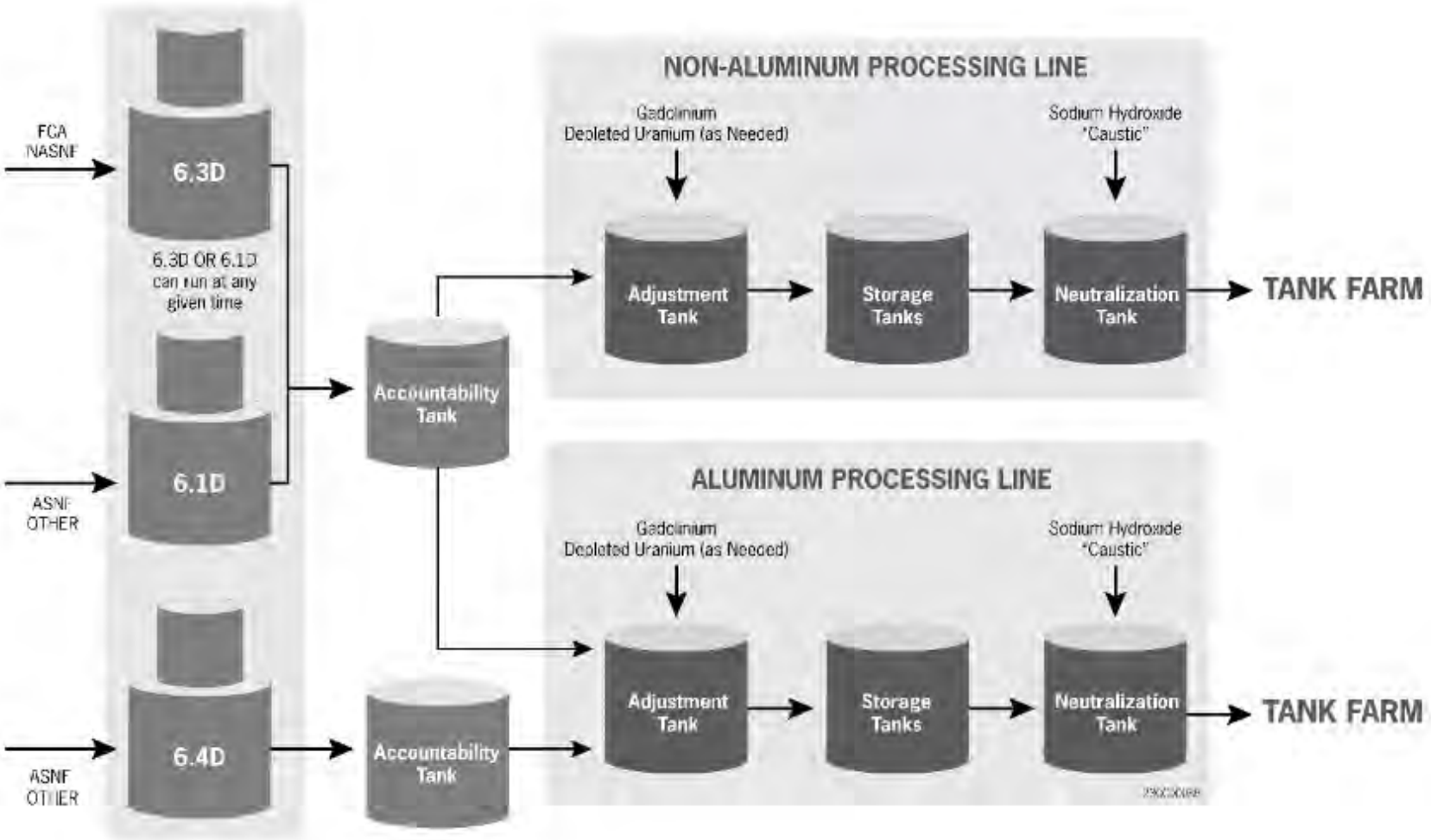


ABD Operations

- In April 2020, the Accelerated Basin De-inventory (ABD) approach was authorized.
  - Transitioned from recovering HEU (Highly Enriched Uranium) from SNF to more streamlined and cost-effective disposition of fuel by discarding to Liquid Waste for vitrification.



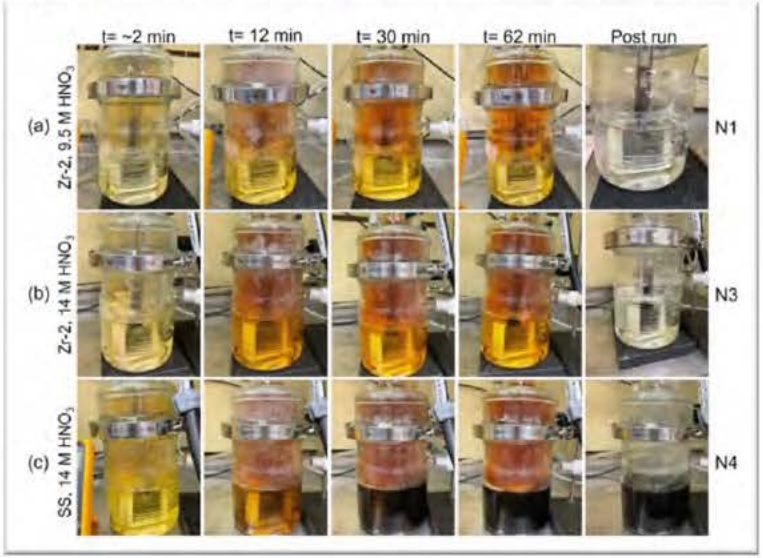
Inside H-Canyon ABD Process Flow



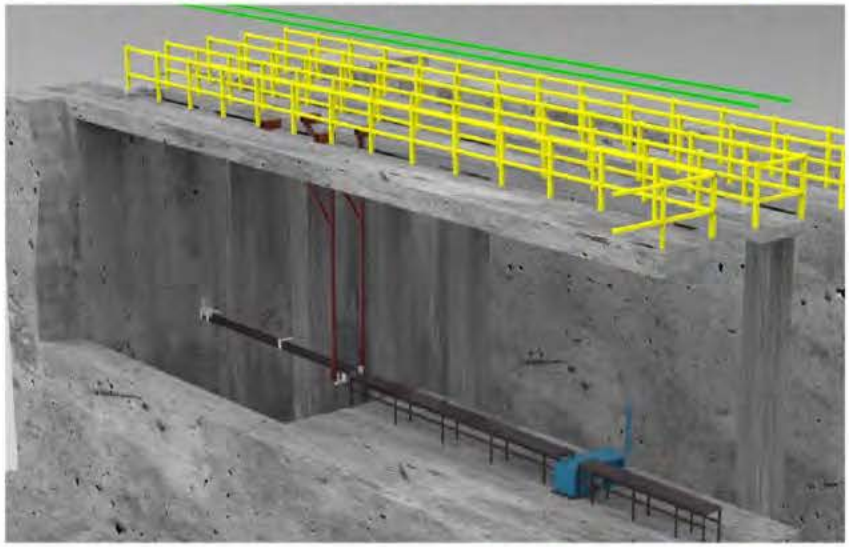
Technology Development

ZrSST "Sludge" Model Simulation

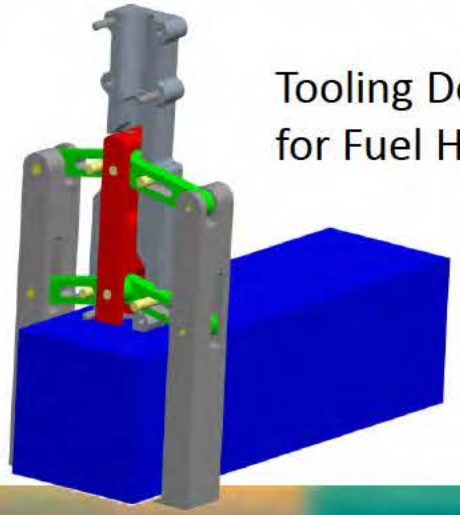
Flowsheet – How to Run the Dissolver



L-Basin Modifications for Rebundling



Tooling Development for Fuel Handling

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