

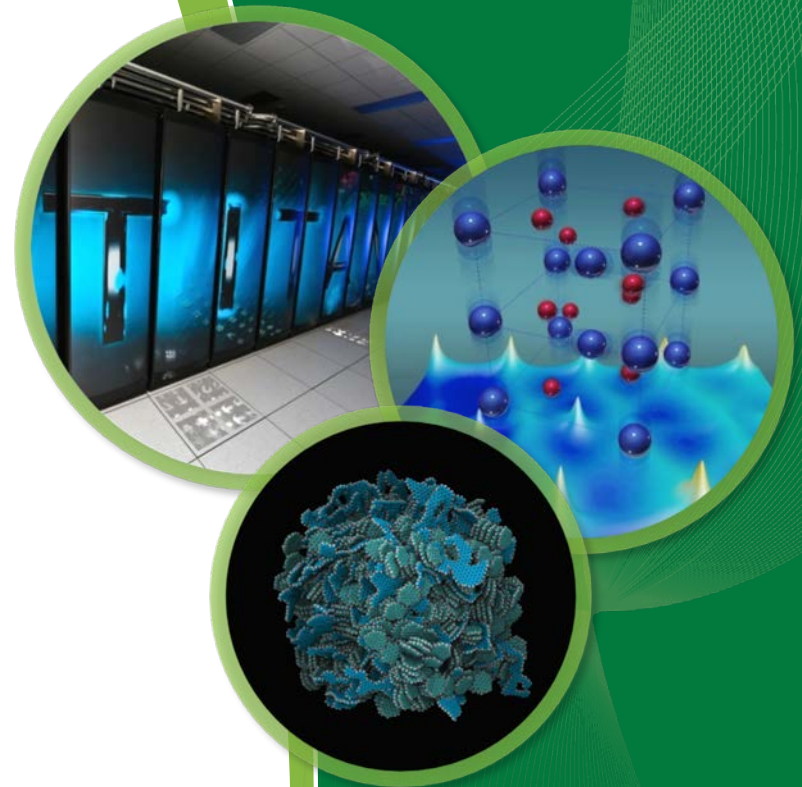
# Liquid Salt Experimentation to Support FHR and MSR Development

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NSUF Nuclear Thermal-Hydraulics Capabilities Workshop  
July 13, 2017

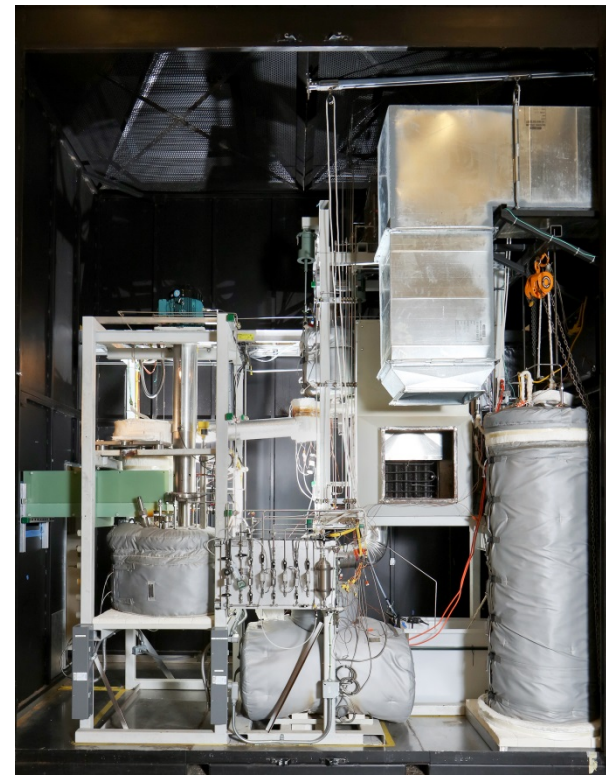
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# Liquid Salt Test Loop

- Forced convection facility
- Designed to perform multiple types of tests
  - Initial testing – heat transfer in a salt cooled pebble bed
  - Potential testing
    - Pump performance
    - Instrument testing
    - Etc.

Salt	FLiNaK
Operating Temperature	$\leq 700^{\circ}\text{C}$
Flow rate	$\leq 4.5 \text{ kg/s}$
Operating pressure	Near atmospheric
Material of construction	Inconel 600
Loop volume	75 liters
Power	~20 kW trace 200 kW induction
Primary piping ID	2.67 cm (1.05 in.)



# Two Fluoride Salt Cleanup Systems

- Designed to purify commercial salts
- Batch processes:
  - Dedicated HF, H<sub>2</sub> supplies
  - Processing crucible
  - Off-gas clean-up systems
- Large scale process (160kg):
  - FLiNaK (1<sup>st</sup> operation summer 2016)
  - Others [ZrF<sub>4</sub> salts (KF, NaF)]
    - *(not Be or fuel salts)*
- Bench scale process (4kg)
  - FLiBe salt (operational summer 2017)
  - Can handle U and limited rad material in bldg.
  - Glove box includes cooler and well: small heated tests



160 kg system

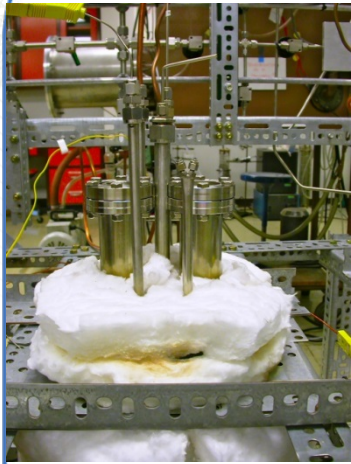


4 kg system



# Other Molten Salt Facilities Are Available to Support Salt Reactor Technology

## Molten Salt Cell



Observation of 700°C Molten Salt During Testing

Sapphire Windows

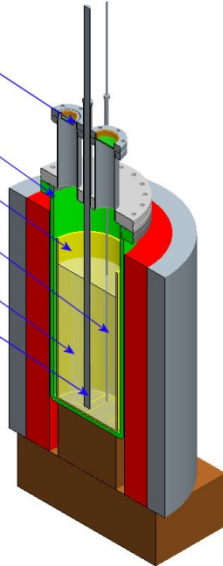
NI Vessel

NI Crucible

T/C probe

FLiNaK Salt

Heater



## Flow Calibration Test Stand

- Designed to calibrate flow meter(s)
  - ~120 L,  $\leq 710$  C,  $\leq 30$  psig
  - ~0.5-4.5 m/s (1" pipe)
- Potential uses:
  - Heat transfer testing
  - freezing tests
  - Oil similitude test
  - Natural circulation setup, ~7.5m
- Status: all major parts acquired; I&C and plumbing needs installed



## Other facilities

- Forced convection FLiBe loop being designed

## Salt infrastructure

- Salt Chemistry
- Corrosion and materials compatibility
- Salt property measurement
- Instrumentation development
- ....