



MicroNuclear LLC

Micro-Scale Nuclear Battery 2019

Micro-Scale Nuclear Battery (MsNB) Concept Overview

Design Overview

Reactor



- Molten Salt – FliBe
- Dissolved Fuel
- Natural Circulation

Heat Pipe



- Standard Wick Designs
- Working Fluid
 - Sodium/Potassium

Power



- Brayton Cycle
- Generator ~10MWe
- HRSG

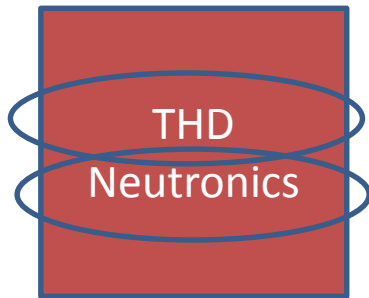


Micro-Scale Nuclear Battery (MsNB)

Current Design Status - Initial GAIN and Other Results – Unitized/Steady

(GAIN work conducted under PI P. Sabharwall-INL)

Reactor



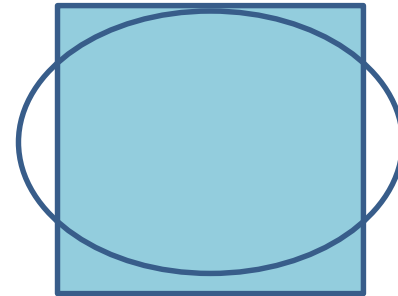
- Natural Circulation flow confirmed
- 10 year operation (ability to go critical)
 - Fission Products
 - Dose/Shielding
 - Reactivity Control
- Thermo/Physical Salt Properties
- Thermal/Structural
 - Materials/Corrosion
- Transport/Cask Design
- Manufacturing Cost

Heat Pipe



- Design/operating envelope confirmed
 - Pressure drop
 - Sonic Limit
 - Entrainment Limit
 - Boiling Limit
- Model Results Correlate well with literature

Power

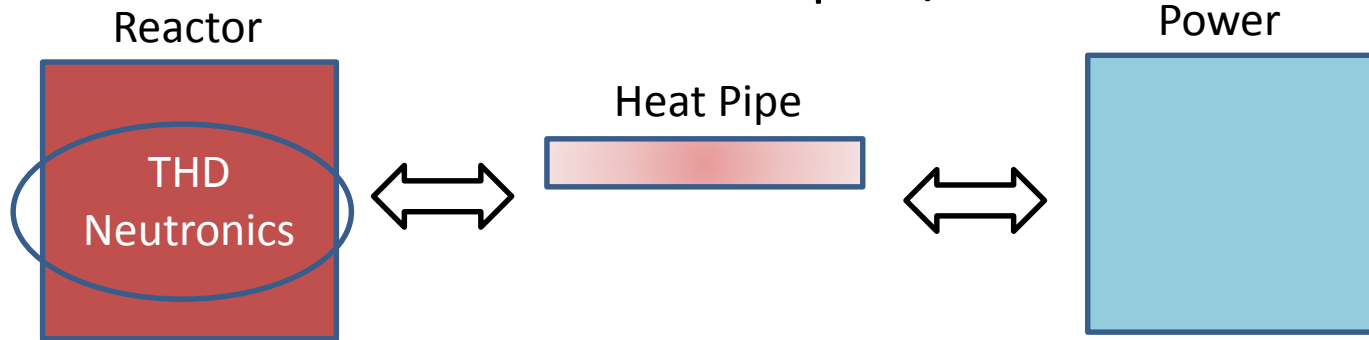


- Thermodynamic cycle efficiency analyses
- Economics
 - Levelized Cost of Power



Micro-Scale Nuclear Battery (MsNB)

Needs - GAIN and Other Efforts – Coupled/Transient



- Design optimization
- Transient – Startup/Shutdown/Operation/Safety Analysis

- Limitations
 - Codes and Computing Capabilities
 - Resources exist at National Labs – More/Bigger GAIN
- Mission - Design it – Build it – Run it – Deploy it
- Micro Reactors are a fundamental step in advanced reactor commercialization
- **Just like field of dreams, If you build it,**

