

Fuel Cycle Information Exchange



Fast Reactor Working Group

- Multiple developers working on multiple technologies
 - ARCWestinghouseSouthernGEColumbia BasinExelonTerraPowerElysium IndustriesDukeOkloGeneral AtomicsEPRI

FRWG Fuels



etal	
• 5 Developers	
Oxide	
• 2 Developers	
Nitride	
• 2 Developers	
Carbide	
• 1 Developer	
nloride Salt	
• 2 Developers	



Tomorrow's opportunities



Metal Fuel Experience



- Metal fuel is a mature technology
- Phenomena of interest are well characterized
- Over 130000 pins irradiated in EBR-II and over 1000 pins irradiated in FFTF
- In-core tests
 - > 1986 SHRT tests
 - Also involved 40 startup cycles, 8 overpowers, 45 loss of flow tests
 - No fuel failures!
 - > RBCB tests
- TREAT tests
- Out of pile tests
- Resilient to variations in manufacturing techniques and tolerant of impurities

Fuel Safety Perspectives





Fuel Design Considerations



• Robust fuel behavior can enhance the safety case

- Fuel changing phase is not necessarily fuel failure, it can be a safety benefit
- Coolant system can play an important role as a barrier to radionuclide release
- Operational considerations
 - > Leakers may not impede operations

Fuel Design Variations



- Extend operating envelope of metal fuels e.g. advanced metal fuels
- Next generation cladding materials
- Alternative fuel materials
 - > Carbides, nitrides, UZrH, cermets, etc.
- Vented fuel and "cladding-free" designs
- General fuel design evolution

8

Takeaways

- Metal fuel is a mature technology
 - > Building on legacy data
- Developing new fuels
 - > Extending operating envelopes
 - > Exploring new concepts

• Will require a full suite of supporting capabilities

