ADVANCED REACTOR, FUEL CYCLE, AND ENERGY PRODUCTS WORKSHOP FOR UNIVERSITIES

Will Windes

Generation IV Nuclear Energy Systems Initiative

Very High Temperature Reactor

(NGNP Program)

Idaho National Laboratory

Workshop for Universities
Hilton Hotel, Gaithersburg, MD
March 20, 2007

The VHTR Work Scope

- *Fuel Development*
  - *Development and testing of UCO fuel form*
- *Materials Development*
  - *New (or previously unused) structural materials*
- *Methods Development*
  - *Reactor models for VHTR and gas reactors including a movable pebble bed core*
- *Energy Conversion*
  - *Hydrogen or process heat production*

FY06 Accomplishments

- *Fabrication and characterization of UCO fuel particles and compacts for first irradiation campaign*
- *Completed assembly of fuel test train (AGR-1) and final inspection for Rx insertion*
- *Completion of initial graphite irradiation test train (AGC-1) designs and key components*

FY06 Accomplishments

- *Completion of high temperature corrosion/aging loop for structural component ageing studies*
- *High temperature creep-fatigue testing for high temperature Ni-based alloys*
- *Fabrication of full sized (100mm diameter) SiC_f/SiC composite tube*
- Completed interactions with industry and prioritized research needs

What we're doing in FY07

- *Transitioning from an R&D program to a "Projectized" program*
- *AGR has been inserted in the Advanced Test Reactor (ATR). (In there right now)*
- *Graphite irradiation creep test capsule (AGC-1) is in middle of design reviews*
  - *Three different mockups will be completed*
    - *Assembly, fabrication, & operational mockup*

What we're doing in FY07

- *Engineering Studies and Pre-conceptual designs being reviewed*
  - *From three design teams*
- *Examination of critical safety issues through modeling tools (e.g., air ingress)*
- *Methods is defining key experiments to validate data for VHTR design*

FY08-09 Plans

- *Continue fuel irradiations (7 campaigns)*
- *Complete and insert graphite irradiation creep capsule test (FY ‘09)*
- *Complete initial ageing studies on high temperature alloy systems*
- *Continue creep-fatigue studies of HT alloys (617 & 230)*
  - *Compact heat exchangers*

FY08-09 Plans

- *Continue composite studies (C-C hangers and insulation)*
- *Investigate alloy 800H for use as control rod material*
- *Initiate secondary component test loop*
- *Define key experiments for VHTR design and safety tools (e.g. scaled T/H experiments, mixing and hot streaking phenomena, cross-sections)*