Fast Reactor Technology Training Curriculum

Day 1

Time	Lecture	Topics	Presenters
8:30	Introduction	Motivation and applications for Fast Reactors High level design and safety approach	Tanju Sofu
9:00	Historical perspective for fast reactors		George Flanagan
9:20	Fast reactor physics	Fast vs. thermal neutron spectrum, cross section treatments, nuclear data and validation needs.	Bob Hill
10:00	Break		
10:15	Fast reactor physics	Reactivity feedbacks, burnup and depletion characteristics, implications on fuel cycle (breeding, burning, or breakeven cycles, used fuel management).	Bob Hill
11:00	Fast reactor fuels	Overview of metallic and oxide fuel forms and their safety characteristics.	Tanju Sofu
12:00	Lunch		
1:00	SFR technology overview	Reactor core, reactivity control and shutdown systems, fuel handling and storage, reactor vessel and guard vessel, containment. Heat transport systems: • Primary system design (loop vs. pool configurations, sodium coolant, pumps, intermediate heat exchanger, shielding) • Intermediate system design (piping, pumps, secondary heat exchanger, energy conversion system) • Decay heat removal systems	Tanju Sofu
2:15	Sodium technology, test facilities, and materials research.		Dave Garabaskas
3:00	Break		
3:15	Considerations for operational states	Neutronic, thermal-hydraulic, and structural core design considerations for normal operation and AOO (SAFDL, operational events like secondary sodium leaks, primary sodium and cover-gas cleanup systems, failed fuel monitoring).	Dave Grabaskas
4:00	Overview of past U.S. SFR operations experience and safety testing program		George Flanagan Tanju Sofu
5:00	Adjourn		

Day 2

Time	Lecture	Topics	Presenters
8:30	Fast reactor safety design approach	Design criteria, inherent and passive safety, reactivity control, decay heat removal, containment function, and sodium accidents.	George Flanagan
9:00	Fast reactor safety	• Design basis accident initiators/sequences/phases (inadvertent control rod withdrawal, loss of flow, loss of heat sink, fuel assembly blockage, fuel loading/handling errors, and local faults). • Beyond design basis accidents with potential fuel failures, containment design basis.	Tanju Sofu
10:00	Break		
10:15	Mechanistic source term calculations		Dave Grabaskas
11:15	Existing and developmental fast reactor modeling and simulation tools and methods.		Tanju Sofu
12:00	Lunch		
1:00	Probabilistic risk assessments	Reliability estimates from past SFR and test-loop operations, methods for incorporating passive system reliability into a PRA	Dave Grabaskas
2:00	Overview of Lead-cooled Fast Reactor (LFR) technology		Tanju Sofu
3:00	Break		
3:15	Overview of heat-pipe based micro-reactor technology		Dave Grabaskas
4:00	Summary and concluding remarks		George Flanagan and Tanju Sofu
4:15	Questions and answers		All
5:00	Adjourn		