U.S. DEPARTMENT OF ENERGY | Office of NUCLEAR ENERGY

2024 CINR FOA Webinar Presentation

NE- 8, 81, 82, Spent Fuel and Waste Science and Technology (SFWST):

May 31, 2023

Topic Area 6: Spent Fuel, Waste Science & Technology and Integrated Waste Management

Mission Statements:

- **NE-8, Spent Fuel and Waste Disposition (SFWD): Protect people and the environment, now and in the future, by establishing an integrated system for storage, transportation, and disposal of the nation's spent nuclear fuel and high-level radioactive waste.**
- **NE-81, Spent Fuel and Waste Science and Technology (SFWST): Provide confidence in the safe long-term management of the nation's spent nuclear fuel and high-level radioactive waste by reducing uncertainty and advancing technology for extended storage, transportation, and geologic disposal.**
- **NE-82, Integrated Waste Management (IWM): Construct one or more federal interim storage facilities, using a consent-based siting process, ready to receive commercial spent nuclear fuel as soon as practicable.**

Overview of SFWST Disposal Research (DR) areas:

- Repository Geology – investigate argillite, crystalline, and salt as a potential host-rock.
- Engineered Barrier System (EBS) R&D – study the geochemical and mineralogical alterations that occur at elevated temperatures, and the effect on interactions between the buffer materials and the waste package.
- Geologic Disposal Safety Assessment (GDSA) – develop Features, Events, and Processes (FEP); processes include waste form and EBS evolution model, flow and transport model, biosphere model.
- Direct Disposal of Dual-Purpose Canisters R&D – investigate criticality mitigation by ceramic or cementitious fillers; criticality consequences.
- Inventory and Waste Form Characteristics and Performance – perform fuel matrix degradation modeling and testing; conduct isotopic measurements of BWR and PWR fuels to more accurately estimate criticality burn-up credit for DPCs.
- Advanced Reactor SNF and HLW Streams and Waste Forms – develop FEPs for GDSA; develop gap analysis for S&T Safety Analysis.

Overview of SFWST Storage & Transportation (S&T) research areas:

- High Burn-up Fuel Field Test and Sibling Pin Testing – collect temperature data from field-test canister; obtain data and develop gap analyses of BWR, IFBA, ATF, and higher burn-up PWR fuels and cladding; testing and analysis of sibling pins.
- Thermal profiles – testing and analysis on canistered and bare fuel storage systems in vertical and horizontal orientations during drying, storage, handling, and transportation.
- Stress Profiles – external loads (shake table) testing and analysis, 30 cm drop test analysis of effects on pinch loads on fuel cladding.
- Welded Canister Atmospheric Corrosion – chlorine-induced stress corrosion cracking modeling, mitigation, and repair; full-scale chloride dust canister deposition/deliquescence demonstration.

Overview of SFWST Storage & Transportation (S&T) research areas continued:

- Drying – test and analyze lab-scale, bench-scale, and full-scale canisters to develop simulation, sampling, and analysis techniques to quantify residual water as a function of drying parameters; perform consequence analysis.
- Canister Failure Consequences – perform numerical and empirical models to study crack size, particle size distribution, particle and aerosol flow through micro-channels, aerosol release and depletion rates.
- Canister Internal Environment Monitoring – develop non-intrusive sensors, and power supply and signal transmission technologies for monitoring internal temperature, pressure, and gas species and concentrations.

Thank You

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