



U.S. DEPARTMENT OF  
**ENERGY**

**Nuclear Energy**

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**Nuclear Energy University Programs  
Fiscal Year 2018  
Annual Planning Webinar**

**Spent Fuel and Waste Disposition  
FC - 4.1 Disposal  
FC - 4.2 Storage & Transportation**

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## Used Fuel Disposition Overview

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### ■ DOE Office of Nuclear Energy Mission

- Advance nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration as appropriate

### ■ Spent Fuel and Waste Disposition Mission

- Identify alternatives and conduct scientific research and technology development to enable storage, transportation and disposal of spent nuclear fuel and wastes generated by existing and future nuclear fuel cycles



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# Used Fuel Disposition Campaign R&D Participants



## Grand Challenge

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- **The *Grand Challenge* for the Spent Fuel and Waste Campaign is to provide a sound technical basis for the safety and security of long-term storage, transportation, and disposal of used nuclear fuel and wastes from the nuclear energy enterprise**
  - **Importance: Supports the establishment of SNF management and disposition pathways**

# Used Fuel Disposition Research Needs

## ■ Storage/Transportation

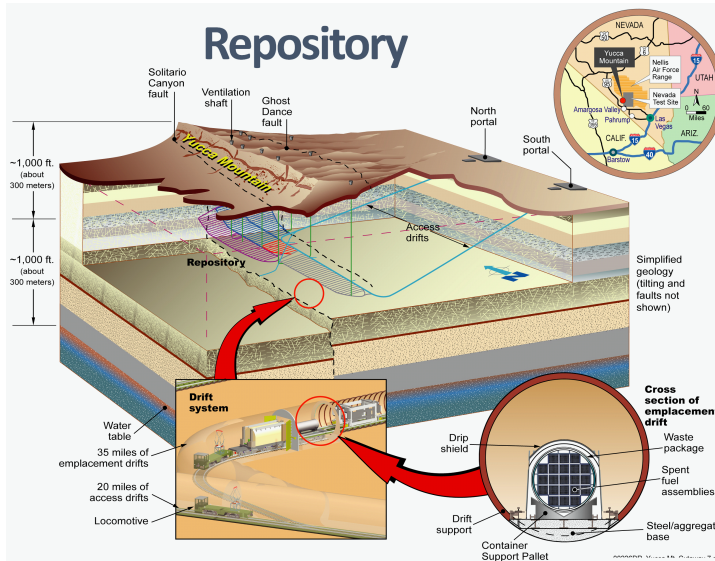
- **Develop the technical bases:**
  - **To demonstrate used fuel integrity for extended storage periods**
  - **For fuel retrievability and transportation after extended storage**
  - **For transportation of high burnup fuel**

## ■ Disposal

- **Provide a sound technical basis for assurance that the US has multiple viable disposal options available when national policy is ready**
- **Identify and research generic sources of uncertainty that challenge the viability of disposal concepts**
- **Increase confidence in robustness of generic disposal concepts to reduce the impact of site-specific complexity**
- **Develop the science and engineering tools required to address the needs above**

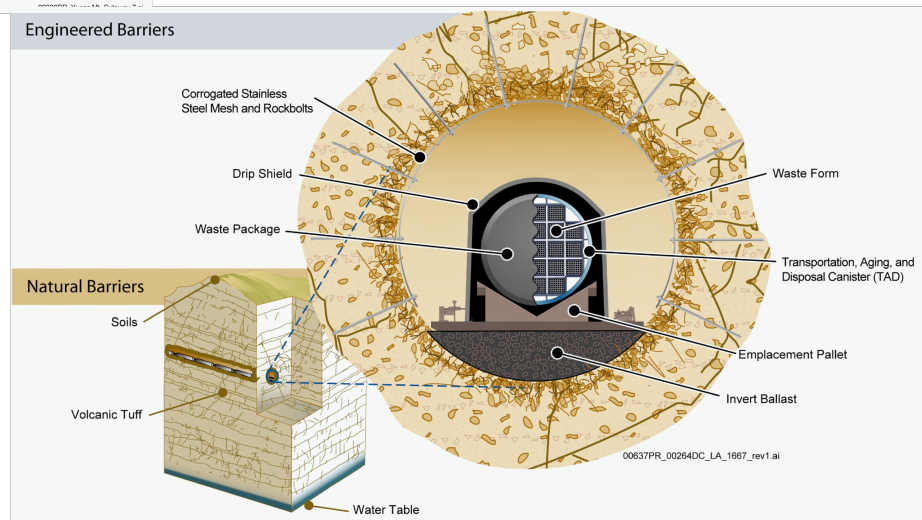


# NEUP R&D Work Scope Description: Used Fuel Disposition FC-4.1



## Barriers for Waste Isolation

- Unsaturated Zone
- Waste Form
  - Glass or hard ceramic
- Engineered Barrier System

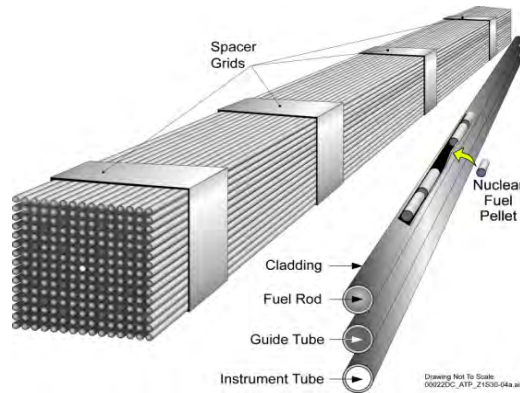




# Storage System Components

## I. Fuel

- I. Fuel/Pellet
- II. Cladding
- III. Assembly hardware

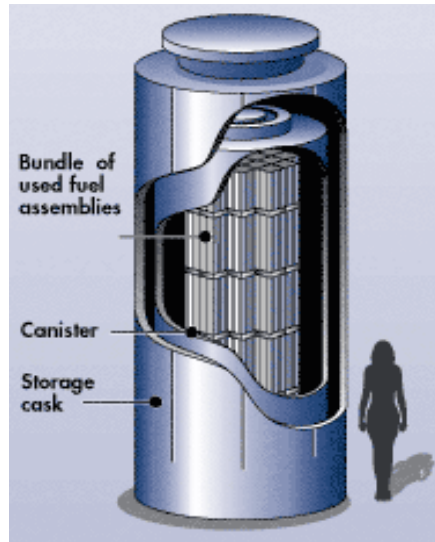


## III. ISFSI

- I. Pad
- II. Rebar
- III. Physical Protection

## II. Cask

- I. Internals (baskets, neutron poisons)
- II. Container (canister, welds, seals, bolts)
- III. Overpack/Storage module



## IV. Monitoring Systems

- I. Remote inspection
- II. In-package sensors
- III. Security

## Used Fuel Disposition (FC-4.1) and (FC-4.2) Focus Areas for University Proposals

**No IRP proposals are being solicited in the  
Used Fuel Disposition Area at this time**

**Two R&D proposals are being solicited in the  
Used Fuel Disposition Area, FC-4**

**They are Program Supporting R&D grants  
University-led up to \$800,000 over 3 years**

**FC-4.1 Disposal**

**Chemical Dynamics in Waste Isolation Barrier**

**FC-4.2 Storage and Transportation**

**Repair and Mitigation of Postulated Cracks in  
SNF Storage Canisters**