U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Spent Fuel & Waste Disposition:

Planning for a Defense Waste Repository

Presented to SRS
Citizens Advisory Board

Nancy Buschman
Senior Advisor for Defense Waste Disposal
Office of Spent Fuel and Waste Science Technology (NE-81)
Office of Nuclear Energy
U.S. Department of Energy

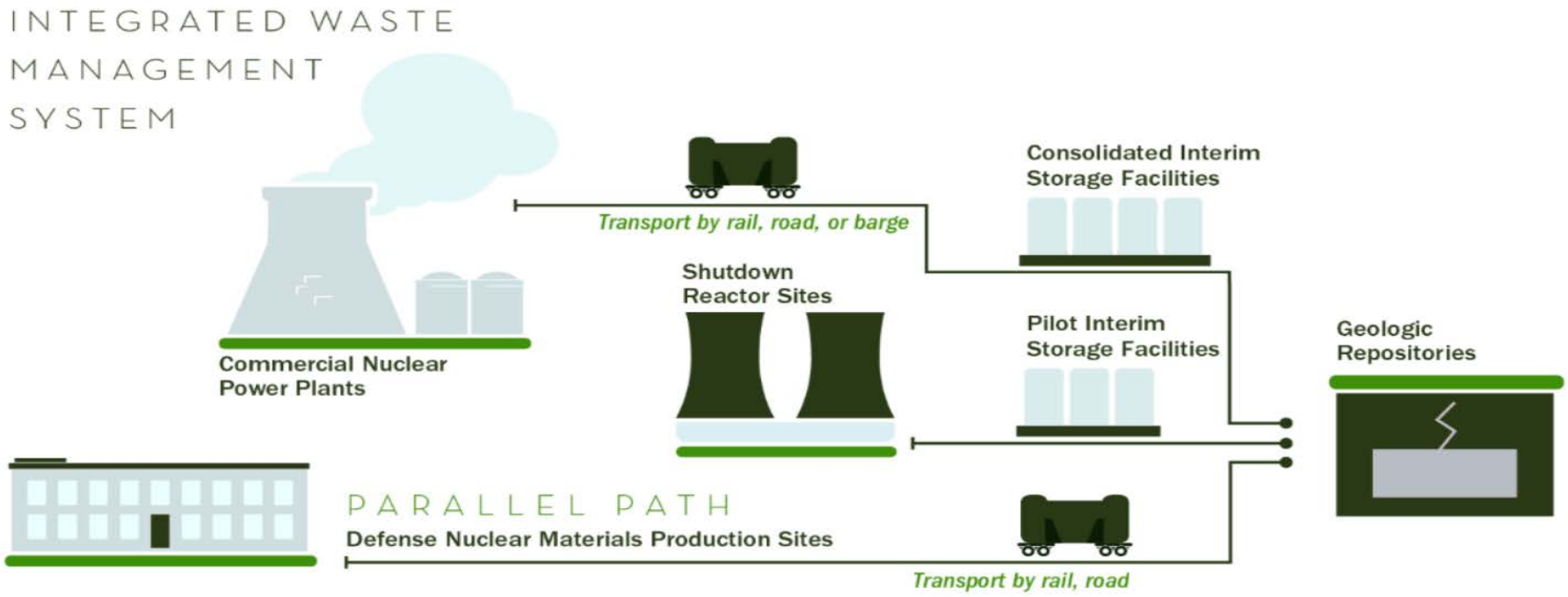
December 6, 2016

Outline

- Need for a Defense Waste Repository
- Development of a consent-based siting process
- Overview of plan activities
- Next steps

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Integrated Waste Management System



U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Need for a Defense Waste Repository

- **In March 2015, the President found that "the development of a repository for the disposal of high-level radioactive waste resulting from atomic energy defense activities only is required"**

- **Circumstances changed since 1985**
  - The U.S. is no longer generating high-level waste from weapons production - inventory of defense high level waste is essentially fixed and known.
  - The 1985 evaluation assumed the NWPA schedule would be met, and that the first repository would become available in 1998 and the second before the capacity of the first repository reached its limit.
  - Potential to build a repository more quickly and de-inventory waste from cleanup sites and help DOE comply with environmental obligations

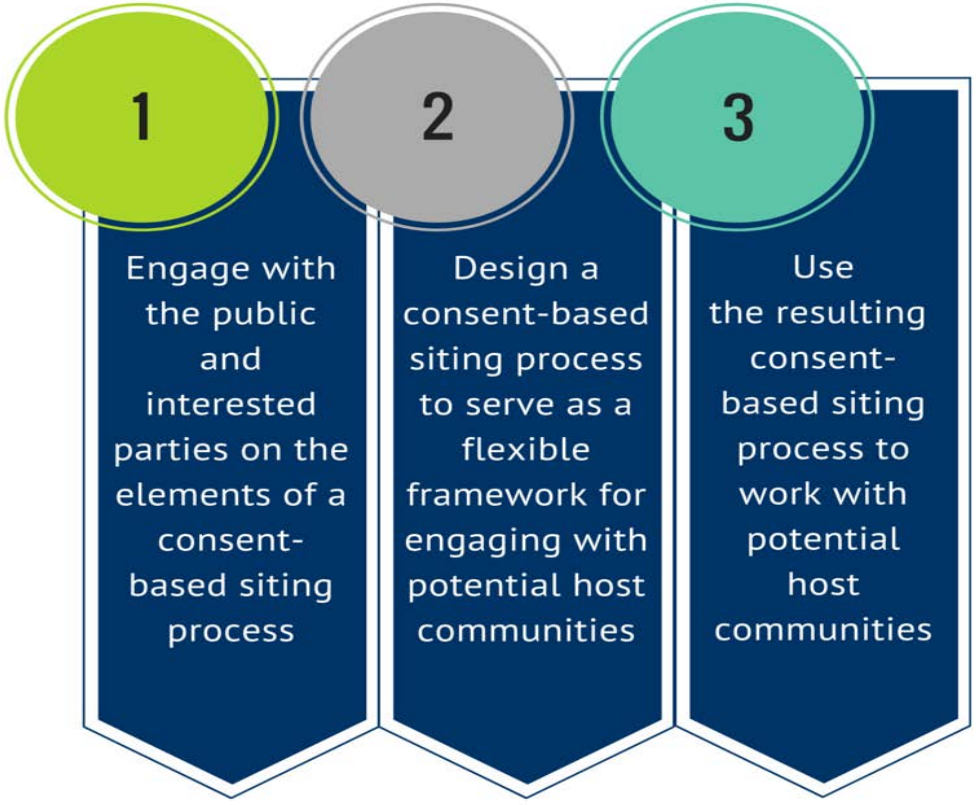
U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Development of a Draft Plan

- **Since March 2015, DOE has begun early planning to identify various activities that need to be performed to evaluate and design a separate repository for defense waste (DWR)**
- **This Defense Waste Repository would be a deep geologic repository developed by the DOE under the Atomic Energy Act for the disposal of a portion of the HLW and SNF resulting from atomic energy defense activities, R&D activities of the DOE, or both**
- **The draft plan will be published for public comment and will:**
  - Describe technical, regulatory, risk management and schedule activities
  - Inform potential and current host communities and request feedback

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Steps to Develop a Consent-Based Siting Process



U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Key Elements of a Defense Waste Repository Plan

- **Site Identification**
  - Identify potential candidates through the consent-based process
  - Establish working relationship with candidate sites
- **Site Screening**
  - Conduct screening evaluations and work with volunteer host communities to select one or more sites for detailed subsurface characterization
  - Select one or more sites for characterization and subsequent licensing
- **Site Characterization**
  - Complete subsurface investigations to support detailed repository design and preparation of an EIS
  - Negotiate agreement with host community and submit a license application
- **Licensing and Construction**
  - Receive authorization to construct
  - Begin disposal operations

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Estimated Costs and Schedule (ROM) Leading to Site Characterization

DURATION	3 YEARS	3 YEARS	5 YEARS	11 YEARS
PROGRAM PHASE	Site Identification	Site Screening	Site Characterization	TOTAL
Consent-Based Siting Process	$45 M	$45 M	$300 M	$390 M
Site Screening and Selection	$45 M	$400 M	$10 M	$455 M
Site Characterization	$0 M	$50 M	$600 M	$650 M
Waste Characterization	$6 M	$10 M	$35 M	$51 M
Repository Design	$4 M	$30 M	$275 M	$309 M
National Environmental Policy Act (NEPA) Activities	$10 M	$15 M	$100 M	$125 M
Repository Licensing	$5 M	$15 M	$100 M	$120 M
Repository Construction	$0 M	$0 M	$730 M	$730 M
Management Support	$15 M	$70 M	$150 M	$235 M
TOTAL	$130 M	$635 M	$2300 M	$3065 M

Rough order of magnitude (ROM) cost and schedule estimate for an example scenario (two site screenings and one site characterization). These estimates are independent of geology.

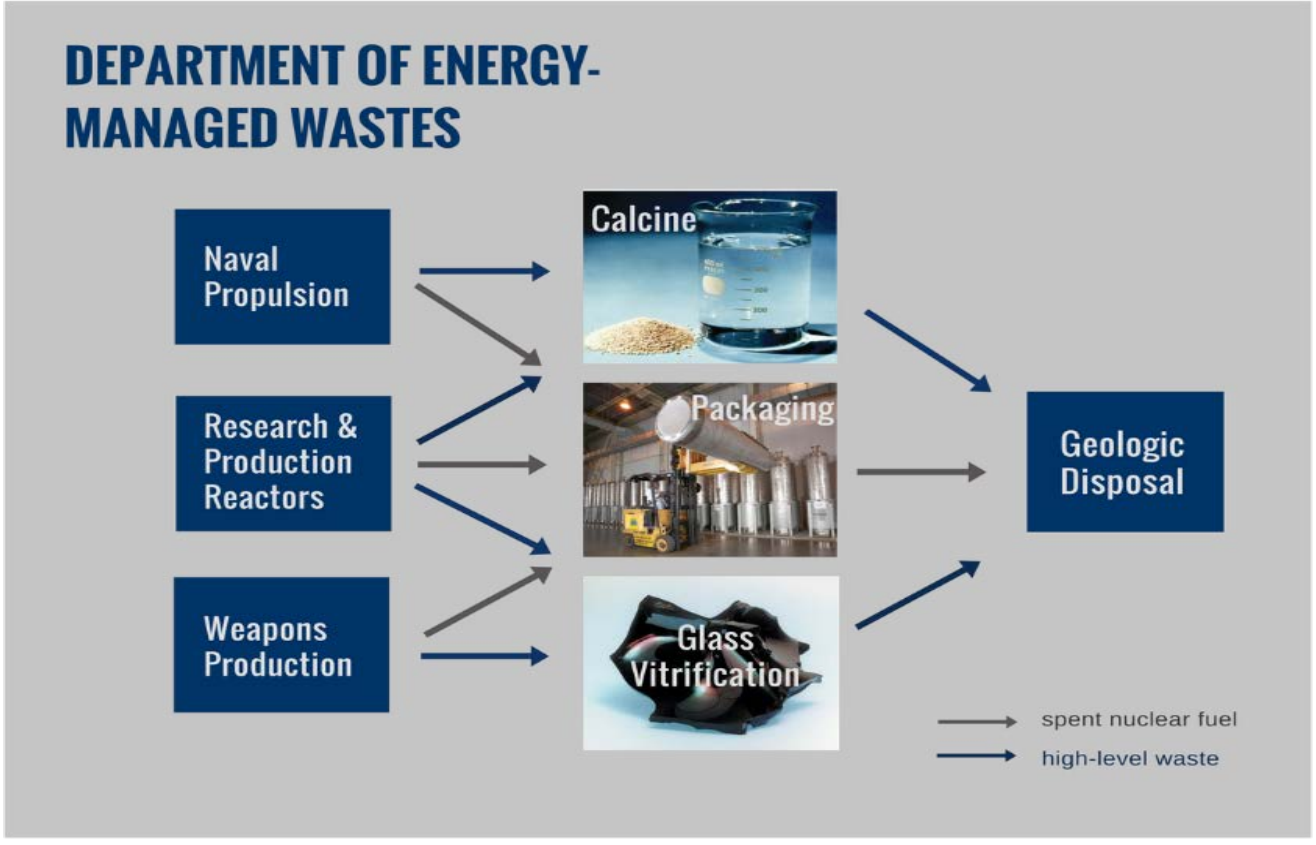
U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Plan Activities

- **Siting**
  - Consent-based siting process being developed
  - Volunteer sites will be screened
- **Development of waste acceptance criteria with host site participation**
- **DWR Design**
- **Evaluation of System Performance/Licensing**
- **Construction**
- **Transportation**
- **Operations**
- **Closure**

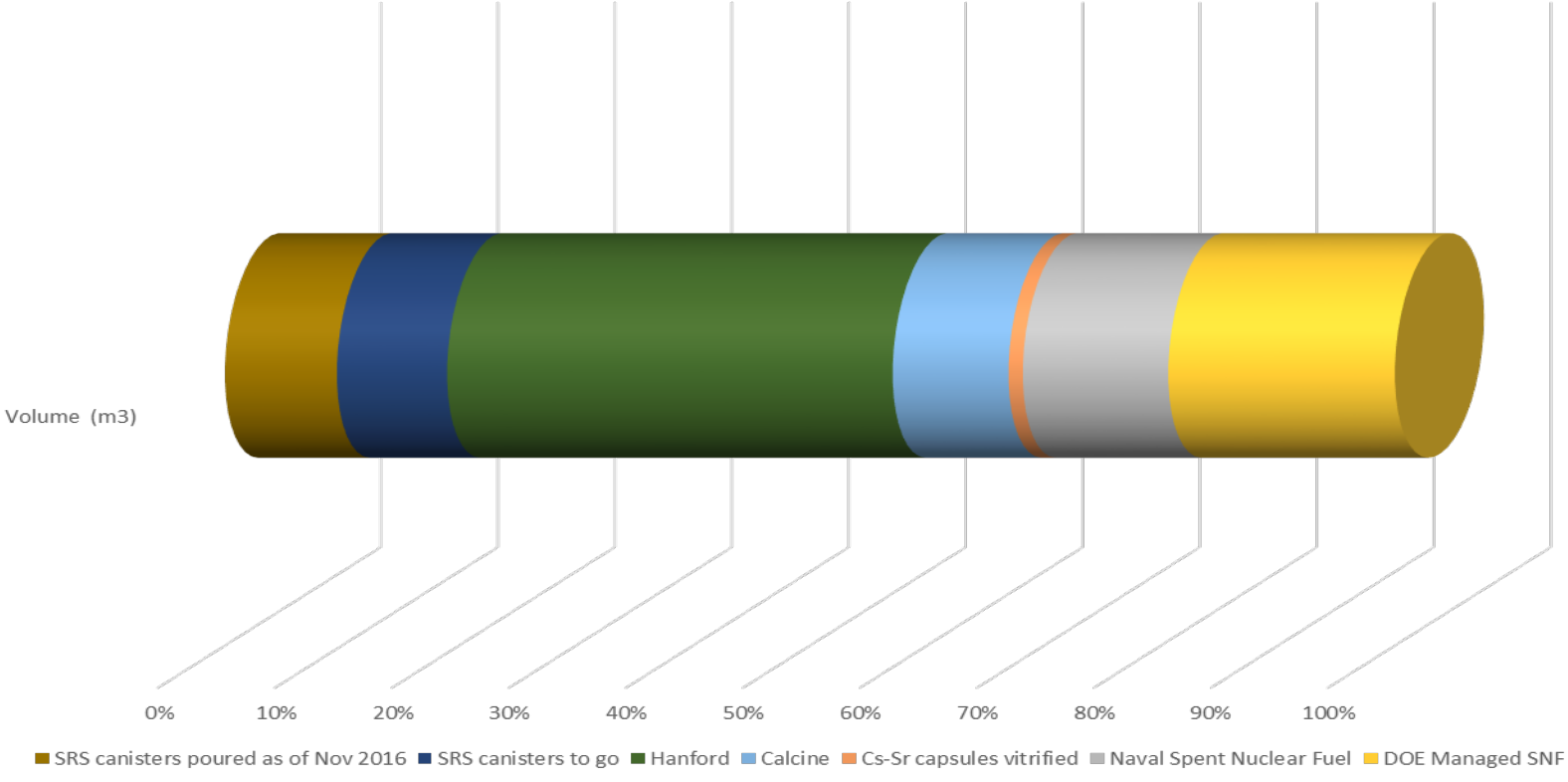
U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Potential waste types



U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Potential Items for Emplacement in a Defense Waste Repository



U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Next Steps

- **Collect public input on the draft Defense Waste Repository plan and incorporate feedback**
  - Update plan
- **Continue generic research & development**
  - Inventory and waste characterization
  - Preliminary design concepts (non-specific geologies)
  - Safety analyses
- **Work with volunteer host communities**
  - Develop partnership through information sharing
  - Evaluate site suitability
  - Conduct detailed site characterization
  - Perform cost analysis that considers geology and waste types

Summary

- **The draft plan describes a path for the development of a separate defense repository for the permanent disposal of a portion or all of the high level waste and spent nuclear fuel derived from national defense and research and development activities of the DOE**
- **The plan for disposal of these wastes is consistent with the DOE's existing authority under the Atomic Energy Act of 1954; with the requirements of the Nuclear Waste Policy Act of 1982, as amended; and with the Presidential finding in March 2015 that "the development of a repository for the disposal of high-level radioactive waste resulting from atomic energy defense activities only is required".**

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

References

- DOE *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,* January 2013.
  - http://energy.gov/sites/prod/files/Strategy%20for%20the%20Management%20and%20Disposal%20of%20Used%20Nuclear%20Fuel%20and%20High%20Level%20Radioactive%20Waste.pdf
- Sandia National Laboratories, *Evaluation of Options for Permanent Geologic Disposal of Spent Nuclear Fuel and High-Level Waste in support of a Comprehensive National Fuel Cycle Strategy*, April 2014.
  - http://www.energy.gov/ne/downloads/evaluation-options-permanent-geologic-disposal-spent-nuclearfuel-and-high-level
- DOE Report, *Assessment of Disposal Options for DOE-Managed High-Level Radioactive Waste and Spent Nuclear Fuel,* October 2014.
  - http://energy.gov/sites/prod/files/2014/10/f18/DOE_Options_Assessment.pdf
- DOE *Report on Separate Disposal of Defense High-Level Radioactive Waste,* March 2015.
  - http://www.energy.gov/ne/downloads/report-separate-disposal-defense-high-level-radioactive-waste

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

How Can Individuals Get Involved?