Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste

Christopher Hanson

Senior Policy Advisor
Office of Nuclear Energy
U.S. Department of Energy

Washington, DC
June 4, 2013

2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.

3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.

4. Prompt efforts to develop one or more geologic disposal facilities.

5. Prompt efforts to develop one or more consolidated storage facilities.

6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.

7. Support for continued U.S. innovation in nuclear energy technology and for workforce development.

8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.
Summary of the Administration’s UNF and HLW Strategy

- Statement of Administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste
- Response to the final report and recommendations made by the *Blue Ribbon Commission on America’s Nuclear Future*
- Initial basis for discussions among the Administration, Congress and other stakeholders
- 10-year program of work that:
  - Sites, designs, licenses, constructs and begins operations of a pilot interim storage facility
  - Advances toward the siting and licensing of a larger interim storage facility
  - Makes demonstrable progress on the siting and characterization of geologic repository sites
Key Strategy Elements

**System Design**
- Pilot interim storage facility
- Consolidated interim storage facility
- Geologic repository
- Transportation system designed, regulated, and executed for safe and secure interstate shipping

**Consent-based Facilities Siting**
- Agreement at multiple jurisdictional levels
- Open and transparent communication of benefits and risks
- Mutually agreed upon off-ramps

**Governance & Funding**
- A new organization, empowered with the authority to succeed
- Timely access to sufficient funding
- Fees collected; applied to their intended purpose
Interim Storage Facilities

- **Facilities sited using consent-based process and licensed by the Nuclear Regulatory Commission**

- **Pilot-scale interim storage facility**
  - Focused on servicing shutdown reactors
  - Operational in 2021

- **Consolidated interim storage facility**
  - Larger capacity to provide system flexibility
  - Operational in 2025

- **Facilities could service environmental cleanup and defense sites**
Geologic Disposal and Transportation

- **Geologic Repository**
  - Sited using consent-based process by 2026
  - Designed and licensed by 2042
  - Operational in 2048

- **Transportation**
  - Build on experience in industry and with WIPP
  - Capability to service facilities safely and securely
  - Ongoing planning activities provide foundation for implementation

**One of each facility for now, possible additions based on consent-based process**
Consent-based Process and New Organization

**Consent-based process**
- Host jurisdictions to be recognized as partners
- Consent required at multiple levels
- Public trust and confidence necessary for success
- Defining process and terms is critical initial step

**New Organization**
- Multiple workable models
- RAND study looked at independent government agency and government corporation models
- Critical attributes: accountable, autonomous, mission-oriented, stable
- No specific model endorsed at this time
Funding Reform

■ Ongoing appropriations
  • Ongoing role for Appropriations Committees with funds from the General Fund
  • Could fund specific activities – e.g., management, personnel, regulatory development activities
  • Could meet obligation to fund disposal of government UNF and HLW

■ Reclassification of fee income or spending
  • Needed to support:
    — interim storage facility development and operations
    — repository siting and licensing
  • Could move fee income to discretionary or move spending to mandatory
  • Annual amounts limited by incoming fees (~$750M/year)

■ Access to “corpus” of the Nuclear Waste Fund
  • Needed for construction of repository
  • Could be tied to specific milestones or performance triggers
Conclusion: Legislation Needed for Implementation

- Active engagement in a broad, national, consent-based process to site storage and disposal facilities
- Siting, design, licensing, and commencement of operations at a pilot-scale storage facility
- Significant progress on siting and licensing of a larger consolidated interim storage facility
- Development of transportation capabilities to begin movement of fuel from shut-down reactors
- Reformation of the funding arrangements
- Establishment of a new organization to run this program
The program is a very long term, flexible, multi-faceted approach to dispose of the nation’s commercial and defense waste. The estimated programmatic cost of this effort over its first 10 years is $5.6 billion including:

- construction and operation of a pilot interim waste storage facility
- progress on both full-scale interim storage and long-term permanent geologic disposal

**Proposed funding will consist of:**

- Ongoing discretionary appropriations of up to $200M beginning in 2014 and continue for the duration of the waste management mission
- Mandatory appropriations from the fee collections and balance of the Nuclear Waste Fund in addition to the discretionary funding provided annually beginning in 2017 to fund the balance of the annual program costs

**Other Strategy Elements in President’s Budget**

- funding and authority for EPA to begin the revision of generic (non-site specific) disposal standards to help guide the siting of used fuel and high-level waste facilities
The President’s FY 2014 Budget includes $60M for Strategy Implementation Activities

**Research and Development: $30M**

- R&D to support extended storage of used fuel
- R&D on alternative disposal environments (modeling, evaluation and experiments)
- Implement field tests to advance salt repository science for disposal of heat-generating waste
- Borehole Research: Undertake R&D as necessary to further the understanding of hydro-geochemical, physical geology, structural geology, geophysical state and engineering properties of deep crystalline rocks
- Increase involvement with international organizations to leverage existing international knowledge
- R&D to support transportation of extended storage fuel: field testing to assess realistic loadings during transport

**High-Level Waste Management and Disposal System Design Activities: $30M**

- Continue developing plans for a consent-based siting process
- Complete an analysis for initial used fuel shipments from shutdown reactor sites
- Continue the conceptual design for a generic storage facility and supporting transportation system
- Conduct system architecture and operating evaluations of various used fuel management systems
- Continue the evaluation of standardized containers for storage, transportation, and potentially disposal
- Continue to work cooperatively with the state regional groups on transportation issues
- Update the National Transportation Plan to address initial shipments from shutdown reactors to a generic consolidated storage facility
Disposal Research & Development

- Increase analysis capabilities of geologic media that were not looked at since the decision to focus on Yucca Mountain.

- Goal is to determine there is a technical basis for disposal in the U.S. in these different geologic settings and will provide confidence in future decisions.
Disposal Research & Development (cont’d)

- Conduct field work relevant to repositories in salt.
- Develop an R&D plan and roadmap for taking the borehole disposal concept to the point of a demonstration.
- Conduct R&D on the direct disposal of existing dual purpose (storage and transportation) canisters.
Objective
Prepare for the eventual large-scale transport of spent nuclear fuel and high level waste

Develop the technical basis for:
• Fuel retrievability and transportation after extended storage
• Transportation of high burn-up used nuclear fuel
Objective:
Ensure the implementation of a staged, adaptive, collaborative transportation process for UNF and HLW

- Prepare planning report for shipping stranded fuel from shutdown sites to a consolidated interim storage facility
- Publish revised NWPA 180(c) policy regarding financial and technical assistance to states along transportation routes for SNF
- Develop communication products
- Develop draft National Transportation Plan
- Identify preliminary routes for shipments from shutdown sites
Objective:
Begin laying the ground work for implementing consolidated storage

- Build on previous DOE work and industry storage licensing efforts
  - Evaluation of design concepts for consolidated storage
  - Conduct system analyses on operational strategies
  - Develop communication packages which describe various attributes of a consolidated storage facility for use in interaction with potential host communities
- Initiate development of consent-based siting process
- Evaluate system benefits of standardized packaging
Ongoing Litigation

- Mandamus
  - Suit filed to compel NRC to continue review of the Yucca Mountain license application
  - Court had delayed action pending Congressional direction on funding in 2012
  - Further guidance from the Court expected soon

- Waste Fee
  - Utilities and regulatory utility commissioners filed suit to halt collection of the 1 mill per kilowatt-hour fee
  - Court vacated previous DOE analysis justifying continued collection
  - DOE submitted an updated analysis in January 2013
  - Awaiting Court action (expected Fall 2013)

- Standard Contract
  - Partial breach of contract for government’s failure to take used fuel from utilities starting in 1998
  - Of 84 complaints filed, 19 remain open
  - $2.6 billion paid to date
Senators Wyden, Murkowski, Feinstein, and Alexander released a discussion draft of comprehensive nuclear waste legislation – Nuclear Waste Administration Act of 2013

- Establishes a new organization – Nuclear Waste Administration – run by a single Administrator and overseen by an Oversight Board
- Addresses funding reform by creating a new Working Capital Fund in which fees are deposited and are available as needed
- Establishes a siting process for storage and repository facilities that relies on consent agreements and Congressional ratification

Path to passage is difficult to predict

- Court cases still pending
- Some factions in Congress ready to “move on” from Yucca Mountain, while others not