Nuclear Waste Policy: Alternatives to Yucca Mountain
Mark Holt
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Agenda

• Redirection of U.S. nuclear waste policy
• Waste program under current law
• Policy change options and consequences
• Search for new waste sites: Lessons from past approaches
Redirection of U.S. nuclear waste policy
Redirected Waste Policy

- Obama-Biden Campaign called Yucca Mountain not a “suitable site”
- FY2010 DOE budget would “terminate the Yucca Mountain program while developing nuclear waste disposal alternatives”
- Budget continues DOE and NRC funding for Yucca Mountain licensing process
- Congress may fully address policy change for the first time during FY2010 budget debate
## Repository program funding by subprogram ($thousands)

<table>
<thead>
<tr>
<th>Repository Program</th>
<th>FY 2008 Appropriation</th>
<th>FY 2009 Appropriation</th>
<th>FY 2010 Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repository Project</td>
<td>271,913</td>
<td>183,252</td>
<td>116,100</td>
</tr>
<tr>
<td>Transportation</td>
<td>18,300</td>
<td>2,100</td>
<td>–</td>
</tr>
<tr>
<td>Program Management &amp; Integration</td>
<td>26,412</td>
<td>26,200</td>
<td>10,700</td>
</tr>
<tr>
<td>Congressionally Directed Projects</td>
<td>1,600</td>
<td>1,855</td>
<td>–</td>
</tr>
<tr>
<td><strong>Subtotal, Repository Program</strong></td>
<td><strong>318,225</strong></td>
<td><strong>213,407</strong></td>
<td><strong>126,800</strong></td>
</tr>
<tr>
<td><strong>Program Direction</strong></td>
<td><strong>68,215</strong></td>
<td><strong>74,983</strong></td>
<td><strong>70,000</strong></td>
</tr>
<tr>
<td><strong>Total, Repository Program</strong></td>
<td><strong>386,440</strong></td>
<td><strong>288,390</strong></td>
<td><strong>196,800</strong></td>
</tr>
</tbody>
</table>

**Source:** Budget Request. DOE (2010). Adapted by CRS.
Considerations for Congressional Debate

- Parameters for new repository site search
- Potential for indefinite on-site storage
- Implications for new reactor licensing
- Sites for centralized interim storage
- Waste treatment technology options
- Federal liability under waste disposal contracts
Waste program under current law
Baseline Program Projections

- Waste shipments to begin in 2020
- Commercial on-site storage peaks at 85,000 metric tons in 2023
- All commercial and defense waste emplaced by 2066 (if Yucca Mountain limit is lifted)
- Annual funding would rise to $2 billion during repository construction
- Total cost of $96 billion through 2133
- No alternatives to Yucca Mountain under current law
Annual cost profile (\$millions)

Policy change options and consequences
Administrative Options for Implementing Policy Change

- Withdraw license application
- Find Yucca Mountain unsuitable
- Reduce waste program funding
- Appointments to policymaking positions
- Broad review of waste management options
Consequences of Halting Yucca Mountain

- Further delays in baseline program (which envisions on-site storage through 2066)
- Nuclear waste contract repudiation and federal liabilities
- DOE disposal contracts and NRC “waste confidence decision” for new reactors
- DOE environmental cleanup penalties
- Long-term waste storage risk
DOE estimate of waste delay liabilities

Source: Yucca Mountain Program Status Update. DOE (2008). Adapted by CRS.
Alternatives to Yucca Mountain

• NWPA names Yucca Mountain as sole candidate site
• Federal central interim storage facility tied to Yucca Mountain progress
• Without congressional action, on-site storage and private facilities are main options
• New law would be needed for major redirection
Institutional Change

- Government corporation or independent agency
- Private-sector organization
  - Need for new funding mechanism
  - Ability to take permanent title to waste
- Increased oversight
Federal corporation business relationships

Extended On-Site Storage

- All options likely to result in longer on-site storage than baseline program
- Compensate utilities for storage costs
- Federal government takes title to on-site waste and storage facilities
- Use of Waste Fund for on-site storage
Federal Central Interim Storage

- Monitored Retrievable Storage is only federal central storage currently authorized
  - Oak Ridge selection overturned by Congress in 1987
  - MRS now tied to Yucca Mountain progress
  - Limited to 15,000 tons
- Voluntary site selection program cut short by Congress in 1993
- Storage at Yucca Mountain passed by Congress but vetoed in mid-1990s
- Storage at federal sites proposed since 2005 but not enacted
Private Central Storage

- NRC routinely licenses on-site storage facilities
- PFS facility in Utah
  - Licensed by NRC after 9 years
  - Operation blocked by administrative rulings
- Private facility limitations
  - Storage volume
  - Time period
  - Ownership of stored waste
Waste Treatment Technology

- Alternatives to direct disposal of spent fuel
- Spent fuel reprocessing/recycling could reduce waste volume and long-term heat and radioactivity
- Spent fuel could be stored at reprocessing sites
  - Congress rejected shipments to foreign reprocessing plants in 1992
- Industry studies for Global Nuclear Energy Partnership described alternative concepts for implementation
- Major obstacles still continue:
  - Spent fuel treatment projected to increase costs
  - Concerns about weapons proliferation
- Implementation to take many decades
General Atomics proposal, before 2100

General Atomics proposal, after 2100

Obama to Continue Fuel Cycle R&D

- DOE requests $192 million for FY2010
- Program targeted at waste treatment
  - Improve waste storage and disposal options
  - Promote safe and secure management of nuclear waste
  - Minimize proliferation risk of civilian nuclear fuel cycle
  - Reduce time-scale for managing waste from hundreds of thousands of years to centuries
Non-Repository Options

- Subseabed
  - U.S. participated in international studies
  - Prohibited under London Dumping Convention
- Outer space
- Deep boreholes
- Ice sheets
- Volcanoes
Search for new waste sites:
Lessons from past approaches
New Repository Site Search

- Needed eventually if non-repository options not chosen
- Past site searches have faced strong opposition
- Yucca Mountain selection reduced congressional opposition
- New search would reopen consideration of candidate sites throughout the country
Site Search Under NWPA

- Concept: Technically driven process that would be considered fair by selected site
- Two repositories envisioned in East and West
- First repository chosen from previous candidate sites
- Second repository based on broad screening of crystalline rock
Proposed potentially acceptable sites and candidate areas for second repository

Figure 4. Proposed Potentially Acceptable Sites and Candidate Areas for the Second Repository

Explanation
- ● Proposed Potentially Acceptable Sites (12)
- ○ Candidate Areas (8)
Potential Hosts Criticize Program

- Methodology for ranking candidates for first repository attacked
- DOE cancellation of second repository angers western states
- Tennessee opposes MRS site choice
- Opposition threatens to paralyze program after only five years
"We created a principled process for finding the safest, most sensible place to bury these dangerous wastes."

"Today, just 5 years later, this great program is in ruins."

Potential host states “no longer trust the technical integrity of the Department of Energy’s siting decisions.”

Statement on the House floor, December 21, 1987
NWPA Amendments of 1987

- Named Yucca Mountain as sole repository candidate site
- Eliminated second repository program
- Tied MRS operation to Yucca Mountain progress
- Offered benefits to host states
- Established Nuclear Waste Negotiator to find voluntary sites
- Established Nuclear Waste Technical Review Board to increase confidence in DOE program
Site Selection Approaches that Have Been Tried

- Administrative process under the Atomic Energy Commission
- DOE selection of MRS site
- Site ranking process for first repository
- Screening process for second repository
- Benefits agreement for hosts
- Negotiations for voluntary sites
- Congressional designation of site
- None have yet succeeded in developing high-level waste facilities
Repository in Operation: Waste Isolation Pilot Plant

- Bedded salt site volunteered by Carlsbad, NM, for economic development
- Proposed for high-level waste but switched to transuranic waste
- Congress authorized in 1979 but received first waste in 1999
- Some local support for high-level waste but state officials strongly oppose

Source: DUSEL at Carlsbad, NM WIPP Site
Concluding Comments

- Long-term repository site studies involve scientific uncertainty that may increase public concern
- Difficulty of siting is likely to mean longer on-site storage without Yucca Mountain
- Alternative technologies face significant obstacles
- No legal framework for selecting new sites or new disposal policy
- Upcoming congressional debate will be watched closely
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