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Nuclear Waste Policy: Alternatives to Yucca Mountain

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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*)

Repository Program	FY 2008 Appropriation	FY 2009 Appropriation	FY 2010 Request
Repository Project	271,913	183,252	116,100
Transportation	18,300	2,100	--
Program Management & Integration	26,412	26,200	10,700
Congressionally Directed Projects	1,600	1,855	--
Subtotal, Repository Program	318,225	213,407	126,800
Program Direction	68,215	74,983	70,000
Total, Repository Program	386,440	288,390	196,800

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





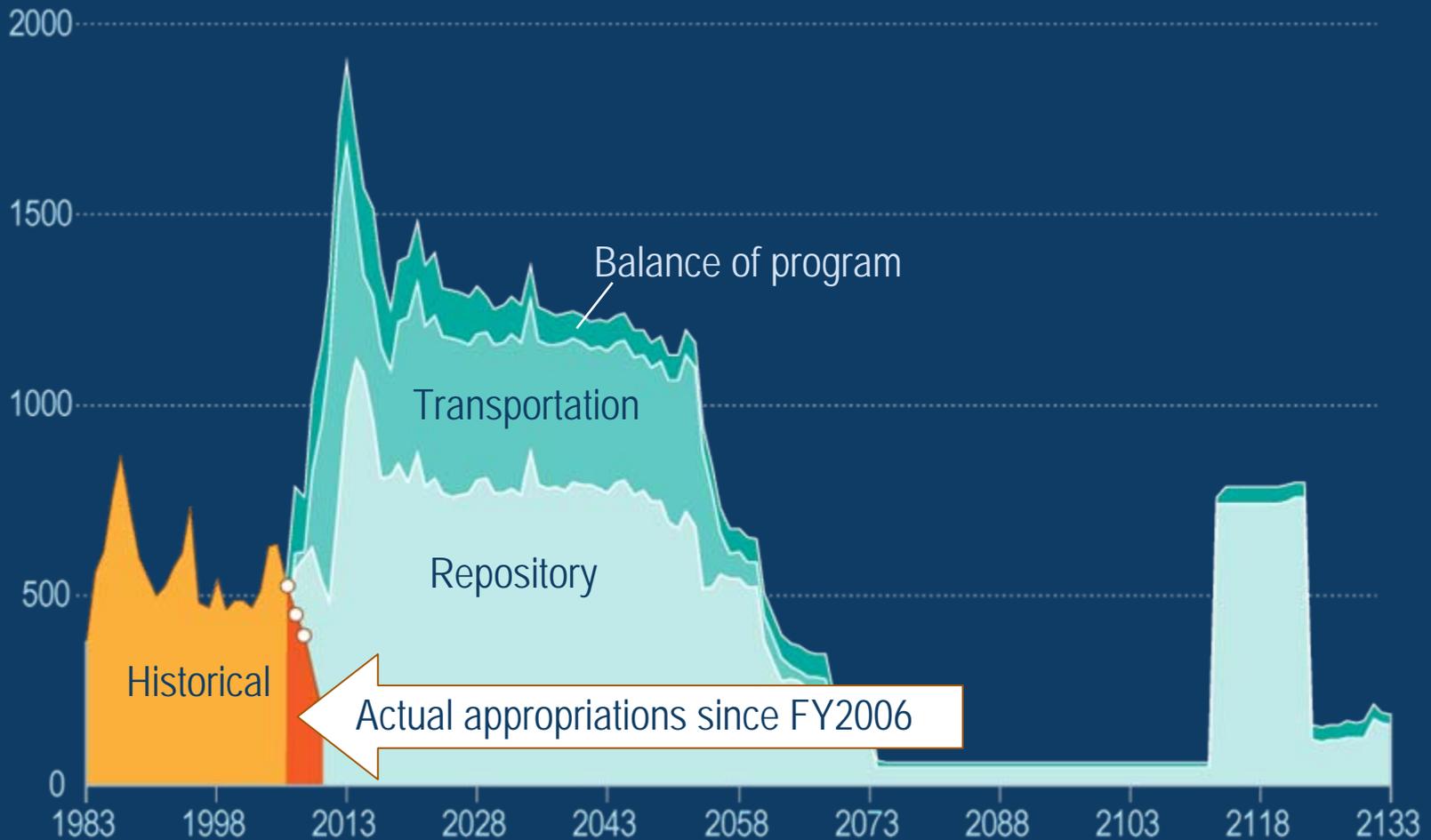
Waste program under current law

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)



Source: Analysis of the Total System Life Cycle Cost of the Civilian Radioactive Waste Management Program, FY2007. DOE (2008). Adapted by CRS.



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

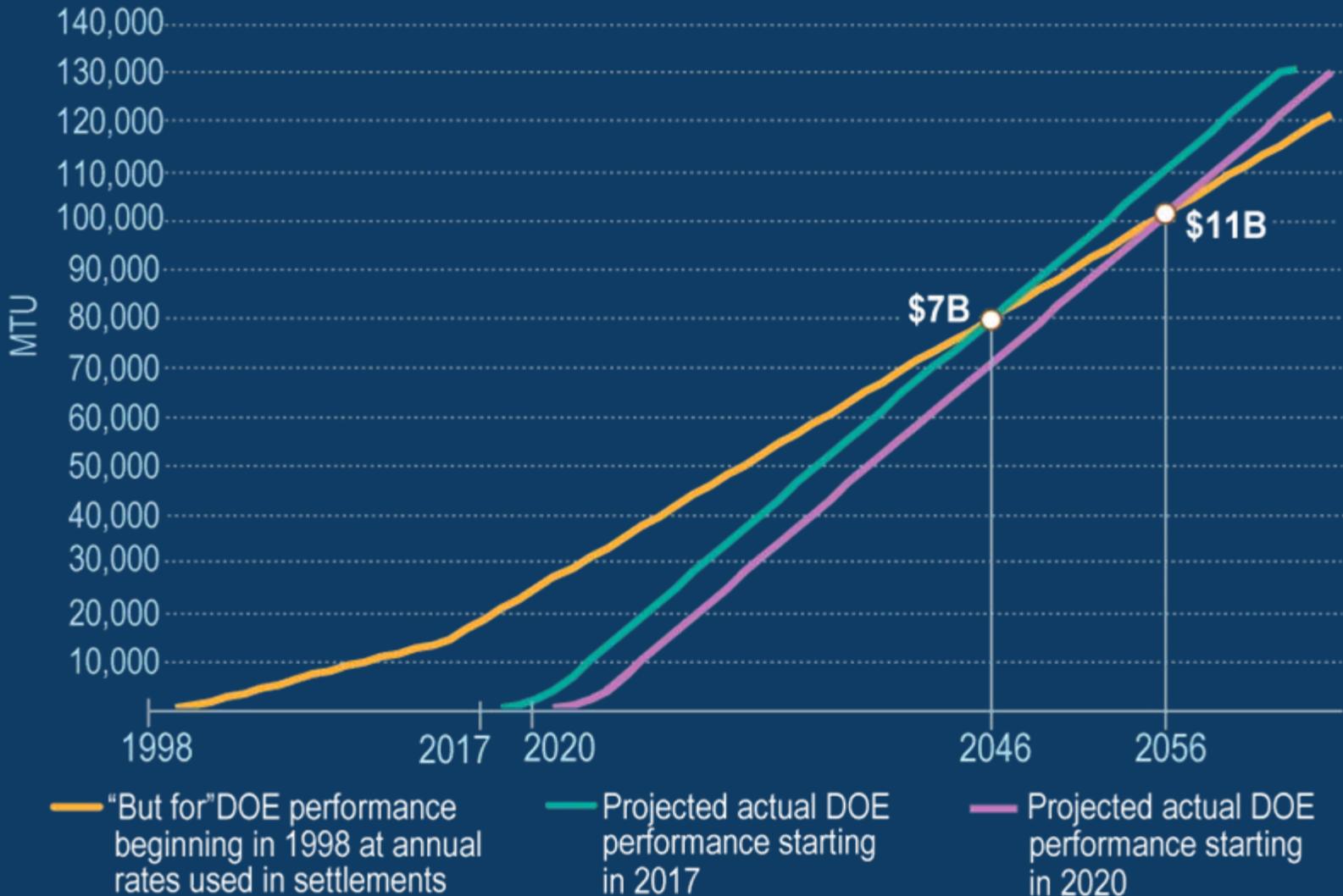


Consequences of Halting Yucca Mountain

- 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



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

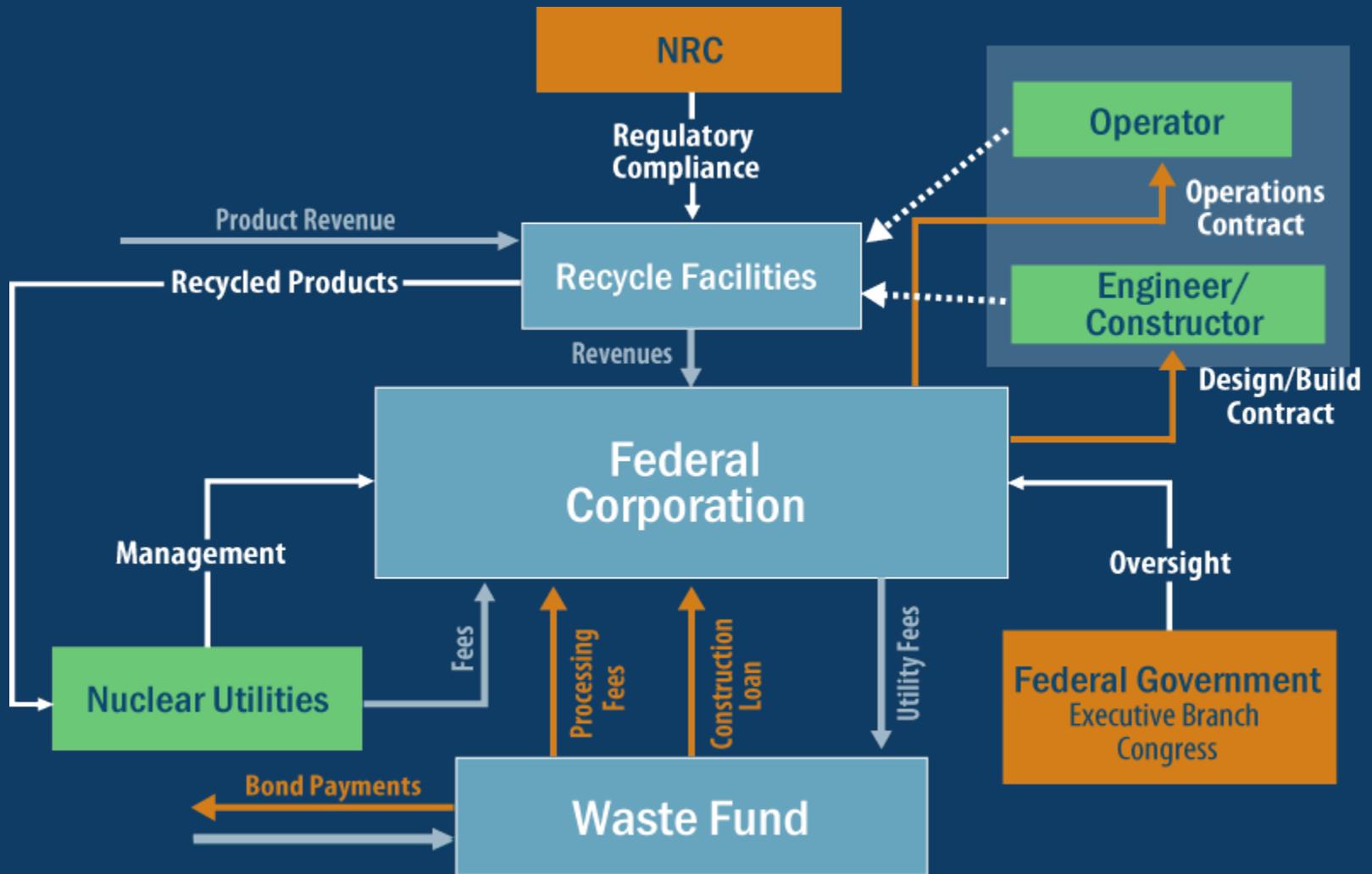


Institutional Change

- 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

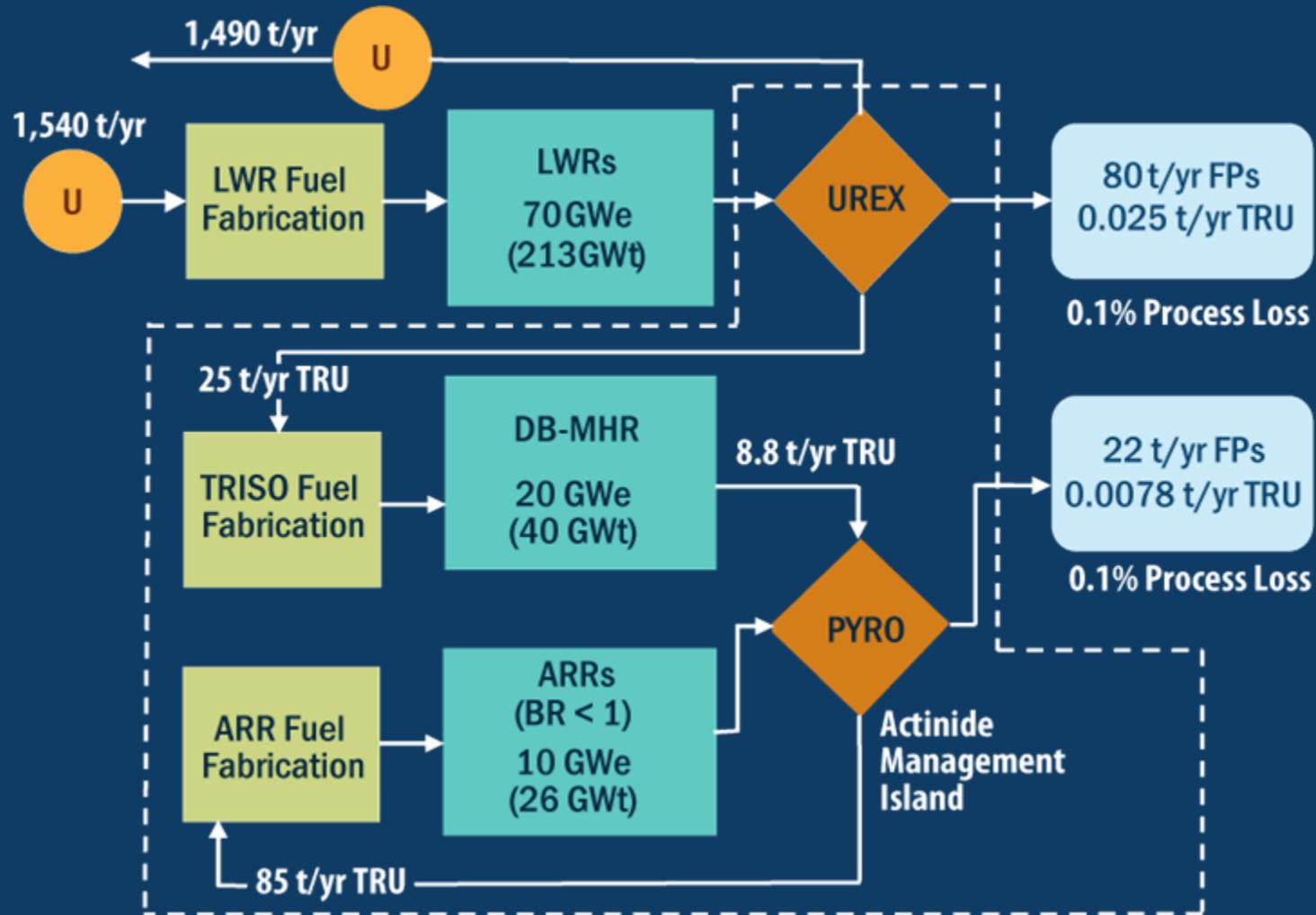


Waste Treatment Technology

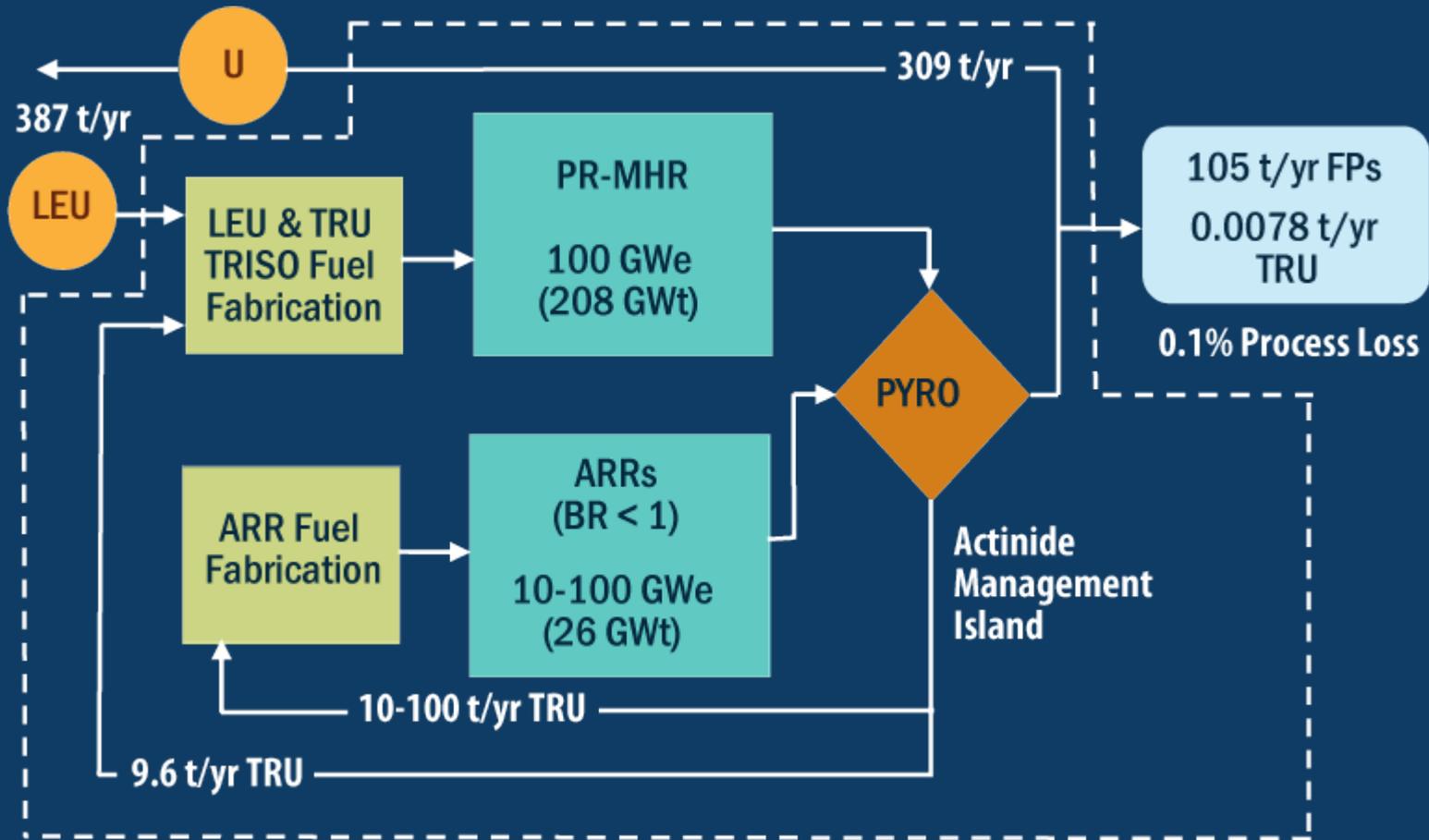
- Alternatives to direct disposal of spent fuel
- Spent fuel reprocessing/recycling could reduce waste volume and long-term heat and radioactivity
- Spent fuel could be stored at reprocessing sites
 - Congress rejected shipments to foreign reprocessing plants in 1992
- Industry studies for Global Nuclear 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

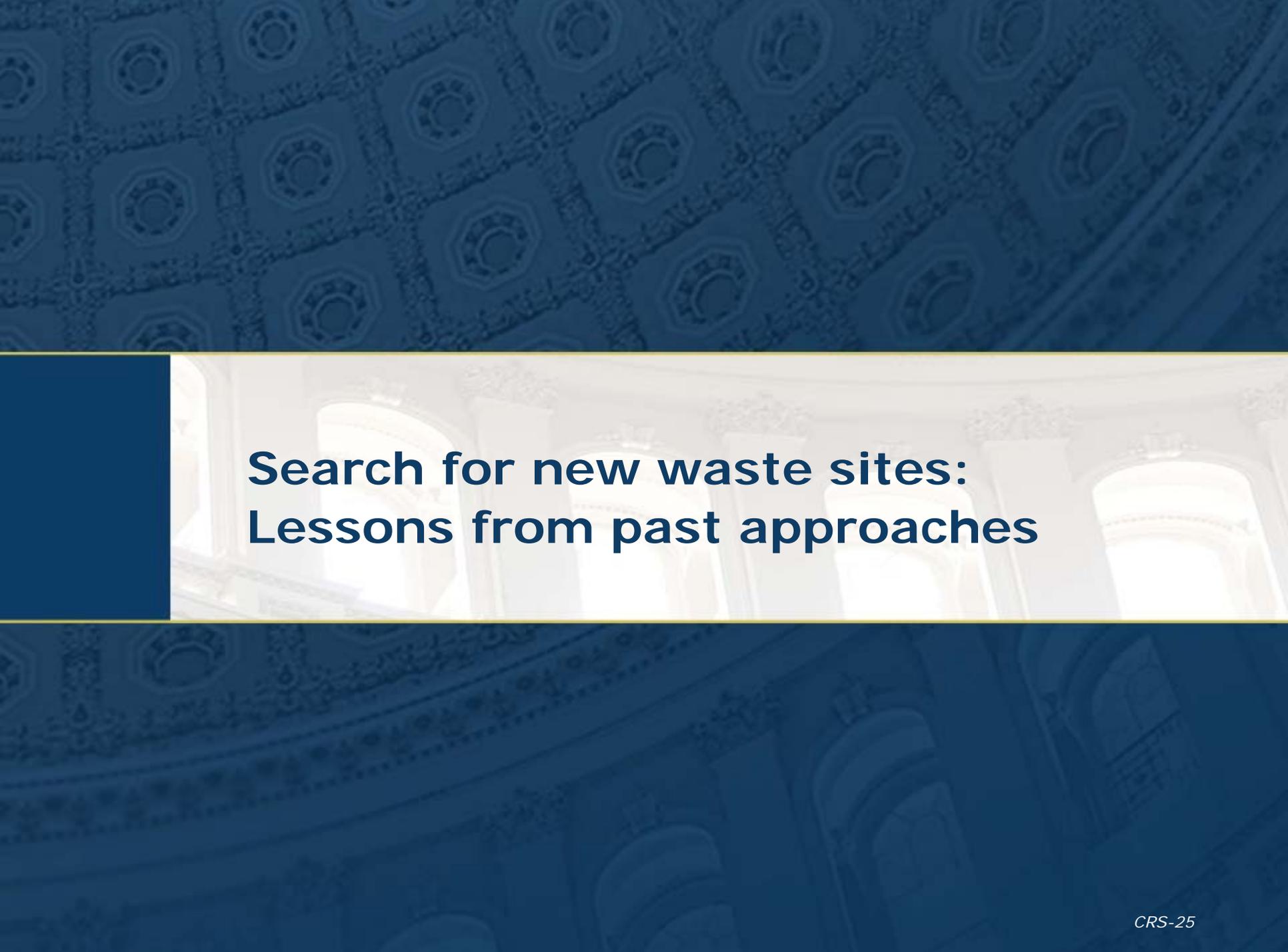
- DOE requests \$192 million for FY2010
- Program targeted at waste treatment
 - Improve waste storage and disposal options
 - Promote safe and secure management of nuclear waste
 - Minimize proliferation risk of civilian nuclear fuel cycle
 - Reduce time-scale for managing waste from hundreds of thousands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

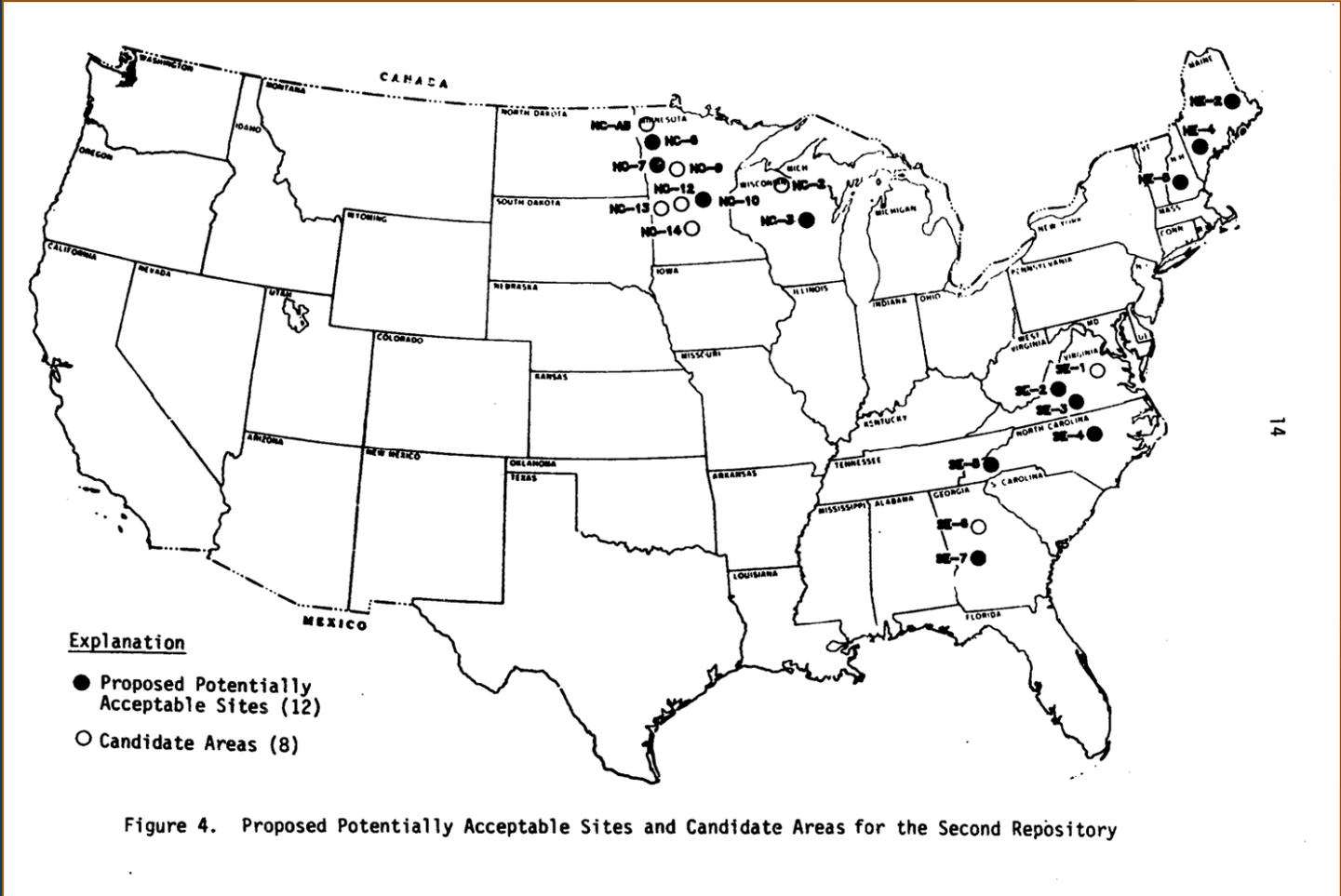
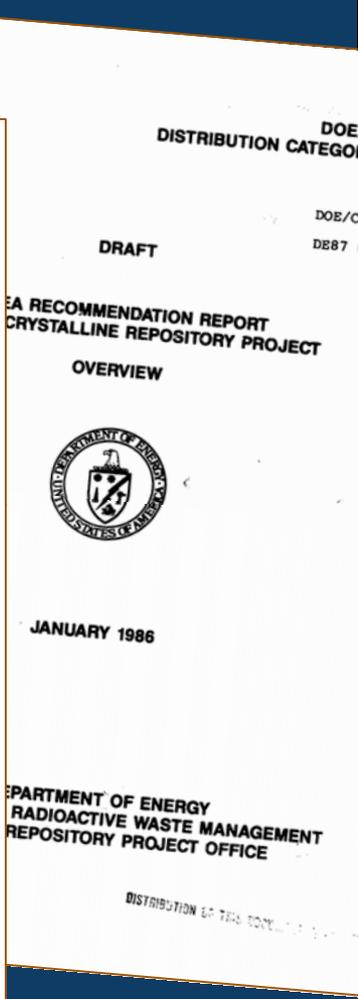


Figure 4. Proposed Potentially Acceptable Sites and Candidate Areas for the Second Repository



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



Summary of Congressional Sentiment by Representative Morris Udall



“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*

Image source: Addresses and Special Orders Held in the U.S. House of Representatives and the Senate, Presented in Honor of The Honorable Morris K. “Mo” Udall, A Representative from Arizona, One Hundred Second Congress, First Session. Washington, D.C.: U.S. Government Printing Office, 1993.



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



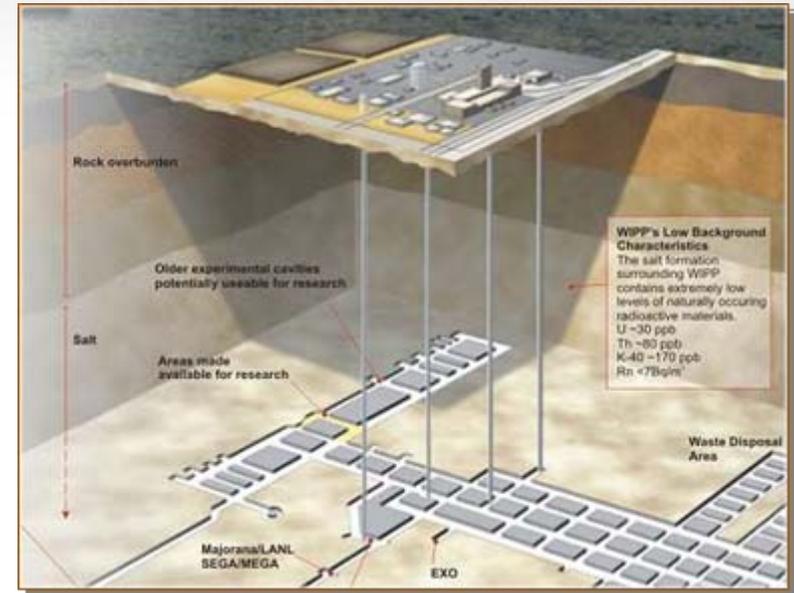
Site Selection Approaches that Have Been Tried

- 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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