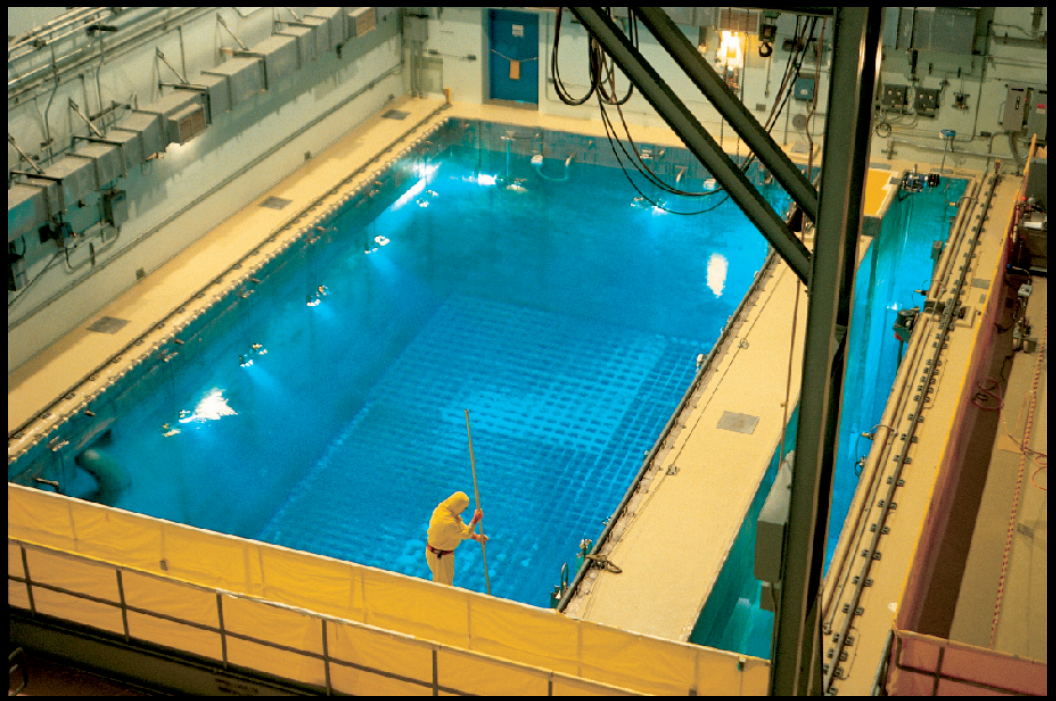
RAND INFRASTRUCTURE, SAFETY, AND ENVIRONMENT

Managing Spent Nuclear Fuel: Strategy Alternatives and Policy Implications



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Presentation based on report available at: http://www.rand.org/pubs/monographs/MG970/

About RAND and This Study

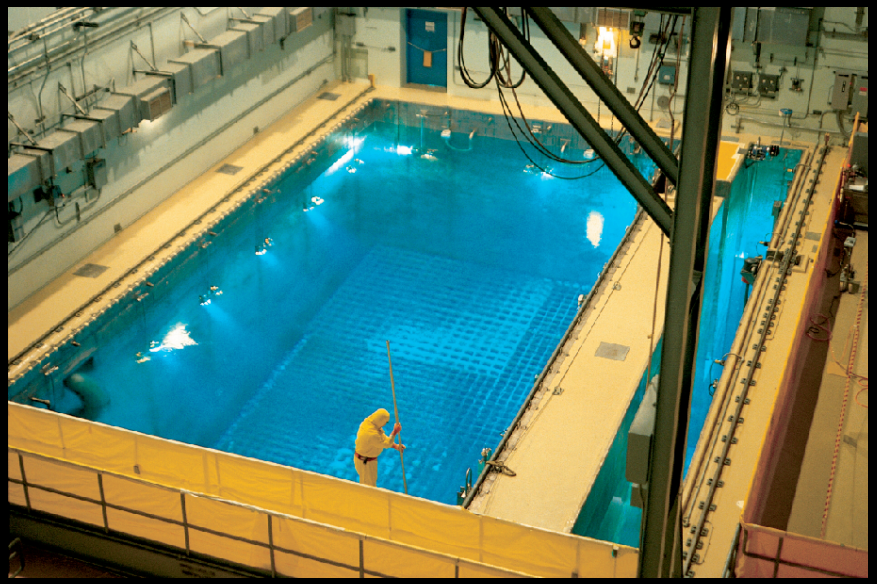
- **The RAND Corporation is a nonprofit institution that helps improve policy and decisionmaking through research and analysis**
- **This study is part of an on-going effort examining alternatives for meeting future energy demands**

We Used Technical and Social Considerations to Distinguish Spent-Fuel Management Strategies

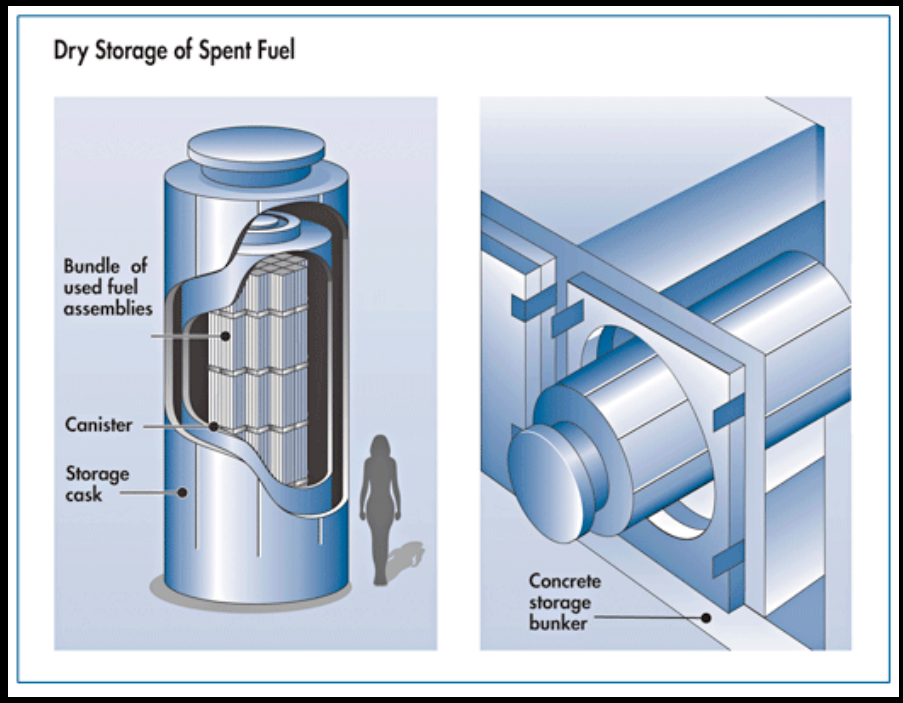
- **What are the opportunities and limitations of different technical approaches to managing spent nuclear fuel?**
- **How has the current institutional framework performed?**
- **To what extent are different spent-fuel management strategies consistent with different societal priorities?**

We Examined Four Technical Approaches for Managing Spent Fuel from Commercial Plants

1. **On-site storage at existing nuclear plant sites**



Storage in Pools

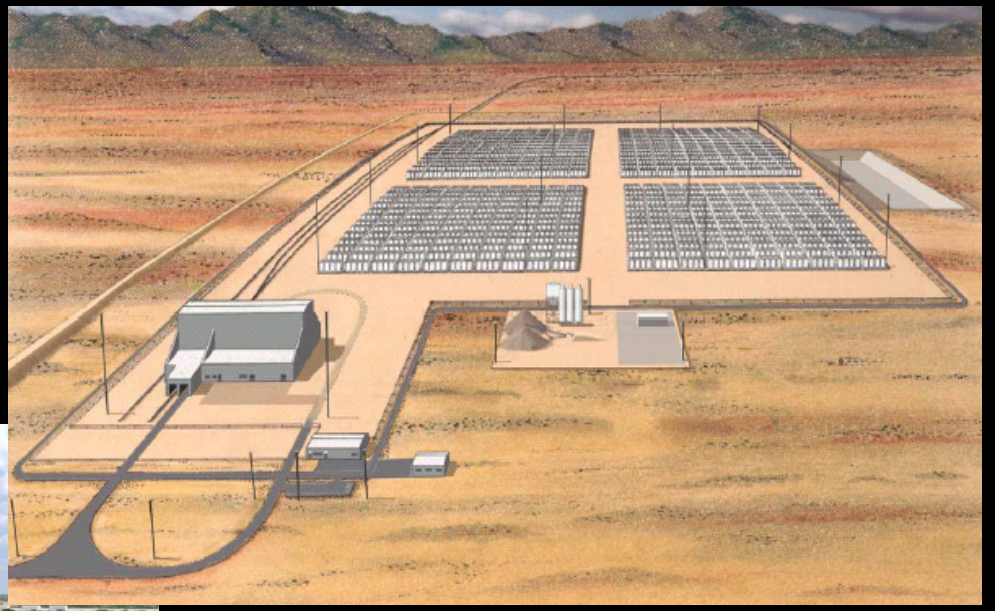


Storage in Dry Casks

We Examined Four Technical Approaches for Managing Spent Fuel from Commercial Plants

1. On-site storage at existing nuclear plant sites

2. **Centralized interim storage**



Possible Storage Arrangement

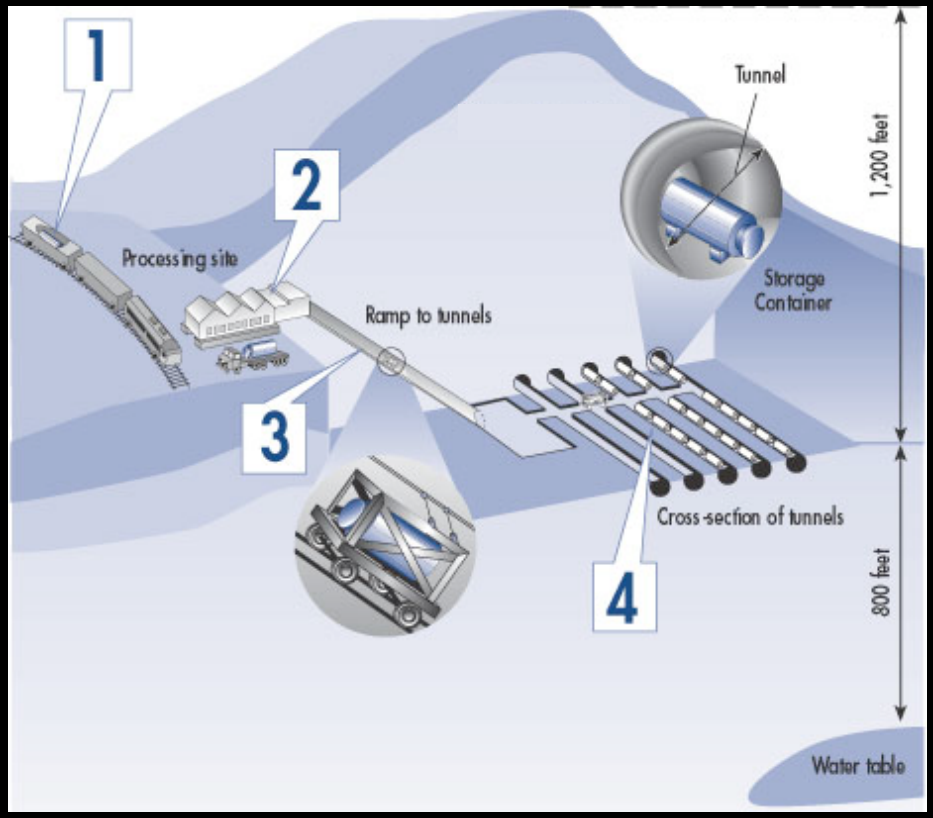
Transportation to Facility

We Examined Four Technical Approaches for Managing Spent Fuel from Commercial Plants

1. On-site storage at existing nuclear plant sites

2. Centralized interim storage

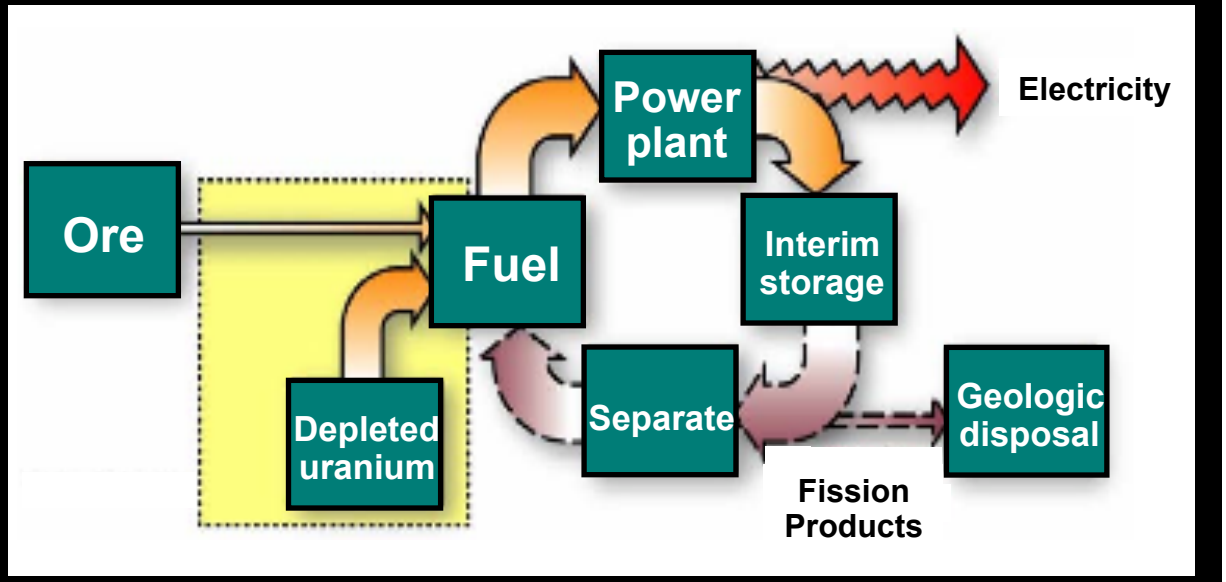
3. **Permanent disposal in a deep geologic repository**



We Examined Four Technical Approaches for Managing Spent Fuel from Commercial Plants

1. On-site storage at existing nuclear plant sites
2. Centralized interim storage
3. Permanent disposal in a deep geologic repository
4. **Advanced fuel cycles**

Advanced Fuel Cycle

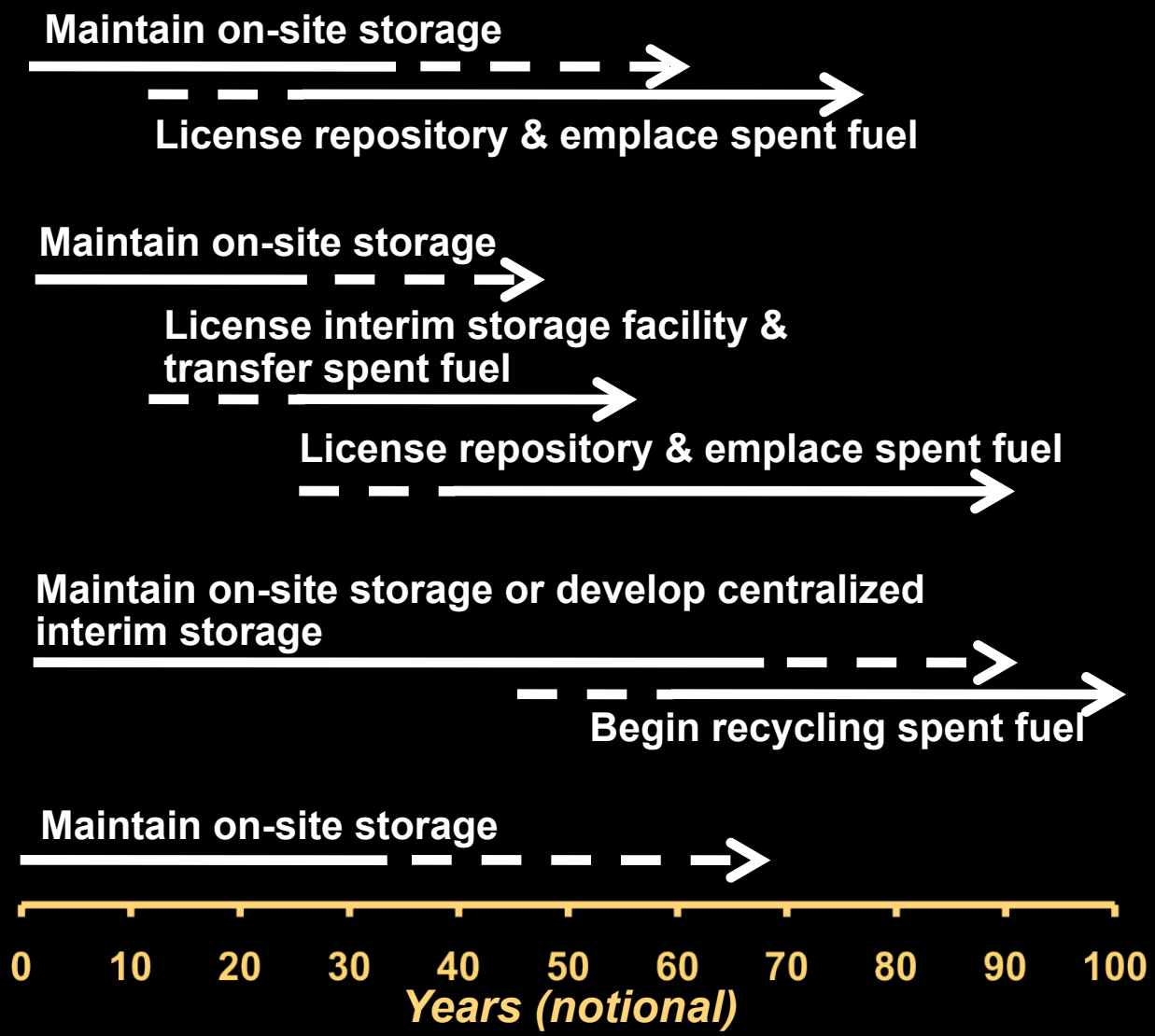


Findings from Analysis of Technical Approaches

- **Dry cask surface storage is feasible, safe, secure, low cost**
  - **May need repackaging**
  - **Not acceptable at decommissioned sites**
- **Technical obstacles to geological repository appear surmountable**
  - **Greater challenge is gaining public acceptance and trust**
- **Advanced fuel cycle technologies have the potential to greatly reduce repository capacity needs and uranium consumption**
  - **Transition would take several decades**
  - **May offer little benefit in terms of reducing a repository's long-term environmental risk**

Four Distinct Strategies Draw from Combinations of Technical Approaches

1. Expeditiously Proceed with Yucca Mountain
2. Develop Centralized Interim Storage in Conjunction with Permanent Geologic Disposal
3. Pursue Advanced Fuel Cycles
4. Maintain Extended On-site Storage



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Strategies Address Different Priorities

Expeditiously Proceed with Yucca Mountain

Solve spent fuel disposal quickly

- ***Generational equity***

Develop Centralized Interim Storage in Conjunction with Permanent Geologic Disposal

Pursue Advanced Fuel Cycles

Maintain Extended On-Site Storage

Strategies Address Different Priorities

Expeditiously Proceed with Yucca Mountain

Develop Centralized Interim Storage in Conjunction with Permanent Geologic Disposal

Pave the way for nuclear power growth

- ***Utilities reluctant to invest***
- ***State moratorium laws***

Pursue Advanced Fuel Cycles

Maintain Extended On-Site Storage

Strategies Address Different Priorities

Expeditiously Proceed with Yucca Mountain

Develop Centralized Interim Storage in Conjunction with Permanent Geologic Disposal

Increase confidence in repository performance and decision consensus

- ***Regain credibility & trust***

Pursue Advanced Fuel Cycles

Maintain Extended On-Site Storage

Strategies Address Different Priorities

Expeditiously Proceed with Yucca Mountain

Develop Centralized Interim Storage in Conjunction with Permanent Geologic Disposal

Decrease demand for repository capacity

- ***If nuclear grows to become dominant electricity source***

Pursue Advanced Fuel Cycles

Maintain Extended On-Site Storage

Strategies Address Different Priorities

Expeditiously Proceed with Yucca Mountain

Develop Centralized Interim Storage in Conjunction with Permanent Geologic Disposal

Wait and see

- ***If current options are too uncertain to warrant moving forward now***

Pursue Advanced Fuel Cycles

Maintain Extended On-Site Storage

Policy Decisions Come Down to Societal Preferences

- **Aggressively pursuing advanced fuel cycles is attractive if constraints on repository capacity or uranium resources are important**
  - **Entails great investment and great uncertainty**
- **Maintaining extended on-site storage ("wait and see") is attractive if current options unacceptable**
  - **May contribute to shrinking of nuclear power**

Policy Decisions Come Down to Societal Preferences

- **Yucca Mountain or centralized storage-geologic disposal is most attractive when we prioritize:**
  - **Facilitating the growth of nuclear power**
  - **Not leaving spent fuel disposal for future generations**
- **Choosing between them hinges on desire to increase confidence in decision consensus**

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