



U.S. Department of Energy  
Office of Civilian Radioactive Waste Management



# Operating Geological Repositories: A Necessity for the Nuclear Renaissance?

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# Geological Disposal: In the beginning

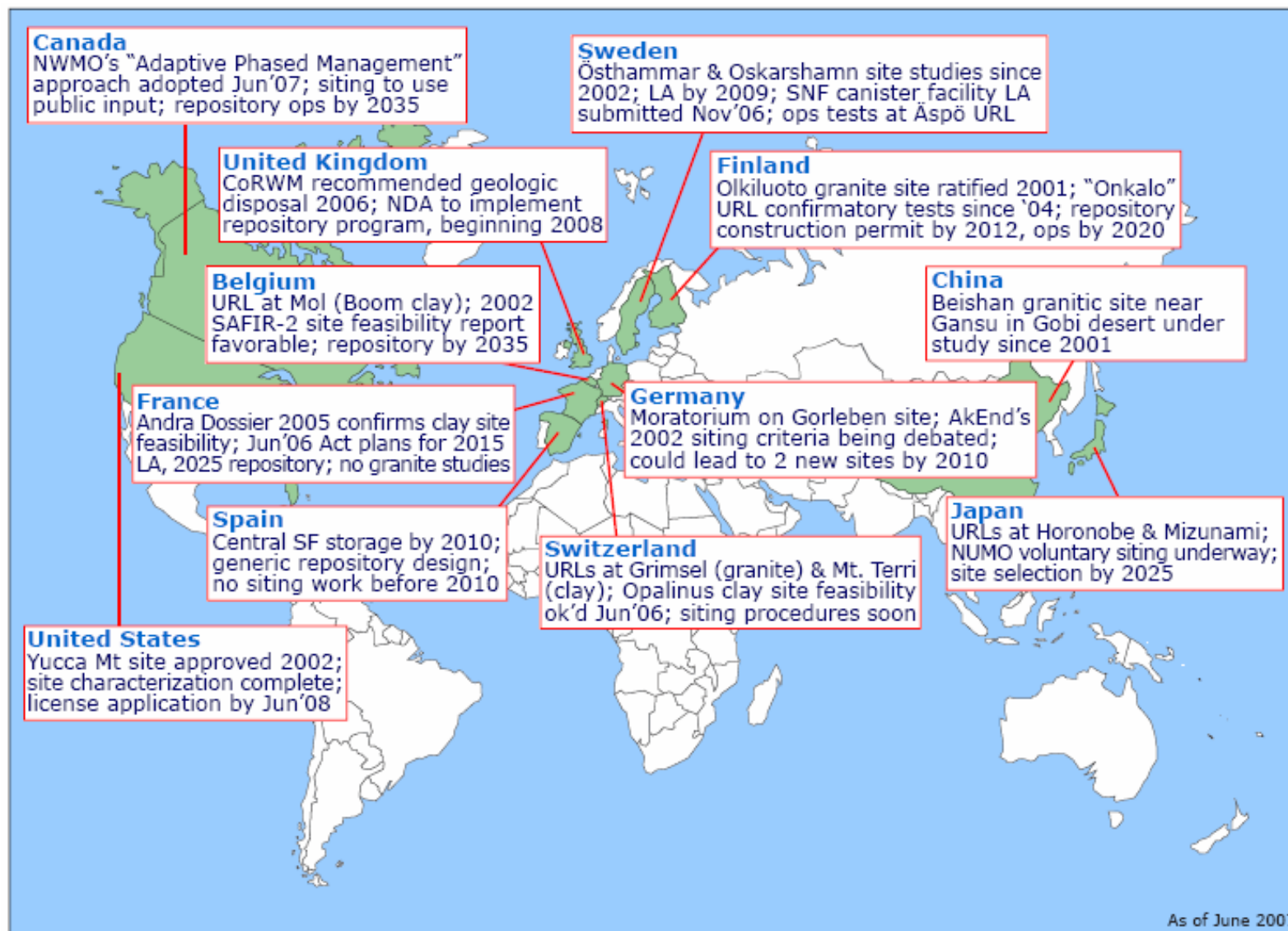
- **1957 National Academy of Sciences Report: “Disposal of Radioactive Waste on Land”**
  - liquid waste forms; no engineered barriers; no retrievability
  - safe disposal in geological repositories is possible
  - strict inspection & required monitoring
  - **safety above cost**

## 50 Years Later...

- Technical Changes; Evolving Understanding
- **Consistency of Ethical Sentiments**



# National Programs



# Issues

- **Safety & Security**

- safeguarding nuclear materials
- radiological releases
- worker exposure
- post-closure & into the future

- **Long Durations**

- timescales foreign to human psyche
- scientific predictions difficult at best
- for the public, **Trusting Predictions** → **Leap of Faith**



# Issues

- **“User Pays”**

- those who **create** waste
- those who **benefit** from nuclear power
- **finance** waste disposal
- evident in existing programs

- **Generational Ethics**

- **GENERATIONS** that benefit responsible for waste
- Create and preserve **OPTIONS** not make decisions
- **FINAL DECISIONS** made by future generations



# Issues

- **Environmental Accountability**
  - Global Warming & Environmental Impacts
  - Environmental questions for **ANY** 21<sup>st</sup> century industrial activity
  - Nuclear renaissance to account for environmental impacts
  
- **Public Opinion**
  - building **confidence** & gaining **support**
  - technical solutions not sufficient
  - public support does not **guarantee success**, but lack of it can **ensure failure**



# What Now?

- Waste management programs worldwide are realizing **technical know-how alone is not enough**
- Increasing development in non-technical areas of repository development
- No conclusive answers; No universal approaches
- Growing appreciation for types of approaches that **broaden acceptance** and **increase confidence** in repository programs



# Tell the Story: A Safety Case

- A well-told story
- **How** and **Why** repository **protects health & safety** for the long-term
- Clearly identified, **strict safety goals**
- Shows how **engineered & natural barriers** work **together** to meet or **exceed** safety goals
- Matures with repository design



# Flexibility & Public Involvement

## Public Concerns:

- Lack of public involvement in decisions
- Accepting final disposal concept → relinquishing control

## Steps Toward Inclusiveness:

- Maintain Flexibility
- Involve Stakeholders in Decisions
- Increased Cost vs Increased Stability

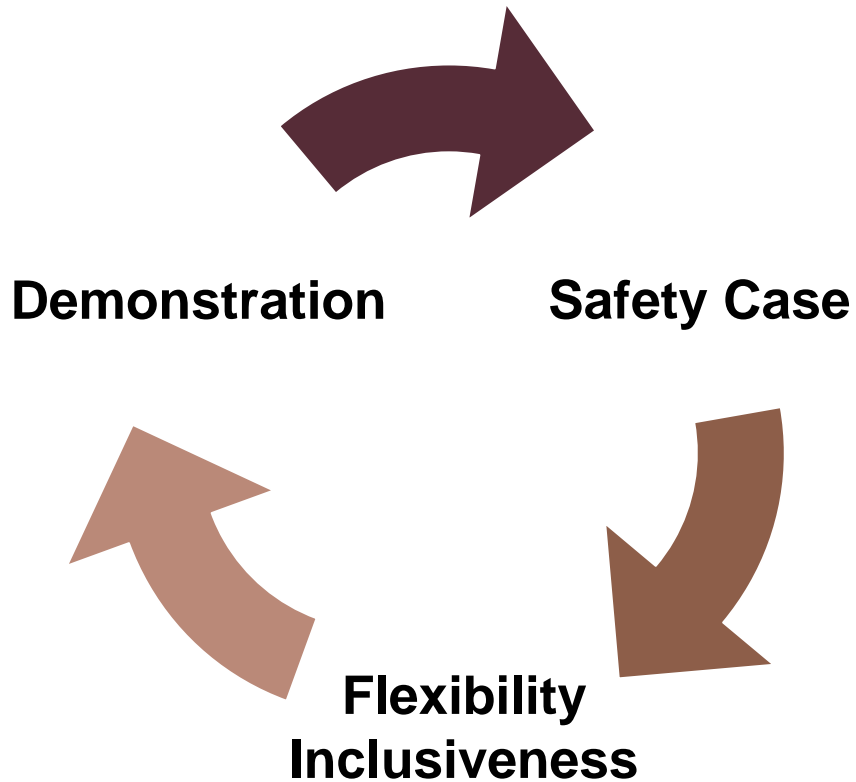


# Proving the Concept: Demonstration

- Prototype & Process Testing → Part of the Plan
- Demonstration → Confirms Expectations → Solidifies Support
- Confirms Validity of Safety Case
- Assurance Public Trust Well Placed



# Closing the Loop



- Tell the **safety story** with the **Safety Case**
- Build **Trust & Respect** though **Flexibility & Inclusiveness**
- **Confirm Expectations & Promises** through successful **demonstration of performance**



# Definitive Solutions vs. Evolving Processes

- **Definitive Solutions Not Essential**
- **Successful Repositories → Evolving Processes**
  - Safety case
  - Inclusive processes, discussions, decisions
  - Successful demonstration of concepts & designs
- **Relieving Public Fears & Concerns through Process**



# Conclusions: What is Different?

- Same Issues; New Environment
- Global Warming, Energy Shortages, Terrorism, Public Trust
- Safety Cases, Openness, Demonstration → Perceiving technical, social, political interactions differently
- Successful repository **Programs** leading **Toward** operating repositories → **Affirmative Answer** to the “waste” question

