CLOSING THE NUCLEAR FUEL CYCLE

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INTRODUCTION

• Very little energy is used in a single pass of a nuclear cycle

• No permanent waste solution

• No regulations to follow for recycling
1954 – AEC allows nuclear recycling with license

1977 – President Carter implements nuclear recycling ban.

1982 – President Reagan lifts recycling ban. NWPA passed.

1987 – NWPA amended. Instates NWTRB and designates Yucca Mountain

1993 – President Clinton states the US will not engage in any Pu separations processes (including recycling)

2001 – President Bush supports international collaboration on recycling and fuel treatment research

2009 – President Obama ends groundwork for commercial recycling facilities. Yucca Mountain closed and defunded.
ONCE THROUGH CYCLE

- Fuel used once
  - Untapped energy
- Stored in spent fuel pool
- Moved to dry cask storage
- Permanent storage
### SINGLE PASS RECYCLE

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<td>• UNF undergoes chemical separation and fabrication</td>
<td>• Proliferation</td>
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<td>• Used a second time in fuel</td>
<td>• Regulation</td>
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<td>• Disposed to repository</td>
<td>• No existing Repository</td>
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## MULTI-RECYCLE

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<th>PROCESS</th>
<th>CHALLENGES</th>
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| • UNF undergoes chemical separation and fabrication  
  • Transmutation                           | • Proliferation                   |
| • Reused                                      | • Regulation                       |
| • Cooled                                      | • No existing repository            |
| • Repeat as long as possible                  | • Expensive                        |
| • Disposed to repository                      | • Untested                         |
|                                              | • Creates more LLW                  |
CHALLENGES

• Deep Geologic Repository necessary
• Public perception
• Policy for licensing does not exist
  • Chemical separation
  • Recycling
• Economics
• Transportation Infrastructure
RECOMMENDATION

• Continue to use once-through fuel cycle as a national policy, but prepare for recycling

• Make progress on repository

• Goal: Multi-recycle and transmute, then dispose.
ACTIONS

• Amend NWPA
  • NWTRB review all back-of-fuel-cycle operations
  • Create new agency

• Consent-Based Citing

• DOE continue funding recycling research
  • Electrochemical Pilot Plant

• Resume regulation creation (NRC)
QUESTIONS?