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Status of the US Department of Energy's Management of Spent Nuclear Fuel and High-Level Waste

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and Public Acceptance
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U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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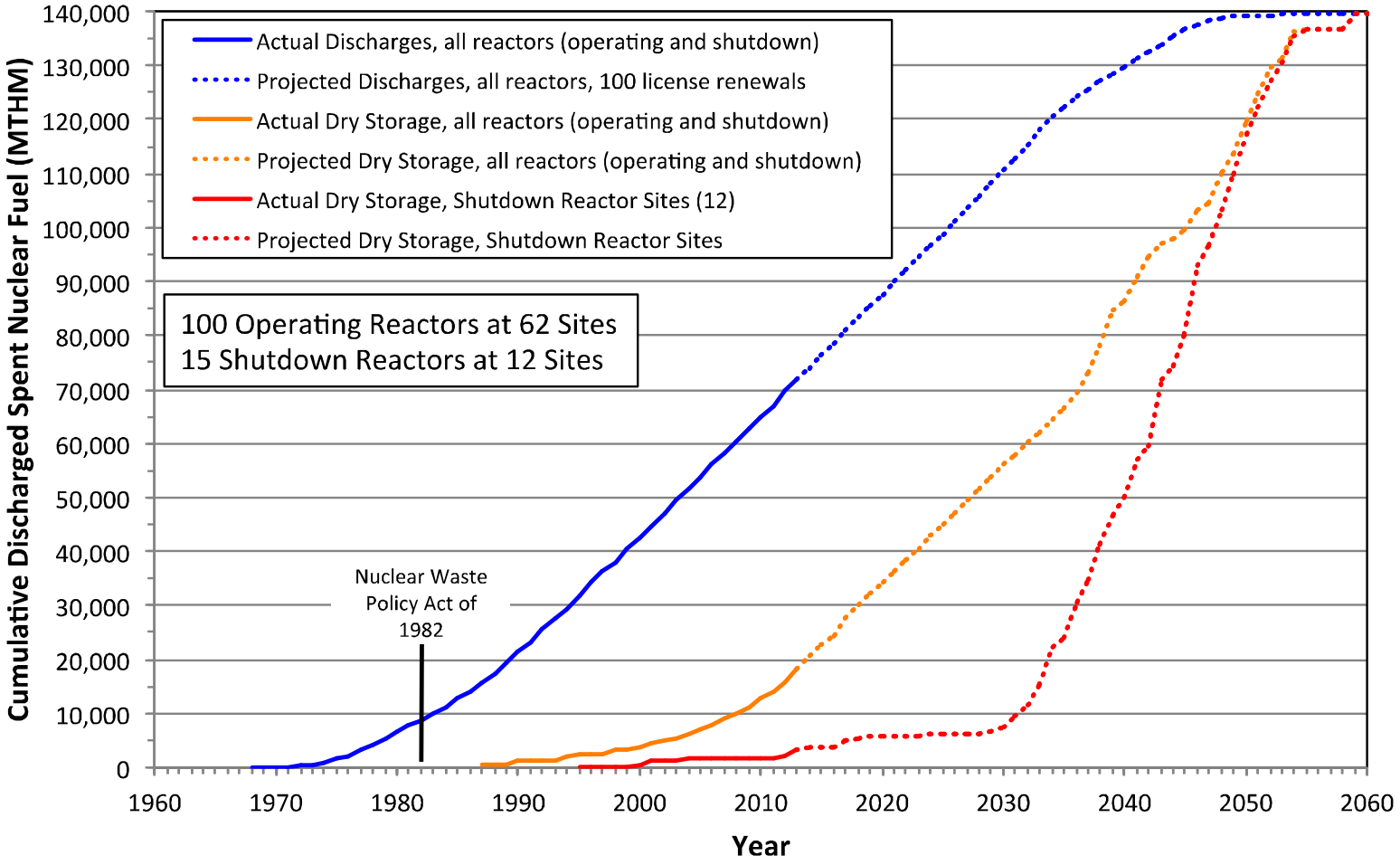
Outline

- **Commercial Used Nuclear Fuel in Storage**
- **U.S. Strategy for SNF and HLW**
- **Used Nuclear Fuel Disposition Research and Development**
  - Storage and Transportation R&D
  - Disposal Research R&D
- **Nuclear Fuels Storage and Transportation Planning Project (NFST)**
- **Public Survey Results**
  - Public Support for Nuclear Energy
  - Public Understanding and Perceptions of Interim Storage
  - Public Perspectives on the Institutional Basis for Nuclear Waste Management
  - Public Views on Consent-Based Siting
- **Summary**

Commercial UNF in Storage Continues to Increase by ~2,000 MTHM Annually



Used Nuclear Fuel in Storage

(Metric Tons, end of 2014)

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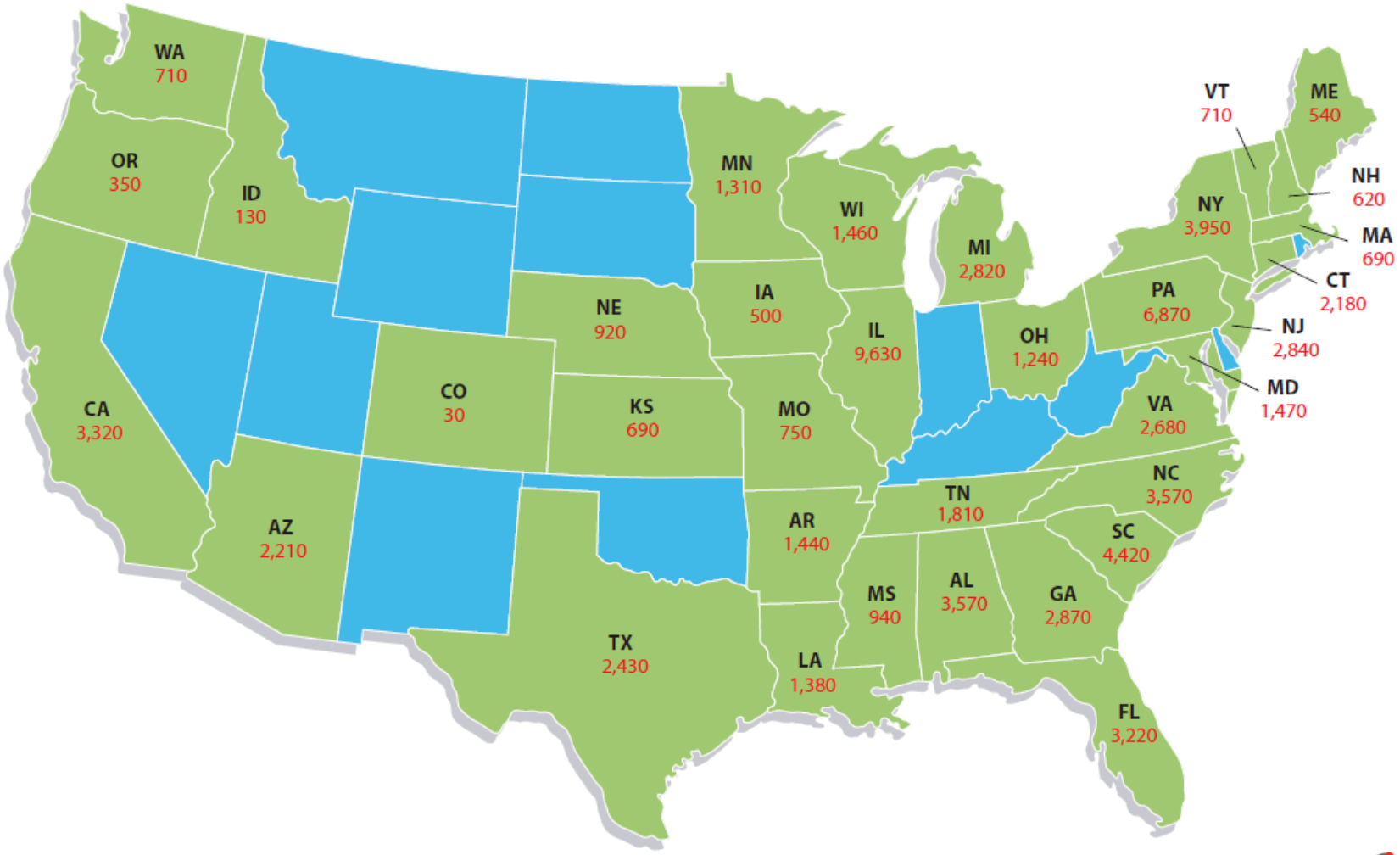

Source: Gutherman Technical Services

NEI
NUCLEAR ENERGY INSTITUTE

Summary of U.S. Strategy for SNF and HLW

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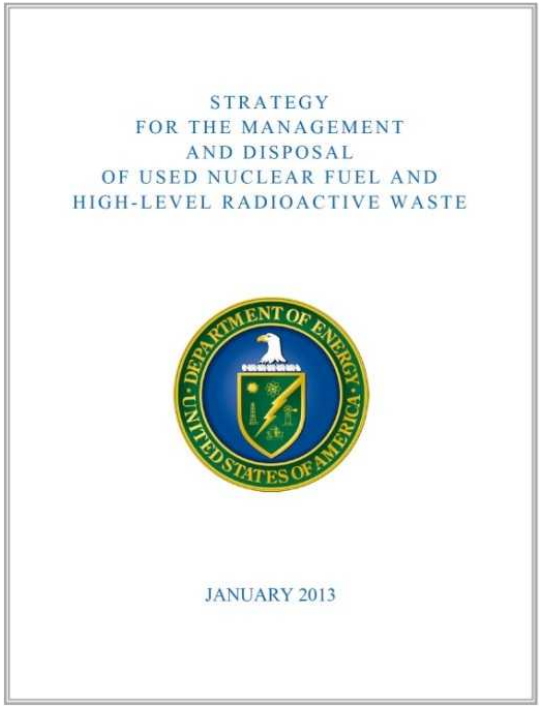
***Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* issued January 2013**

The Strategy outlines a 10-year program of work that:

- **Sites, designs, licenses, constructs and begins operations of a pilot interim storage facility (operating 2021)**
- **Advances toward the siting and licensing of a larger interim storage facility (operating 2025)**
- **Makes demonstrable progress on the siting and characterization of repository sites (repository sited 2026, licensed 2042, operating 2048)**



Used Nuclear Fuel Disposition R&D:
Storage and Transportation R&D

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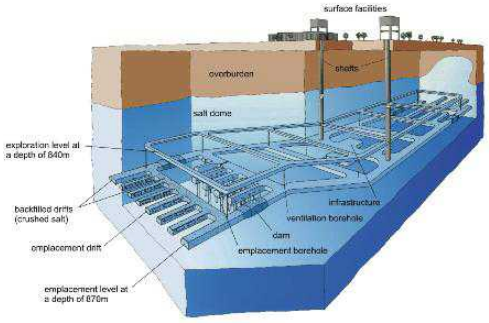
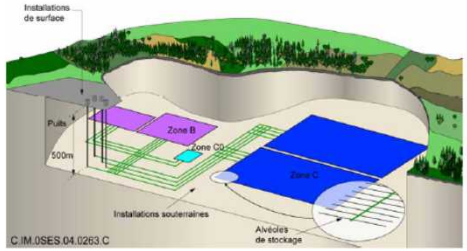
Prepare for extended storage and eventual large-scale transport of used nuclear fuel (UNF) and high-level waste

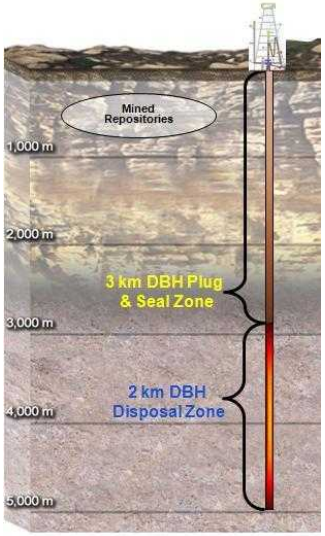
- Develop additional confidence in the technical basis for:
  - Extended storage of used nuclear fuel
  - Fuel retreivability and transportation after extended storage
  - Transportation of high-burnup used nuclear fuel

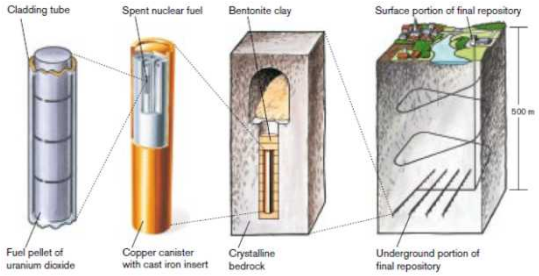
Used Nuclear Fuel Disposition R&D:
Disposal R&D

- **Provide a sound technical basis for multiple viable disposal options in the US**
- **Increase confidence in the robustness of generic disposal concepts**
- **Develop the science and engineering tools needed to support disposal concept implementation**









Nuclear Fuels Storage and Transportation Planning Project (NFST)

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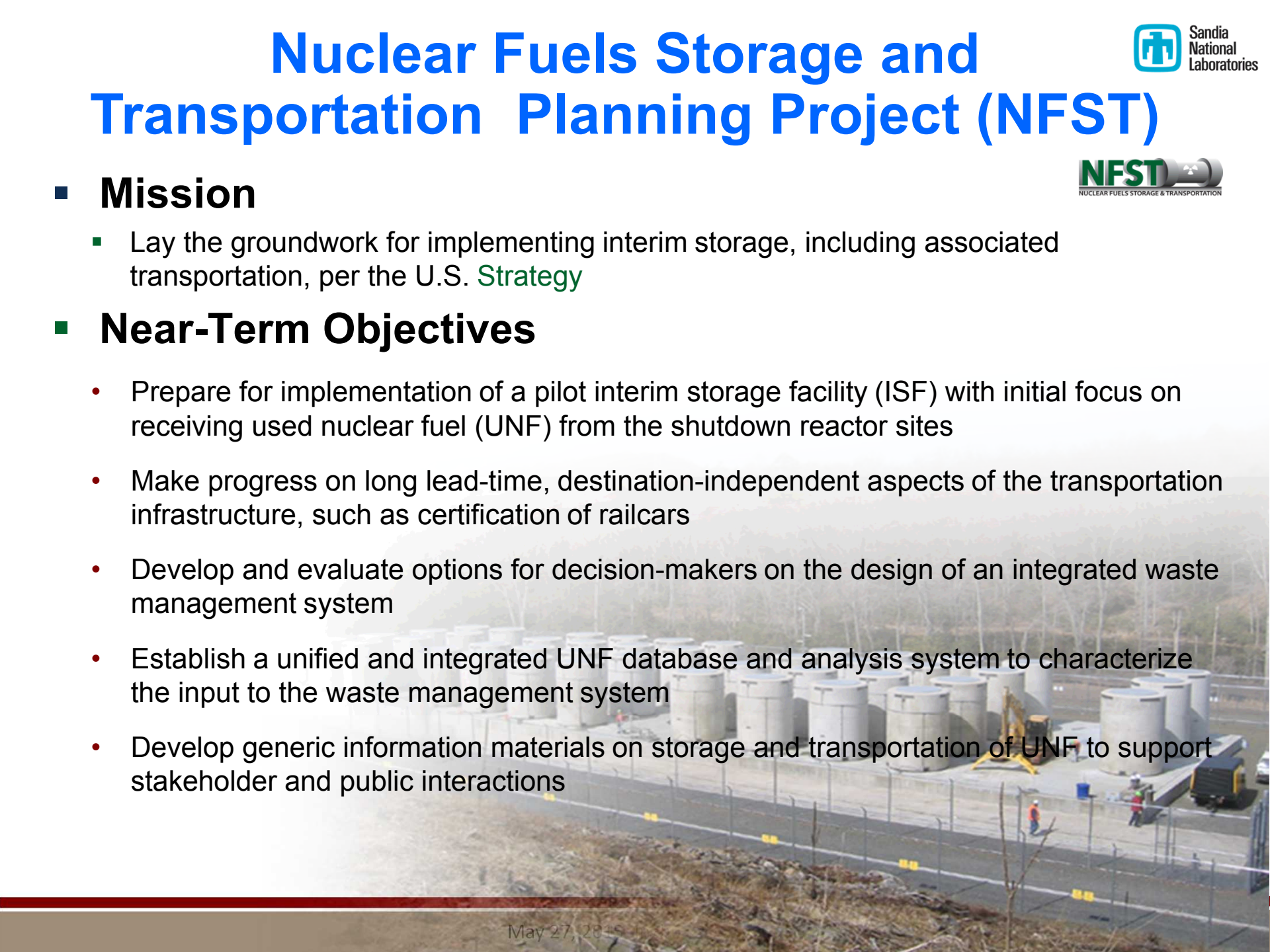
NFST NUCLEAR FUELS STORAGE & TRANSPORTATION

Mission

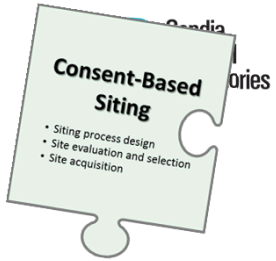
- Lay the groundwork for implementing interim storage, including associated transportation, per the U.S. Strategy

Near-Term Objectives

- Prepare for implementation of a pilot interim storage facility (ISF) with initial focus on receiving used nuclear fuel (UNF) from the shutdown reactor sites
- Make progress on long lead-time, destination-independent aspects of the transportation infrastructure, such as certification of railcars
- Develop and evaluate options for decision-makers on the design of an integrated waste management system
- Establish a unified and integrated UNF database and analysis system to characterize the input to the waste management system
- Develop generic information materials on storage and transportation of UNF to support stakeholder and public interactions



Preparing to Support Publicly Accepted Consent-Based Siting Process



- **Developed and maintained a database of prior siting efforts**
  - http://curie.ornl.gov/SED/pages/sed-homepage
- **Reviewing and evaluating lessons learned from prior domestic and international siting efforts**
- **Gained additional insights on consent-based sighting of waste management facilities**
- **Preparing to develop informational materials**

BRC recommendation:
DOE should build a data base of the experience that has been gained and relevant documentation produced in efforts to site nuclear waste facilities, in the United States and abroad.

Public Insights on Nuclear Energy and Nuclear Waste Management

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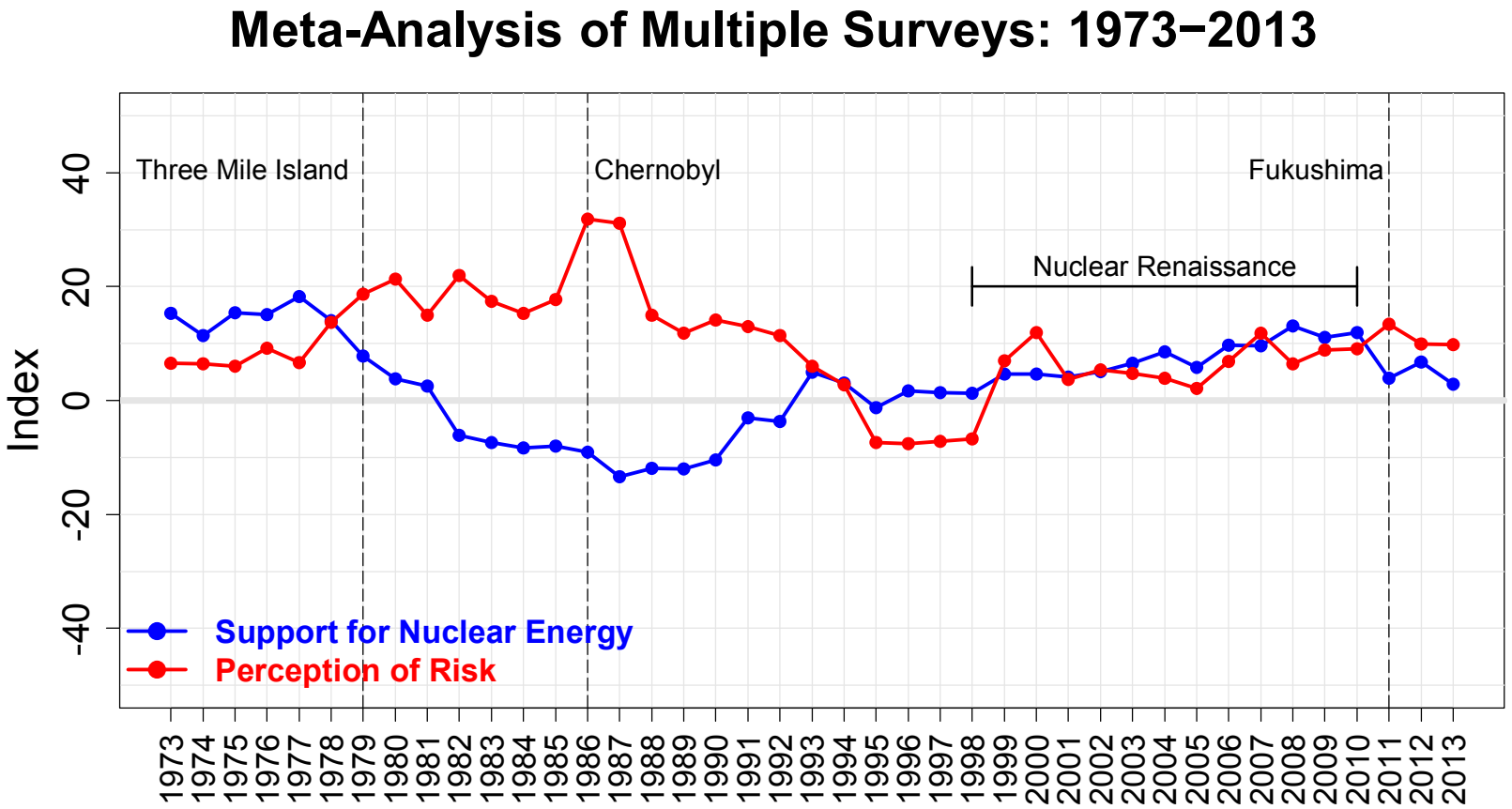
- Public Support for Nuclear Energy
- Public Understanding and Perceptions of Interim Storage
- Public Perspectives on the Institutional Basis for Nuclear Waste Management
- Public Views on Consent-Based Siting

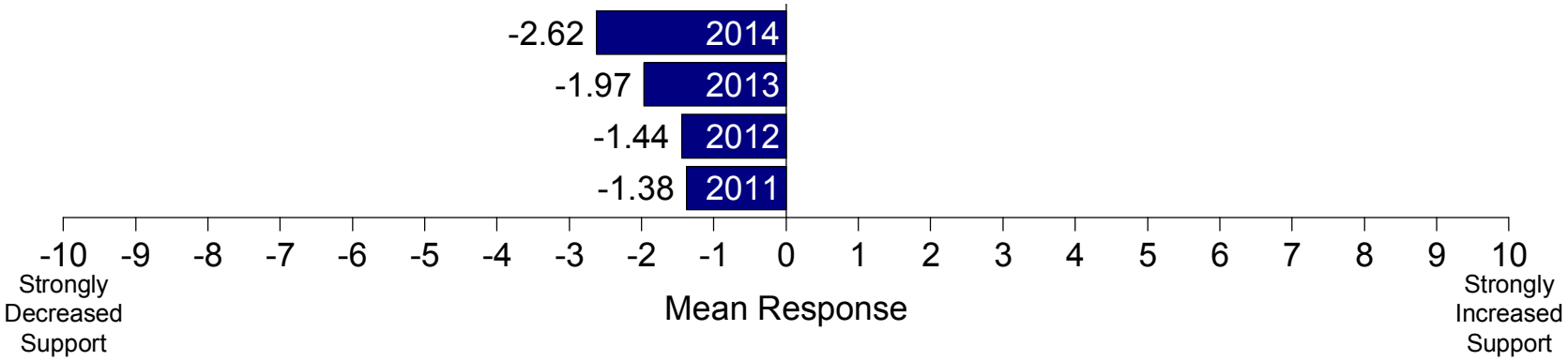
Trends in Support for and Risk Perceptions about Nuclear Energy



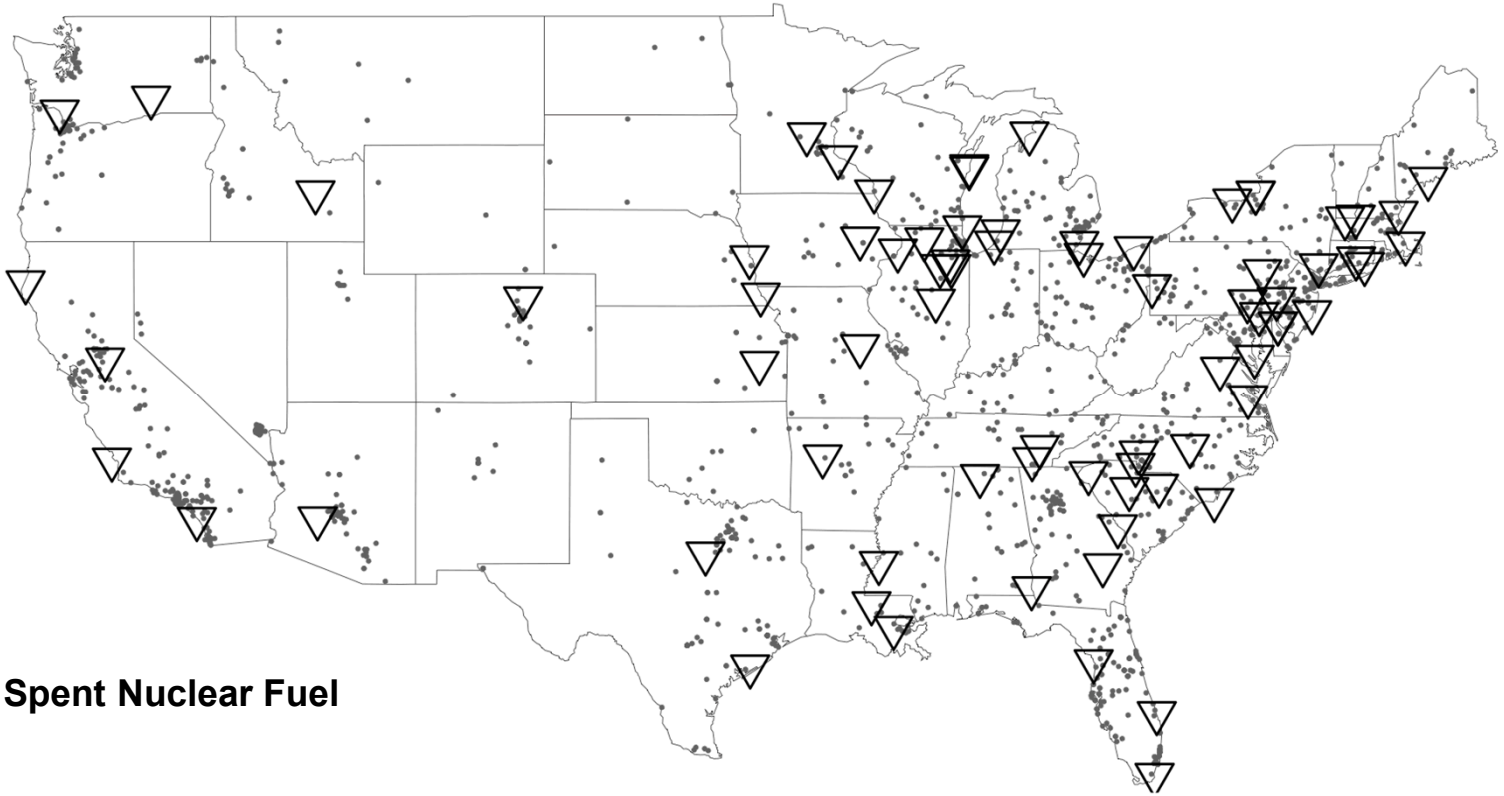
Negative Effects of Fukushima Are Increasing with Time

"A severe earthquake occurred on March 11, 2011 in the Pacific Ocean near Japan, creating large tidal waves that destroyed some Japanese coastal cities. Also damaged was the Fukushima nuclear power plant, which released radioactivity into the atmosphere and nearby portions of the sea."

How have recent events in Japan influenced your support for nuclear power production in the United States?



SNF Sites & Respondents: 2014



▽ = Spent Nuclear Fuel

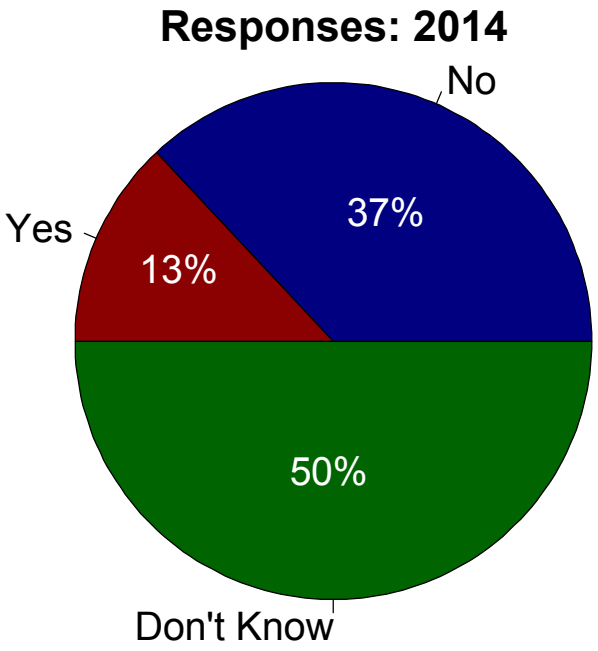
Estimates for Lower 48 Contiguous States (approximations)

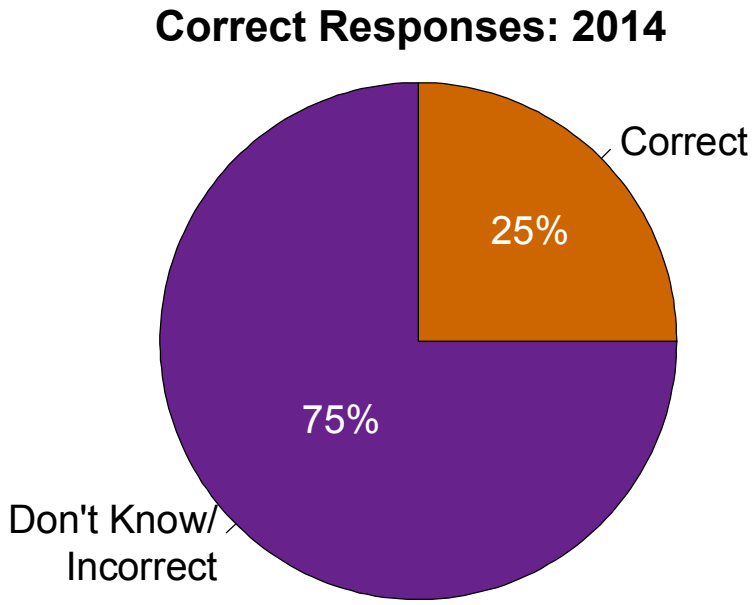
76% of population (76% of 2014 respondents) reside within 100 miles of SNF

44% of population (42% of 2014 respondents) reside within 50 miles of SNF

Knowledge about Proximity to Current Storage Locations

To the best of your knowledge, is your primary residence located within approximately 100 miles of a site where used nuclear fuel is being stored?

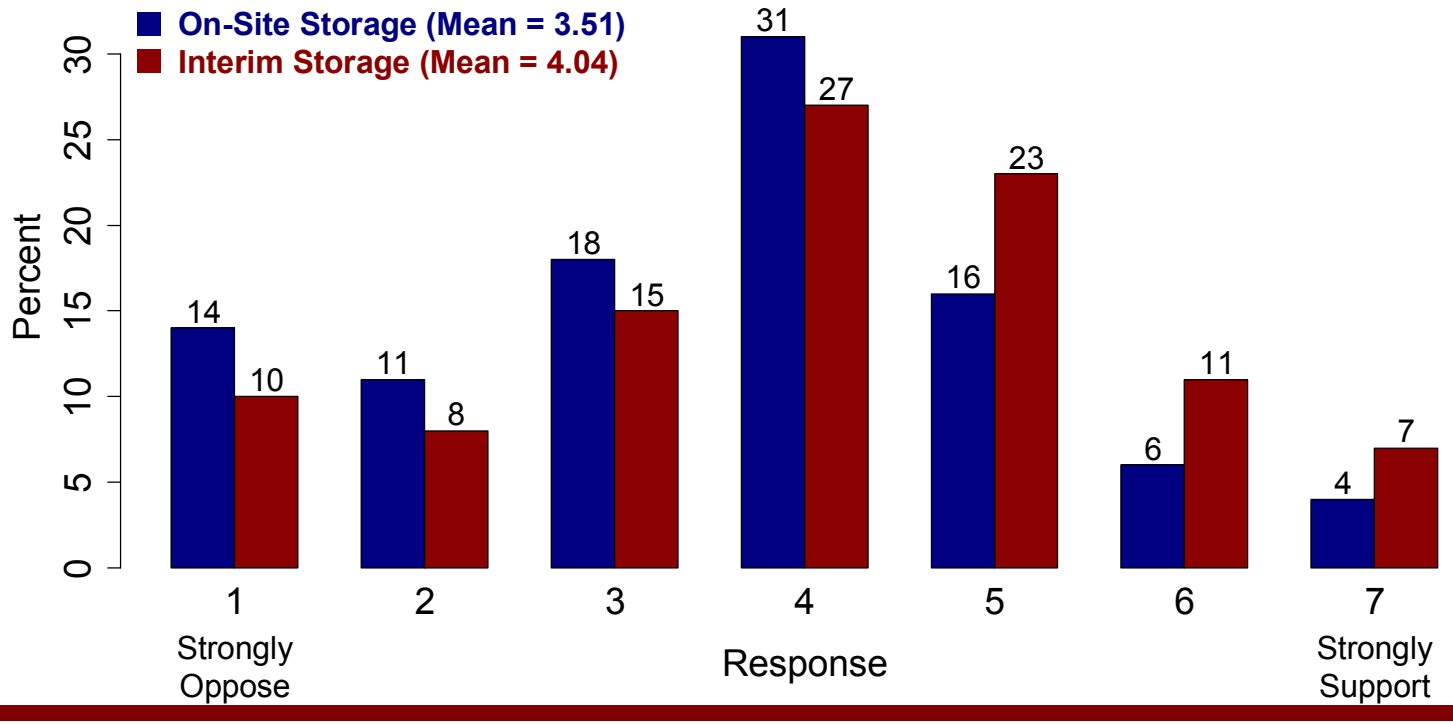




Preferences for On-Site vs. Interim Storage

Using a scale from one to seven, where one means *strongly oppose* and seven means *strongly support*, how do you feel about…

- the current practice of storing used nuclear fuel at or near nuclear power plants?
- constructing one or more interim storage facilities for consolidating used nuclear fuel in the U.S.?



Recent Stakeholder Comments

- **Albuquerque Journal, May 4, 2015**

"Holtec International Inc. wants to build the nation's first "interim" depository in southeast New Mexico for spent nuclear fuel from U.S. power plants, but the company faces many hurdles, including opposition from environmental groups and a potential need for a change in federal law."

John Heaton, a former Democratic state representative from Carlsbad and now chair of the EddyLea County Energy Alliance — is promoting the Holtec project

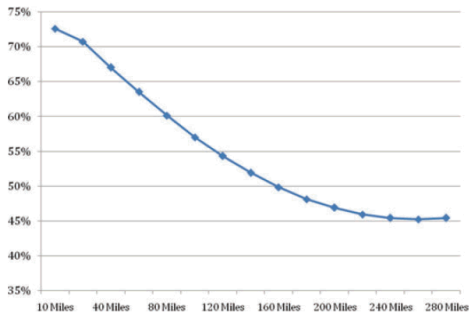
"New Mexico's U.S. senators, Democrats Martin Heinrich and Tom Udall, released statements last week stressing their support for permanent, not interim, solutions."

"We can't put the cart before the horse," Heinrich said. "I cannot support establishing an interim storage facility until we are sure there will be a path forward to permanent disposal."

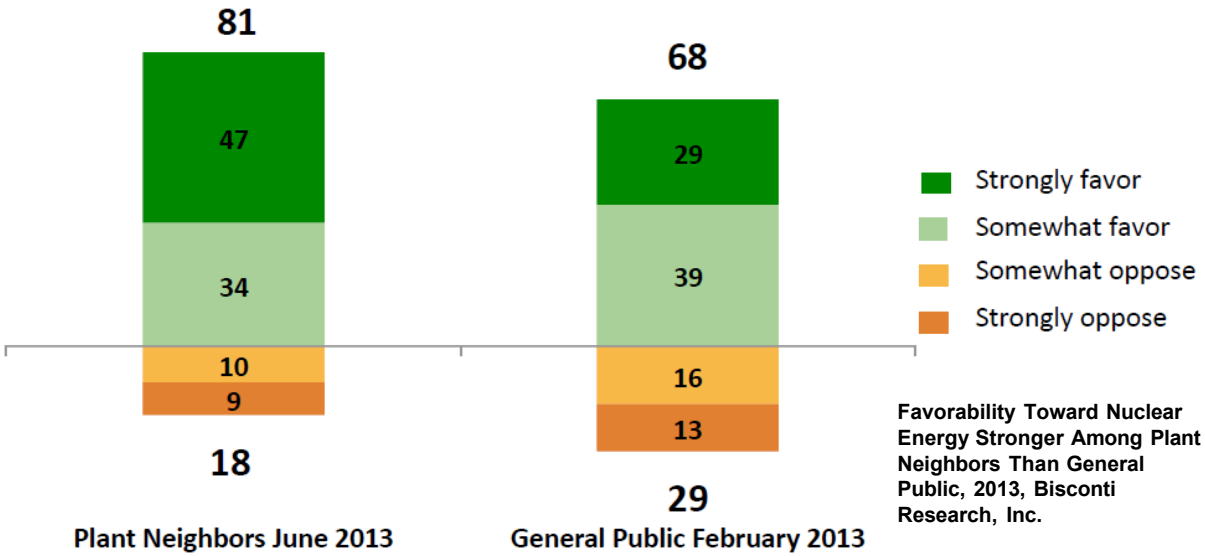
Udall said "he wouldn't support an interim site without a permanent one, no matter where it's built, because the nuclear waste could end up "orphaned there indefinitely."

Estimated Effects of Current Proximity

Mean Estimated Support (1=Strongly oppose, 7=Strongly support)	Distance to Prospective ISF: 50 Miles	100 Miles	200 Miles	300 Miles
Proximity to Existing UNF Storage				
Reside 25 miles from existing UNF	3.51	3.62	3.84	4.06
Reside 50 miles from existing UNF	3.46	3.57	3.79	4.00
Reside 75 miles from existing UNF	3.41	3.51	3.73	3.95
Reside 100 miles from existing UNF	3.35	3.46	3.68	3.90



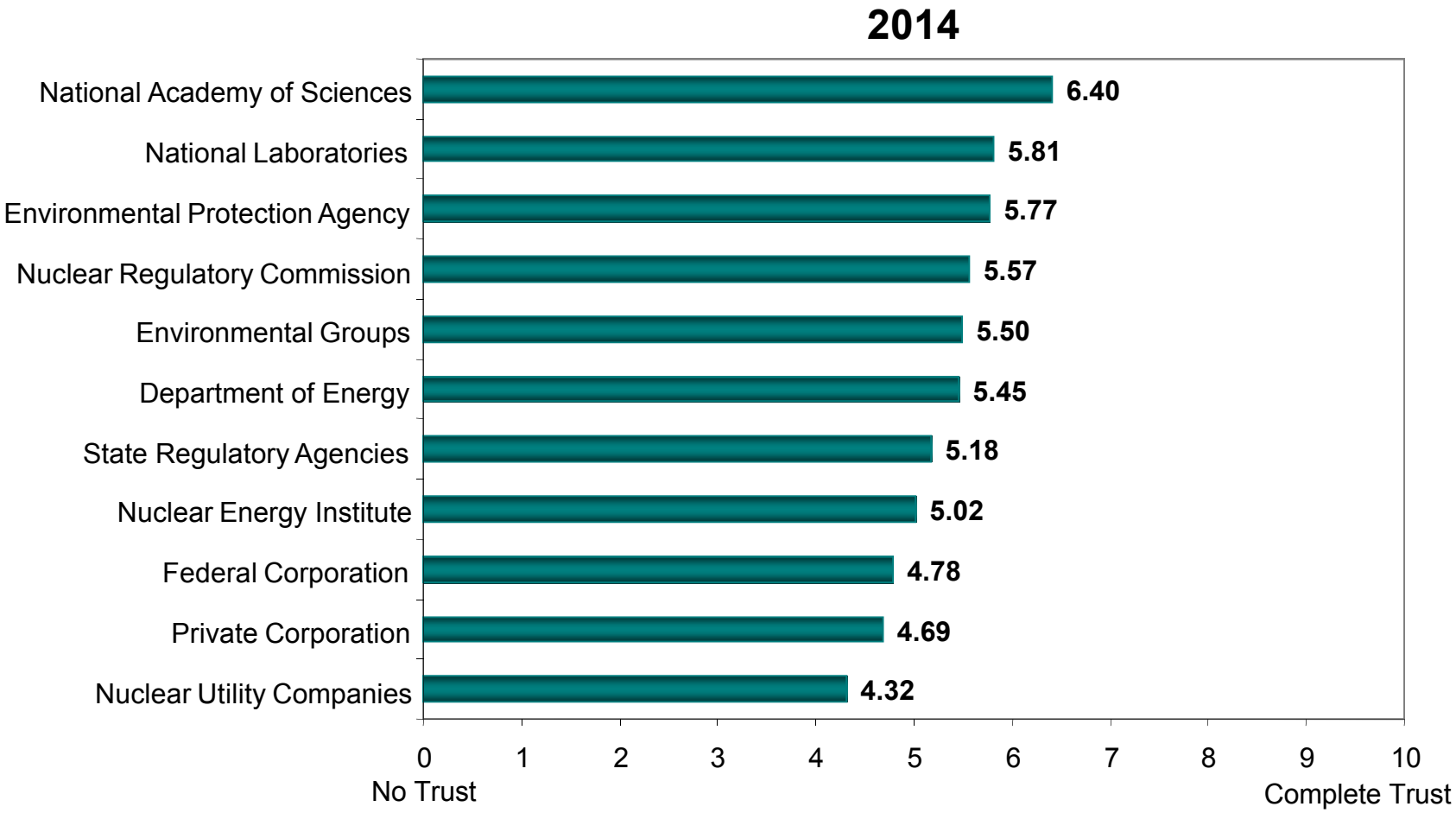
Predicted percent support by distance from WIPP facility (Jenkins-Smith et al., 2011)



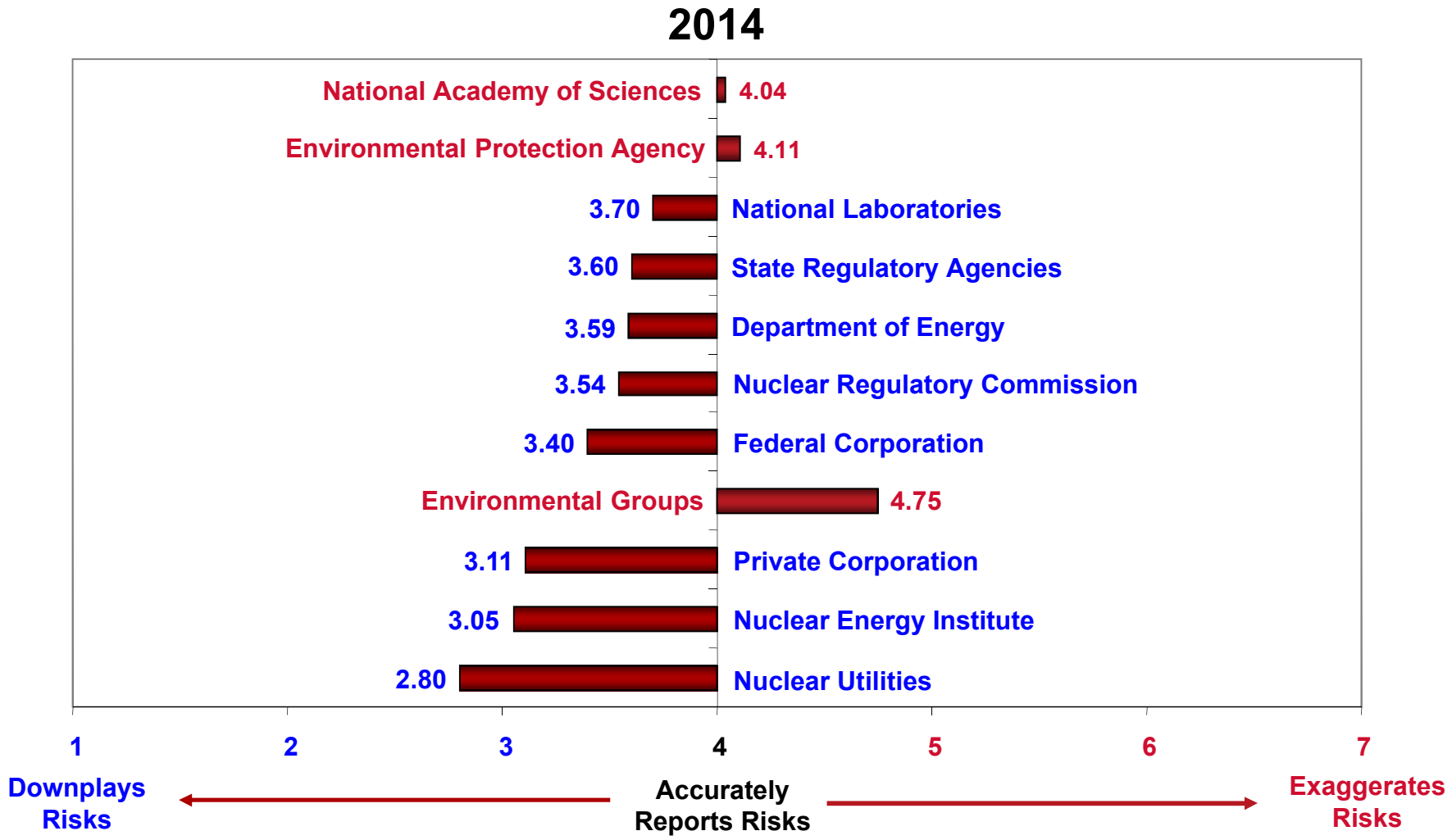
Favorability Toward Nuclear Energy Stronger Among Plant Neighbors Than General Public, 2013, Bisconti Research, Inc.

Relative Institutional Trust

Mean trust in information about SNF from each of the following sources



Perceived Institutional Risk Bias



How do members of the public define "Consent"?

"Consent" should involve a process where only the elected representatives of those that are most affected must agree. Thus consent should require agreement by local elected officials and the host state's governor.

"Consent" should involve a process where many different stakeholders must agree, thus consent should require agreement by local elected officials, the host state's governor, both of the host state's US senators, the US congressperson representing the host community, and the state's environmental protection agencies. In addition, consent should require majority support in a state-wide vote.

Preferences: 2014

Less Inclusive: 16%

More Inclusive: 84%

Consent and Veto Authority

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Who should be allowed to block / veto a siting decision for an ISF?	**%**
A majority of citizens residing within 50 miles of the facility	**68**
A majority of voters in the host state	**68**
Host state environmental protection agency or equivalent	**53**
U.S. Environmental Protection Agency	**50**
Governor of the host state	**49**
U.S. Nuclear Regulatory Commission	44
U.S. Department of Energy	44
Leaders of the host state's legislature	34
U.S. Congressperson representing the host district	32
Either of the two U.S. Senators representing the host state	31
Nongovernmental environmental groups in the host state	21

When should host community by allowed to withdraw consent?	*% Yes*
Host community/state volunteers; site assessment is initiated	**76**
Scientific evaluation of site suitability is completed	**72**
Application for a license to construct a UNF facility is submitted to agencies	**66**
License is obtained; facility construction is initiated	43
Construction is completed; facility is prepared to receive UNF	32

Important Elements in the Siting Process*

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- It is important to recognize that a problem exists, and that the problem needs to be solved and can be solved
- Confidence and trust in the regulatory body and in the implementers is crucial
- The veto authority given to municipalities was critical to successful siting
- It is important that the role of the Environmental Impact Assessment in the siting process, as well as the role of stakeholder involvement in the Environmental Impact Assessment, be clear from the beginning
- Public interest in participation can be maintained only if stakeholders believe that they can have an influence on key decisions
- Being informed and being included are different matters; real public involvement should be pursued
- Stakeholder confidence is never established once and for all. It needs continuous work and upkeep

*Progress in Siting Nuclear Waste Facilities, FCRD-NFST-2014-000628,September 2014

Summary

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- **DOE is pursuing a strategy for management of UNF and HLW**
  - **Pilot interim storage facility (operating 2021)**
  - **Larger interim storage facility (operating 2025)**
  - **Repository sited in 2026, licensed in 2042, operating in 2048**
- **Public -**
  - Opinion is affected by major incidents such as Three Mile Island, Chernobyl and Fukushima
  - Understanding of current SNF management policy is lacking
  - Support for interim storage is higher than support for current on-site storage
  - Opinion indicates substantial variation in trust for different institutions
  - Prefers to define “consent” very broadly
- **An SNF management plan must be developed and communicated effectively**
- **Stakeholders must be informed, but they must also have involvement in decision making**
- **Stakeholder confidence needs continuous work and upkeep**

References

- Hank C. Jenkins-Smith, Carol L. Silva, Matthew Nowlin, and deLozier. 2011. Reversing Nuclear Opposition: Evolving Public Acceptance of a Permanent Nuclear Waste Disposal Facility. *Risk Analysis* 31(4): 629-644.
- Guidance for Consent Based Siting of Radioactive Waste Management Facilities, FCRD-NFST-2013-000280, August 2013.
- Insights on Conducting Consent-Based Siting of Radioactive Waste Management Facilities: Evidence from a Nationwide Survey of US Residents, FCRD-NFST-2014-000087, September 2014.
- Progress in Siting Nuclear Waste Facilities, FCRD-NFST-2014-000628,September 2014.

Questions


billions
breaking
tennessee
cashes
questions
beds
radioactive
cleanup
alone
report
sentenced
adjust
mexico
dump
activists
doe
complex
oak
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site
workers
concerns
waste
company
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