

A Common Ground Consortium case study on Yucca Mountain siting – The Willrich report predictions

Cassie Koerner, R. A. Borrelli



University of Idaho
Department of Nuclear Engineering
and Industrial Management

American Nuclear Society – International High Level Radioactive Waste Management

2025.11.12

Collaborative-Based Siting of Spent Nuclear Fuel

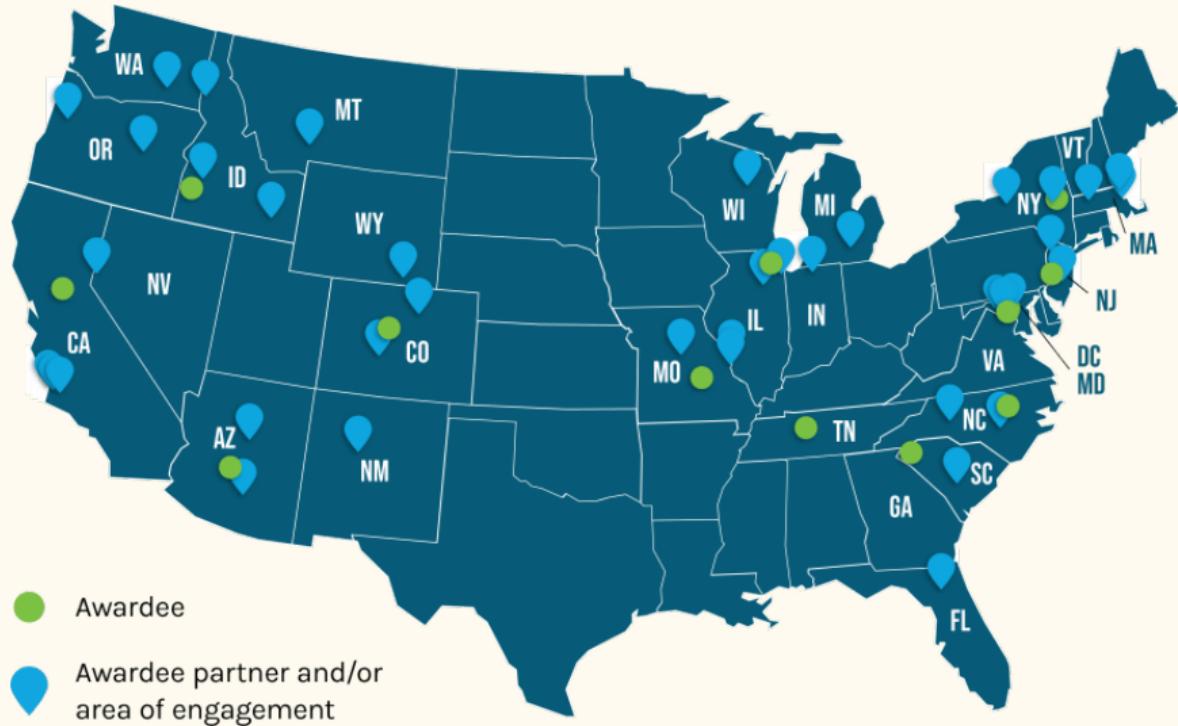
2021 Consolidated Appropriations Act allocated funds for ‘expenses necessary for nuclear waste disposal activities . . .’

‘. . . including interim storage activities’

DOE awarded \$26M to thirteen (now twelve) consortia across the nation for building capacity in Collaborative-Based Siting (CBS)

Support more comprehensive community engagement to collaborate with stakeholders to manage SNF effectively

Not siting; process and frameworks



[1] Department of Energy, 2023. DOE awards \$26 million to support consent-based siting for spent nuclear fuel.

The Common Ground Consortium (CGC)

CGC spans several institutions across the intermountain west and Denia at the University of Michigan

Centered on public input

We have had a lot of public meetings over three states with more to come in 2026

Research focus on historical lessons (this presentation), types of public decision-making, and state-specific and/or cross-jurisdictional challenges in Collaborative-Based Siting of critical infrastructure

Not about actually siting a facility

Providing recommendations to DOE

Cost extension till March 2026

More below

[2] Borrelli, R. A., et al., 2024. Consent based siting for Spent Nuclear Fuel. Las Vegas, Nevada: Proc., American Nuclear Society Annual Meeting.

Goals

The 1976 Willrich report offered predictions and recommendations for HLW management still relevant

We want to look back at the YM story within the lens of the Willrich report
Analyze key insights of the report within the context of the Yucca Mountain story
Bringing up the Willrich report as a jumping off point to analyze historical events
Focus is on *process* not whether Yucca Mountain can perform as designed

The Ford Administration saw a lot of activity

The Energy Research and Development Administration (precursor to DOE) proposed the National Waste Terminal Storage policy for national SNF management

This is the first time multiple barriers were proposed

Construct six facilities at multiple sites across the US so no one place ‘bore the burden’

General criteria were formulated – hydrology testing, geologic mapping, etc.

*Very probably, a satisfactory solution to the problem of nuclear waste disposal will not be possible unless there is **public and political acceptance in the local areas** where geologic studies and facility development must proceed program to the people who need to know so that they have full information to base their decisions on. . . In other words, there must be an aggressive program of public affairs for best results. . . the **public perception of waste management might well determine its success** [3].*

[3] Zerby, C. D. et al., 1976. Denver, Colorado: Proc., International Symposium on the Management of Wastes from the LWR Fuel Cycle.

On to the Willrich report ('Willrich')

Willrich was the the first comprehensive analysis for HLW management

'... assist in developing public policy and institutions which are necessary for the safe management of radioactive waste, currently and in the long term.' [4]

Criticized federal activities for a lack of HLW policies

Report is exhaustive

I got a scanned copy

Key highlights are discussed and analyzed within our current HLW paradigm

[4] Willrich, M., et al., 1976. Radioactive waste management and regulation. Energy Laboratory Report No. MIT-EL 76-011.

Willrich's key points I

- (1) Safe management of nuclear waste is already a present necessity and an irreversible long-term commitment

Main concern was accumulation of SNF at NPPs because no reprocessing

Still somewhat of a (public, economic) concern today,

Now we have dry storage option though, currently onsite

- (2) Existing structure for HLW management is unworkable

Was back then split between public and private sectors

Concern was both could be motivated by cross purposes

*Nevertheless, through **political means** and **legal and procedural delays**, a **state government** may effectively oppose attempts by the federal government to establish a federal repository within its borders without state consent.*

Willrich's key points II

- (3) A national Radioactive Waste Authority should be established as a federally chartered public corporation

This has been the case for most nations

We do have the added degree of complexity due to State and Tribal governments

Canada was able to collaborate with Tribal governments

But the Blue Ribbon Commission on America's Nuclear Future also advocated for this approach

- (4) Willrich was largely supportive of nuclear energy as a credible alternative to fossil fuels
- (5) Recommended NRC assume sole regulatory oversight for nuclear waste management
- (6) US did not have a long term vision for HLW management but solvable

Probably the prevailing opinion now

Ensuing key events

Nuclear Waste Policy Act 1982 & 1987

NWPA key features outside of the technical I

- (1) The NWPA built upon prior work and was a bipartisan bill

The Nuclear Waste Policy Act of 1982, which I'm signing today, provides the long overdue assurance that we now have a safe and effective solution to the nuclear waste problem. It's an important step in the pursuit of the peaceful uses of atomic energy, a program that was launched by President Eisenhower some 30 years ago. The outlines of that program have changed with the years, but America's leadership in the development and use of peaceful atoms remain strong [5].

- (2) DOE responsible to foster public trust and confidence
- (3) Regional distribution – meant for siting to be in west and east
- (4) NWPA required further congressional action to authorize construction on the second repository
- (5) *NWPA stipulated that DOE would take title of SNF on 1998.01.31*

NWPA key features outside of the technical II

- (6) Treasury would collect 1 mill per kWh of electricity generated into a Nuclear Waste Fund (NWF) ('Standard Contract')
- (7) Several mentions of "consultation and cooperation" with governors of affected States and Tribes
- (8) DOE could provide financial support to States and Tribes for their own analyses
- (9) Any affected State or Tribe was afforded a veto
- (10) *Congress could overrule the veto with a majority vote in both houses*
- (11) 1987 amendments were attached to the Omnibus Budget Reconciliation Act of 1987
- (12) We all know this was where Yucca Mountain was designated as the sole site
Do not forget – Explicitly terminated eastern siting activities

Rep. Al Smith (WA) – *What you are watching is an exercise in pure politics . . . I am participating in a nonscientific process – sticking it to Nevada [6]*

Relevant 1983 – 1987 activities

Potential siting seems premature and rankings cause controversy

1983 – Nine sites recommended for site characterization before NWPA siting criteria

Nine reduced to five under 10CFR60 siting criteria

Multiatribute utility analysis under additional 10CFR960 ranked Yucca Mountain first, Deaf Smith third, Hanford fifth [7]

Strong function of preclosure and transportation costs

These three were recommended to the president by DOE

Controversy about scientifically or politically motivated process [8]

To be fair, National Academy review concluded methodology sound but other judgements required

Still though, focus on *process* and what we would now call ‘optics’

[7] Merkhofer, M. W. et al., 1987. A multiatribute utility analysis of alternative sites for the disposal of nuclear waste. Risk Analysis 7, 173.

[8] Halstead, R. J., et al., 2015. Remaking the US Nuclear Waste Program. Phoenix, Arizona: Proc., Waste Management Conference.

Eastern siting is terminated in 1986 with the recommendation of the three sites

Most SNF is in the east

DOE earlier had announced possible sites in seven states, notably New Hampshire

Considered an essential compromise for passage of original NWPA

Congress accused the Secretary of violating the original NWPA

November 1986 featured many important state and congressional races in these affected states [8]

And a presidential primary in New Hampshire in 1988

The Secretary denied the decision was political but to save money

A decision for a second repository would not be needed until 1995 due to lower projections of SNF

Again, *process* and optics

[8] Halstead, R. J., et al., 2015. Remaking the US Nuclear Waste Program. Phoenix, Arizona: Proc., Waste Management Conference.

Courts shape policy

Nevada responds to the veto

When Yucca Mountain was officially recommended in 2002, the expected Nevada veto was overridden and became law

Legal challenges to technical criteria and regulations

Refused to grant water access to drill bore holes [9]

Courts struck down a law based on state sovereignty to store HLW

Delayed progress on scientific investigations and site characterization

*Nevertheless, through **political means** and **legal and procedural delays**, a state government may effectively oppose attempts by the federal government to establish a federal repository within its borders without state consent.*

[9] Easley, M., 2012. Standing in Nuclear Waste: Challenging the Disposal of Yucca Mountain. Cornell Law Review 97, 659.

DOE was sued for breach of the Standard Contract

DOE could not take title to SNF in 1998

Utilities were bearing storage costs

About 80 lawsuits filed over 1998 – 2012 for partial breach of contract

Basically, the utilities won and were awarded damages still being paid today

\$800M annually to the utilities

Yucca Mountain ‘ends’

In 2008 DOE submitted a construction license to NRC

With Harry Reid as Senate majority leader the FY2010 budget only provided funds to continue the licensing process

Funding was eliminated in FY2012 and closed the OCRWM (fellowship)

DOE withdrew the license and faced lawsuits over its authority to do so

Court ordered to complete licensing process with the available budget

NRC finally ruled that Yucca Mountain met post-closure requirements, but issues regarding land ownership and water rights for construction required further work

And that was it

While terminated de facto, Yucca Mountain is still legally the designated site for the repository

The Nuclear Waste Fund suspended

DOE ordered to suspend collection of fees in 2013 due to license termination

Legally, the fee was not eliminated but reduced to zero

At the time of suspension, \$750 million was collected annually

Currently, there is about \$50 billion with \$1.5 billion added annually in interest

Main takeaways

The federal government would seem to be the main player

DOE determined sites prior to issuance of criteria

DOE unilaterally terminated eastern siting before 1987 amendments based on interpretation

Speaker of the House & House Majority Leader pushed for Yucca Mountain in 1987

Senate Majority leader pushed for termination in 2008

Top-down processes – Dictating sites to study to states

A decide-announce-defend strategy which did not work

Public not really an active participant, not really much of the ‘public’ in the ‘public policy’
Willrich recommended

The Ford–Carter Administration and Congress should be given credit for the groundwork and study leading up to and then crafting and passage of the NWPA in 1982

But the courts affected waste management policy probably the most

Probably the most telling prediction by Willrich

Nevada used the legal system to mount myriad legal challenges to delay though never actually winning

Utilities used the courts to sue DOE for breach of contract and damages

Nuclear Waste Fund fees were suspended

Courts essentially froze HLW management activities

Can we craft better policy?

Siting processes will always be inherently political I

Designating a second site to be in the east was a good political compromise in 1982

Selecting Yucca Mountain and terminating the eastern siting process was not well crafted policy

More politics – NWPA will have to be amended to designate a new site, construct other sites

All stakeholders must act in good faith to ensure success

All stakeholders will need access and agency to and from the political process

Better processes obviates the influence of the courts, optimistically because everyone will feel involved

Even more politics – Will need to address federal v state relationships, and including Tribes

HLW management was recognized as a bipartisan issue before and it can be again

Siting processes will always be inherently political II

Willrich also had policy recommendations that were incorporated into the BRC report
Start with Willrich and BRC as a jumping off point for policy

Collaboration was acknowledged as necessary from the Willrich report in 1976

Called consultation and concurrence by the Interagency Review Group on Nuclear Waste Management in 1979

Changed to consultation and cooperation in the NWPA

States were allowed a veto but it was meaningless

No measures for local participation beyond public comment

Nye County support for Yucca Mountain was eradicated by the Nevada delegation

Public involvement is essential but needs to have real agency

Soliciting public comment is good but cannot be the only participation

Public opinion and attitudes will vary regionally and locally

Collaboration across all stakeholders has to move deeper than just a top-down approach

A veto should be binding but also clearly defined and agreed upon prior to even expressing interest (go/no-go)

We do have a success story in WIPP so we can achieve success

This is not an insurmountable challenge, as Willrich also predicted

Wrapping up

What can we do going forward?

The federal government has the legal responsibility for HLW management

Top-down approaches have not worked

Bottom up engagement must be developed to take advantage of 'on the ground expertise'

Include local officials or community leaders early on in the process

Mayor Casper of Idaho Falls told the Nuclear Waste Technical Review Board that local leaders should be an essential part of the siting process

Include other groups that have not historically been part of the siting process in an effort to co-produce new knowledge

Even if a locality is interested in hosting a site but eventually cannot, either technically or veto, they can pass on the new expertise to other communities

Can engage on a more granular level than DOE cannot



References

1. Department of Energy, 2023. DOE awards \$26 million to support consent-based siting for spent nuclear fuel.
2. Borrelli, R. A., et al., 2024. Consent based siting for Spent Nuclear Fuel. Las Vegas, Nevada: Proc., American Nuclear Society Annual Meeting.
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4. Willrich, M., et al., 1976. Radioactive waste management and regulation. Energy Laboratory Report No. MIT-EL 76-011.
5. Reagan, R., 1983. Remarks on Signing the Nuclear Waste Policy Act of 1982. Ronald Reagan Presidential Library & Museum.
6. Church, F., 1990. Federal Report: Nuclear Waste – Can Nevada Keep America's Sizzling Nuclear Waste Out of Its Backyard.
7. Merkhofer, M. W. et al., 1987. A multiattribute utility analysis of alternative sites for the disposal of nuclear waste. Risk Analysis 7, 173.
8. Halstead, R. J., et al., 2015. Remaking the US Nuclear Waste Program. Phoenix, Arizona: Proc., Waste Management Conference.
9. Easley, M., 2012. Standing in Nuclear Waste: Challenging the Disposal of Yucca Mountain. Cornell Law Review 97, 659.

Acronyms I

ANS American Nuclear Society.

BRCA Blue Ribbon Commission on America's Nuclear Future.

CAA Consolidated Appropriations Act.

CBS Collaborative-Based Siting.

CFR Code of Federal Regulations.

CGC Common Ground Consortium.

DOE United States Department of Energy.

ERDA Energy Research and Development Administration.

FY Fiscal Year.

HLW High-Level Radioactive Waste.

IHLRWM International High Level Radioactive Waste Management.

Acronyms II

IRG Interagency Review Group on Nuclear Waste Management.

kWh Kilowatt-Hour.

NPP Nuclear Power Plant.

NRC Nuclear Regulatory Commission.

NWF Nuclear Waste Fund.

NWPA Nuclear Waste Policy Act.

NWTRB Nuclear Waste Technical Review Board.

NWTS National Waste Terminal Storage.

OCRWM Office of Civilian Radioactive Waste Management.

SNF Spent Nuclear Fuel.

UM University of Michigan.

US United States.

Acronyms III

WIPP Waste Isolation Pilot Plant.

YM Yucca Mountain.