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# COMMUNICATING THE TECHNICAL RELIABILITY OF GEOLOGICAL REPOSITORIES

*Engaging a wide range of stakeholders*

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Japan Nuclear Waste Management Organization (NUMO)  
Technical Advisory Committee Meeting  
November 21, 2025  
Tokyo, Japan



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

# TECHNICAL EXCELLENCE IS NOT ENOUGH



Nuclear waste management requires effective communication and ability to adapt the message to the social and regional context of a variety of stakeholders

- Messaging that contributes to public confidence is truthful, candid, and founded on the historical background and concerns of the audience
  - Radioactive waste management issues are often linked to broader societal controversies
  - Perceptions of fairness, trustworthiness, integrity, and motivation feature prominently in evaluation of safety information
- Clarity and transparency in roles increases visibility, but ALSO increases criticism
- Scientists must translate complex technical and policy issues into understandable language
  - Only then the knowledge can be applied correctly
- Personal engagement by project leadership living and working in the community is essential
- Persistence – Decadal time frame for successful messages
- Technical Independence – The regulatory structure and local community technical review teams must be independent of the implementor, have local credibility, openly challenge the programs technical basis.

# TECHNICAL RELIABILITY PLAYS A KEY PART ON SITING ALL TYPES OF “CONTENTIOUS” FACILITIES



## US-based siting exemplars

|             |                               |
|-------------|-------------------------------|
| Nuclear     | Repository*                   |
|             | Advanced Reactor*             |
|             | Private CISF                  |
|             | Reactor Expansion             |
|             | Monitored Retrievable Storage |
|             | Low-level Waste Facilities    |
|             | GNEP Facilities               |
|             | Nuclear Waste Negotiator      |
| Non-nuclear | Large-Scale Solar*            |
|             | Biosafety Research Facility*  |
|             | Petrochemical Manufacturing   |

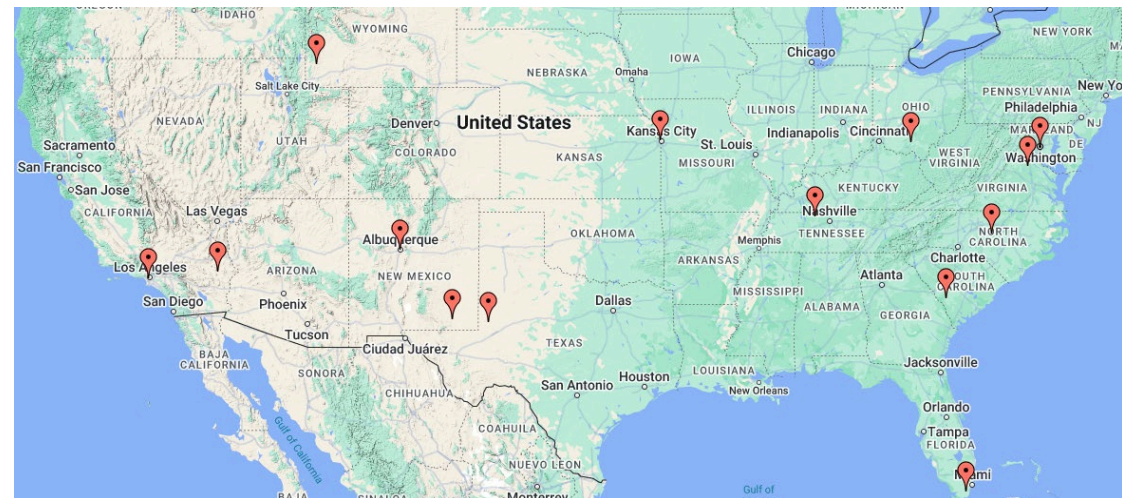
\*Indicates successful siting attempt

## Objectives

- Identify best practices and lessons learned for gaining community support and coping with opposition in siting processes.

## Methods

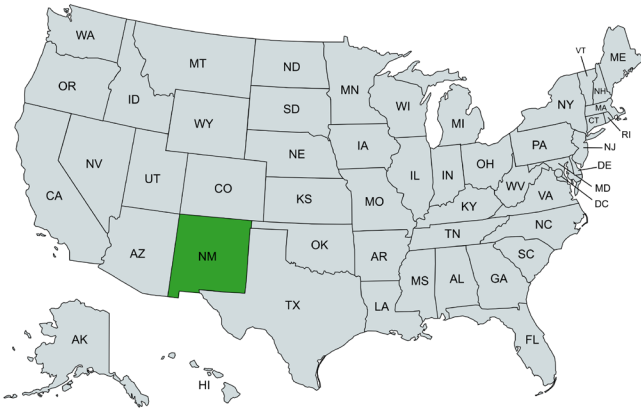
- 10 cases in FY25 (4 cases completed in FY24)
- Literature review and archival research
- Semi-structured interviews with subject matter experts familiar with the siting process



# WASTE ISOLATION PILOT PLANT (WIPP) CASE STUDY



## DGR for United States defense-generated transuranic waste



- **Purpose**

- U.S. Department of Energy (DOE) deep geological repository (DGR) for defense-generated transuranic waste
- Underground and ground-level facilities for accepting, emplacing, and disposing of waste

- **Location**

- 17,200 acre tract overlying salt formations 26 miles southeast of Carlsbad, New Mexico

- **Siting and Development**

- Advocacy from state government and local communities played a key role.
- Authorized by Congress via the National Security and Military Applications of Nuclear Energy Authorization Act of 1980.
- Facility certified by the EPA in 1998.

- **Regional Context:**

- Low population density: Only 16 residents within 10 miles
- Economic instability due to declines in potash mining, oil and gas, and agriculture.
- Local communities receptive to stable jobs and economic benefits from WIPP.

# COMMUNICATING TECHNICAL RELIABILITY FOR WIPP



- **Broad and Sustained Engagement**

As new science and assessments were produced, consistent face-to-face meetings with **nearly every local stakeholder group throughout the 20-year WIPP siting process** fostered transparency and allowed technical experts to address stakeholder concerns.

- **Local Presence of Trusted Project Champion**

Sandia National Laboratories' Nuclear Waste Technology Department manager did not have a communications or public relations background. However, his personable style and excellent science communication built long-term relationships with nearly every civic group in Carlsbad. His scientific ambassadorship contributed to sustained community trust and support for WIPP.

- **Independent Scientific Oversight**

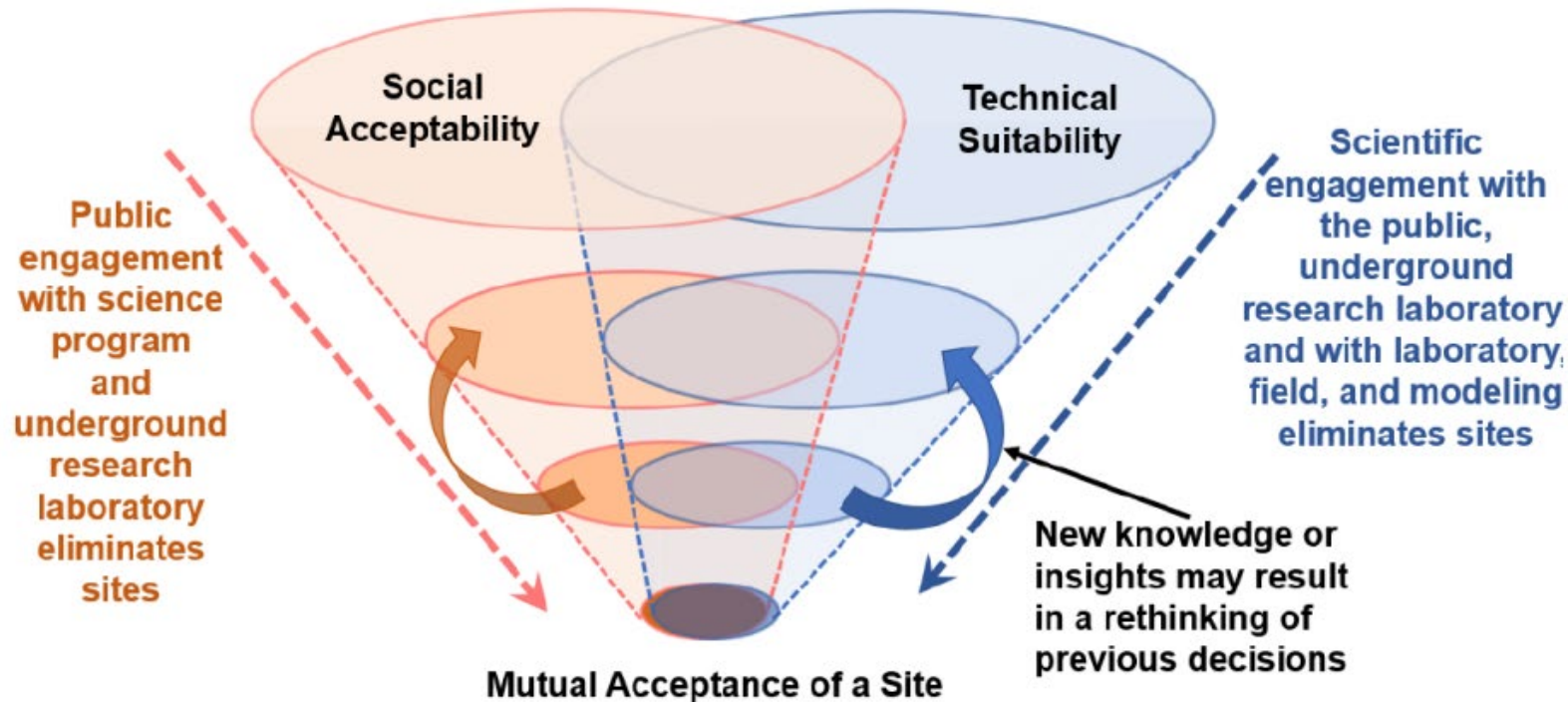
Mechanisms for independent oversight such as the New Mexico Environmental Evaluation Group (EEG) provided objective assessments of the facility's development, safety, and environmental impact and confirmed federal science. This addressed concerns about DOE's objectivity during facility development and enhanced credibility.



# SOCIAL AND TECHNICAL ASPECTS OF REPOSITORY SITING



NWTRB reviewed the geologic repository siting programs of ten countries



NWTRB figure captures iterative process and overlap of the social and technical aspects of repository siting that leads to mutual acceptance of a site

# LESSONS LEARNED FOR ENGAGEMENT IN SITING



## From domestic and international exemplars case studies



Anticipate opposition and **develop tools and resources to address mis- and disinformation** early in the process.



Community outreach at the earliest stages can build a culture of inclusion and avoid surprises that create distrust and opposition.



Acknowledge and develop tools for **communicating about limitations to scientific certainty** to support and maintain transparency.



Anticipate and develop tools for responding efficiently to legislative, regulatory and policy changes that might during project lifetime.



Clearly define the mission of the facility from the outset, including whether its scope could ever foreseeably widen.



Sensitivity to local and State level political context and timelines can improve outreach strategy.



Partner with local decision-makers on site planning to ensure facility design is in alignment with long-range community strategic plans.



Communities should play a direct role in determining community benefits - community controlled benefits funds have proven successful.



Consider **independent scientific oversight** to provide assessments of the facility's development, safety, and impact to strengthen public trust.



Ensure local connections and representation among those leading the siting effort and identify local champions to facilitate local support.