

## **How to Do it Right: U.S. Western State Perspectives on Highly Radioactive Materials Transportation**

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### **Abstract:**

In the US, most of the existing or proposed radioactive waste storage and disposal sites are located in the West. Western states' participation in transportation to these sites has provided useful insights. In addition, the prospect of future large-scale transportation in the West, especially that of spent nuclear fuel and high-level radioactive waste (SNF/HLW), gives the Western states a keen interest in future planning efforts. From this place of both actual experience and keen interest, the Western Interstate Energy Board High-Level Radioactive Waste (WIEB HLRW) Committee decided to work together to formulate policy positions on how best to conduct SNF/HLW transportation. After all, the record of safety that radmat transportation has largely enjoyed is not built on robust casks and regulation alone. Many human choices fill the gulf between what has been, and what may yet be. The WIEB policy papers seek to inform these human choices using the history and experiences that have brought us to now. The policy papers that have come out of the HLRW Committee's consensus work have been adopted by the WIEB Board, and generally endorsed by the Western Governors' Association. This presentation would briefly describe the policy formulation process, then summarize some of the policy recommendations contained within the adopted papers. Titles of some policy papers include: "The WIPP Transportation Model and its Application to SNF/HLW Transport"; "Social Risk"; and "Physical Protection Requirements for SNF Transport."

**Main text:**

Since the beginning of nuclear power generation in the United States, there has been the assumption and expectation that at some point in time, spent nuclear fuel (SNF) would be transported from the reactors to a final disposal site. That assumption has continued through the decades, though the time frame for when this might begin has repeatedly slipped.

Throughout this time, it has been clear to Western states that other regions of the country fully expect the disposal facility to be located in the West. The federal government has generally seemed to endorse that premise.

For more than 20 years, the U.S. Department of Energy (DOE) studied the viability of constructing a deep geologic repository in the West, at Yucca Mountain in Nevada. Though the Obama Administration cancelled the Yucca Mountain project, legal rulings and Congressional action may yet again lead to active consideration of the site over the next several years.

With the delays in getting a disposal facility operating, two private-led ventures, both in the West – one in New Mexico and the other in west Texas – have begun to pursue hosting a facility for interim storage of SNF. DOE, meanwhile, began a process to seek voluntary host sites for storage and disposal of both SNF and high-level radioactive waste (HLW). That process has since been shelved.

The vast majority of commercial SNF is generated east of the Mississippi River. Transporting the SNF to a Western site would place disproportionate transportation impacts upon the Western and corridor states.

Recognizing these potential impacts, Western states, through the Western Interstate Energy Board's High-Level Radioactive Waste Committee, have engaged with DOE since the 1980s to develop an acceptable transportation program for SNF and HLW. Western states have considerable experience in working with other DOE programs on the development of a large-scale radioactive material transportation program. Western state representatives worked closely with DOE throughout the 1990s to develop a comprehensive transport safety program for the safe transport of transuranic waste to a deep geologic repository near Carlsbad, New Mexico. Since 1999, more than 11,900 shipments of transuranic waste have safely traversed Western states on their way to the Waste Isolation Pilot Plant (WIPP), before an accident at the site closed it in early 2014. Shipments subsequently resumed in early 2017. Thousands more shipments will travel Western highways before WIPP eventually closes. That experience provides the Western states with expertise in planning ahead for SNF/HLW shipments.

The High-Level Radioactive Waste Committee, working with other state regional groups and affected Native American tribes, is qualified to assist DOE or any federal or private management entity in developing a comprehensive transport safety program for SNF and HLW.

As a result of its previous and current interactions with DOE as well as its experience with transuranic waste and other radioactive materials shipments, the High-Level Radioactive Waste Committee has collectively developed and agreed to nine major policy positions related to SNF and HLW transport as of 2018. These policies have been presented and adopted by the WIEB Board. In addition, the 2017 papers were endorsed by the Western Governors'

Association in WGA Policy Resolution 2018-10: Transportation and Disposal of Radioactive Waste, Radioactive Materials, and Spent Nuclear Fuel.

Two of these nine policies follow, and cover these topics: the application of the WIPP transport model to SNF/HLW transport, and social risk. The other policy papers address the following topics: physical protection requirements for SNF transport; shipping oldest fuel first; implementing a program to support state and federal rail inspectors; developing a process for robust and consistent inspections of rail shipments; subjecting SNF transportation rail and truck casks to full-scale cask testing; creation of an origin site transportation coordination working group; and the proper procurement of state and local funding for development and implementation of a SNF/HLW transportation system.

Additional policy statements related to other aspects of SNF shipment planning will be developed by the High-Level Radioactive Waste Committee in the coming year, and presented to the WIEB Board for their adoption.

## High-Level Radioactive Waste Committee Position Paper

### The “WIPP Transportation Model” and Its Application to SNF/HLW Transport Number 2017-1

Version: Final, September 2017  
Date Adopted by WIEB: December 20, 2017

#### Statement of Policy

DOE should work collaboratively with Western states to develop a comprehensive transport safety program for the shipment of spent nuclear fuel and high-level radioactive waste (SNF/HLW) to consolidated storage sites and/or a repository. A previous collaboration resulted in the development of a highly-regarded transport safety program for shipments of transuranic waste to the Waste Isolation Pilot Plant (WIPP).

#### Background and Context

##### 1. The Western Governors’ policy: use the WIPP process.

The policy of the twenty-one Western Governors provides that: “The WIPP Transportation Safety Program Implementation Guide is an excellent model for transportation planning, and a similar guide should be used as a base document for DOE transportation programs for shipments of spent nuclear fuel, High-Level Waste, and/or Greater Than Class C (GTCC) waste to any storage and/or disposal facility.”<sup>1</sup>

##### 2. The Blue Ribbon Commission recommendation: WIPP provides a “successful model.”

In its January 2012 final report, the Blue Ribbon Commission (BRC) strongly recommended the WIPP transportation program as a model for federal partnership with states, recognizing that “[t]he WIPP facility.....provides a longstanding and highly successful model for partnering with states to achieve shared success in addressing issues related to the transport of nuclear materials.”<sup>2</sup> The BRC found that: “States have extensive experience with transportation issues and important roles to fulfill with respect to issues such as routing, inspections, training, emergency preparedness, communications, public information and security for radioactive materials and other hazardous shipments.”<sup>3</sup>

##### 3. The WIPP transportation planning process.

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<sup>1</sup> Western Governors’ Association Policy Resolution 2016-03.

<sup>2</sup> BRC Report to the Secretary of Energy, Jan. 2012, pg. 85.

<sup>3</sup> Ibid.

The “WIPP transportation model” is fully documented in the Western Governors’ Association (WGA) WIPP Transportation Safety Program Implementation Guide. Two early WGA reports not only created the foundational program concepts, but demonstrated that the WIPP experience should be used to prepare for future large-scale shipments of SNF, HLW, and other radioactive materials. These WGA reports include the following:

- Report to Congress: Transport of Transuranic Wastes to the Waste Isolation Pilot Plant—State Concerns and Proposed Solutions, June 1989.
- Report to the Western Governors and Secretary of Energy: Safe Transport of Transuranic Wastes to the Waste Isolation Pilot Plant, June 1991.

Key elements of the “WIPP transportation model”:

- High-level negotiators represented DOE consistently throughout the process.
- The Western state negotiators were persons with both extensive experience in hazardous materials transport and access to their governors; these negotiators were supported with federal funding so as to make the negotiations a priority and a substantial portion of their jobs.
- The focus of the negotiations was to ensure “safe and uneventful transportation” of transuranic waste, through provisions addressing routing, state inspections, bad weather and road conditions, high quality carriers and drivers, emergency response and emergency response training, notifications and communications, contingency planning, safe parking, carrier audits, and public information.
- Recognizing a heightened public interest in such a large and prolonged radioactive materials transport campaign, the Western states insisted that DOE go beyond minimum federal requirements for many elements of the WIPP transportation program, and adopt extra-regulatory accident prevention and emergency response measures. DOE eventually agreed.
- Full-scale cask testing of the TRUPACT-I and TRUPACT-II transport casks was an important step in establishing credibility for the program.
- The need for casks to be certified by the Nuclear Regulatory Commission (NRC).
- Western states and DOE cooperatively developed a risk communication program including protocols for public information response to accidents and incidents.
- The states’ willingness to endorse the WIPP transport safety program was critical in establishing public confidence and reducing opposition to the shipments.

#### **4. The success of the WIPP transportation program.**

- More than 11,900 shipments of transuranic waste have been transported safely to WIPP. All of the dozen or so transport incidents that have occurred have been minor. Emergency response has been quick and effective.
- Biennial reviews of the program by the Western states have consistently found it to be a successful system for safely transporting transuranic waste.

**5. Significant differences between rail and highway shipments must be addressed.**

As the Western states and DOE discovered in 2003-2004 while looking to adapt the WIPP transport program to support WIPP shipments by rail, there are significant differences between the two transport modes. That rail shipments occur on privately owned property instead of in the public right-of-way is just one of the many fundamental differences. These differences must be recognized and accounted for, while still maintaining the integrity of a collaborative process to develop the transport program.

## **Proposed Policy Recommendations**

**1. Use the WIPP transport safety program as a starting point to develop a commensurate transport safety program for rail.**

Despite the differences between highway and rail, the common-sense principles embedded in the WIPP transport program are also relevant for SNF/HLW shipments: well-maintained equipment; well-trained and experienced crew; rigorous independent inspections; using the best routes and focusing training along those routes; providing advance notification and shipment tracking to the states; and, having provisions in place for bad weather or other off-normal occurrences.

**2. Follow the WIPP model as closely as possible for highway shipments of SNF/HLW.**

Some shipments of SNF/HLW must be transported by highway instead of rail. Security restrictions related to SNF/HLW transport will require some changes in terms of shipment schedule availability and access to shipment tracking, but otherwise the WIPP program should be readily adaptable to SNF/HLW shipments by highway.

**3. Commit to a collaborative approach to develop a rail transport safety program.**

The WIPP experience provides the best model for negotiating and conducting large-scale SNF/HLW transportation operations. Its key feature is that high-level federal and state personnel were appointed to negotiate and achieve consensus on the transportation program, and were provided the authorization, funding support and time to work through the details.

**4. Consistent with the Western Governors' charge to their staffs for WIPP, develop and maintain a transport program that is "safe and uneventful" for SNF/HLW transport.**

For the WIPP transport safety program, DOE eventually agreed to extra-regulatory requirements for all WIPP shipments. These requirements reduce the likelihood of an accident occurring and help provide for a more efficient and robust response if an accident does occur. Relying strictly on existing regulations and the integrity of the casks is not sufficient to achieve "safe and uneventful" transport.

## High-Level Radioactive Waste Committee Position Paper

### Social Risk Number 2018-1

Version: Amended, August 2019  
Date Adopted by WIEB: November 6, 2018

### Statement of Policy

Before undertaking any large-scale spent nuclear fuel or high-level radioactive waste (SNF/HLW) shipping program, the U.S. Department of Energy (DOE), or any new management entity, must anticipate, identify, and actively mitigate “social risks” that will potentially impact shipment activities. The success of a shipping program may depend as much on the management of social risks as radiological risks.

### Background and Context

- 1. Public concerns about the safety and security of SNF/HLW shipments result in social risks.**  
The success of a large-scale shipping campaign must address public concerns about nuclear waste safety and security. These public concerns are the framework within which a transportation program must function. They are the result of social processes that are hard to predict, quantify, and measure. As a result, the communication and stakeholder engagement standards for an organization shipping spent nuclear fuel and high-level radioactive waste are extremely high. Every aspect of the transportation program must be of extremely high quality, and be perceived as such, by the affected public.
- 2. The stigma associated with radioactive materials is well-documented.**  
The mere mention of nuclear waste conjures up images of pollution and contamination, and triggers fears of mutation, illness, and death. These associations have resulted in social processes that impact radioactive waste management. The National Academy of Sciences (NAS) Committee on Transportation of Radioactive Waste 2006 report labeled these social processes and human perceptions as “social risk.”<sup>4</sup> One manifestation of social risk is that the stringent regulatory framework surrounding the transportation of radioactive materials is not sufficient to address all of the social processes that result in public concern.

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<sup>4</sup> “*Going the Distance: The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*,” National Research Council, 2006, pg. 333.

**3. Even routine shipments can result in impacts.**

According to the NAS, routine shipments can have both direct socioeconomic (loss of economic or social well-being) and perception-based impacts (increased stress and anxiety and associated illness; loss of property values; and reduced economic activity).

**4. Accidents would likely result in greater impacts.**

Severe accidents involving nuclear waste shipments could result in direct socioeconomic impacts (temporary loss of transportation route use, and associated business disruptions, such as loss of tourism) and a range of perception-based impacts. In particular, accidents could result in the social amplification of the adverse impacts of routine operations, including stigmatization of people and places, and in loss of trust and confidence in government and government agencies.<sup>5</sup> This could potentially result in a moratorium on transportation operations and increased program costs.

**5. Social risks are difficult to measure, hard to quantify, and vary over time and within populations.**

Despite these problems, there is a robust body of research that has analyzed perceptions of and responses to radioactive waste topics, focusing on social risk. The NAS provides a useful review of some of this research in their 2006 report.<sup>6</sup> Any agency seeking to ship large quantities of SNF/HLW across the country for an extended period of time should draw on this research in devising a transportation program in order to mitigate some of these social risks.

**6. A social risk program could help identify and effectively respond to problems.**

A program of this type may effectively reduce or ameliorate the processes which can lead to program delay or cancellation. Another goal of a social risk program is to inform the management of a shipping program about the importance and significance of social risk. It may also create a conduit for effective interactions between the management organization and its stakeholders.

## **Proposed Policy Recommendations**

**1. Any agency planning a large-scale spent nuclear fuel or high-level radioactive waste shipping campaign should follow the NAS recommendations regarding social risks.**

The NAS made two specific recommendations for the DOE repository transportation

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<sup>5</sup> Id. at pp. 112, 151.

<sup>6</sup> Id. at pp. 154-161.



program: expand the membership and scope of an existing advisory group<sup>7</sup> to obtain outside advice on social risk, including impacts and management; and, establish a *transportation risk advisory group* that is explicitly designed to provide advice on characterizing, communicating, and mitigating social, security, and health and safety risks that arise from the transportation of spent nuclear fuel and high-level radioactive waste to a federal repository or interim storage facility. The NAS suggested that the current Nuclear Waste Technical Review Board could be broadened to serve this function after repository operations begin.<sup>8</sup>

**2. The social aspects of nuclear-related activities should not be minimized.**

The NAS expert consensus report made this general recommendation: “Transportation implementers should take early and proactive steps to establish formal mechanisms for gathering high-quality and diverse advice about social risks and their management on an ongoing basis.”<sup>9</sup>

**3. Information from past and current transportation programs should be examined for lessons learned and meaningfully incorporated into the new program.**

The collaboratively developed state and DOE Waste Isolation Pilot Plant (WIPP) transportation program incorporated a number of common-sense elements that have helped reduce public anxiety about these shipments. This includes stringent requirements for the drivers and trucks; requirements for avoiding certain hazardous road and weather conditions; extensive training of emergency responders and public officials along the transport routes; and full-scale testing of the transportation casks. We suggest, as did the Blue Ribbon Commission on America’s Nuclear Future, that using the WIPP Program as a model would be useful in designing the SNF/HLW transportation program.

**4. Information from DOE’s consent-based siting hearings should be incorporated into the program.**

DOE conducted a series of public meetings with stakeholders and communities around the country to seek feedback and inform future efforts. In its draft report on the consent-based siting process, DOE acknowledged that social considerations are important in siting a nuclear waste management facility and offered potential options for dealing with these factors. Those DOE draft report findings, gleaned from public hearings and written comments, should be considered in developing the strategy to address the social risk in transportation of SNF/HLW.

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<sup>7</sup> At the time of the NAS recommendations, that group was the Transportation External Coordination Working Group. It has since been replaced by the National Transportation Stakeholders Forum.

<sup>8</sup> *Id.* at 11.

<sup>9</sup> *Ibid.*