

**Proceedings of the 19th International Symposium on the
Packaging and Transportation of Radioactive Materials
PATRAM 2019
August 4-9, 2019, New Orleans, LA, USA**

**The Potential Role of the Department of Homeland Security in the Transportation of
Commercial Spent Nuclear Fuel (#1399)**

Kathleen Capstick

Northeastern University - Master's Program in Homeland Security, Boston, MA, USA

ABSTRACT

Over 80,000 metric tons of commercial spent nuclear fuel (SNF) is stranded at more than 100 operating and/or decommissioned nuclear power reactor sites across the United States – and that volume increases every year. Federal law, enacted in the 1980's, mandated that the U.S. Department of Energy (DOE) build a permanent repository in Nevada; transport SNF from reactor sites to this repository; and under Section 180(c) of the Nuclear Waste Policy Act (NWPA) DOE would act as the primary federal agency responsible for providing training and support to states and tribes through whose jurisdictions the SNF would be transported. However, Congress has been deadlocked for years on how to move forward on a national nuclear waste management program and is continuing to provide no direction or funding to DOE.

Two private companies have applied to the Nuclear Regulatory Commission (NRC) to build temporary consolidated interim storage facilities (CISF) in New Mexico and West Texas; take title to the SNF at shutdown reactor sites; and privately transport the material to these facilities. If these applications are approved by the NRC, CISF's could be operational and start accepting commercial SNF in the next three to five years. As long as the private companies comply with federal regulations required by NRC and DOT with regard to transporting SNF, they can transport commercial fuel to CISF's outside of the NWPA - and therefore without the involvement of DOE.

In order to ensure state, local, tribal, and territorial (SLTT) governments are prepared to assist with the private transport of SNF through multiple jurisdictions, the Department of Homeland Security (DHS) needs to be prepared to be the primary federal agency supporting SLTT jurisdictions. As mandated by the 2013 Presidential Policy Directive 21 and the 2015 DHS Nuclear Sector Specific Plan, DHS is mandated to work with SLTT entities and take proactive steps to manage risk and strengthen security of the nation's critical infrastructure nuclear sector. This paper will analyze several potential near-term transportation scenarios and provide a recommended DHS action to address SLTT emergency preparedness for potential private shipments of commercial SNF across the country.

INTRODUCTION

Over 80,000 metric tons of commercial spent nuclear fuel (SNF) sits idle at more than 100 operating and/or decommissioned nuclear power reactor sites across the United States. The volume of SNF stranded at these reactor sites is increasing every year and nuclear utility companies and their host communities and states want it removed. Federal law, enacted in the 1980's, mandated that the U.S. Department of Energy (DOE) build a permanent repository in Nevada, transport SNF from reactor sites to this repository, and provide training and support to

jurisdictions impacted. To date, none of that has happened. Two private companies have applied to build temporary consolidated interim storage facilities (CISF),¹ which could take title to the SNF at shutdown reactor sites and transport the material to these facilities without DOE involvement. If these applications are approved by the NRC, CISF's could be operational and start accepting nuclear waste in the next three to five years. In order to ensure state, local, tribal, and territorial (SLTT) governments are prepared to help safely transport SNF through multiple jurisdictions, the Department of Homeland Security (DHS) needs to fund emergency preparedness training for these governments. As mandated by Presidential Policy Directive 21 (PPD-21) and the 2015 DHS Nuclear Sector Specific Plan, DHS is mandated to work with SLTT entities to manage risk and strengthen security of the nation's critical infrastructure nuclear sector. This paper will analyze three alternative actions DHS can take to address needed emergency preparedness training for large-scale shipments of SNF across the country.

BACKGROUND

Nuclear Waste Policy Act and the Standard Contract

Generating nuclear power creates what is known as spent nuclear fuel (SNF) and more than 2,000 metric tons of it is produced each year. SNF must be permanently isolated “and the scientific consensus has consistently maintained that isolation in a deep, geological repository is the best path forward.”² In 1982, Congress enacted the Nuclear Waste Policy Act (NWPA) that established a federal obligation for the Department of Energy (DOE), in collaboration with the Nuclear Regulatory Commission (NRC) and Department of Transportation (DOT), to begin removing and safely transporting SNF from commercial nuclear power reactor sites across the nation to a permanent geological repository. The NWPA, as amended in 1987, mandated that by January 1998 DOE would build a permanent repository at Yucca Mountain, Nevada, take title of the SNF at the reactor sites, and begin to transport the nuclear waste. Further, as laid out in Section 180(c) of the NWPA, DOE would act as the primary federal agency responsible for providing training and support to states through whose jurisdictions the SNF would be transported.

The NWPA established the Nuclear Waste Fund (NWF) to collect fees from ratepayers for the electricity generated from commercial nuclear power plants to fund the construction and transportation mandates. In accordance with the NWPA, DOE entered into the Standard Contract for the Disposal of SNF and/or High-Level Radioactive Waste (10 CFR 961) between the nuclear utilities and the Federal government.³ While over \$40 billion (including interest) has been collected to fund the large-scale shipment and disposal of SNF, Congress has not allocated these funds to DOE as originally intended due to differences between the Senate and the House on the policy direction to be taken, leaving everything, including the SNF, at a standstill.

After the 1998 deadline was missed, nuclear utility companies filed suit against DOE because it had not met the legally required terms of the Standard Contract and had not started to remove the SNF. Through multiple court cases in the U.S. Court of Federal Claims and the U.S. Court of Appeals, DOE “was ultimately held in partial breach of contract and ordered to pay financial damages to the utilities.”⁴ The damages awarded have reimbursed the utilities for the costs associated with storing SNF onsite, and the Courts “directed that the damages were to be paid out of a specific Treasury Department account, known as the Judgement Fund, which pays all claims against the Federal government, rather than out of the Nuclear Waste Fund.”⁵ The Judgement Fund is financed by taxpayer dollars and to date the estimated liability to the U.S. taxpayers is over \$34 billion. In short, taxpayers are carrying and will continue to carry the

financial burden of DOE not removing the SNF, after electric rate payers have already paid fees to fund the permanent disposal of commercial SNF.

Emergence of Consolidated Interim Storage Facilities (CISF)

Because Congress has remained deadlocked for several sessions on how to move forward with reestablishing the Yucca Mountain program, private companies have looked to remove the SNF from shutdown and operating nuclear power plant sites and alleviate the burden of having to indefinitely store the SNF on power plant sites. Currently two private companies are proposing to license a consolidated interim storage facility (CISF) which would move the SNF from nuclear power plant sites to a centralized temporary facility in a remote location that is not co-located with a nuclear power plant. These companies are looking to develop a CISF in West Texas (Interim Storage Partners, Inc.) and Southeast New Mexico (Holtec International) and have submitted license applications to the NRC which are moving forward and could be approved as soon as 2020.⁶

The NRC Atomic Safety and Licensing Board (ASLB) held a hearing in January of 2019 in Albuquerque, New Mexico on the license application submitted by Holtec International regarding the standing of the petitioners and the admissibility of their proposed contentions. On May 7, 2019, the ASLB issued a decision concluding that while some of the petitioners met the qualifications for standing, the nearly 50 contentions raised were not admissible for an evidentiary hearing as they were either not relevant to the application or did not establish a genuine dispute with aspects of the application.⁷ The Interim Storage Partners (ISP) application for the Waste Control Specialist CISF site in west Texas was submitted to the NRC in June 2018 and the same ASLB panel in the Holtec proceeding will adjudicate this application and has scheduled a hearing on standing and the admissibility of contentions for July 2019 in Texas.⁸ To further reinforce the potential of private transportation of SNF to a CISF location, the Nuclear Energy Institute (NEI) will be conducting a SNF transportation table top exercise on May 21, 2019, using a private shipment model – with no DOE involvement – to a hypothetical CISF location on the Texas or New Mexico border.⁹

As long as the applications are approved and the private companies comply with the regulations required by NRC and DOT with regard to moving SNF, they can begin transporting fuel to CISF's in the near future, without the involvement of DOE. Additionally, these private companies intend to purchase shutdown nuclear power plants and take title to the SNF, which would enable them to potentially continue to sue DOE for breach of the Standard Contract. The NWPA, as amended, required that DOE begin in January 1998 to transport and dispose of the SNF in a permanent repository at Yucca Mountain, Nevada and did not anticipate the movement of SNF to temporary CISF's. Thus, if private companies take title and move the SNF on their own, the NWPA would not apply, DOE would not be involved, and consequently DOE would not provide necessary emergency preparedness training to SLTT governments under Section 180(c) of the NWPA.

The Role of DOE and the States/Tribes in Transporting Commercial SNF

Over the past several years DOE's Office of Nuclear Energy (DOE NE) has, in preparation for the eventuality of DOE moving SNF, conducted preliminary evaluations for the removal of SNF from shut down nuclear reactor sites. These evaluations identified the site related transportation infrastructure needs and actions that DOE would need to undertake in order to remove the SNF. The evaluation, conducted in 2017, estimated that DOE would need

11.5 to 14.5 years to prepare for and remove the used nuclear fuel from nine shutdown reactor sites.¹⁰ These evaluations were developed “based on the assumption that DOE would be responsible for shipping used nuclear fuel... from the shutdown sites” to a permanent repository at Yucca Mountain, Nevada and clarified that these actions “might differ if a private entity were responsible for the shipping of the used nuclear fuel.”¹¹ The DOE continues to conduct these preliminary evaluations of removing the SNF stored at shut down nuclear power plant sites.¹²

SLTT governments play a critical role in the development and maintenance of a comprehensive SNF transportation emergency preparedness program. The Western Interstate Energy Board High Level Radioactive Waste Committee clearly states that, “any shipment program must contain provisions to ensure that funding is provided, at a minimum, to meet the needs of states and tribes, including but not limited to: preparedness including planning, training, inspections, public information, shipment monitoring, equipment acquisition, security, and so forth”.¹³

One of the more important reasons that providing preparation to state and local governments is a vital component in the planning for the shipment of SNF is the challenges these governments will face regarding the public's perception of risk as it relates to transporting commercial SNF. According to a nuclear energy industry professional, “the public perceives the consequences of a serious nuclear reactor [or waste] accident to be catastrophic in magnitude. [The public] is not dissuaded, nor does it feel comfortable with the calculations of such an event’s low probable occurrence. The nuclear industry, however, relies heavily upon the low probability figures and thus its perception of nuclear safety based on the calculated risk (consequence times probability) is significantly lower than the public’s”.¹⁴

The NRC has conducted multiple studies over the past 40 years, examining the risks associated with transporting commercial SNF and found the risk to the public would be very low. The study conducted in 2014 found that “there is less than a 1 in a 1 billion chance that radioactive material would be released in an accident [and] if an accident did release radioactive material, the dose to the most affected individual would not cause immediate harm.”¹⁵ However, “public perception of risk [does] not necessarily reflect actual or estimated levels of risk.”¹⁶ SLTT governments will need to not only be able to properly educate and communicate with the public in regard to the actual or estimated risk of transporting SNF, but also be prepared to handle potential hazards or emergencies when SNF is being transported through their jurisdiction. Without the federal government upholding its obligation to provide necessary training and support to SLTT governments, and with no other statutory requirement that the federal government is mandated to provide this training, state and local governments across the nation will not be prepared to support the large-scale shipments of SNF and communications with the public.

ANALYSIS OF POTENTIAL DHS ACTIONS

Action 1: The Department of Homeland Security does not need to change its current role regarding the preparation of states for the transportation of commercial SNF.

As mandated by Presidential Policy Directive 21 (PPD-21), the Secretary of Homeland Security established the Nuclear Reactors, Materials, and Waste Sector (or Nuclear Sector) as a DHS critical infrastructure sector in 2003. As the federal agency responsible for the Nuclear Sector, DHS is involved with aspects of managing onsite risks at commercial nuclear power plants, but not when commercial SNF is being transported. According to state emergency response officials involved with the transportation of high-level radioactive waste in the

Northeast, DHS will only have a peripheral role in the shipment of commercial SNF. Other than being notified that movement of SNF may take place, no other role is required of DHS.¹⁷

DHS's critical infrastructure Nuclear Sector Specific Plan, released in 2015, assesses the nuclear sector-specific threats, vulnerabilities, and "consequences to enable a risk-informed approach to security and resilience enhancements."¹⁸ This report, however, does not clarify the role that DHS plays specific to the transport of commercial SNF. When referencing transportation of commercial SNF, the report explains the roles of other federal agencies, specifically referencing Section 180(c) of the NWPA, as amended, that directs DOE to provide emergency preparedness training to SLTT governments for transporting of commercial SNF.¹⁹

Congress has not provided DOE with nuclear waste program direction this session or funding in the FY 2019 Energy & Water Development Appropriations bill. Private companies are awaiting approval from the NRC of their license applications to build CISF's. Thus, the current status of commercial SNF is that it is stored at various secured sites across the nation with no immediate plans to move any of it. Assuming there is no change to this current status, and no movement of commercial SNF, DHS's nuclear critical infrastructure sector can maintain its current role and will require no additional resources to maintain its current level of minimal involvement. DHS and the Federal Emergency Management Agency (FEMA) would only become involved if an incident or disaster were to take place onsite at a nuclear power plant. The disadvantage of the status quo going forward and with DHS maintaining its current uninvolved role, is that states will not receive federal training and preparedness support to deal with the future private transportation of commercial SNF through their jurisdictions.

Action 2: DHS's Nuclear Sector should actively monitor the ongoing status of the two applications to build CISF's by private companies in West Texas and Southeast New Mexico.

The NRC has indicated that the two CISF license applications could be approved by 2020 and if approved, the private companies could begin privately transporting SNF in the next three to five years. Monitoring the status of the applications is essential, because even if Congress manages to resolve its current policy gridlock and allocate funding to DOE, the NWPA Section 180(c) funds are only available for a NWPA- authorized facility. The NWPA only requires that DOE be involved with taking title and transporting commercial SNF for to a permanent repository at Yucca Mountain, Nevada. Unless there is legislation authorizing DOE with regard to consolidated interim storage, DOE would not be involved with transporting SNF to a CISF site. With nothing more than the required regulatory notifications of plans to transport SNF, state and local governments will have no mechanism to receive the training and support they need. According to industry professionals, private companies will only be required to comply with NRC and DOT regulations of transporting nuclear waste and even assuming Congress provides DOE with authorization and allocates funding, DOE's timeline of preparation will not align with the potential of SNF moving in the next three to five years.²⁰ As noted previously, DOE's estimate of the time it would need to prepare for and remove the SNF from shutdown reactor sites ranged from 11.5 to 14.5 years. The private companies are not going to wait for DOE to be prepared to transport the fuel if they can do it themselves within the next three to five years.

Up until the recent license applications, CISF's were not considered viable temporary solutions to removing the SNF stranded at reactor sites across the nation. Most state emergency management agencies were operating under the impression that if and when commercial SNF was transported within their jurisdictions, DOE would be responsible for both the transportation and providing them with the necessary advance training to handle both potential emergencies

and the public's perceptions of the risks involved with shipping large quantities of commercial SNF. In fact, because in 2017 DOE curtailed some of the limited support it was providing to the states for commercial SNF related transportation, the state regional groups wrote to DOE requesting reconsideration of that decision. The letters from the Council of State Governments Eastern Regional Conference, the Council of State Governments Midwestern Office, the Tribal Radioactive Materials Transportation Committee, and the Nuclear Waste Strategy Coalition (NWSC), to the Assistant Secretary of DOE were not met with a positive response. In DOE's response letter, the Assistant Secretary indicated that once Congress provides DOE with a "more defined path forward for transporting SNF...additional meetings for collaborative planning with states and tribes and DOE participation in regional transportation meetings will be considered."²¹ Although DOE has restored support for some of those activities such as the National Transportation Stakeholders Forum and the SNF Rail/Routing Ad Hoc Working Group,²² the response underscores the fact that without Congressional direction and funding for DOE, there will be no sustained preparation provided by the federal government to SLTT governments with regard to shipping commercial SNF. With the introduction of CISF's as a possibility for private companies to begin moving the commercial SNF on their own, state emergency management agencies need to know how they will get the training they require, especially given that DOE has no statutory requirement to help with the transport to private CISF's. State regional groups "expect that all costs associated with preparation for and responding to the transportation of commercial [SNF]...to [a consolidated] interim storage facility or repository will be paid for by DOE (or any new management entity), whether through the Nuclear Waste Fund or other means of funding."²³ Another federal agency will need to take on the responsibilities of supporting the states for these large-scale private shipments and DHS needs to be monitoring what is happening in case it must become the federal agency to take over SLTT preparedness.

Action 3: DHS should update the 2015 Nuclear Sector Specific Plan to address the need for DHS to provide emergency preparedness support and training to SLTT governments for the private transportation of commercial SNF within the next 3 to 5 years.

As mandated by PPD-21, DHS "shall work with critical infrastructure owners and operators and SLTT entities to take proactive steps to manage risk and strengthen the security and resilience of the Nation's critical infrastructure, considering all hazards that could have a debilitating impact on national security, economic stability, public health and safety, or any combination thereof."²⁴ Even if DOE receives direction and funding from Congress, DOE's timeline for commercial SNF transportation readiness does not align with the nearer term schedule projected for the CISF facilities to become operational. Accordingly, if those license applications are approved in 2020, it will be the responsibility of DHS to be involved in the near term with the planning, training and preparation of the states regarding the transportation of commercial SNF. As the federal agency responsible for the Nuclear Sector, DHS must take on the responsibility of providing the support and funding to ensure that essential preparedness and training for SLTT governments is provided in advance of transporting commercial SNF.

DHS should update the 2015 Nuclear Sector Specific Plan to address the necessary procedures and/or protocols for how DHS will handle providing emergency preparedness training for SLTT governments in the event that commercial SNF is transported privately within the next three to five years. The current sector specific plan makes no mention of DHS's role with regard to the transportation of SNF and DHS needs to acknowledge that transporting commercial SNF is a fundamental element of the nuclear critical infrastructure sector that is not

being addressed in light of recent CISF developments. The current plan only addresses the roles that DOE, NRC and DOT play in the transportation of SNF and the plan makes the assumption that the NWPA will be in effect. Knowing that private companies could begin moving SNF on their own in three to five years, operating outside of the NWPA, DHS needs to prepare to fill the gap left by DOE and take on the responsibility of supporting SLTT governments.

SLTT emergency preparedness agencies do not have the funds necessary to prepare on their own for the transport of commercial SNF, which is planned to be moved predominately by private rail companies across the country and is different from the highway transportation of both the low and high-level radioactive material the states deal with currently. Even if they did have the capability of handling the emergency preparedness necessary for such large-scale shipments of commercial SNF, there will be challenges for these state agencies to coordinate with each other across the multiple changes in jurisdictions the shipments will make. In addition, each state has its own specific state protocols and regulations with regard to transporting radiological material, which will involve coordination by a federal agency.

In 2017, bipartisan legislation emerged out of the House Energy and Commerce Committee that would have amended the NWPA and enabled DOE to uphold its legal obligation of beginning to remove commercial SNF, provide SLTT governments with expanded transportation related training and support, and provide a path toward ending the taxpayer's liability for the federal government's breach of contract. Further, with DOE upholding its obligation and taking title to the SNF at reactor sites as intended under the NWPA, DOE would be able to follow Section 180(c) of the NWPA and provide state and local governments with transportation related training and preparation.²⁵ While the House overwhelmingly passed this legislation in 2018 on a bi-partisan vote of 340-72, the U.S. Senate did not hold a hearing on the bill and did not bring the legislation to a vote during the 115th Congressional session.²⁶ Once again, Congress remains at a standstill and state, local, tribal and territorial governments still have no mechanism to receive the preparedness training that they need.

If DHS takes on the responsibility of preparing SLTT governments for the transportation of commercial SNF, the benefits are that these governments will be prepared to handle potential accidents as well as address the public's perception of the transportation risk at the state and local level. The drawback is that DHS will require additional resources and funding in order to take on this task, which will likely involve Congressional appropriations.

CONCLUSION

This paper has analyzed three alternative actions that DHS can take to address emergency preparedness and training needed by SLTT governments for the potential large-scale shipments of commercial SNF across the nation. (1) DHS maintain its current peripheral role in the preparation for transportation of commercial SNF; (2) DHS actively monitor the ongoing status of the two applications to build CISF's with private transportation outside of the requirements of the NWPA; or (3) DHS take on the responsibility of providing the support and funding to ensure that essential preparedness training for SLTT governments is provided in the event of private transportation of commercial SNF to CISF facilities within the next three to five years.

Action 3 is the recommended course of action. DHS must take on the responsibility of providing the necessary emergency preparedness training to SLTT in advance of the potential private transportation of commercial SNF. In order for action 3 to be successful, DHS must update the 2015 Nuclear Sector Specific Plan to address the procedures and/or protocols for how DHS will meet its mandate to ensure the necessary emergency preparedness to SLTT

governments in the event that commercial SNF is privately transported. DHS also needs to reallocate its programmatic funding priorities or request additional appropriations in its next budget request to Congress in order to fund the transportation planning, procedures, protocols, and training necessary to protect the public that need to be in place well in advance of the potential private transportation of commercial SNF to CISF's. DHS is a federal agency positioned and prepared to manage the coordination of state, local, tribal, territorial and federal resources to ensure the safe private transport of commercial SNF across the nation. Additionally, DHS is an agency that is well equipped to help communicate with the public regarding the risks of transporting commercial SNF, both real and perceived. As mandated by PPD-21 and the 2015 DHS Nuclear Sector Specific Plan, DHS is required to work with SLTT entities to manage risk and strengthen security of the Nuclear Sector of the nation's critical infrastructure and action 3 falls within these mandates.

ACKNOWLEDGEMENTS:

I would like to thank the following people who took the time to help me understand the history and current status of efforts to move spent nuclear fuel and to share their observations of the political, economic and public safety complexities involved with this issue: Theodore Fisch, Chief of Radiological Emergency Preparedness Program, NYS Homeland Security and Emergency Services, Office of Management; John Giarrusso, Jr., Planning & Preparedness Division Chief, Massachusetts Emergency Management Agency; Rich Janati, Chief, Division of Nuclear Safety Pennsylvania Dept. of Environmental Protection, Bureau of Radiation Protection; Uldis Vanags, Council of State Governments Eastern Regional Conference Project Director, Northeast High-Level Radioactive Waste Transportation Project; and of course, my father, Robert W. Capstick, Director of Government, Public and Regulatory Affairs for Yankee Atomic Electric Co. and Connecticut Yankee Atomic Power Co., who first introduced me to this field when he showed my brother and I, a 2001 VHS recording on the safe transportation of spent nuclear fuel. I would also like to thank my professor at Northeastern University, David Hagen, JD, an assistant teaching professor in the graduate Security Domain, 2017-2018 Teaching Inquiry Fellow with the Northeastern Center for Advancing Teaching and Learning Through Research (CATLR), 2018-2019 Faculty Scholar, and retired Navy Captain where he held four commands, and was assigned to the Strategic Studies group as a policy analyst. He encouraged me to take on this issue, guided my research and advised on my presentation.

REFERENCES

- ¹ U.S. Nuclear Regulatory Commission. (2018, August 15). *Consolidated Interim Storage Facility (CISF)*. Retrieved from <https://www.nrc.gov/waste/spent-fuel-storage/cis.html>
- ² United States. Cong. House. Committee on Energy and Commerce. (2017, October 19). *Nuclear Waste Policy Amendments Act of 2017*. 115th Congress. H.Rept.115-355. p 16 Retrieved from <https://www.congress.gov/115/crpt/hrpt355/CRPT-115hrpt355-pt1.pdf>
- ³ Department of Energy. (2018). *Office of Standard Contract Management*. Retrieved from <https://www.energy.gov/gc/services/environment-and-nuclear-programs/office-standard-contract-management>
- ⁴ United States. Cong. House. Committee on Energy and Commerce, p 24.
- ⁵ Ibid

-
- ⁶ U.S. Nuclear Regulatory Commission. (2018, August 15). *Consolidated Interim Storage Facility (CISF)*. Retrieved from <https://www.nrc.gov/waste/spent-fuel-storage/cis.html>
- ⁷ U.S. Nuclear Regulatory Commission. (2019, May 7). *NRC Atomic Safety and Licensing Board Denies Evidentiary Hearing on Holtec International's Proposed Spent Fuel Storage Facility in New Mexico*. Retrieved from <https://www.nrc.gov/reading-rm/doc-collections/news/2019/19-021.pdf>
- ⁸ US Nuclear Regulatory Commission (2019, May 7), Atomic and Safety Licensing Board: *Docket No. 72-1050-ISFSI, ASLBP No. 19-959-01-ISFSI-BD01 Order In the Matter of Interim Storage Partners LLC (WCS Consolidated Interim Storage Facility)*
- ⁹ Richter, Mark A., (2018, December). "Used Fuel Transportation Tabletop Exercise: An Overview"[PowerPoint slides]. Presented at the Nuclear Regulatory Division of Spent Fuel Management Regulatory Conference.
- ¹⁰ Department of Energy, Office of Nuclear Energy. (2017, September). *Preliminary Evaluation of Removing Used Nuclear Fuel from Shutdown Sites*. p v. Retrieved from https://www.energy.gov/sites/prod/files/2018/06/f53/ne-Shutdown_Sites_Report_Sept2017.pdf
- ¹¹ Ibid.
- ¹² Maheras, Steve, et.al. (2019, April 16). *Evaluations of removing SNF from shutdown nuclear power plant sites in the US*. Paper presented at the American Nuclear Society International High Level Radioactive Waste Management Conference, Knoxville, Tennessee.
- ¹³ Western Interstate Energy Board. (2018, November 6). *High Level Radioactive Waste Committee Position Paper*.
- ¹⁴ Energy Research Group. (1979, October). *Concepts and Public Perceptions of Risk in Contemporary Society*. Waltham MA, Energy Research Group, Inc. p 21.
- ¹⁵ U.S. Nuclear Regulatory Commission. (2017, February). *Safety of Spent Fuel Transportation*. p 6. Retrieved from <https://www.nrc.gov/docs/ML1703/ML17038A460.pdf>
- ¹⁶ Energy Research Group. (1979, October). *Concepts and Public Perceptions of Risk in Contemporary Society*. Waltham MA, Energy Research Group, Inc. p 2.
- ¹⁷ Interviews with experts:
Fisch, Theodore. (2018, November 26). Chief of Radiological Emergency Preparedness Program – NYS Homeland Security and Emergency Services, Office of Management.
Giarrusso, John Jr. (2018, November 19). Planning & Preparedness Division Chief - Massachusetts Emergency Management Agency.
Janati, Rich. (2018, November 16). Chief, Division of Nuclear Safety Pennsylvania Dept. of Environmental Protection – Bureau of Radiation Protection.
Vanags, Uldis. (2018, November 14). Council of State Governments Eastern Regional Conference Project Director - Northeast High-Level Radioactive Waste Transportation Project.
- ¹⁸ Department of Homeland Security. (2015). *Nuclear Reactors, Materials, and Waster Sector-Specific Plan: An Annex to the NIPP 2013*. p vi. Retrieved from <https://www.dhs.gov/sites/default/files/publications/nipp-ssp-nuclear-2015-508.pdf>
- ¹⁹ Ibid, p 47.
- ²⁰ Interviews with experts, *op cit*.
- ²¹ Department of Energy. (2018, July 6). *DOE Response letter to the Nuclear Waste Strategy Coalition*.

²² Bickford, Erika. (2019, April 22). *National Transportation Stakeholders Forum Newsletter: SNF Rail/ Routing Ad Hoc Working Group*

²³ Western Interstate Energy Board. (2018, November 6). *High Level Radioactive Waste Committee Position Paper*.

²⁴ The White House. (2013, February 12). *Presidential Policy Directive (PPD 21) -- Critical Infrastructure Security and Resilience*. Retrieved from <https://obamawhitehouse.archives.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil>

²⁵ United States. Cong. House. Committee on Energy and Commerce, *op cit*.

²⁶ Nuclear Waste Policy Amendment Act of 2018, H.R. 3053, 115th Cong. (2017)

Additional Research Materials:

Department of Homeland Security. (2013). *NIPP 2013: Partnering for Critical Infrastructure Security and Resilience*. Retrieved from <https://www.dhs.gov/sites/default/files/publications/National-Infrastructure-Protection-Plan-2013-508.pdf>

Dillon, Jeremy. (2018, October). *Failures of Congress Keep Nuclear Waste Scattered Across the US*. Retrieved from <https://www.rollcall.com/news/policy/failures-congress-nuclear-waste-scattered>

Federal Emergency Management Agency. (2018, November). *2018 National Preparedness Report*. Retrieved from <https://www.fema.gov/media-library-data/1541781185823-2ae55a276f604e04b68e2748adc95c68/2018NPRRprt20181108v508.pdf>

Kail, Benjamin. (2018, May). *Nuclear waste storage projects receives bipartisan boost*. Retrieved from <https://www.theday.com/article/20180512/NWS01/180519776>

Klaus, David. (2018, October). *Is less government the key to nuclear waste management?* Retrieved from <https://thehill.com/opinion/energy-environment/412039-is-less-government-the-key-to-nuclear-waste-managementD>

Nuclear Waste Policy Amendments Act of 2018, H.R. 3053. 115th Congress. (2018)

Nuclear Waste Strategy Coalition. (2018, April 16). *NWSC Letter to DOE Secretary Perry*.

Tribal Radioactive Materials Transportation Committee (TRMTC). (2018, January 10). *Letter to Principal Deputy Assistant Secretary for Nuclear Energy*.

United States. Cong. House. Committee on Energy and Commerce. *Nuclear Waste Policy Act of 1987*. 100th Congress. H.J.Res.395. Washington GPO, 1987

U.S. Nuclear Regulatory Commission. (2018, September 27). *Storage of Spent Nuclear Fuel*. Retrieved from <https://www.nrc.gov/waste/spent-fuel-storage/cis.html>

U.S. Nuclear Waste Technical Review Board. (2017, November 1). *Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*. Retrieved from https://www.nwtrb.gov/docs/default-source/facts-sheets/overview_snf_hlw.pdf?sfvrsn=15