**Nuclear-Free Takoma Park Committee**
**2023 Status Report on High-Level Radioactive Waste Transport in the U.S. Affecting the City of Takoma Park, MD**
**April 3, 2023**

**Summary: The Nuclear Regulatory Commission (NRC) is in the process of approving interim storage sites for high-level nuclear waste. While the process is in litigation, it is possible that one or more new sites will be approved in the near term. There is a parallel process for planning the transport of high-level waste to those sites. Such transport could potentially involve high-level nuclear waste being transported through or near Takoma Park and pose potential impact by radiological exposure. The Nuclear-Free Takoma Park Committee is monitoring the process and will keep the City advised of developments, including opportunities for the City to be involved in the planning and emergency response process.**

## I. Introduction

The Takoma Park Nuclear-Free Zone Act (NFZA) *establishes "the City as a nuclear-free zone in that work on nuclear weapons is prohibited and that harmful exposure to high-level nuclear waste is limited within the City limits."*[1]

The NFZA specifies in its "Findings":

"*The production of nuclear energy creates highly radioactive nuclear waste whose transportation through the City creates substantial risk to the public safety and welfare of the City*."[2]

The NFZA asks the Nuclear-Free Takoma Park Committee (NFTPC) to

"*make recommendations to the City Council … on how best to promote the safety and welfare of the City from harmful exposure to high-level nuclear waste*."[3]

This report updates the City on plans for the transportation of high-level radioactive waste as it potentially impacts Takoma Park residents.

## II. National High-Level Nuclear Waste Transport Status

### A. BACKGROUND

The NFZA expresses the City's concern over the risks to public health and safety arising from the transport of high-level radioactive waste (HLRW) from nuclear power stations and a potential shipment within or near city limits potentially involving

[1] Takoma Park City Code, Section 14.04.020, Purpose
[2] Ibid, Section 14.04.030, Findings, Part J
[3] The City of Takoma Park Advisory Committees, Chapter 2.16, Section 2.16.250, Article 8 (E), https://www.codepublishing.com/MD/TakomaPark/#!/TakomaPark02/TakomaPark0216.html#2.16.250

a severe accident, fire, or act of sabotage resulting in a large release of radiation that impacts city residents. These concerns are reasonably warranted and most recently highlighted by a series of railroad accidents involving hazardous materials in communities across the country. On February 3, 2023, the derailment of a Norfolk Southern train spilled toxic chemicals near East Palestine, Ohio that necessitated a "controlled burn" which received wide international media attention as thousands of frightened residents worried about their potential exposure to long-term health consequences. The Federal Railroad Administration reports that there were 1,164 derailments in 2022 across the country or roughly 3 derailments per day, although they are not usually disasters.[4]

The primary exposure paths to the Takoma Park public would come from the transport of irradiated nuclear fuel from at least the nuclear power stations at Calvert Cliffs in Lusby, Maryland and North Anna in Mineral, Virginia by way of the CSX railroad line and Washington Beltway near Takoma Park, MD.

These potential transportation routes were originally identified in 2002 by U.S. Department of Energy (DOE) Environmental Impact Statement analysis during earlier federal licensing proceedings for transportation routes for the siting of a permanent deep geological repository at Yucca Mountain, Nevada.[5]

Federal licensing of the Yucca Mountain deep geological repository project has been suspended. Yucca Mountain is the only named geological repository project in the nation although its future remains uncertain. However, the federal government, and the nuclear power industry continue to pursue a strategy to site long-term nuclear waste as originally legislated by Congress under the Nuclear Waste Policy Act of 1982.[6]

This strategy now includes the establishment of "consolidated interim storage facilities" (CISF). [7]

At present, there is neither a federally licensed /operational HLRW permanent storage or interim storage facility. Therefore, irradiated nuclear fuel is not being transported. In the meantime, the HLRW is being indefinitely stored on-site at the source of generation at commercial nuclear power stations in two modes.

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[4] "There are about 3 U.S. train derailments per day. They aren't usually major disasters," National Public Radio, March 9, 2023, https://www.npr.org/2023/03/09/1161921856/there-are-about-3-u-s-train-derailments-per-day-they-arent-usually-major-disaste

[5] U.S. Department of Energy (DOE) Final Supplemental Environmental Impact Statement (FSEIS) (2002) for the transport impacts of HLRW westward to Yucca Mt., NV including Maryland and District of Columbia highways and railroad route, Figure J-7, p.587 of 811: https://www.energy.gov/sites/default/files/EIS-0250-FEIS-02-2002.pdf .

[6] U.S. Nuclear Regulatory Commission (NRC), High-Level Radioactive Waste Disposal, NRC's Yucca Mountain Licensing Activities, https://www.nrc.gov/waste/hlw-disposal.html

[7] NRC, Consolidated Interim Storage of High-Level Radioactive Waste, https://www.nrc.gov/waste/spent-fuel-storage/cis.html

The first mode, “wet storage,” involves removing a portion of the irradiated fuel from the reactor core by remote controlled cranes at scheduled refueling outages for transfer underwater into the onsite “spent fuel pool.” That portion of fuel assemblies is stored in forty feet of water for cooling and radiation shielding inside the reactor complex but outside of the primary reactor containment structure. After a cooling period of at minimum three to five years, the still highly radioactive and thermally hot nuclear fuel assemblies are again moved underwater and loaded into a submerged, empty cylindrical steel cask in preparation for “dry storage” of the nuclear waste.

Once the dry cask is loaded to various capacities still shielded underwater in the pool, the cask lid is placed on the cask which is then removed from the pool, the cask is drained of water, the air pumped out and filled with helium, an inert gas which increases the passive transfer of heat through the cask steel wall for passive dry cooling of the extremely hot radioactive fuel. The cask lid is welded on and loaded into a ventilated concrete overpack before it is moved out of the reactor building onto the onsite “Independent Spent Fuel Storage Installation” (ISFSI) with other dry casks.[8] The dry casks are typically of different manufacturers, designs, sizes (up to 15 feet) and weights (150 to 200 tons each). The ISFSI is the default onsite storage system licensed for up to 100 years in 20-year NRC-licensed intervals. The environmental and biological threat from exposed irradiated nuclear fuel, however, far exceeds the projected design life of any of the current dry cask systems by tens of thousands of years.

With the present focus on on-site wet and dry storage, there has been no transportation of commercial HLRW to a permanent storage site.

In the absence of a permanent long-term nuclear waste management strategy or a licensed federal “interim” consolidated storage facility, the NRC is conducting licensing proceedings for the construction and operation of two private centralized interim storage facilities, one in Andrews County, Texas and one in New Mexico.[9] The two private facilities are currently being challenged in court on the basis that the companies involved are in violation of the federal Nuclear Waste Policy Act (NWPA). More specifically, the intervenors have argued that both private licensing applications to the NRC contemplate the storage of DOE-titled spent nuclear fuel. The NWPA remains the federal law establishing the US government’s responsibility for managing high-level nuclear waste from commercial nuclear power and the nuclear weapons program. The law prohibits the federal government from taking title to commercial HLRW and transporting it to an interim storage site, unless and until a permanent geological repository is sited, licensed and operating.

[8] NRC, U.S. Independent Spent Fuel Storage Installations, https://www.nrc.gov/docs/ML1628/ML16286A019.pdf

[9] NRC, Consolidated Interim Storage of High-Level Radioactive Waste, https://www.nrc.gov/waste/spent-fuel-storage/cis.html

In addition to the development of private facilities before the NRC, the DOE is separately soliciting the federal licensing and siting of voluntary consent-based consolidated interim storage facilities.

As a result, federal planning for the mass transportation of HLRW by railroad, roads, and barges has resumed should any of these facilities be licensed, constructed, and operational, potentially as soon as within the next five years.

## B. CURRENT STATUS OF HIGH-LEVEL NUCLEAR WASTE TRANSPORTATION

The DOE Office of Nuclear Energy is currently coordinating with federal and state agencies to develop a transportation strategy for HLRW from nuclear power stations to a still unidentified and federally licensed location. The federal agencies and intergovernmental coordination with the DOE include the US Nuclear Regulatory Commission, the Department of Homeland Security, the Department of Transportation, the Army Corp of Engineers and the US Coast Guard. Additionally, the DOE is coordinating its transportation development plans with the affected states, communities and Tribes that would be potentially impacted along transportation routes. "Future large-scale transportation of commercial SNF will involve close coordination between DOE and state and tribal governments to ensure safe and uneventful transport of shipments through their jurisdictions. The Department will coordinate with other federal agencies responsible for regulating transportation and radioactive materials, e.g. NRC and the Department of Transportation."[10]

Nearly all of the current (and still growing) volume of 90,000 metric tons nationally of irradiated nuclear fuel is located at operational and closed nuclear power plant sites in both wet and/or dry storage. This involves 74 sites (some with multiple reactor units) of which 20 sites have permanently ceased operations. A very large-scale transportation strategy for the hazardous radioactive waste will be required to move commercial spent nuclear fuel in 39 States to the projected interim storage facilities. Once the nuclear waste starts moving, the number of high-level radioactive waste shipments is estimated to run into the tens of thousands of railroad shipments alone. However, no number is final given current US energy policy is to extend the operating licenses of nuclear power plants now planned thoughout the 2060s and possibly longer.

According to the DOE, the predominant mode of transport will be railroad in tandem with large multi-axle trucks and barge movement along inner and coastal waterways to move nuclear waste from nuclear power stations to railheads capable of handling

[10] "Spent Fuel and Waste Disposition Office of Nuclear Energy, Department of Energy, https://www.energy.gov/ne/spent-fuel-and-waste-disposition

extremely heavy loads. The nuclear waste loaded transport casks are anticipated to weigh up to two hundred tons each.[11]

DOE is developing special railcars with carriages to "safely and securely" accommodate the very heavy and hazardous cargo. Specifically, DOE is working with the American Association of Railroads (AAR), which have developed a standard specific for the transport of high-level radioactive waste (S-2043). The specific standard is based on the U.S. Navy transport standard which was first developed for the transport of naval reactor propulsion fuel on a much smaller scale.

DOE started developing this railroad transportation standard in 2014. The AAR has currently approved an eight-axle railroad carriage car (the "Fortis"). DOE contracted for the fabrication and testing of this design in 2022. No test or performance results are as yet published. DOE additionally has a twelve-axle railroad carriage car under testing that is expected to be completed and approved in 2023.

DOE has partnered with the US Navy for the additional development of a security-related Rail Escort Vehicle (REV) to integrate security, including armed guards and monitoring equipment.

A Stakeholder Tool for Assessing Radioactive Transport (START) is under development by DOE to evaluate transportation routing options and emergency preparedness. A key component of START is the development and utilization of a web-based decision-support tool that utilizes geographic information systems (GIS) technology to represent transportation network operations as well as proximate features, such as tribal lands, emergency response capability (fire and police departments), schools, and environmentally-sensitive areas. The tool will be integrated into the Transportation Emergency Preparedness (TEP) program.

The START program includes, *"Modes and routes* [rail, roads and barges] *between shipment origins and destinations designated by the user can be evaluated according to multiple routing criteria, and users can impose constraints that require the route to pass through or avoid specified locations."*[12] According to the DOE, "The Stakeholder Tool for Assessing Radioactive Transport (START) is a web-based geographic information system (GIS) tool that enables users to visualize more than 50 data layers relevant to radioactive materials transportation planning including modal options, transportation infrastructure conditions, and emergency response assets. The tool also allows evaluation of possible transportation routes by highway, rail, waterway, or multiple modes, and incorporation of geo-tagged imagery from

[11] By comparison, the average weight of a carload of coal is a bit over 100 tons.

[12] "Development and Application of the Stakeholder Tool for Assessing Radioactive Transportation (START)", Abkowitz, Mark (Department of Civil and Environmental Engineering, Vanderbilt University, United States & Bickford, Erica (U.S. Department of Energy, Office of Nuclear Energy), 2016, https://www.osti.gov/biblio/22838297

facility site visits. START is currently for official use only and therefore only available for government use."[13]

The Nuclear Free Takoma Park Committee will be monitoring the DOE intergovernmental working group virtual public meeting schedule for 2023. At least one member of the NFTPC will plan to participate in the meetings. The committee will provide additional updates and details to the City on how interested public stakeholders and representatives may participate.

The Committee recommends that it continue to monitor government and industry activity on the transport of high-level nuclear waste. Additional thought could go into how the committee and the City might effectively advocate for the inclusion of the Department of Health and Human Services in the intergovernmental activities to also evaluate routine population radiological exposures along radioactive waste transportation routes that do not involve a severe accident, fire, or act of sabotage.

The committee makes no further recommendations to the City at this time.

[13] Ibid, https://www.energy.gov/ne/spent-fuel-and-waste-disposition