

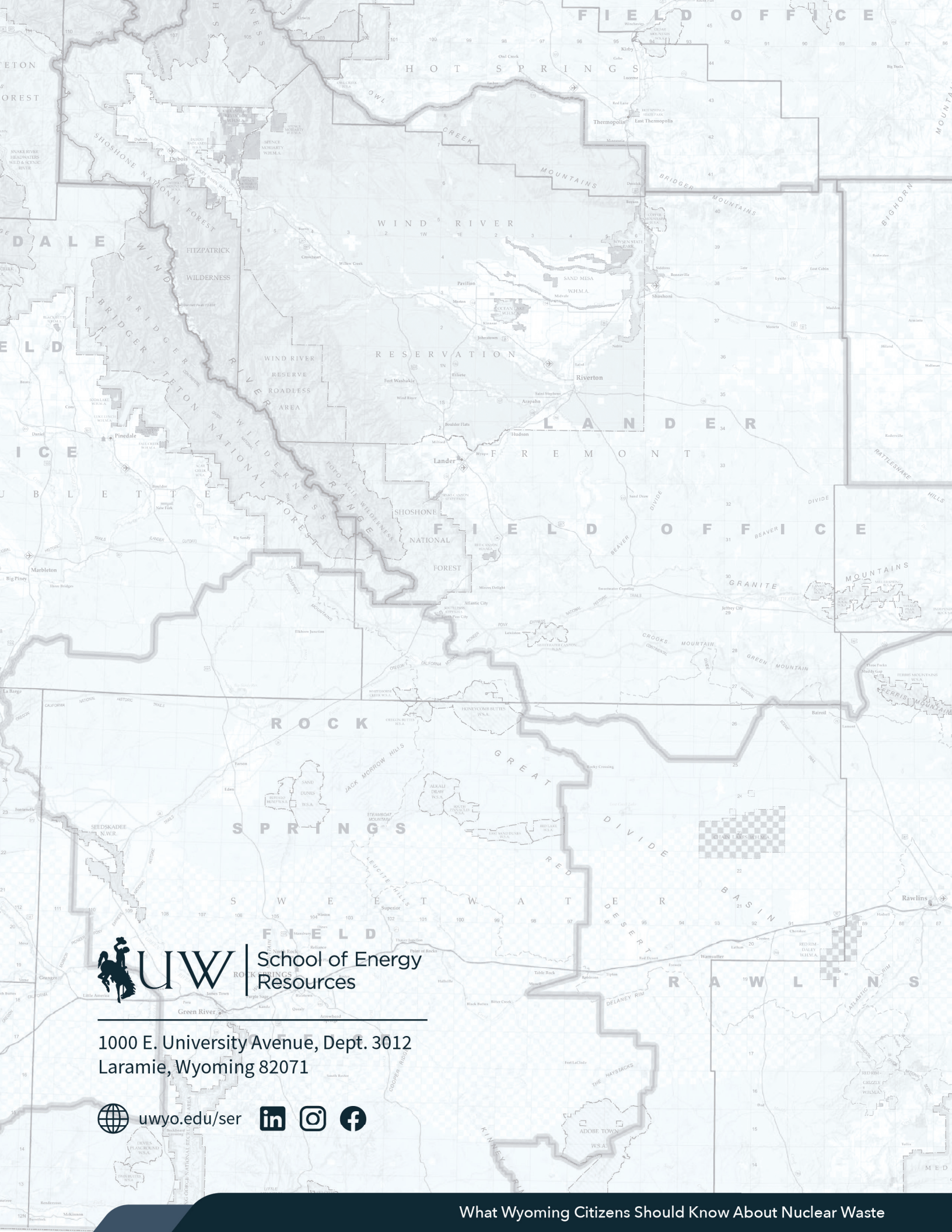


School of Energy Resources
Jurisprudence of Underground
Law & Energy



WHAT
WYOMING CITIZENS
SHOULD KNOW ABOUT
NUCLEAR WASTE





School of Energy Resources

1000 E. University Avenue, Dept. 3012
Laramie, Wyoming 82071



uwyo.edu/ser





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AUTHORS

Tara Righetti, Occidental Chair of Energy and Environmental Policies and SER Professor of Law at the University of Wyoming.

Scarlett Forrest, Assistant Research Scientist, University of Wyoming School of Energy Resources Jurisprudence of Underground Law & Energy

CONTRIBUTORS

Sabrina Kaufman, Marketing Outreach Coordinator, University of Wyoming School of Energy Resources.

ABOUT THE SCHOOL OF ENERGY RESOURCES

SER collaborates with stakeholders at the state, national and international levels to advance energy technologies and policies to grow and support Wyoming's robust energy sector. SER's mission is to promote energy-driven economic development for the state, and it leads the University of Wyoming's talent and resources for interdisciplinary research and outreach, fulfilling Wyoming's promise to be a global leader in a thriving and sustainable energy future.

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TABLE OF CONTENTS

What is going on with the nuclear industry in Wyoming? _____	5
What kinds of activities generate radioactive waste? _____	6
What is radiation? _____	9
What is spent nuclear fuel? _____	13
What are the risks of spent fuel storage? _____	14
How is SNF managed? _____	14
How is SNF currently stored in the U. S.? _____	15
How does interim storage work? _____	16
Why doesn't the U.S. have any permanent storage sites? _____	19
What are the technical requirements for a permanent repository? _____	22
What do other countries do with their SNF? _____	23
What about reprocessing? _____	24
What is a Consolidated Interim Storage Facility (CISF)? _____	25
Do any CISFs currently exist in the U.S.? _____	27
Will developing CISFs mean that spent fuel will no longer be stored at nuclear generating facilities? _____	28
How long is Interim? _____	28
How are CISFs sited and regulated under federal law? _____	29
How are CISFs sited and regulated under state law? _____	30
How are CISFs sited and regulated under local law? _____	32
What protections ensure that nuclear facilities won't become a public liability? _____	33
What is the opportunity for SNF management and CISFs in Wyoming? _____	34
How would SNF be transported to a CISF or repository? _____	35
How will I know if a CISF is proposed near me? _____	41



WHAT IS GOING ON WITH THE NUCLEAR INDUSTRY IN WYOMING?

Wyoming has a long and proud history of supporting the energy sector and shaping national energy policy as one of the country's top energy exporters. The state also has decades of experience regulating nuclear industries and is the largest producer of uranium in the United States. These factors have drawn the nuclear energy sector's attention to Wyoming during a time of major technological innovation and industry expansion.

Wyoming already has a robust regulatory framework for nuclear activities. These regulations have been developed based on existing nuclear activities within the state. As the nuclear industry evolves, Wyoming may need to update its laws and regulations to reflect the recent advancements in technology and to invite new projects. The Wyoming Legislature has already taken steps in this direction to enable Wyoming's first commercial nuclear power generation facility and has considered other proposals that would invite investment in other parts of the nuclear value-chain. These efforts have sparked strong public interest, intense debate, and extensive media coverage as citizens and policymakers consider what nuclear development could mean for the state's energy future. Some of the most prominent discussions revolve around whether Wyoming communities will support activities that generate spent fuel, an unavoidable by-product of producing nuclear power.

As many Wyoming communities hosting energy sector operations know, producing power almost always generates some form of waste. For example:

- Coal-burning power plants generate fly ash, sludge and waste gas,
- Natural gas power plants emit waste gas and waste heat,
- Solar and wind facilities produce waste when panels, blades, and wind turbines are decommissioned, and
- Nuclear power plants generate spent fuel, a form of radioactive waste.

Concerns over nuclear waste and radiation are understandable. The nuclear fuel cycle is technologically complex, and industry outsiders can face significant difficulty obtaining and understanding detailed information about it. The application of nuclear technology to military and defense uses has also contributed to a legacy of secrecy, especially during the Cold War, when national security concerns limited public transparency. This combination of technical complexity and historical secrecy has, at times, fueled mistrust, misinformation, and cultural myths about nuclear energy. **This guide aims to demystify waste from the nuclear sector by providing clear, credible, and locally relevant information about nuclear waste and its management in Wyoming.**



WHAT KINDS OF ACTIVITIES GENERATE RADIOACTIVE WASTE?

Nuclear reactors, fuel processing plants, hospitals, certain mining and oil and gas operations, coal-fired power generation, and research facilities can all generate radioactive waste as by-products of their operations. These wastes generally fall into two broad waste classifications: high-level and low-level.¹ U.S. law classifies radioactive waste in several categories and subcategories based on a variety of factors, primarily the waste's origin, chemical composition, and radiotoxicity level.² These categories dictate how different radioactive waste must be treated, stored, transported, and disposed of in the U.S.

For the sake of simplicity, this guide will discuss radioactive waste in terms of two broad waste classifications: low-level waste (LLW) and high-level waste (HLW).

Most radioactive waste is LLW, including medical tubes, clothing, filters, and other items that have become contaminated with radioactive material.³ The radioactivity level in LLW can range from naturally occurring background levels found in nature to much higher levels in certain cases. Low level wastes can be disposed of in a variety of ways, including in specially permitted landfills. Several of these facilities are already operating in the United States. In Wyoming, low-level wastes are managed pursuant to an interstate compact that allows for regional disposal solutions.

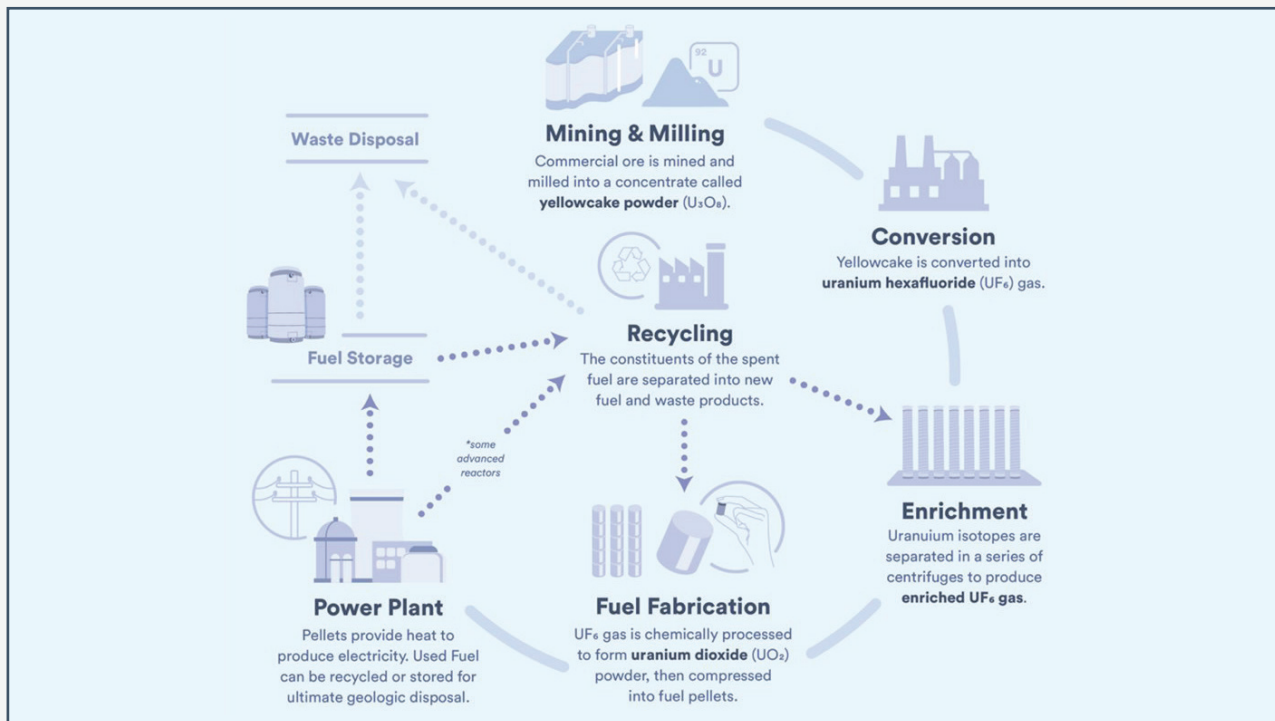
¹ The International Atomic Energy Agency and some industry stakeholders also recognize an "intermediate-level" waste category. However, U.S. law does not recognize an "intermediate" category. U.S. NUCLEAR REGUL. COMM'N, OFF. OF PUB. AFF., BACKGROUNDERS ON RADIOACTIVE WASTE, <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/radwaste.html> (last updated Jan. 26, 2024) [hereinafter Backgrounders on Radioactive Waste, *supra* note 1]; International Atomic Energy Agency [IAEA], *IAEA Safety Standards Series: Predisposal Management of Low and Intermediate Level Radioactive Waste Safety Guide*, IAEA Doc. WS-G-2.5 (2003), https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1150_web.pdf; *Nuclear Fuel Cycle: Radioactive Waste Management*, WORLD NUCLEAR ASS'N, <https://world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-waste/radioactive-waste-management#types-of-radioactive-waste> (last updated Nov. 22, 2025).

² NAT'L ACADS. OF SCI., *Appendix D: Radioactive Waste Classifications and Waste Characteristics from Different Stages of the Fuel Cycle in the United States*, in *MERITS AND VIABILITY OF DIFFERENT NUCLEAR FUEL CYCLES AND TECHNOLOGY OPTIONS AND THE WASTE ASPECTS OF ADVANCED NUCLEAR REACTORS* 269 (Nat'l Acads. Press ed., 2023), <https://doi.org/10.17226/26500>.

³ Backgrounders on Radioactive Waste, *supra* note 1.

In contrast, HLW waste is more radioactive, hot, and decays much slower. While defense-related HLW is permanently stored at the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico,⁴ commercial SNF does not yet have a permanent disposal solution. HLW “is primarily spent fuel removed from reactors after producing electricity.”⁵ This waste typically consists of “irradiated” or used nuclear reactor fuel. This guide focuses on three options for addressing HLW related to nuclear electricity generation activities: interim storage, reprocessing, and permanent disposal.

While Wyoming may be new to nuclear power generation, different nuclear-related industries have operated in Wyoming for decades, with uranium mining for nuclear fuel beginning in the 1950s. The graphic below (from the U.S. Department of Energy) is provided to give context to the different stages of a typical nuclear fuel cycle in the U.S.



⁴ U.S. Department of Energy, Office of Environmental Management, Waste Isolation Pilot Plant, <https://www.energy.gov/em/waste-isolation-pilot-plant-wipp> (last visited Jan 16, 2026).

⁵ *Id.*



Radioactive waste streams are generated throughout the nuclear fuel cycle. The following table summarizes the types of radioactive waste that are - or could be - produced or managed within Wyoming at each stage of this cycle.

	Uranium Mining	Uranium Milling	Conversion	Enrichment	Fuel Fabrication	Nuclear Power Generation	Storing Used Fuel at Reactor Sites
Allowed in Wyoming	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Produces LLW	X	X	X	X	X	X	
Produces HLW						X	
Requires HLW mgmt						X	X
Waste stored onsite		X		X		X	X
Waste stored offsite						X (in theory, not practice)	
Waste disposed onsite	X	X	X (gas)				
Waste disposed offsite/in landfill		X	X	X	X	X (only LLW)	
Requires deep geologic disposal						X** (only HLW)	X
Federal environmental law applies	X	X	X	X	X	X	X
Requires license from NRC			X	X	X	X	X
Requires permit from WDEQ	X	X	X*	X*	X*	X*	X*

LLW = Low Level Waste

HLW = High Level Waste

NRC = U.S. Nuclear Regulatory Commission

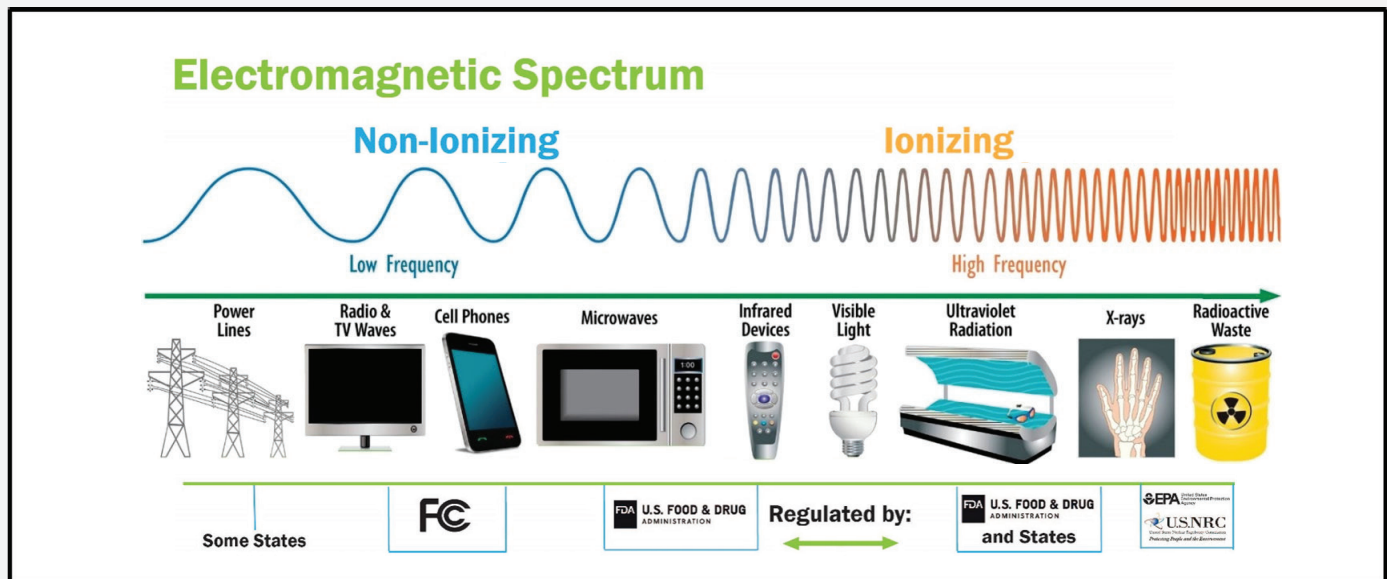
WDEQ = WY Department of Environment Quality

X* = Depends on the specific project or facility

X** = While nuclear power generation does not require deep geologic disposal to operate, international law requires each country to develop a permanent disposal solution for the high-level waste it generates. RDD Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, opened for signature Sept. 29, 1997, 2153 U.N.T.S. 303.

WHAT IS RADIATION?

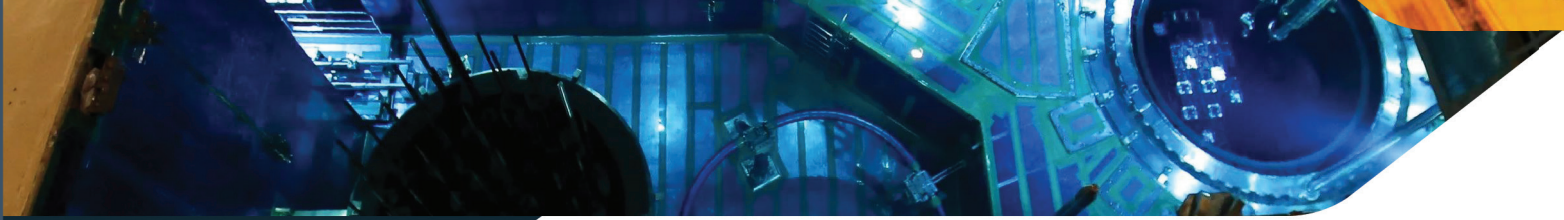
Radiation is energy that travels from its source as energy waves or energized particles.⁶ High energy (ionizing) radiation is harmful because it can damage cell tissue and break DNA bonds.⁷ Once a cell is damaged from radiation, it can either: (1) repair itself and go back to normal; (2) not repair or incorrectly repair itself, so the cell changes (which can eventually lead to cancer); or (3) incur irreparable damage and die.⁸



⁶ "Non-ionizing radiation has enough energy to move atoms in a molecule around or cause them to vibrate, but not enough to remove electrons from atoms... Ionizing radiation has so much energy it can knock electrons out of atoms, a process known as ionization." U.S. ENV'T PROT. AGENCY, RADIATION BASICS, <https://www.epa.gov/radiation/radiation-basics#:~:text=Non%2Dionizing%20radiation%20has%20enough,and/or%20gamma%20rays> (last updated Oct. 1, 2024).

⁷ *Id.*; U.S. CTR. FOR DISEASE CONTROL, ABOUT HEALTH EFFECTS OF RADIATION, <https://www.cdc.gov/radiation-health/about/health-effects-of-radiation.html#:~:text=How%20radiation%20impacts%20your%20body,Glossary> (last updated Feb. 19, 2024).

⁸ U.S. CTR. FOR DISEASE CONTROL, ABOUT HEALTH EFFECTS OF RADIATION, <https://www.cdc.gov/radiation-health/about/health-effects-of-radiation.html#:~:text=How%20radiation%20impacts%20your%20body,Glossary> (last updated Feb. 19, 2024).



Not all radiation is the same. There are five main types – alpha, beta, gamma, neutron, and X-ray – each with different energy levels, sources, and health risks. Some, like alpha particles, are stopped by skin or a sheet of paper whereas others, like X-rays, are energy waves that can penetrate the body and require dense shielding like lead; Neutron radiation, which is released during nuclear fission, is among the most penetrating.⁹

However, radiation cannot be avoided. Everyone is exposed to radiation daily, including from natural background sources like the sun.¹⁰ According to the U.S. Nuclear Regulatory Commission (NRC): “On average, Americans receive a radiation dose of about 0.62 rem (620 millirem) each year. Half of this dose comes from natural background radiation.”¹¹ Much of the other half comes from activities like plane travel, CT scans, and airport screenings.

The table below compares radiation doses from various activities or situations. The radiation doses provided below are measured in millirems (mrem), one of the two standard units, which provides a measure of the amount of energy from ionizing radiation deposited in human tissue, with the medical effects of the radiation.¹²

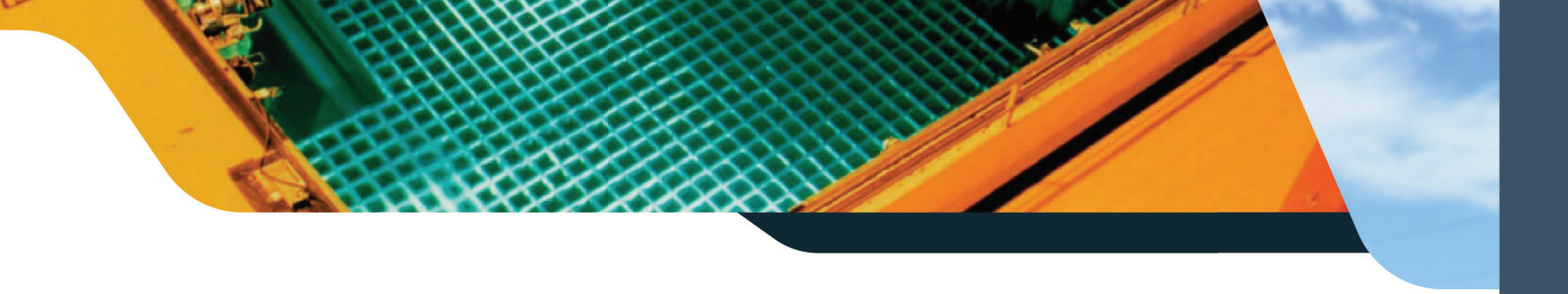


⁹ U.S. NUCLEAR REGUL. COMM’N, RADIATION BASICS, <https://www.nrc.gov/about-nrc/radiation/health-effects/radiation-basics.html> (last updated Mar. 20, 2020).

¹⁰ Besides for solar radiation, background sources of radiation come from the Earth itself as radioactive materials exist naturally in the subsurface and all people have internal radiation inside their bodies from birth. U.S. NUCLEAR REGUL. COMM’N, NATURAL BACKGROUND SOURCES, <https://www.nrc.gov/about-nrc/radiation/around-us/sources/nat-bg-sources.html> (last updated Mar. 20, 2020).

¹¹ *Id.*

¹² U.S. NUCLEAR REGUL. COMM’N, REM, <https://www.nrc.gov/about-nrc/radiation/health-effects/radiation-basics.html> (last updated July 21, 2021).



CATEGORY	DOSE
Average, yearly radiation dose per U.S. citizen	620 mrem per year ¹³
Traveling by plane	1 mrem per 1,000 miles flown ¹⁴
Going through a screening machine at airport security	0.003 mrem per screen ¹⁵
A whole-body CT scan	1,000 mrem per scan ¹⁶
Smoking one pack of cigarettes	0.49 mrem per pack ¹⁷
Having porcelain crowns or false teeth	0.07 mrem per year ¹⁸
Living within 50 miles of a nuclear power plant	0.009 mrem per year ¹⁹
Living within 50 miles of a coal-fired power plant	0.03 mrem per year ²⁰
Terrestrial radiation (from the ground) living in the Colorado Plateau	90 mrem per year ²¹
Average, yearly radiation from the sun living between 6,000 - 7,000 ft above sea level (WY's average elevation)	40 mrem per year ²²

¹³ U.S. EVN'T PROT. AGENCY, CALCULATE YOUR RADIATION DOSE, <https://www.epa.gov/radiation/calculate-your-radiation-dose> (last updated Feb. 19, 2026) [hereinafter CALCULATE YOUR RADIATION DOSE, *supra* note 13].

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ U.S. EVN'T PROT. AGENCY, RADIATION SOURCES AND DOSES, <https://www.epa.gov/radiation/radiation-sources-and-doses#:~:text=All%20of%20us%20are%20exposed,sources%20of%20this%20average%20dose.> (last updated Feb. 19, 2026) [hereinafter RADIATION SOURCES AND DOSES, *supra* note 16].

¹⁷ CALCULATE YOUR RADIATION DOSE, *supra* note 13.

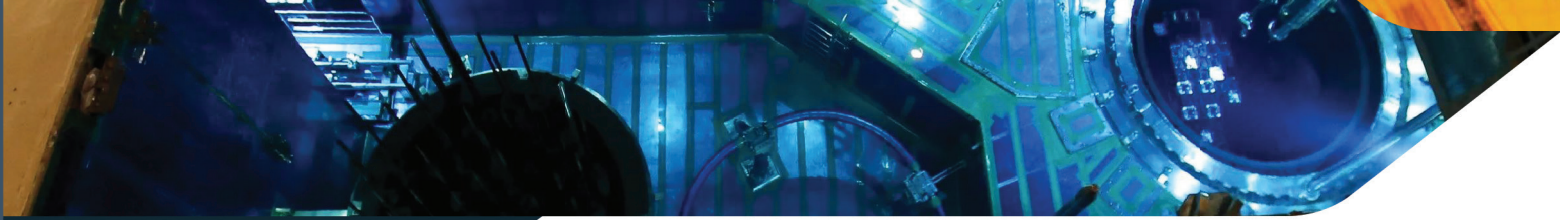
¹⁸ *Id.*

¹⁹ *Id.*

²⁰ *Id.*

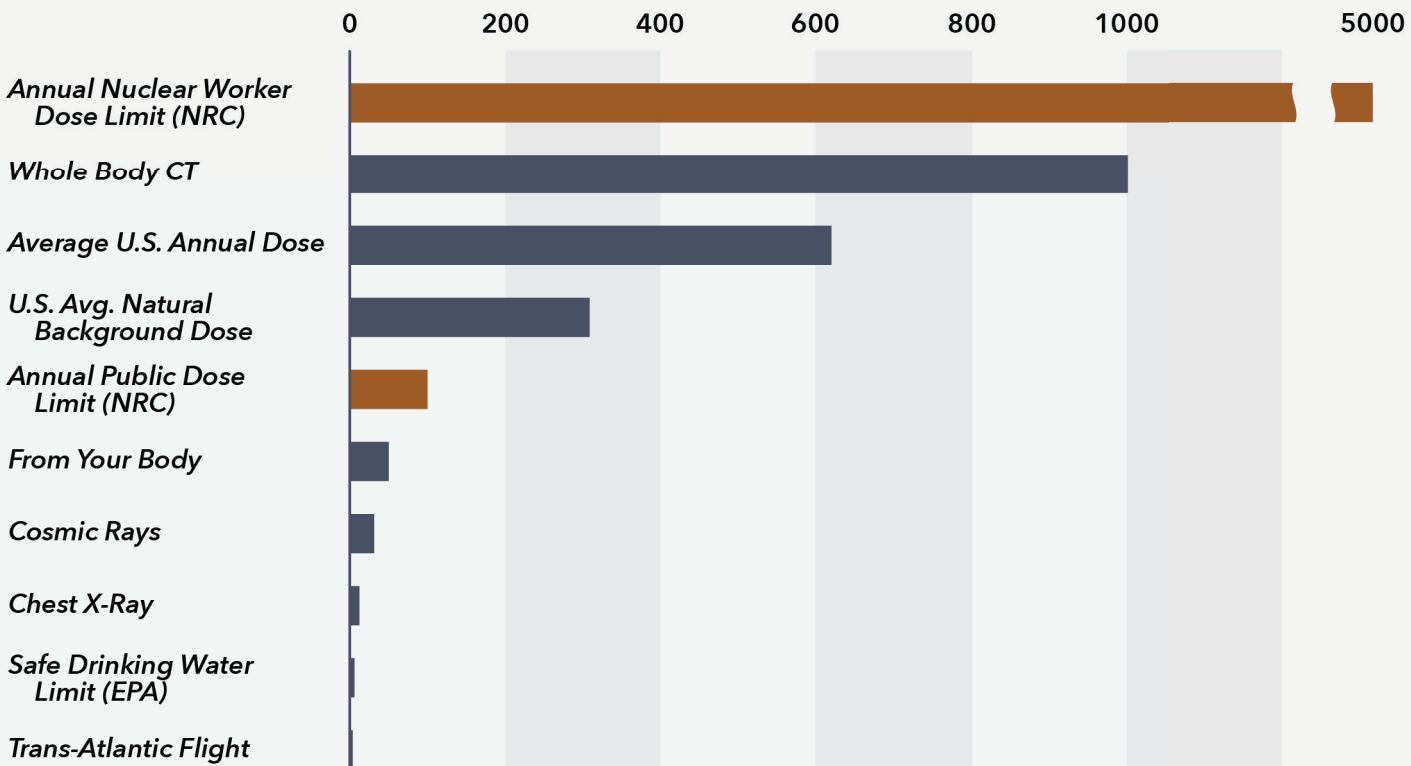
²¹ *Id.*

²² Included because solar radiation dose varies with elevation above sea level. RADIATION SOURCES AND DOSES, *supra* note 16; WYO. WATER RES. DATA SYS., *The Climate of Wyoming*, <https://www.wrds.uwyo.edu/sco/wyoclimate.html> (last visited Jan. 15, 2026).



Radiation Doses and Regulatory Limits

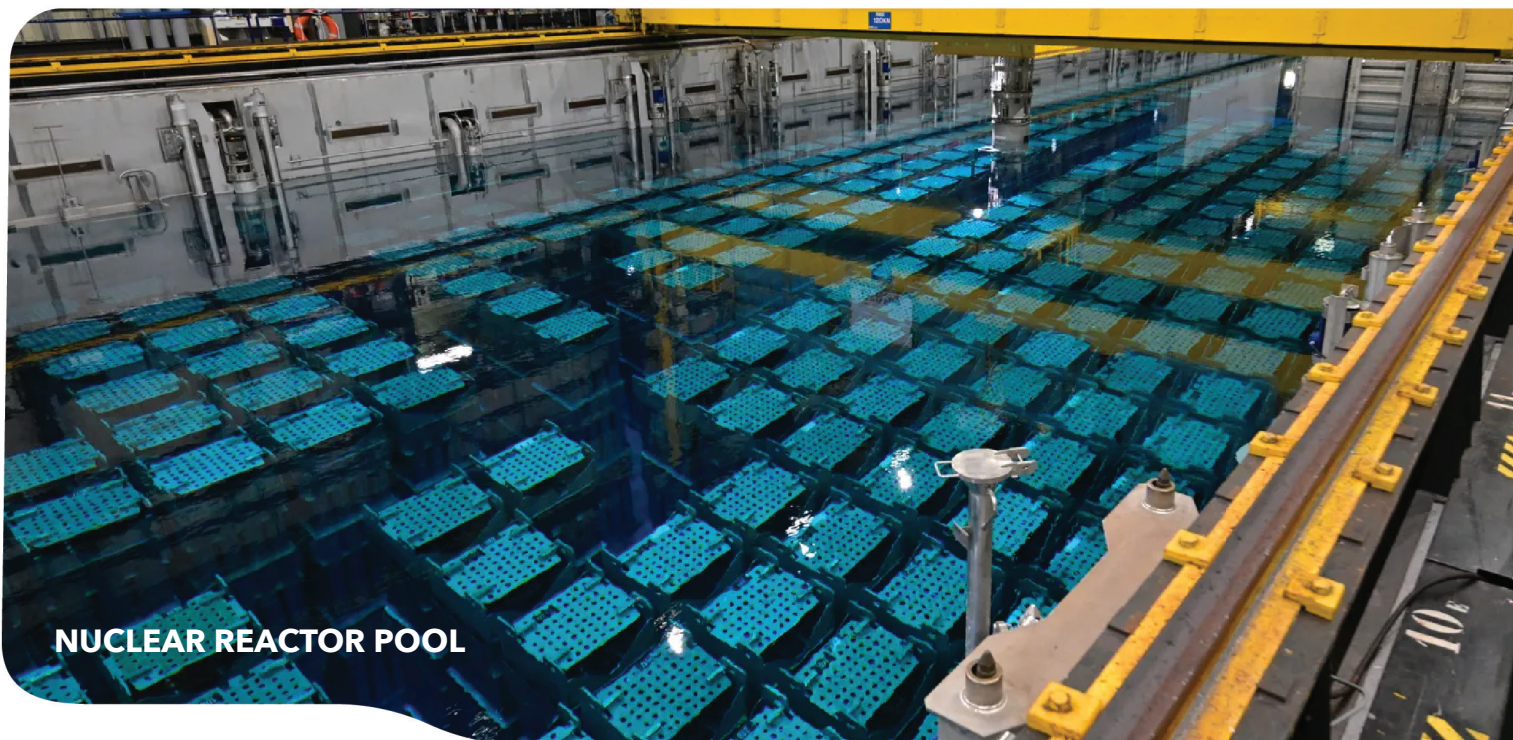
Doses in Millirems



GEIGER COUNTER

WHAT IS SPENT NUCLEAR FUEL?

Commercial nuclear power plants generate electricity by splitting uranium atoms in fuel rods and harnessing the energy and heat released from that process (nuclear fission).²³ Spent nuclear fuel (SNF) is the resulting high-level, radioactive waste composed of “spent” uranium fuel that can no longer efficiently produce electricity.²⁴ Commercial SNF is a solid material, that remains in a stable and manageable form after use. SNF is hazardous because it can produce fatal radiation doses during short periods of direct exposure without the use of engineering and safety controls. Managing SNF waste is essential to nuclear energy production.²⁵ The volume of SNF generated from a nuclear power plant depends primarily on the reactor design and the fuel type.



²³ Madeleine Jennewein, *Looking for a Trash Can: Nuclear waste management in the United States*, HARV. GRIFFIN GSAS SCI. POL'Y GRP. (Sept. 5, 2018), <https://sciencepolicy.hsites.harvard.edu/blog/looking-trash-can-nuclear-waste-management-united-states> [hereinafter Jennewein, *supra* note 23].

²⁴ The U.S. Nuclear Regulatory Commission (NRC) defines SNF as “fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year’s decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. Spent fuel includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies.” 10 C.F.R. § 72.3 (2025).

²⁵ Backgrounder on Radioactive Waste, *supra* note 1, at 1.



WHAT ARE THE RISKS OF SPENT FUEL STORAGE?

Due to its radioactive properties, significant care is required to assure that handling, transferring, and storing SNF does not pose threats to human health and the environment.²⁶ If not properly handled, SNF presents risks of radiation exposure, unintentional releases of radioactive material into the environment, and security risks if material is stolen.²⁷ To account for these risks, nuclear waste storage facilities must be designed to:

- protect SNF from theft,
- prevent SNF from emitting radioactivity,
- prevent water intrusion and leaks,
- insulate SNF from natural and man-made disasters.²⁸

HOW IS SNF MANAGED?

The risks and duration of SNF storage present unique management challenges. Strategies for managing SNF include interim storage, permanent disposal, and/or reprocessing and recycling.

- Interim storage refers to the temporary storage of SNF, typically at or near the land surface, “pending the availability of a long-term disposal option.”²⁹ There are two distinct forms of interim storage: initial storage in spent fuel pools at the reactor facility (wet storage) and interim storage in dry casks. Initial storage operators under the reactor’s operating license. Interim storage can be either at the reactor facility under its operating license or can be consolidated away from the reactor, in which a separate license is required.
- For permanent disposal, a deep underground geological storage repository is widely considered the safest and best option.³⁰
- Reprocessing and recycling recovers usable material from SNF and can reduce the volume of SNF headed for permanent disposal.³¹

²⁶ *Id.*

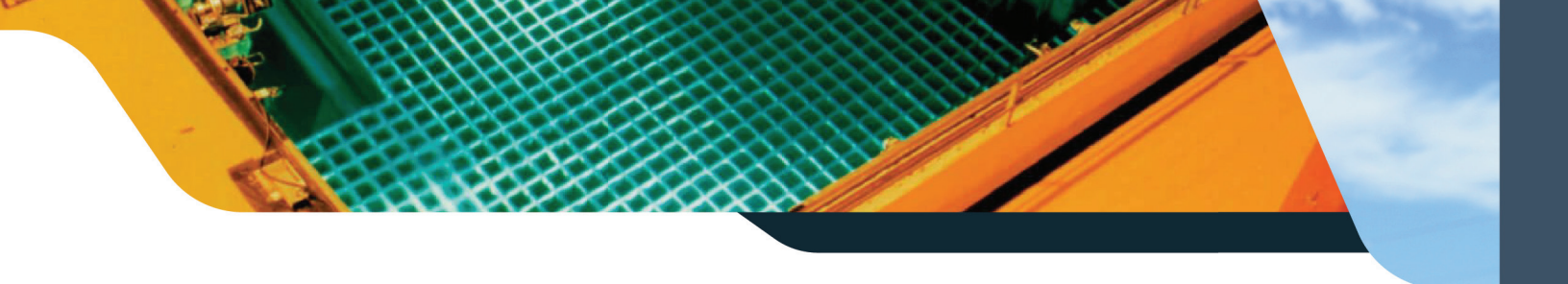
²⁷ Jennewein, *supra* note 23

²⁸ *Id.*

²⁹ *The Nuclear Fuel Cycle: Storage and Disposal of Radioactive Waste*, WORLD NUCLEAR ASS’N, <https://world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-waste/storage-and-disposal-of-radioactive-waste#interim-waste-storage-and-transport> (last updated Apr. 24, 2024); see also Max Johnson, Note, *Defining Interim Storage of Nuclear Waste*, 117 NW. U. L. REV. 1177, 1197-98 (2023).

³⁰ There are currently no operating, permanent underground repositories for commercial high-level radioactive waste or spent nuclear fuel in the U.S. *Id.*

³¹ There are currently no commercial nuclear fuel reprocessing centers operating in the U.S. *Id.*



“ *The interim storage of SNF is an essential part of nuclear power plant operations. Once SNF is removed from the reactor, it cannot be transferred offsite until it radioactively decays and cools enough to be safely handled and transported. All reactors generate SNF and therefore cannot be licensed without a plan for SNF storage. States, local governments, and communities should recognize that banning all storage of spent fuel effectively prevents the construction of new nuclear power plants.*

HOW IS SNF CURRENTLY STORED IN THE U. S.?

All commercially generated SNF in the U.S. is currently stored onsite or near reactor facilities either in spent fuel pools or in dry cask storage. Neither offsite interim storage facilities nor a permanent repository exist.³² The Nuclear Waste Policy Act, passed in the 1980's, requires the U.S. Department of Energy (DOE) to take responsibility for commercially produced SNF for disposal in a permanent federal repository.³³ The efforts to license a deep geological repository, however, are stalled due to political, legal, and local opposition.³⁴ As a result, all commercial nuclear power plants in the U.S. must store SNF onsite until a permanent national storage facility is developed.³⁵ Waste from commercial generation facilities nationally continues to accumulate at a rate of more than 2,000 metric tons annually.³⁶ According to CURIE, DOE's resource portal for nuclear waste management information, as of August 2025, the commercial nuclear industry has currently accumulated approximately 97,000 metric tons of SNF from operating and previously decommissioned facilities.³⁷ Given that SNF is extremely dense, if stacked approximately 30 feet high, this volume of waste could fit on a single football field.³⁸

³² Claire Corkhill & Neil Hyatt, NUCLEAR WASTE MANAGEMENT 4 (IOP Publishing Ltd., 2018), <https://doi.org/10.1088/978-0-7503-1638-5> [hereinafter Corkhill & Hyatt, *supra* note 32].

³³ JASON O. HEFLIN, CONG. RSCH. SERV., LSB11199, CONSOLIDATED INTERIM STORAGE OF SPENT NUCLEAR FUEL: RECENT LICENSING DECISIONS 3 (2024), <https://www.congress.gov/crs-product/LSB11199> [hereinafter Heflin, *supra* note 33]; U.S. GOV'T ACCOUNTABILITY OFF., GAO-11-229, COMMERCIAL NUCLEAR WASTE: EFFECTS OF A TERMINATION OF THE YUCCA MOUNTAIN REPOSITORY PROGRAM AND LESSONS LEARNED 2 (2011), <https://www.gao.gov/products/gao-11-229> [hereinafter Effects of Yucca Mountain Termination, *supra* note 33].

³⁴ Heflin, *supra* note 33, at 2; Effects of Yucca Mountain Termination, *supra* note 33, at 31.

³⁵ Corkhill & Hyatt, *supra* note 32, at 4.

³⁶ U.S. GOV'T ACCOUNTABILITY OFF., GAO-21-603, COMMERCIAL SPENT NUCLEAR FUEL: CONGRESSIONAL ACTION NEEDED TO BREAK IMPASSE AND DEVELOP A PERMANENT DISPOSAL SOLUTION (2021), <https://www.gao.gov/products/gao-21-603>. A metric ton is equivalent to 2,204 pounds and a ton is 2,000 pounds.

³⁷ CURIE, Resource Portal for DOE Nuclear Waste Management Information, <https://curie.pnnl.gov/map> (last visited Aug. 27, 2025).

³⁸ U.S. DEP'T OF ENERGY, 5 FAST FACTS ABOUT SPENT NUCLEAR FUEL (Oct. 3, 2022), <https://www.energy.gov/ne/articles/5-fast-facts-about-spent-nuclear-fuel>.



With construction of Wyoming’s first nuclear power plant underway in Kemmerer, Wyoming is set to host spent fuel in onsite interim storage for the first time.



Without a permanent storage solution, all interim storage sites threaten to become permanent. Onsite storage was never intended as a permanent solution,³⁹ but has become the default because of repeated failures to locate and construct a permanent repository.⁴⁰

HOW DOES INTERIM STORAGE WORK?

All nuclear power plants must provide interim storage for SNF.⁴¹

The risks posed by SNF peak when it is first removed from the reactor: SNF is the most radioactive and thermally hot at this stage. It requires two to five years to remove the initial intense heat it generates before it can be handled or transported.⁴² Accordingly, nuclear power plants put SNF in “wet” storage in pools immediately after the SNF is removed from the reactor. The spent fuel pools are designed to cool the spent rods under water and provide a shield against the radiation.⁴³



³⁹ Allison MacFarlane & Rodney C. Ewing, *Nuclear Waste Is Piling Up. Does the U.S. Have a Plan?*, SCI. AM., (Mar. 6, 2023) (“Storing [SNF] in pools and dry casks at reactor sites is a temporary solution; it is safe for decades, but not the millennia needed to isolate this radioactive material from the environment.”); see also Dylan Cohen, Note, *Temporary Nuclear Waste Siting is a Major Problem But Not a Major Question*, 13 MICH. J. ENV’T. & ADMIN. L. 179, 184-85 (2023).

⁴⁰ See *The Fight Against Yucca Mountain*, Nevada Attorney General, https://ag.nv.gov/Hot_Topics/Issue/Yucca/ (last visited Dec. 16, 2024); See also, William Beaver, *The Demise of Yucca Mountain*, 14 THE INDEP. REV. 535, 540-41 (2010).

⁴¹ A general license authorizes SNF storage at power reactor sites to those who are already authorized to “possess or operate a power reactor under 10 CFR Part 50 or 10 CFR Part 52”; while a specific license can be for SNF storage co-located with or remotely located from a reactor under 10 C.F.R. 72.3.

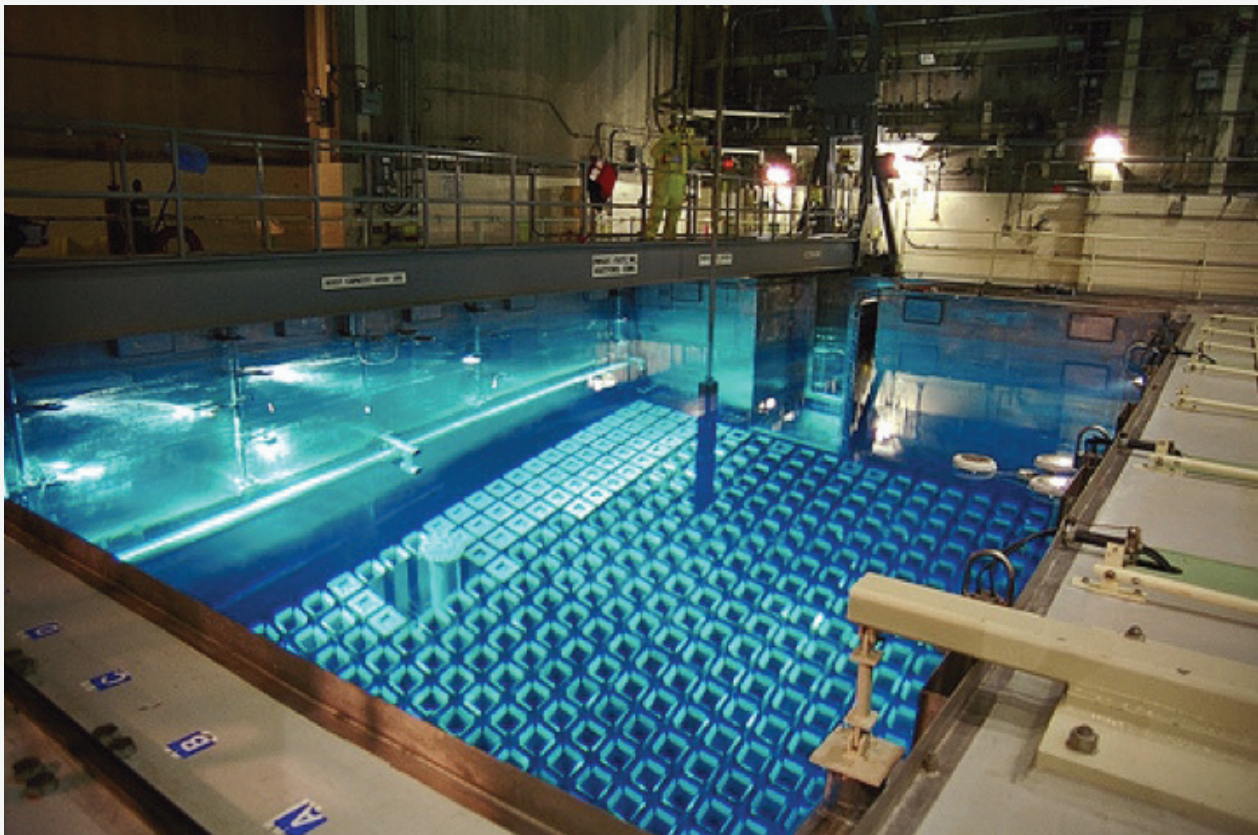
⁴² Uranium-235 has a half-life of 700 million years and Plutonium-239 has a half-life of 24,000 years. Backgrounder on Radioactive Waste, *supra* note 1, at 2. SNF is also susceptible to corroding in the presence of oxygen, making storage and disposal challenging. Corkhill & Hyatt, *supra* note 32, at 9.

⁴³ Corkhill & Hyatt, *supra* note 32, at 9.

Once the pools are near capacity, utilities move some of the older, and cooler, SNF into “dry” storage where it is “surrounded by inert gas inside a container called a cask.”⁴⁴ The casks are typically steel cylinders that are either welded or bolted closed, which provides a leak-tight confinement of the SNF. Each cask is surrounded by additional steel, concrete, or other material to provide radiation shielding to workers and members of the public.⁴⁵

FIGURE 1: Spent Fuel Pool.

All SNF is initially stored here for at least one year before it can be moved into dry cask storage.⁴⁶



⁴⁴ U.S. NUCLEAR REGUL. COMM’N, *Dry Cask Storage*, <https://www.nrc.gov/waste/spent-fuel-storage/dry-cask-storage.html> <https://www.nrc.gov/waste/spent-fuel-storage.html> (last updated June 16, 2023).

⁴⁵ *Id.*

⁴⁶ Image from Radwaste Solutions, *NRC discontinues spent fuel pool rulemaking*, NUCLEAR NEWSWIRE (May 19, 2025), <https://www.ans.org/news/2025-05-19/article-7031/nrc-discontinues-spent-fuel-pool-rulemaking>.

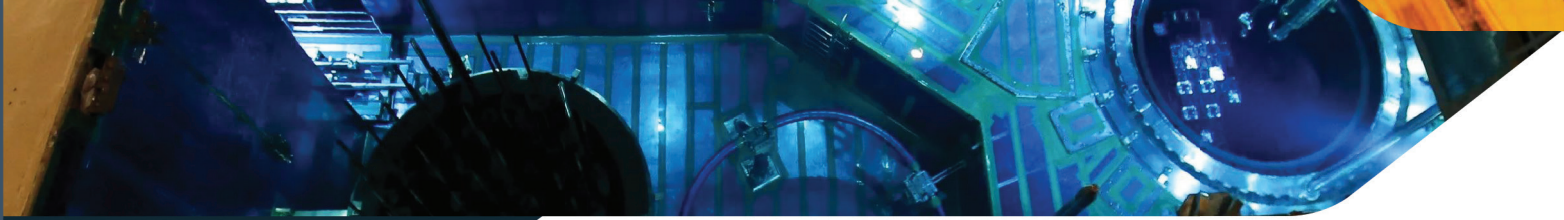


FIGURE 2: Diagram of Dry Storage Cask.⁴⁷

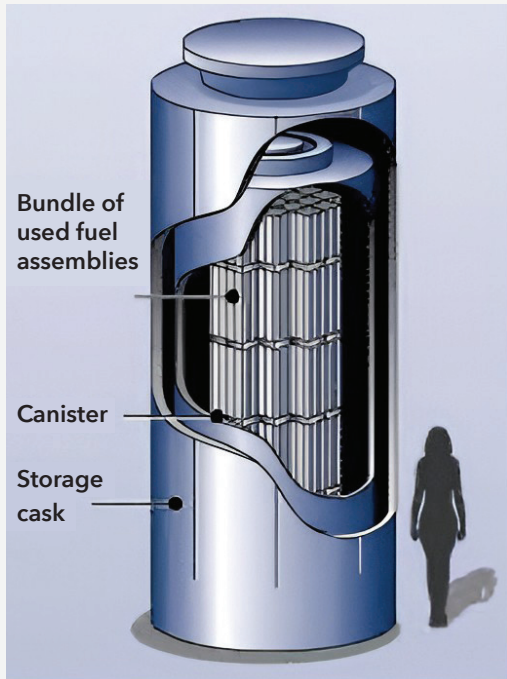


FIGURE 3: Dry Cask Storage.⁴⁸



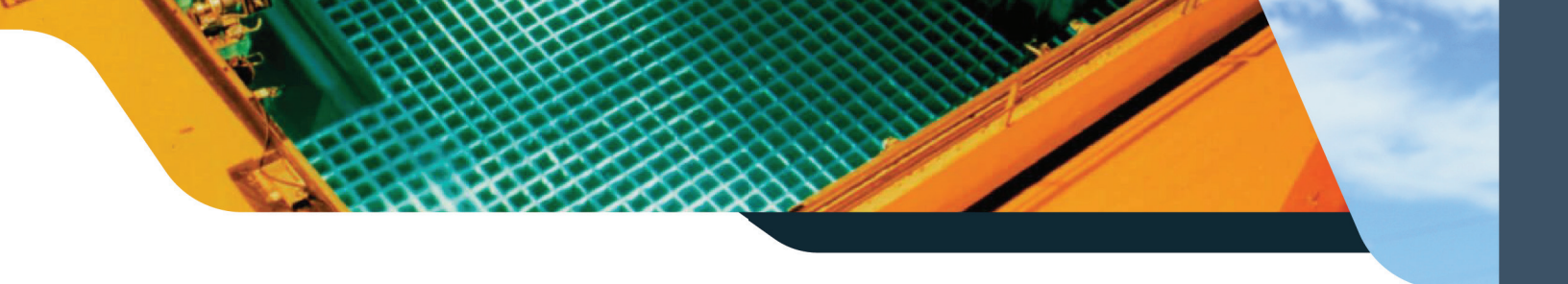
The NRC continuously monitors both “wet” storage in spent fuel pools and “dry” storage in casks to ensure these storage systems are safe.⁴⁹ The requirements for storing SNF can be found in Title 10 of the Code of Federal Regulations. While “wet” and “dry” storage systems have different safety and licensing requirements, NRC staff ensures that both systems provide radiation shielding and heat removal, prevent unintended nuclear reactions (criticality), protect against terrorist attacks and theft, and can withstand natural disasters like earthquakes, accidents like dropped fuel and equipment malfunctions, and other site-specific hazards like industrial activities.⁵⁰

⁴⁷ Image from U.S. NUCLEAR REGUL. COMM’N, TYPICAL DRY CASK STORAGE SYSTEM, <https://www.nrc.gov/waste/spent-fuel-storage/diagram-typical-dry-cask-system> (last updated July 8, 2020).

⁴⁸ Image from Nuclear Information Center, *Dry Cask Storage: An Alternative for Storing Used Fuel*, DUKE ENERGY (May 5, 2025) [v.](#)

⁴⁹ Corkhill & Hyatt, *supra* note 32, at 9.

⁵⁰ See generally, 10 C.F.R. Part 72; U.S. NUCLEAR REGUL. COMM’N, *Spent Fuel Storage in Pools and Dry Casks Key Points and Questions & Answers*, <https://www.nrc.gov/waste/spent-fuel-storage/faqs#7> (last updated Oct. 7, 2024) [hereinafter NRC, *Spent Fuel Storage Qs & As*, *supra* note 50].



The NRC inspects both types of onsite interim storage regularly and is responsible for ensuring that both are designed and remain consistent with the applicable license. For instance, the NRC's regulations require it to inspect spent fuel pools during each refueling outage and when new cooling systems or practices are introduced.⁵¹ For dry cask storage, the NRC conducts reviews of the storage system, which are documented in safety evaluation reports and made publicly available in the NRC Agencywide Documents Access and Management System (ADAMS): <https://adams-search.nrc.gov/home>.⁵² The NRC staff also conducts inspections for quality assurance of vendors who design and manufacture casks and inspects operating "dry" storage facilities to ensure safety compliance.⁵³

WHY DOESN'T THE U.S. HAVE ANY PERMANENT STORAGE SITES?

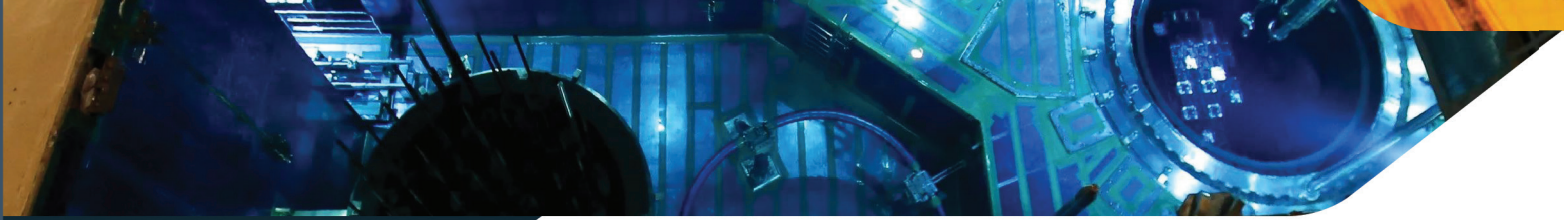
International law requires each country with nuclear power to take responsibility for the safe and secure management of its nuclear waste. Thus far, however, efforts to site a permanent repository in the U.S. have stalled.



⁵¹ 10 C.F.R. Part 72, subparts F, K.

⁵² 10 C.F.R. Part 72, subpart L; U.S. NUCLEAR REGUL. COMM'N, SAFETY OF SPENT FUEL STORAGE, <https://www.nrc.gov/docs/ML1710/ML17108A306.pdf> (last visited Jan. 15, 2026); NRC, *Spent Fuel Storage Qs & As*, *supra* note 50.

⁵³ *Id.*



To address technical and other related challenges for managing SNF, Congress passed the Nuclear Waste Policy Act of 1982 (NWPAct), which established the federal government's responsibility to provide for the permanent disposal of SNF in the U.S.⁵⁴ In 1987, Congress amended the NWPAct and limited the U.S. Department of Energy (DOE) to developing a permanent repository at Yucca Mountain, a site on federal property in Nevada.⁵⁵ However, DOE failed to develop a permanent repository at Yucca Mountain, not because the site lacked technical or geologic suitability,⁵⁶ but because the project lacked social and political support from Nevadans.⁵⁷

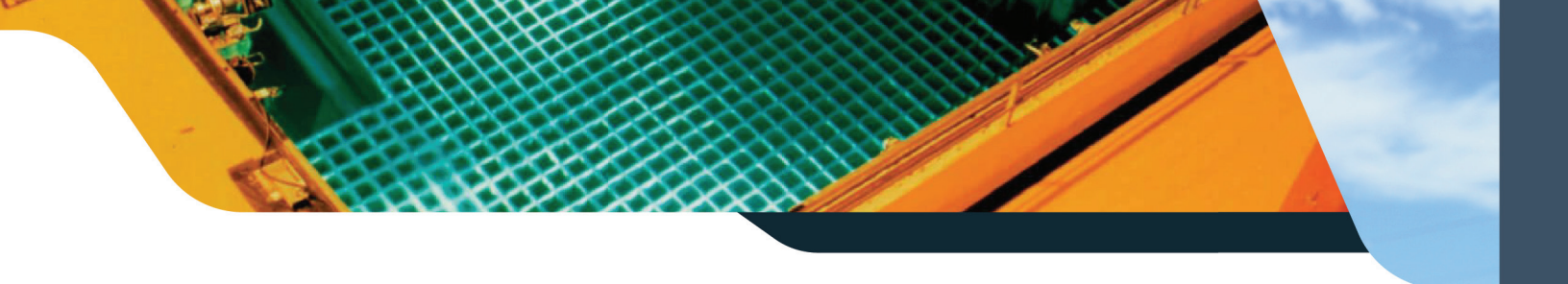


⁵⁴ 42 U.S.C. § 10131 (a)(4); Nuclear Waste Policy Amendments Act of 1987, Pub. L. No. 100- 203, 101 Stat. 1330-227.

⁵⁵ Catherine Clifford, *Clean Energy: The feds have collected more than \$44 billion for a permanent nuclear waste dump – here's why we still don't have one*, CNBC, Dec. 19, 2021; Nuclear Waste Policy Amendments Act of 1987, Pub. L. No. 100- 203, 101 Stat. 1330-227. 42 U.S.C. § 10134 (2024); *Id.* at § 10172; Nuclear Waste Policy Amendments Act of 1987, Pub. L. No. 100- 203, 101 Stat. 1330-227. Congress narrowed the search for a permanent repository to Yucca Mountain for a multitude of reasons, some of which are disputed, including: the high costs of geologically characterizing multiple sites for permanent storage, its location on federally owned land with preexisting contamination from nuclear weapons testing, its promising geological and hydrological suitability, and the lack of political power Nevada held in Congress. John S. Stuckless & Robert A. Levich, *The Road to Yucca Mountain—Evolution of Nuclear Waste Disposal in the United States*, ENV'T & ENG'G GEOSCIENCE, Feb. 2016, at 1; Allison MacFarlane, *Underlying Yucca Mountain: The Interplay of Geology and Policy in Nuclear Waste Disposal*, 33 SOC. STUD. OF SCI. 783, 787 (2003).

⁵⁶ See Approval of Yucca Mountain Site, Pub. L. No. 107-200, 116 Stat. 735 (2002).

⁵⁷ Then-junior senator Harry Reid of Nevada raised fairness concerns over the 1987 amendments to the NWPAct because senators from more powerful states spearheaded and facilitated Congress's focus on Yucca Mountain, without Nevada's consent. This forced Nevada to be the only state under consideration for a permanent repository that clearly no other state wanted. Nevadans also found it unfair that their state, not a state in the eastern U.S., would be burdened with permanently storing the nation's SNF when the bulk of the waste is located in the eastern U.S. See *The Fight Against Yucca Mountain*, Nevada Attorney General, https://ag.nv.gov/Hot_Topics/Issue/Yucca/ (last visited Dec. 16, 2024); See William Beaver, *The Demise of Yucca Mountain*, 14 THE INDEP. REV. 535, 540-43 (2010).



In 2012, the DOE shifted its approach to siting a permanent repository.⁵⁸ It created a bipartisan panel called the Blue-Ribbon Commission on America’s Nuclear Future (BRC).⁵⁹ The BRC recommended using a consent-based siting approach that would identify nuclear waste facility locations by encouraging communities to volunteer. The BRC defined “consent” as the willingness of host states, tribes, and local governments to enter legally binding agreements that safeguard their citizens’ interests.⁶⁰ Even if what DOE is now calling “collaboration-based siting” efforts are successful at identifying other potential locations, Congress would need to amend the NWPA again to allow for a permanent solution at an alternative location.⁶¹



YUCCA MOUNTAIN

⁵⁸ Decades after Congress selected Yucca Mountain, momentum for developing a permanent repository halted during the Obama Administration. Under President Obama, the DOE attempted to withdraw the Yucca Mountain repository license application it had submitted to the NRC (the agency charged with licensing a permanent repository). In 2011, the NRC did not allow the DOE to withdraw its application and instead suspended the licensing proceedings for Yucca Mountain, putting efforts to develop a permanent repository in limbo for the foreseeable future. U.S. Dep’t of Energy (High-Level Waste Repository), Docket No. 63-001-HLW, 74 N.R.C. 212 (2011); Catherine Clifford, *Clean Energy: The feds have collected more than \$44 billion for a permanent nuclear waste dump – here’s why we still don’t have one*, CNBC, Dec. 19, 2021.

⁵⁹ BLUE RIBBON COMMISSION ON AMERICA’S NUCLEAR FUTURE, REPORT TO THE SECRETARY OF ENERGY preamble (Jan. 2012).

⁶⁰ *Id.* at xi.

⁶¹ Catherine Clifford, *Clean Energy: The feds have collected more than \$44 billion for a permanent nuclear waste dump – here’s why we still don’t have one*, CNBC, Dec. 19, 2021; Heflin, *supra* note 33, at 2.



WHAT ARE THE TECHNICAL REQUIREMENTS FOR A PERMANENT REPOSITORY?

The technical requirements for a permanent repository are established by the U.S. Environmental Protection Agency (EPA). Congress mandated that EPA's standards be consistent with recommendations of the National Academy of Science (NAS).⁶² In 1995, scientists at the NAS estimated the time of peak risk could extend as long as one million years and that the performance of a permanent repository should therefore be assessed over that period.⁶³ The EPA used this to create its regulations for the management and disposal of spent nuclear fuel. These regulations include containment, assurance, and individual protection requirements:

- **Containment:** The disposal system must be designed to provide a "reasonable expectation"⁶⁴ that, over 10,000 years, harmful radioactive releases are unlikely to exceed regulatory limits for individual radioactive elements (radionuclides).⁶⁵
- **Assurance:** The disposal site must maintain institutional controls for as long as possible, be monitored without compromising waste isolation, and be permanently marked to warn future generations. Sites must use multiple natural and engineered barriers, avoid areas likely to be mined or with vital water resources, and allow for waste retrieval for a reasonable time after disposal.⁶⁶
- **Individual protection requirements:** The disposal system must be designed to provide a reasonable expectation that, over 10,000 years, the system will not cause any member of the public to receive a dose of radiation exceeding 15 millirems per year – about half the amount of background solar radiation Americans are exposed to annually⁶⁷ – under undisturbed conditions.⁶⁸

⁶² Energy Policy Act of 1992, Pub. L. No. 102-486, § 801(a), 106 Stat. 2921.

⁶³ National Research Council, *Technical Bases for Yucca Mountain Standards* (Nat'l Acad. Press, 1995), <https://doi.org/10.17226/4943>.

⁶⁴ Reasonable expectation means not absolute proof, given the uncertainties of long-term projections that, on the basis of the record before the implementing agency, compliance with regulatory limits – less than a 1-in-10 chance of exceeding the established limits for radionuclides, and less than a 1-in-1,000 chance of exceeding ten times the limits – will be achieved. 40 C.F.R. § 191.13 (2025).

⁶⁵ *Id.*

⁶⁶ 40 C.F.R. § 191.14 (2025).

⁶⁷ Radiation from space makes up 33 millirems of radiation annually and is 5% of the of the total radiation exposure the average American receives per year. See *Radiation Sources and Doses*, *supra* note 16.

⁶⁸ 40 C.F.R. § 191.15 (2025).

WHAT DO OTHER COUNTRIES DO WITH THEIR SNF?

Requirements for the safe management of spent fuel are established by The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.⁶⁹ The Treaty obligates parties to establish and maintain a robust national framework of legislative, regulatory, and administrative measures to ensure safety at all stages of radioactive waste management - from siting and design through to operation and closure.⁷⁰ Within these requirements, each country can define their own fuel cycle policy.⁷¹ Some countries have chosen to pursue reprocessing, as described in the next session. Others, like the U.S., have elected to develop a permanent disposal facility.

While the U.S. efforts have stalled, other nations have made progress with permanent disposal. In March 2025, Finland successfully completed the first test for its repository after decades of research and years of permitting.⁷² It is on track to have the first operational facility in the world. The Swiss Government has also made significant progress. It began the search for an appropriate site for a permanent repository in 2008 and selected a site in 2022.⁷³ In June 2025, the Swiss governing body for the disposal of radioactive waste published its general license applications for a deep geologic repository.⁷⁴



⁶⁹ Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, opened for signature Sept. 29, 1997, 2153 U.N.T.S. 303, <https://www.iaea.org/sites/default/files/infcirc546.pdf>.

⁷⁰ *Id.* at ch. 2-4.

⁷¹ *Id.* at preamble.

⁷² Marta Abba, *Finland Could Be the First Country in the World to Bury Nuclear Waste Permanently*, WIRED (Apr. 23, 2025).

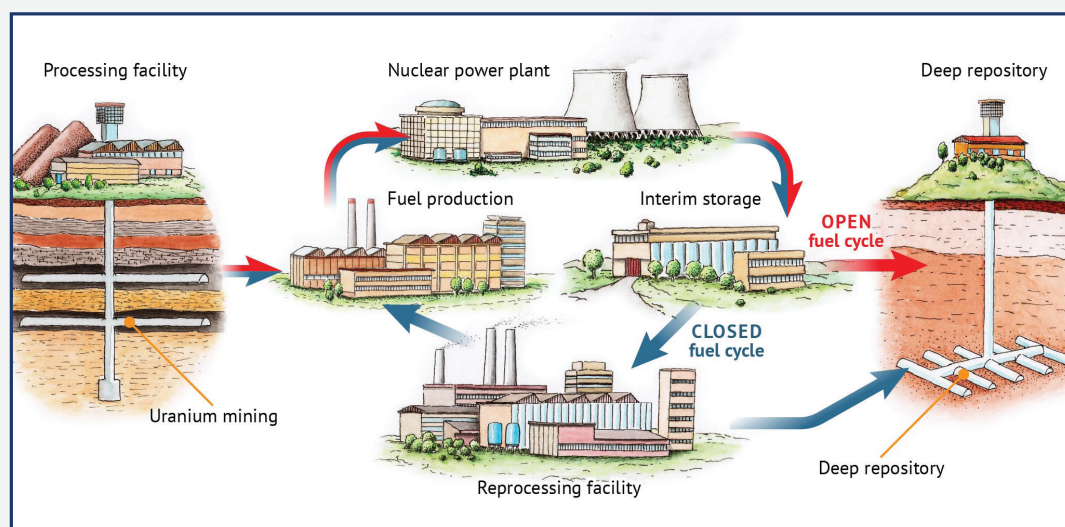
⁷³ Radwaste Solutions, *Nagra publishes license applications for Swiss geologic repository*, NUCLEAR NEWSWIRE (June 27, 2025).

⁷⁴ *Id.*

WHAT ABOUT REPROCESSING?

Reprocessing is one method to reduce the volume of radioactive waste headed for interim storage or permanent disposal. When spent fuel is removed from the reactor, approximately 95% of it is still uranium, but in a “form”⁷⁵ that is not usable in conventional reactors. If reprocessed, the leftover uranium can be used by some reactors, depending on the individual design.⁷⁶

The U.S. has not pursued reprocessing since the 1950s due to high costs and concerns related to nuclear proliferation.⁷⁷ However, the private sector is now developing advanced reactors designed to use reprocessed SNF.⁷⁸ Additionally, the spent fuel from some new advanced reactor designs will require treatment prior to long term storage, further justifying investments in reprocessing. These factors, along with federal funding for research and development of these reactors, have resulted in renewed interest in domestic reprocessing policy.⁷⁹



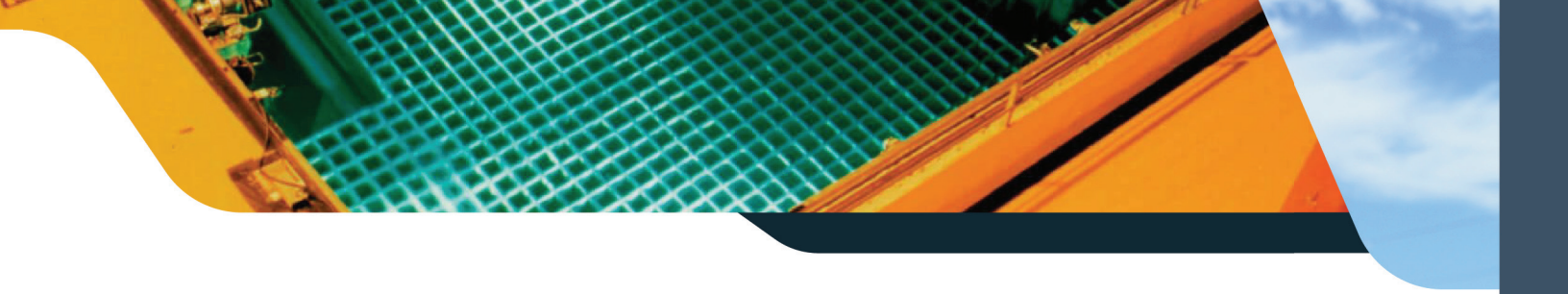
⁷⁵ The word “form” here refers to isotopes of uranium. Conventional reactors must use uranium-235, but naturally occurring uranium and the uranium that’s removed from the reactor is uranium-238. *Nuclear Fuel Cycle Overview*, WORLD NUCLEAR ASS’N, (Sept. 23, 2025).

⁷⁶ *Id.*

⁷⁷ Some material generated through reprocessing can also be used to make nuclear weapons. MARK HOLT & LANCE N. LARSON, CONG. RSCH. SERV., R48364, CONSIDERATIONS FOR REPROCESSING OF SPENT NUCLEAR FUEL (2025).

⁷⁸ *Id.*

⁷⁹ MARK HOLT, CONG. RSCH. SERV., R42853, NUCLEAR ENERGY: OVERVIEW OF CONGRESSIONAL ISSUES (2025).



Reprocessing is not a new technology. Other countries have reprocessing activities:⁸⁰

COUNTRY REPROCESSING POLICY

France	Operates commercial reprocessing plant;	1700 tons of fuel/year capacity
Russia	Operates commercial reprocessing plant;	400 tons of fuel /year capacity
The UK	Operates commercial reprocessing plant;	1500 tons of fuel /year capacity
Japan	Commercial reprocessing plant expected in 2027;	800 tons of fuel /year capacity
India	Operates four commercial reprocessing plants;	260 tons of fuel /year capacity

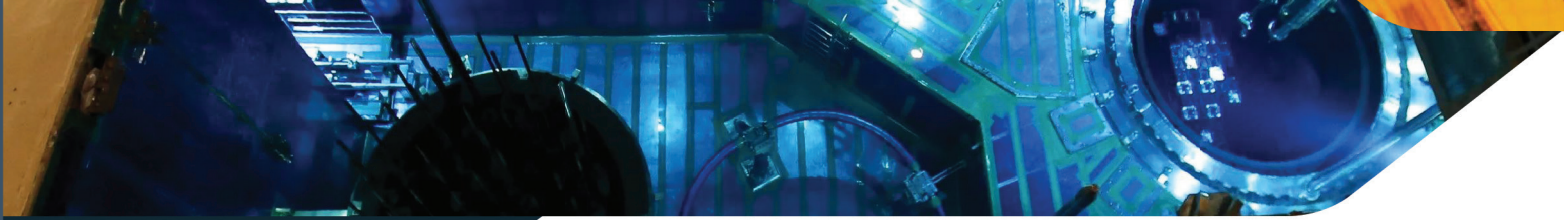
WHAT IS A CONSOLIDATED INTERIM STORAGE FACILITY (CISF)?

A Consolidated Interim Storage Facility (CISF) is a licensed, *away-from-reactor* facility that stores SNF from operating and decommissioned reactors until it can be moved to a permanent repository.⁸¹ Compared to a permanent storage facility that would involve deep underground excavation, a CISF would house dry casks from multiple reactor sites across the country together in one place at or near ground surface.⁸²

⁸⁰ *Processing of Used Nuclear Fuel*, WORLD NUCLEAR ASS'N (Aug. 23, 2024) ; *Nuclear Power in India*, WORLD NUCLEAR ASS'N, <https://world-nuclear.org/information-library/country-profiles/countries-g-n/india> (last updated Jan. 20, 2026); *Japan's Rokkasho reprocessing plant delayed until at least 2027*, INT'L PANEL ON FISSILE MATERIALS BLOG (Aug. 29, 2024), [https://fissilematerials.org/blog/2024/08/rokkasho_reprocessing_pla_3.html#:~:text=Japan%20Nuclear%20Fuel%20Limited%20\(JNFL,plant%20and%20the%20MOX%20facility.](https://fissilematerials.org/blog/2024/08/rokkasho_reprocessing_pla_3.html#:~:text=Japan%20Nuclear%20Fuel%20Limited%20(JNFL,plant%20and%20the%20MOX%20facility.)

⁸¹ U.S. NUCLEAR REGUL. COMM'N, NUREG-2237, ENVIRONMENTAL IMPACT STATEMENT FOR THE HOLTEC INTERNATIONAL'S LICENSE APPLICATION FOR A CONSOLIDATED INTERIM STORAGE FACILITY FOR SPENT NUCLEAR FUEL IN LEA COUNTY, NEW MEXICO (2022) [hereinafter EIS for Holtec CISF, *supra* note 81]; U.S. NUCLEAR REGUL. COMM'N, NUREG-2239, ENVIRONMENTAL IMPACT STATEMENT FOR INTERIM STORAGE PARTNERS LLC'S LICENSE APPLICATION FOR A CONSOLIDATED INTERIM STORAGE FACILITY FOR SPENT NUCLEAR FUEL IN ANDREWS COUNTY, TEXAS (2021) [hereinafter EIS for Interim Storage Partners CISF, *supra* note 81]; see 10 C.F.R. § 72.3 (2025).

⁸² Catherine Clifford, *Clean Energy: The feds have collected more than \$44 billion for a permanent nuclear waste dump – here's why we still don't have one*, CNBC, Dec. 19, 2021.



CISFs could provide several benefits as compared to onsite interim storage, including:

- Providing the means to consolidate and centralize the SNF backlog;⁸³
- allowing the federal government to accept SNF earlier than the establishment of a permanent repository;⁸⁴
- providing an alternative to the “continued unintended and unplanned growth of an ad hoc, decentralized, long-term storage system at reactor sites by default”;⁸⁵
- freeing up decommissioned reactor sites for other uses;⁸⁶
- adding flexibility and the necessary infrastructure for integrated, large-scale SNF management.⁸⁷



DRY CASK STORAGE

⁸³ U.S. DEPT OF ENERGY, NL/RPT-21-64973, SPENT FUEL AND WASTE DISPOSITION: SUMMARY OF CONSOLIDATED INTERIM STORAGE ADVANTAGES AND DISADVANTAGES FROM AN INTEGRATED SYSTEMS PERSPECTIVE FROM PRIOR REPORTS AND STUDIES iii (2023) [hereinafter DOE Summary Report on CISFs, *supra* note 83]; EIS for Holtec CISF, *supra* note 81; EIS for Interim Storage Partners CISF, *supra* note 81.

⁸⁴ DOE Summary Report on CISFs, *supra* note 83, at 6-7.

⁸⁵ *Id.* at 8.

⁸⁶ EIS for Holtec CISF, *supra* note 81; EIS for Interim Storage Partners CISF, *supra* note 81.

⁸⁷ DOE Summary Report on CISFs, *supra* note 83, at 10-11.



DO ANY CISFS CURRENTLY EXIST IN THE U.S.?

CISFs do not yet exist in the U.S., even though the private sector and the federal government through the DOE could develop, own, and operate one.⁸⁸ The DOE is required by law to obtain an NRC license for a permanent repository *before* beginning construction on its own CISF (also called “monitored retrievable storage”).⁸⁹ Accordingly, only private facilities could be licensed today. Private parties have proposed CISFs as early as 1997, but projects have not moved forward due to stalled licensing efforts, litigation, or failure to acquire other required federal approvals (besides for the NRC’s).⁹⁰

This may soon change. In 2021, and 2023, the NRC granted two licenses for the CISFs, sited in Texas and New Mexico, respectively.⁹¹ A recent decision of the U.S. Supreme Court rejected challenges to the NRC’s issuance of those licenses on standing grounds.⁹² Construction of those facilities may move forward if the developers are successful getting the required state authorizations.

“ ***Receipt of an NRC license alone is not the only hurdle to developing a CISF and does not guarantee a CISF will be built. State (and sometimes local) approval may also be required. While the NRC is exclusively in charge of regulating the safety of facilities storing nuclear waste, states can regulate, restrict, and prohibit CISFs for non-safety motivated reasons.⁹³ In Wyoming, the state legislature has conditioned the construction of nuclear waste facilities on state approval, see the state regulation section of this guide for more information.*** ”

⁸⁸ See 10 C.F.R. §§ 72.1, 72.22(d) (2024).

⁸⁹ 42 U.S.C. § 10168(d)(1) (2024); Heflin, *supra* note 33, at 2.

⁹⁰ Heflin, *supra* note 33, at 3.

⁹¹ Letter from Shana R. Helton, Division of Fuel Management Director, Office of Nuclear Material Safety and Safeguards, to Jeffery D. Isakson, CEO/President, Interim Storage Partners LLC (Sept. 13, 2021); Letter from Shana R. Helton, Division of Fuel Management Director, Office of Nuclear Material Safety and Safeguards, to Kimberly Manzione, Director of Licensing, Holtec International (May 9, 2023).

⁹² See *U.S. Nuclear Regul. Comm’n v. Texas*, 605 U.S. ___, 145 S.Ct. 1762 (2025); see e.g., Greg Stohr, *Nuclear Waste Storage Site in Texas Draws Supreme Court Review*, BLOOMBERG NEWS, Oct. 4, 2024; Mark Sherman, *Supreme Court Steps into a Fight Over Plans to Store Nuclear Waste in Rural Texas and New Mexico*, ASSOC. PRESS, Oct. 4, 2024; Nate Raymond, *US Supreme Court to Hear Nuclear Waste Storage Dispute*, REUTERS, Oct. 4, 2024.

⁹³ See *Skull Valley Band of Goshute Indians v. Nielson*, 376 F.3d 1223, 1242 (10th Cir. 2004) (discussing three Supreme Court decisions that addressed the preemptive effect of the extensive federal regulatory scheme for nuclear power and safety concerns).



WILL DEVELOPING CISFS MEAN THAT SPENT FUEL WILL NO LONGER BE STORED AT NUCLEAR GENERATING FACILITIES?

No, the heat and radioactivity emitted by SNF makes it initially unsafe to handle or transport once removed from the reactor core.⁹⁴ As a result for currently operating reactors, *all* SNF must initially be stored at or near the reactor facility and *all* nuclear power plants must provide interim storage.⁹⁵ However, recent developments in reactor technology may change this status quo. Some developers have proposed an alternative for factory fabricated reactors where spent fuel would not be removed from the reactor core at the generating site and instead would be returned to a central location for refueling and interim storage. In this scenario, all spent fuel generated by the manufacturer would be consolidated for interim storage at the manufacturing facility.

HOW LONG IS INTERIM?

CISFs are intended only as an interim storage solution. However, like onsite SNF storage, in the absence of permanent disposal options, CISFs “threaten to become de facto permanent disposal facilities.”⁹⁶ Thus, “interim” will last a permanent repository becomes available.

“*State and local governments desiring nuclear generation, but opposing CISFs, cannot avoid interim storage altogether. Initial wet pool storage and dry cask storage are essential parts of nuclear energy production at every reactor site. The primary difference is that a CISF would bring increased volume and storage of waste, including waste generated from out of state. Once a CISF facility is sited, states may not prohibit shipments from other states (but may enter into compacts). States can participate in other aspects of the nuclear industry such as fuel production, mining, and other manufacturing without authorizing the storage of high-level waste.*”

⁹⁴ Corkhill & Hyatt, *supra* note 32, at 4, 9.

⁹⁵ *Id.* at 9.

⁹⁶ Allison MacFarlane & Rodney C. Ewing, *Nuclear Waste Is Piling Up. Does the U.S. Have a Plan?*, SCI. AM., (Mar. 6, 2023); Max Johnson, Note, *Defining Interim Storage of Nuclear Waste*, 117 NW. U. L. REV. 1177, 1197-98 (2023) (“...the duration of that interim storage is completely unknowable—and potentially permanent.”).



HOW ARE CISFS SITED AND REGULATED UNDER FEDERAL LAW?

“Siting” is the process of determining the location of a particular facility or project. The NRC is not a siting agency and is exclusively responsible for performing a technical review of all safety and environmental protection aspects of a proposed CISF.⁹⁷ To fulfil this responsibility, the NRC determines if the license application demonstrates that the CISF’s design meets the applicable safety and federal environmental regulations.⁹⁸ All applicants, including DOE, for CISF licenses are required to prove that the proposed facility adheres to the NRC’s safety requirements.⁹⁹ The NRC is also required to conduct an environmental review pursuant to the National Environmental Policy Act (NEPA) before issuing a license for a CISF.¹⁰⁰

The NRC’s safety requirements include radiation exposure thresholds and safeguards to prevent releases into the environment. The radiation exposure thresholds establish annual radiation “dose” limits that licensed facilities must not exceed for workers or the public. These limits are currently under review and may change in response to President Trump’s Executive Order 14300, which directed the NRC to reconsider its radiation protection standards, including dose limits.¹⁰¹ As of March 2026, the limits are as follows (and compared to common radiation exposures for context):

CATEGORY	DOSE PER YEAR
Occupational Worker Limits	5,000 mrem ¹⁰²
Public Exposure Limits	100 mrem ¹⁰³
Radiation from whole body CT scan	1,000 mrem ¹⁰⁴
Radiation from the sun between 6,000 - 7,000 ft above sea level	40 mrem ¹⁰⁵

⁹⁷ See *Skull Valley Band of Goshute Indians v. Nielson*, 376 F.3d 1223, 1242-43 (10th Cir. 2004); Consolidated Interim Storage Facility (CISF), U.S. NUCLEAR REGUL. COMM’N, <https://www.nrc.gov/waste/spent-fuel-storage/cis.html> (last updated Dec. 8, 2020).

⁹⁸ 42 U.S.C. § 10168(d)(1) (2024); Heflin, *supra* note 33, at 2.

⁹⁹ See 10 C.F.R. § 72.22(d) (2023).

¹⁰⁰ See 10 C.F.R. § 51.1(2024).

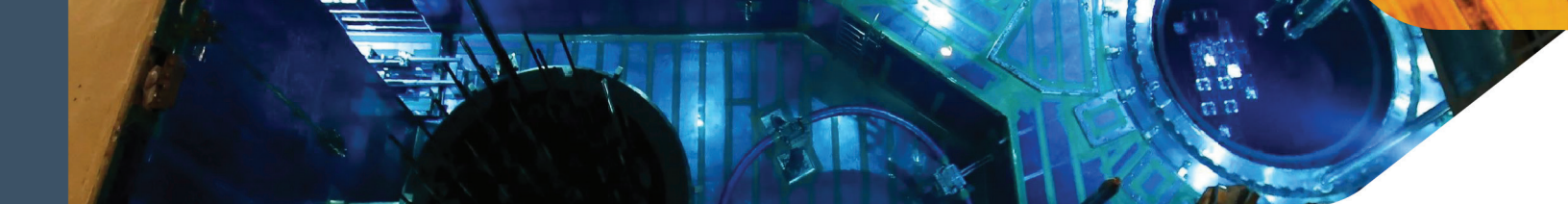
¹⁰¹ Exec. Order No. 14,300, 90 Fed. Reg. 23,473 (May 29, 2025).

¹⁰² 10 C.F.R. § 20.1201 (2025).

¹⁰³ 10 C.F.R. § 20.1301 (2025).

¹⁰⁴ *Radiation Sources and Doses*, *supra* note 16.

¹⁰⁵ *Radiation Sources and Doses*, *supra* note 16.



The NRC's environmental regulations require license holders to conduct radiation surveys and monitor water, gas, and radiation levels in and around the facility to comply with dose limits.¹⁰⁶ The NRC regulates nuclear facilities' water and gas discharges by restricting the concentration of individual radioactive elements (radionuclides) they can release.¹⁰⁷ The specific radionuclides and their amounts are too numerous to list here, but the limits are set so that continuous exposure for a year would result in a radiation dose equivalent to 50 mrem, approximately the same level of exposure as living in a high-altitude community.¹⁰⁸

HOW ARE CISFS SITED AND REGULATED UNDER STATE LAW?

The federal Supremacy Clause of the U.S. Constitution prohibits states from passing laws relating to nuclear safety and interfering with the NRC's exclusive jurisdiction,¹⁰⁹ however, state laws may ban interim storage facilities, condition storage on the construction of a permanent repository, or create state-level siting processes for non-safety motivated reasons.¹¹⁰ Through various land planning processes, state and local governments evaluate facility impacts and the appropriateness of its land use.¹¹¹



¹⁰⁶ See 10 C.F.R. §§ 20.1501 - 20.1802, App. B (2025).

¹⁰⁷ 10 C.F.R. Part 20, App. B.

¹⁰⁸ *Id.*

¹⁰⁹ See *Skull Valley Band of Goshute Indians v. Nielson*, 376 F.3d 1223, 1242 (10th Cir. 2004) (discussing three Supreme Court decisions that addressed the preemptive effect of the extensive federal regulatory scheme for nuclear power and safety concerns).

¹¹⁰ Examples of state laws passed for non-safety motivated reasons include a California statute that bans new nuclear power plants within the state until the federal government provides a plan for nuclear waste disposal (Cal. Pub. Res. Code § 25524.1 (West 2024)), and a New Mexico law that prohibits storing SNF within the state unless it "has consented to or concurred in the creation of the disposal facility" and a federal permanent repository is operating (N.M. Stat. Ann. § 74-4A-11.1 (LexisNexis 2024)).

¹¹¹ U.S. NUCLEAR REGUL. COMM'N, NUREG-2215, FINAL REPORT: STANDARD REVIEW PLAN FOR SPENT FUEL DRY STORAGE SYSTEMS AND FACILITIES xxxvi (2020). <https://www.nrc.gov/docs/ML2012/ML20121A190.pdf>

Currently in Wyoming, state law prohibits:

- interim storage facilities located offsite from reactors until the federal government establishes a permanent repository;¹¹² and
- storing nuclear waste produced from out-of-state.¹¹³

Wyoming law allows onsite interim storage at nuclear power plants. A proposed onsite interim storage facility can obtain siting approval from the state through two pathways.¹¹⁴ The Legislature automatically approves a facility if the NRC issues it a license to construct and operate from the NRC and the facility complies with specified reporting and notification requirements.¹¹⁵ Alternatively, the Legislature can authorize the facility by enacting legislation approving the siting, construction, and operation of the proposed facility before construction can commence.¹¹⁶



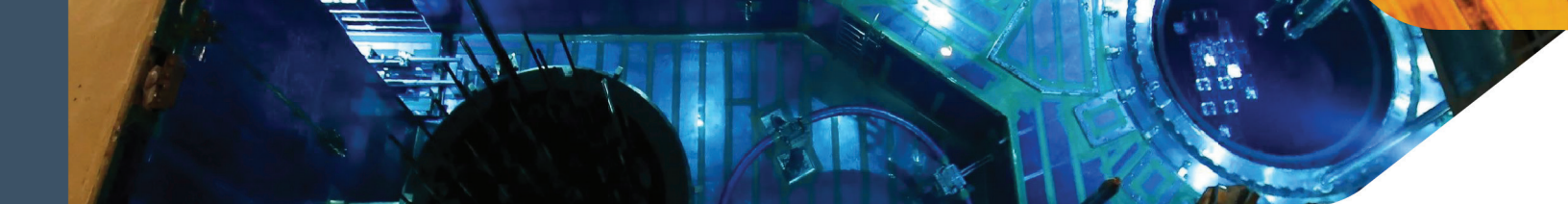
¹¹² See WYO. STAT. ANN. § 35-11-1504(b) (2025) (conditioning certain steps of Wyoming’s licensing process for siting interim storage facilities on a federal permanent repository). See *id.* § 35-11-1506(a), (e)(1).

¹¹³ See *id.* § 35-11-1506(a), (e)(1).

¹¹⁴ *Id.* § 35-11-1506(a).

¹¹⁵ *Id.* § 35-11-1506(e).

¹¹⁶ *Id.* §§ 35-11-1506(a), (b). In addition, before a proposed onsite interim storage facility can obtain legislative authorization from the state via this (second) pathway, DOE must: (1) have submitted a license application for the federal permanent repository and (2) issued a final environmental impact statement in accordance with the National Environmental Policy Act (NEPA).



Wyoming law currently exempts facilities storing high-level radioactive waste from state industrial siting processes.¹¹⁷ However, other major industrial projects such as new nuclear power plants¹¹⁸ and low-level commercial radioactive waste facilities must obtain a state-level Industrial Siting Permit and must be in conformance with local land use plans.¹¹⁹ An Industrial Siting Permit is issued by the Industrial Siting Council (ISC), a quasi-judicial body within the Wyoming Department of Environmental Quality (DEQ). The ISC evaluates socio-economic, environmental, and health impacts of large-scale industrial facilities.¹²⁰ The ISC will only approve permit applications for industrial facilities that demonstrate they do not pose significant social, economic, and environmental burdens on nearby communities.¹²¹

HOW ARE CISFS SITED AND REGULATED UNDER LOCAL LAW?

Local governments influence siting of large industrial facilities through enactment of local land use plans.¹²² The land planning process provides counties with the authority to designate which areas within county borders are open for industrial use.¹²³ For qualifying major industrial projects that do not involve HLW, local governments can participate as a party to Industrial Siting permit hearings and recommend certain conditions to the permit to the Industrial Siting Council. Once the ISC permit is issued, the industrial siting process preempts local governments from requiring additional permits or authorizations for large industrial facilities, including nuclear energy generation facilities.¹²⁴

¹¹⁷ *Id.* § 35-11-1502(a).

¹¹⁸ Specifically, an “advanced nuclear reactor,” meaning a reactor that is an improvement over nuclear reactors placed in service before January 1, 2021 and has a license issued by the NRC, is subject to the Wyoming Industrial Development Information and Siting Act to the extent that those provisions do not interfere with, contradict or duplicate any requirements of the NRC. *Id.* § 35-11-2101.

¹¹⁹ WYO. STAT. §§ 35-12-102 (vii)(C), 35-12-106 (2025); see also Table D-1, U.S. NUCLEAR REGUL. COMM’N, ENVIRONMENTAL IMPACT STATEMENT FOR THE CONSTRUCTION PERMIT APPLICATION FOR KEMMERER POWER STATION UNIT 1: DRAFT REPORT FOR COMMENT at App. D (2025).

¹²¹ *Industrial Siting Division*, WYOMING DEPT’ OF ENV’T QUALITY, <https://deq.wyoming.gov/industrial-siting-2/> (last visited Oct. 29, 2024); *Industrial Siting Council*, WYOMING DEPT’ OF ENV’T QUALITY, <https://deq.wyoming.gov/industrial-siting-2/council/> (last visited Oct. 29, 2024). WYO. STAT. ANN. § 35-12-113(a) (2025).

¹²² Cities and towns may also have limited zoning authority, including the ability to prohibit many industrial uses within city limits, See, e.g., Kemmerer Land Use Zone District Ordinance § 23-70 (2019).

¹²³ Counties are considered entities of the state that may not enact ordinances beyond the scope of power that the legislature has expressly provided and generally cannot zone for or against specific users. See *Bd. Of Teton County Commr’s v. Mackay Invs. LLC*, 2018 WY 34, ¶ 10, 413 P.3d 1120, 1123 (Wyo. 2018).

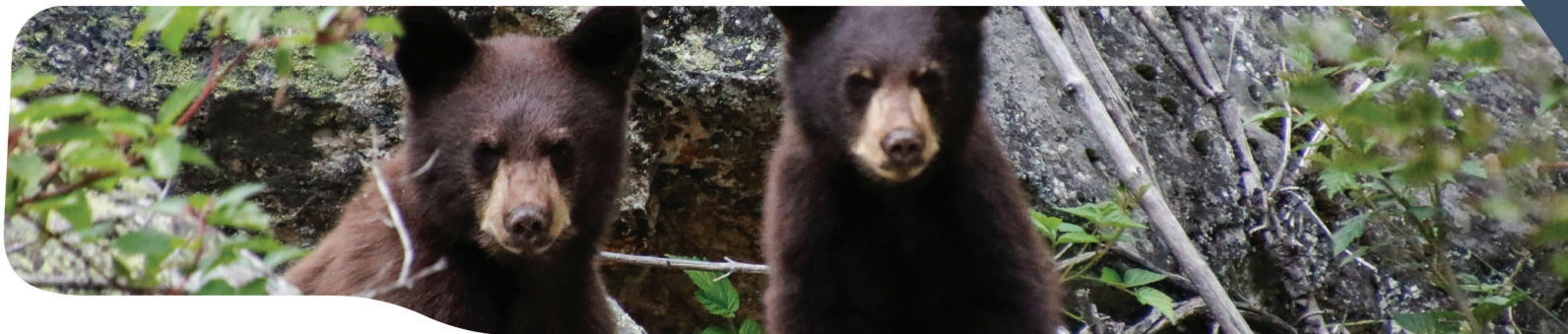
¹²⁴ See *id.*



WHAT PROTECTIONS ENSURE THAT NUCLEAR FACILITIES WON'T BECOME A PUBLIC LIABILITY?

Concerns about companies walking away from cleanup obligations are understandable in Wyoming, given the state's experience with abandoned coal-bed methane wells and other extractive industry sites. The federal regulatory framework for nuclear facilities is specifically designed to prevent this outcome and applies to the full range of facilities discussed in this guide – reactors, storage facilities, CISFs, and reprocessing plants.¹²⁵ Before any NRC-licensed facility begins operations that could result in contamination requiring cleanup, the operator must provide financial assurance for decommissioning costs in an amount based on the size and scale of the facility.¹²⁶ The operator cannot recover any trust funds or use them for other purposes until the NRC verifies that the site meets federal radiological cleanup standards and terminates the license.¹²⁷

Wyoming residents may also be familiar with defense related uranium mine and mill tailings sites that have required extensive federal cleanup, some of which are not fully remediated today. Those sites largely predate today's decommissioning framework and are managed under separate federal programs.¹²⁸ The contamination that persists at some of those sites reflects the absence of financial assurance requirements that now apply to all commercial nuclear facilities.

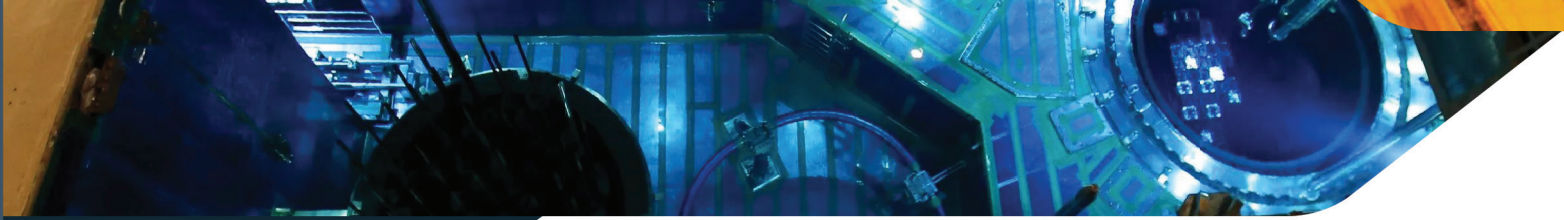


¹²⁵ See 10 C.F.R. § 50.75 (2025) (reactors); 10 C.F.R. § 72.30 (2025) (spent fuel storage installations and CISFs); 10 C.F.R. § 70.25 (2025) (reprocessing and other special nuclear material facilities); 10 C.F.R. § 30.35 (2025) (other materials licensees).

¹²⁶ *Id.*

¹²⁷ 10 C.F.R. § 50.82(a)(8)(i) (2025); see also 10 C.F.R. § 20.1402 (2025) (radiological criteria for unrestricted use required for license termination).

¹²⁸ Uranium Mill Tailings Radiation Control Act of 1978, Pub. L. No. 95-604, 92 Stat. 3021 (codified as amended at 42 U.S.C. §§ 7901-7942); National Defense Authorization Act for Fiscal Year 2013, Pub. L. No. 112-239, § 3151, 126 Stat. 1632, 2207 (authorizing DOE's Defense-Related Uranium Mines program for abandoned uranium mines that supplied ore for defense purposes).



WHAT IS THE OPPORTUNITY FOR SNF MANAGEMENT AND CISFS IN WYOMING?

As of the time of this writing, CISFs have not been proposed in Wyoming and cannot be constructed without authorizing legislation.¹²⁹ However, in February of 2025, the economists at the Center for Business and Economic Analysis (CBEA) estimated that the development of a CISF could provide significant economic benefits to the State including:¹³⁰

- A net monetary value (total economic benefits minus total costs) between \$10 million (worst case scenario) and \$606.8 million over the CISF's lifespan (throughout construction, operation, and decommissioning),
- Between \$52.6 million and \$108.5 million in tax revenue over the CISF's lifespan,
- between 5,700 and 24,500 jobs during construction, and
- between 900 and 4,000 jobs per year during operation.¹³¹



¹²⁹ See WYO. STAT. ANN. §§ 35-11-1504(b), 35-11-1506(a), (e)(1), (2025) (conditioning certain steps of Wyoming's licensing process for siting interim storage facilities on a federal permanent repository).

¹³⁰ ALEX GEBBEN & DANIEL COOLEY, WYOMING'S NUCLEAR SUPPLY CHAIN OPPORTUNITIES AND CHALLENGES: SPENT FUEL 71-72 (Kara Fornstrom ed., Univ. of Wyo. School of Energy Res. 2025). NuclearFuel25_Paper4.indd

¹³¹ *Id.* at 77-78.

HOW WOULD SNF BE TRANSPORTED TO A CISF OR REPOSITORY?

While a CISF would require additional shipments, defense-related nuclear waste and/or waste destined for Idaho National Laboratory is already transported through Wyoming by truck and rail.¹³² Here's what citizens should know about transporting SNF:

1. States cannot ban or block shipments of SNF within their borders.

The U.S. Constitution, the Atomic Energy Act, Nuclear Waste Policy Act, and Hazardous Materials Transportation Act give the federal government exclusive authority over interstate commerce and nuclear safety.¹³³ The NRC and U.S. Department of Transportation (DOT) set uniform rules for packaging, labeling, and routing of nuclear materials. The NRC oversees the design and use of special packaging for shipping radioactive materials, while DOT oversees safety during the actual shipping.¹³⁴ These laws override any state laws that would ban SNF transport within the state.¹³⁵



The NRC notifies States and tribes of nuclear waste shipments by sending advance notification to Governors and Tribal officials prior to shipping radioactive material.¹³⁶ In addition, states and tribes may select the route SNF transporters must take that minimize radiological risk, so long as the route is published in the National Hazardous Materials Route Registry on the Federal Motor Carrier Safety Administration's website at <https://www.fmcsa.dot.gov/regulations/hazardous-materials/national-hazardous-materials-route-registry>.¹³⁷

¹³² WYO. LEGIS. INTERIM COMM., RADIOACTIVE MATERIALS TRANSPORTATION IN WYOMING, (2025).

¹³³ See U.S. CONST. art. VI, cl. 2; 42 U.S.C. § 2021; 42 U.S.C. § 10108; 49 U.S.C. §§ 5101-5127.

¹³⁴ U.S. ENV'T PROT. AGENCY, TRANSPORTATION OF RADIOACTIVE MATERIAL, <https://www.epa.gov/radtown/transportation-radioactive-material> (last updated Feb. 25, 2026).

¹³⁵ Ryan Franklin, *No Time to Waste: Can a State Prevent Nuclear Waste Transportation Within Its Borders Once Yucca Mountain Becomes Operational?*, 45 WM. & MARY ENV'T L. & POL'Y REV. 937, 944 (2021).

¹³⁶ 10 C.F.R. Parts 37, 71 (2025).

¹³⁷ 49 C.F.R. § 397.103 (2025).

2. Transport Modes and Options

The federal DOT has rules for shipping by highway, rail, air and sea.¹³⁸ The amount and type of radioactivity present in the shipment determines how it can be transported and what kind of controls are required.¹³⁹ In Wyoming, shipments are made by rail with specialized railcars or by truck for smaller shipments or where rail access is not possible.

SNF casks are designed for multi-modal transport—the same cask can be loaded on a truck trailer, railcar, or barge cradle.¹⁴⁰ This flexibility allows shipments to move even from sites with limited infrastructure.



¹³⁸ U.S. NUCLEAR REGUL. COMM'N, MATERIALS TRANSPORTATION, <https://www.nrc.gov/materials/transportation> (last updated May 16, 2023).

¹³⁹ U.S. ENV'T PROT. AGENCY, TRANSPORTATION OF RADIOACTIVE MATERIAL, <https://www.epa.gov/radtown/transportation-radioactive-material> (last updated Feb. 25, 2026).

¹⁴⁰ Rose Montgomery, Oak Ridge National Laboratory, *Researching the Effects of Long-Term Dry Storage on Commercial Spent Nuclear Fuel*, AM. SOC'Y FOR QUALITY ENERGY AND ENV'T DIV. NEWSL., Nov. 1, 2019 (sponsored by U.S. Dep't of Energy, OSTI ID: 1651396); H.R. GADEY ET AL., IDAHO NAT'L LAB'Y, SYSTEM ANALYSIS MODELING AND INTERMODAL TRANSPORTATION FOR COMMERCIAL SPENT NUCLEAR FUEL, INL/CON-22-67940-Revision-0 (Nov. 2022).



3. Stringent Safety Regulations

The NRC regulates SNF transport through a combination of safety and security requirements, certification of transportation packages, inspections, and a system of monitoring to ensure transporters are meeting the applicable safety requirements.¹⁴¹ DOT's Office of Hazardous Materials Safety works with the U.S. Nuclear Regulatory Commission to keep shipments safe. Transport of SNF is among the most regulated activities in the U.S.:

» **Package Certification (NRC):**

The NRC must approve any package used for transporting radioactive material before shipment, which includes the cask and any associated containers.¹⁴² Transportation packages must meet NRC's design standards in 10 C.F.R. Part 71, which require them to survive a series of extreme tests, including:

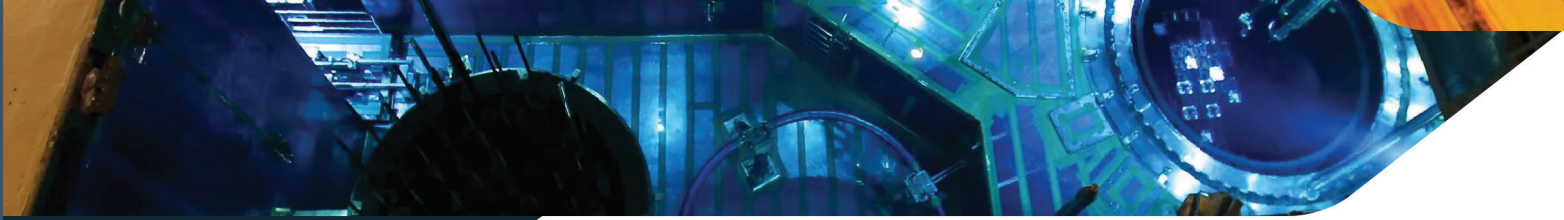
- ◇ A 30-foot drop onto a hard surface
- ◇ A puncture test
- ◇ A fully engulfing fire at 1,475°F for 30 minutes
- ◇ Immersion under water (shallow and deep tests).¹⁴³



¹⁴¹ U.S. NUCLEAR REGUL. COMM'N, TRANSPORTATION OF SPENT NUCLEAR FUEL, <https://www.nrc.gov/waste/spent-fuel-transp> (last updated May 16, 2023).

¹⁴² A transportation package must meet the NRC's requirements and must receive a "Radioactive Material Package Certificate of Compliance" from the NRC before it is considered approved. U.S. NUCLEAR REGUL. COMM'N, NUCLEAR MATERIALS TRANSPORTATION PACKAGE CERTIFICATION, <https://www.nrc.gov/materials/transportation/certification> (last updated Dec. 23, 2020).

¹⁴³ U.S. NUCLEAR REGUL. COMM'N, FREQUENTLY ASKED QUESTIONS AND ANSWERS: SPENT NUCLEAR FUEL TRANSPORTATION, <https://www.nrc.gov/waste/spent-fuel-transp-faq> (last updated Sept. 5, 2023).



» **Radiation Protection:**

Casks are engineered with thick steel and concrete/lead shielding to control radiation exposure outside the cask. Since it is not possible to block all radiation with shielding, spent fuel transportation packages are surrounded by a low-level radiation field. Therefore, to protect the public and workers, the package must meet the regulatory limits of the NRC and the Department of Transportation.¹⁴⁴ The regulatory limit for radiation exposure near a transportation package is 10 mrem per hour, approximately the dose from a chest X-ray, although packages frequently measure far less.¹⁴⁵ An individual's exposure to a transportation package will vary depending on the distance from and time spent near a package. However, members of the public are unlikely to be close enough to a package for more than a few seconds at a time under normal transport conditions.¹⁴⁶

» **Accident Resistance:**

According to the NRC, a transportation accident is highly unlikely to cause a release of spent fuel because packages are designed to withstand severe accidents that are unlikely to occur in routine transportation.¹⁴⁷ In the rare event that an accident were to occur, the robust design of the package would make it highly improbable that any spent fuel would be released. For instance, truck and rail transport packages have "impact limiters" encasing each end that are designed to crush and absorb impact forces during an accident so the package can remain intact.¹⁴⁸ According to the NRC: "there is only about a one-in-a-billion chance that the accident would result in a release of radioactive material."¹⁴⁹



¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

» **DOT Regulations:**

DOT sets requirements for routing, security, labeling; and sets standards for packaging, labeling, preparation of shipping papers, handling, marking, and placarding of shipments (49 CFR Subpart I - Class 7).¹⁵⁰ These requirements to ensure shipments avoid unnecessary risks and are trackable at all times. Additionally, the greater the potential risk posed by the contents, the more stringent DOT's packaging requirements are, and DOT regulations limit how much radioactivity can be transported in each package.¹⁵¹ That way, the dose from any accident will not pose a serious health risk to workers or the public.



¹⁵⁰ U.S. DEP'T OF ENERGY, OFF. OF ENV'T MGMT., PACKAGING AND TRANSPORTATION (Aug. 2020), <https://www.energy.gov/sites/default/files/2020/08/f77/Transportation-Fact-Sheet-08-4-2020.pdf> [hereinafter DOE, PACKAGING & TRANSPORTATION, *supra* note 150].

¹⁵¹ U.S. NUCLEAR REGUL. COMM'N, BACKGROUNDERS ON TRANSPORTATION OF SPENT FUEL AND RADIOACTIVE MATERIALS, <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/transport-spenfuel-radiomats-bg> (last updated Mar. 31, 2021) [hereinafter Backgrounders on SNF Transport, *supra* note 151].



» **Emergency Response:**

The U.S. Department of Energy (DOE) maintains regional emergency management field offices that can dispatch qualified response teams to an incident involving nuclear material, but first responders are primarily local fire departments and law enforcement agencies.¹⁵² Any state, tribal, local, or private sector organization needing radiological assistance can call its DOE Regional Response Center to get information, advice, or assistance, and the Regional Response Center also ensures that appropriate state or tribal personnel are contacted.¹⁵³ In the event of a radiation emergency, the appropriate state radiation control agency typically handles the emergency response and first responders are trained to stay clear and call the state radiation control officer.¹⁵⁴ For shipments of SNF, the NRC's physical protection requirements and security rules require advance notice to each state's governor (or their representative) and coordination with local law enforcement, so responders are prepared in case of an emergency or if shipment escorts need assistance.¹⁵⁵ The Wyoming Office of Homeland Security (WOHS) is the lead state agency for coordinating emergency response efforts across the state, and WOHS and the Wyoming Highway Patrol are the designated points of contact within the state to receive these notifications.¹⁵⁶



¹⁵² U.S. DEP'T OF TRANSP., DOT'S ROLE IN THE SAFE AND SECURE TRANSPORTATION OF SPENT NUCLEAR FUEL (SNF) AND HIGH-LEVEL RADIOACTIVE WASTE (HLRW) TO THE PROPOSED GEOLOGICAL REPOSITORY AT YUCCA MOUNTAIN, NEVADA (Sept. 24, 2008); DOE, PACKAGING & TRANSPORTATION, *Supra* note 150.

¹⁵³ FED. EMERGENCY MGMT. AGENCY & U.S. DEP'T OF ENERGY, RADIOACTIVE MATERIALS: TRANSPORTATION AND INCIDENT RESPONSE, FEMA 358, 05/10.

¹⁵⁴ *Id.*

¹⁵⁵ Backgrounder on SNF Transport, *supra* note 151.

¹⁵⁶ WYO. LEGIS. INTERIM COMM., *supra* note 132.



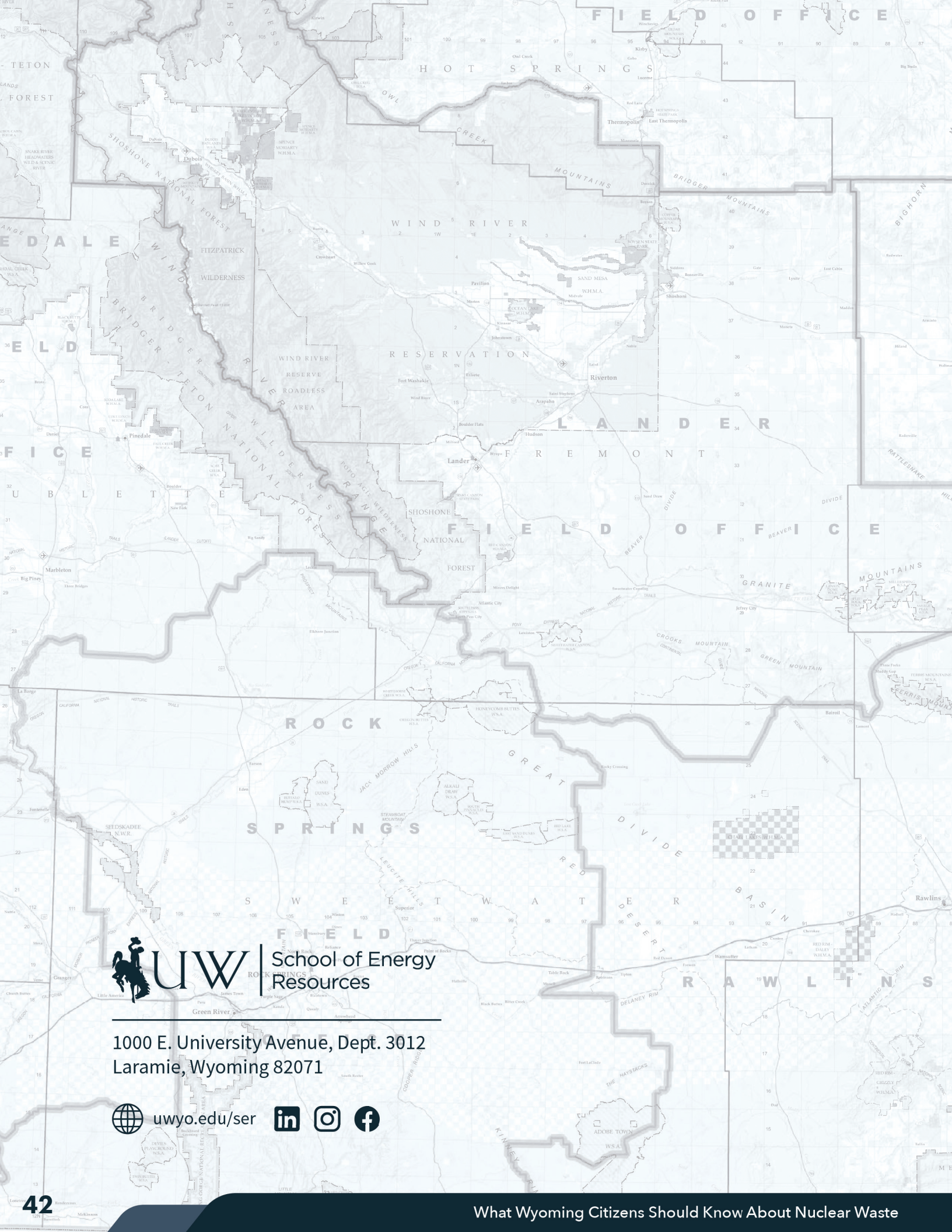
HOW WILL I KNOW IF A CISF IS PROPOSED NEAR ME?

No CISF's have been proposed in Wyoming as of the date of publication. Concerned Wyoming citizens can follow developments in this area by:

- Monitoring the Wyoming Legislature, which would need to pass a new law or amend the current law to allow for offsite interim storage in a CISF (W.S. § 35-11-1506).
- Citizens interested in other major industrial projects such as nuclear power plants and low-level commercial radioactive waste facilities can register with the Wyoming Department of Environmental Quality website to automatically receive Industrial Siting Council public notices electronically. Registration for public notices is available at <https://deq.wyoming.gov/industrial-siting-2/isd/>.
- Tracking federal actions at the NRC
- Keeping up with your local county government for developments in your area.

Please reference the separate *Getting Involved: Community guide to participation in nuclear facility authorization* for more details and a step-by-step guide for how to get involved with the different levels of government responsible for approving CISFs and other nuclear facilities.





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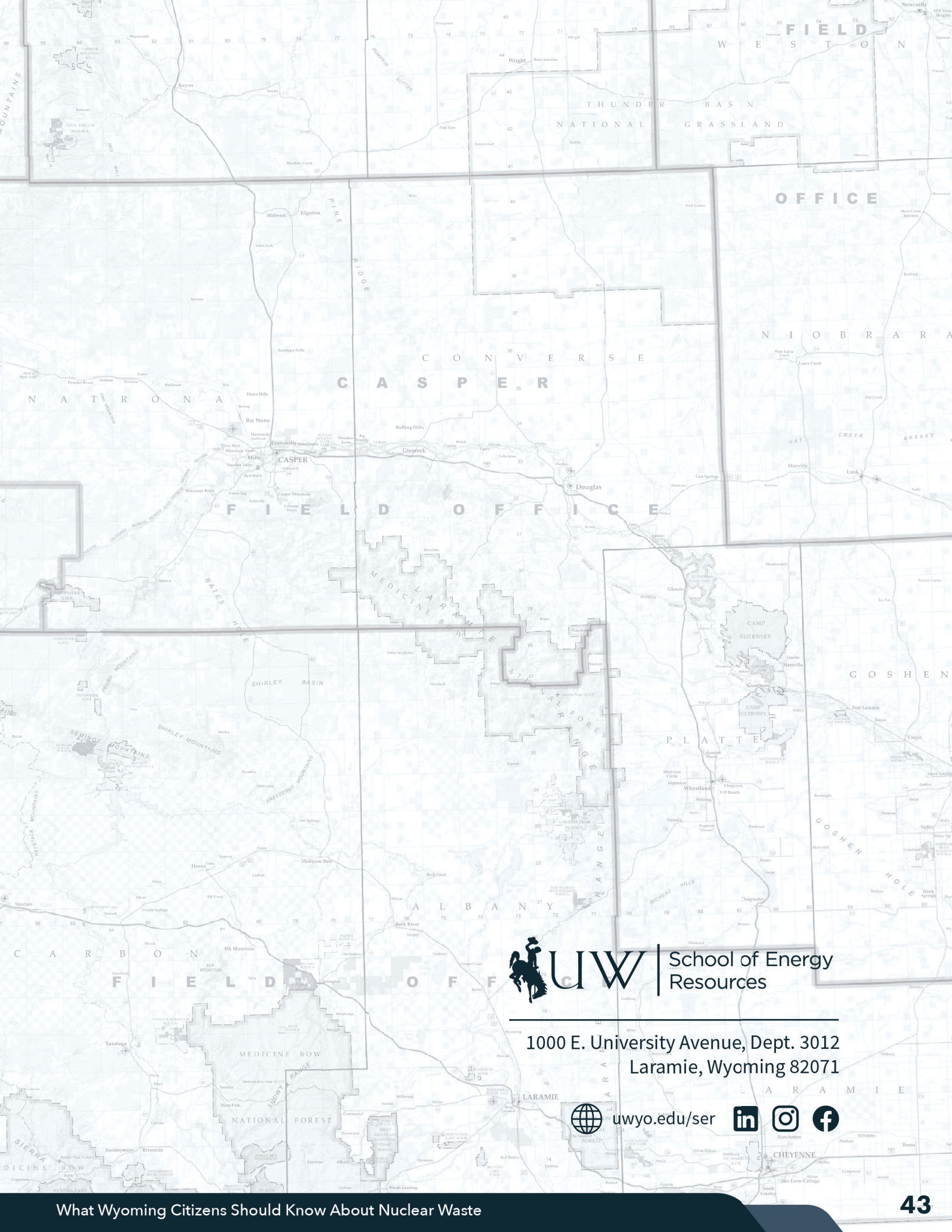
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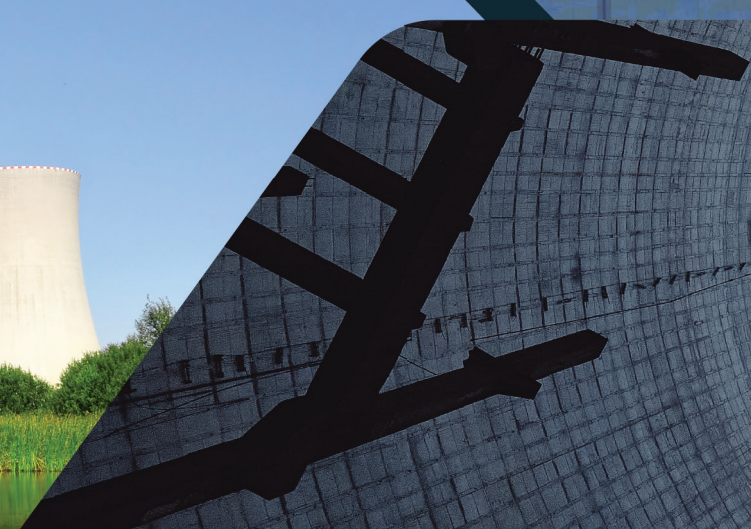


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