

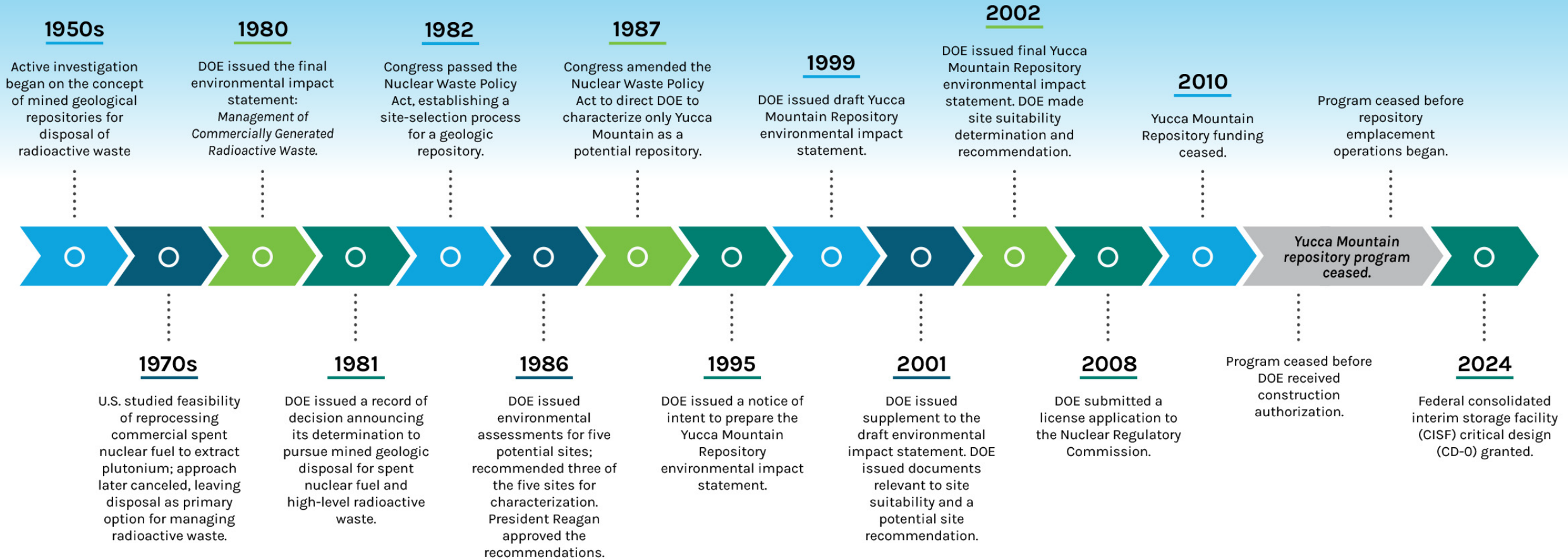
U.S. DEPARTMENT OF
ENERGY

Office of
NUCLEAR ENERGY

NWTRB Meeting August 2024: Spent Nuclear Fuel and High Level Waste.

Mr. Paul Murray, Deputy Assistant Secretary
Spent Fuel & High Level Waste Disposition
U.S. Department of Energy

TIMELINE HISTORY OF DEEP GEOLOGIC REPOSITORY PROGRAM

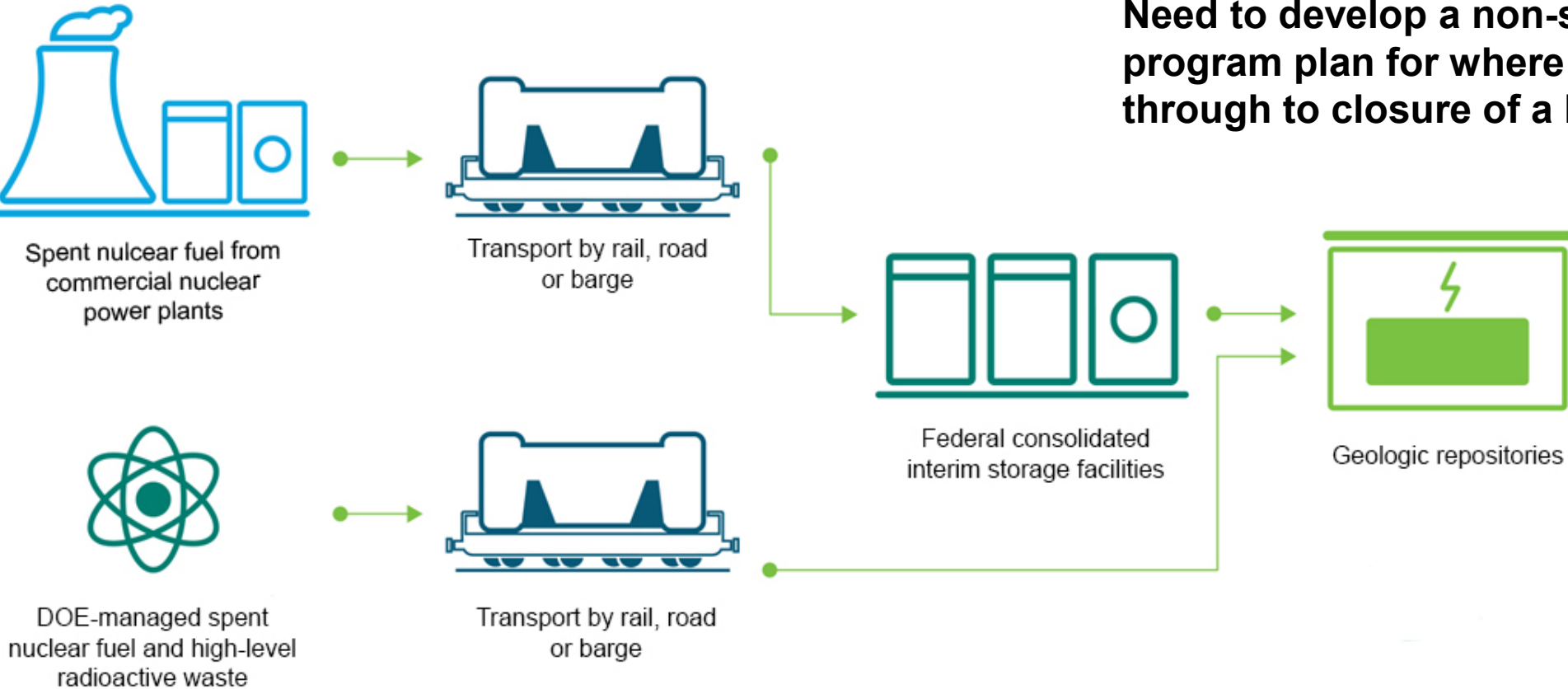


Taxpayer Liability for Spent Nuclear Fuel*

Fiscal Year Ending	DOE's Estimate of Total Liability	Amount Paid from Taxpayer Funded Judgment Fund		DOE's Estimate of Remaining Liability (Total less Amount Paid)
		Cumulative	Annual	
9/30/2023	\$ 44.7 Billion	\$ 10.6 Billion	\$ 500 Million	\$ 34.1 Billion
9/30/2022	\$ 41.1 Billion	\$ 10.1 Billion	\$ 1.1 Billion	\$ 31.0 Billion
9/30/2021	\$ 39.9 Billion	\$ 9.0 Billion	\$ 400 Million	\$ 30.9 Billion
9/30/2020	\$ 39.2 Billion	\$ 8.6 Billion	\$ 600 Million	\$ 30.6 Billion
9/30/2019	\$ 36.5 Billion	\$ 8.0 Billion	\$ 600 Million	\$ 28.5 Billion
9/30/2018	\$ 35.5 Billion	\$ 7.4 Billion	\$ 500 Million	\$ 28.1 Billion
9/30/2017	\$ 34.1 Billion	\$ 6.9 Billion	\$ 800 Million	\$ 27.2 Billion
9/30/2016	\$ 30.8 Billion	\$ 6.1 Billion	\$ 800 Million	\$ 24.7 Billion
9/30/2015	\$ 29.0 Billion	\$ 5.3 Billion	\$ 800 Million	\$ 23.7 Billion
9/30/2014	\$ 27.1 Billion	\$ 4.5 Billion	\$ 800 Million	\$ 22.6 Billion

* Source: DOE Nuclear Waste Fund Annual Financial Statement Audit Reports. Over time, these estimates have been based on varying assumptions including when DOE would begin removing commercial spent nuclear fuel from reactor sites. During the ten-year window covered by the table, the date has been pushed out ~ 17 years. In FY 2023, DOE utilized a range approach for “subsequent license renewals” – the numbers in the table above represent the low end of the range.

Integrated Waste Management System



Need to develop a non-site specific program plan for where we are today through to closure of a DGR?

Advance Act

Not later than January 1, 2026, and biennially thereafter, the Secretary of Energy shall submit to Congress a report that describes—

- (1) the annual and cumulative amount of payments made by the United States to the holder of a standard contract due to a partial breach of contract under the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101 et seq.) resulting in financial damages to the holder;
- (2) the cumulative amount spent by the Department of Energy since fiscal year 2008 to reduce future payments projected to be made by the United States to any holder of a standard contract due to a partial breach of contract under the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101 et seq.);
- (3) the cumulative amount spent by the Department of Energy to store, manage, and dispose of spent nuclear fuel and high-level radioactive waste in the United States as of the date of the report;
- (4) the projected lifecycle costs to store, manage, transport, and dispose of the projected inventory of spent nuclear fuel and high-level radioactive waste in the United States, including spent nuclear fuel and high-level radioactive waste expected to be generated from existing reactors through 2050;
- (5) any mechanisms for better accounting of liabilities for the lifecycle costs of the spent nuclear fuel and high-level radioactive waste inventory in the United States;
- (6) any recommendations for improving the methods used by the Department of Energy for the accounting of spent nuclear fuel and high-level radioactive waste costs and liabilities;
- (7) any actions taken in the previous fiscal year by the Department of Energy with respect to interim storage; and
- (8) any activities taken in the previous fiscal year by the Department of Energy to develop and deploy nuclear technologies and fuels that enhance the safe transportation or storage of spent nuclear fuel or high-level radioactive waste, including technologies to protect against seismic, flooding, and other extreme weather events.

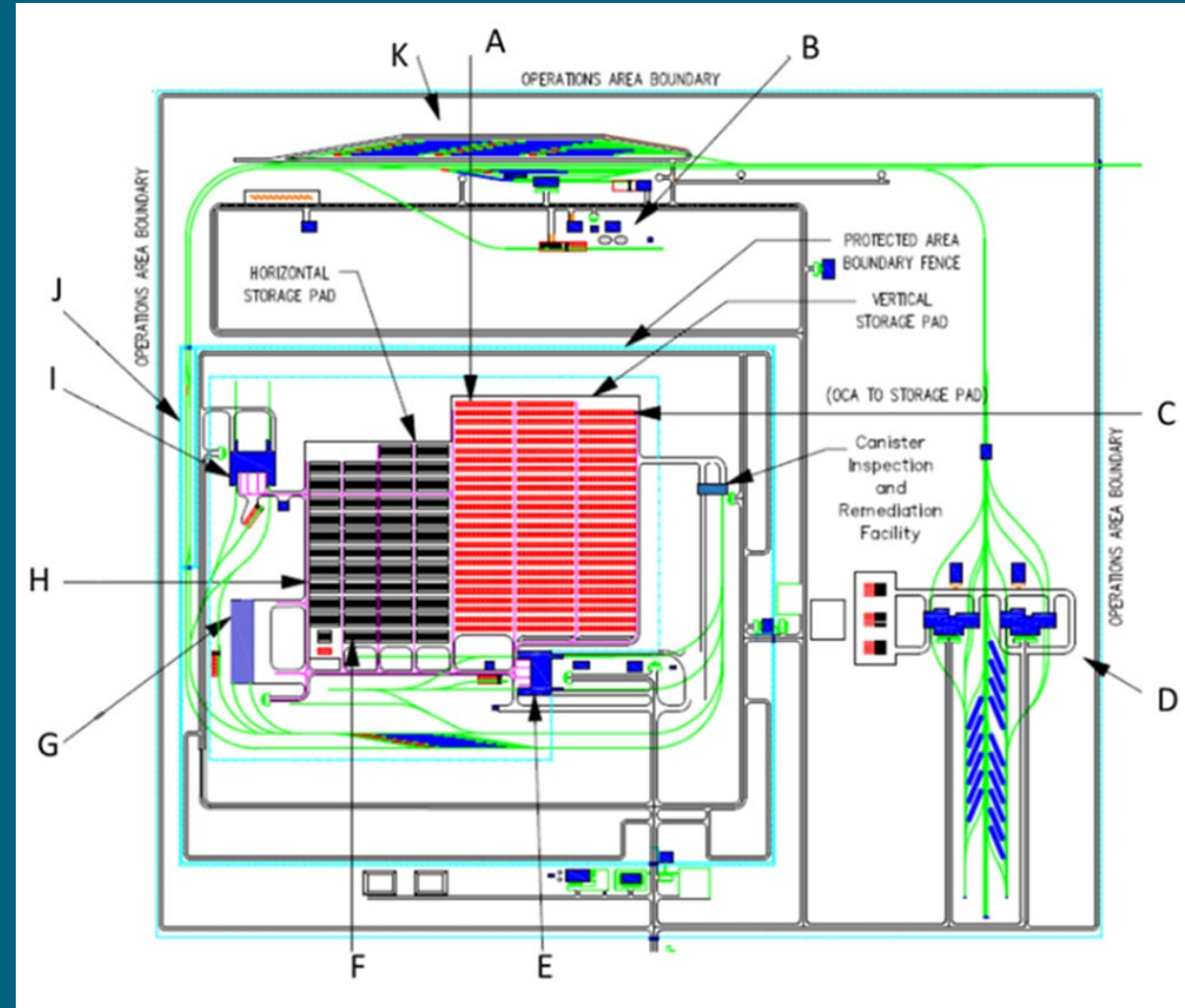
The ADVANCE Act of 2024, sec. 403(b)

Legacy R&D.

- Congress has appropriated over \$1B to the Spent Nuclear Fuel management program since Oct 2010
- We have conducted a lot of R&D programs and generated a lot of data
- We have to look at the data that we have generated and determine if we can remove or reduce liabilities

Federal Consolidated Interim Storage

- Design proceeding on schedule
- Liability estimate assumes start of operations in 2038
- DOE will be an NRC licensee and we will have the organizational culture that allows us to design and build the facility
- We will design, build and operate to current NRC regulations and guidelines



Atlas Railcar



High Burn-up Demonstration Cask

- Supporting the safe long term dry storage of high burn-up fuel at utility sites
- Most new SNF is now high burn-up
- Important to license renewal applications for over 60 of the current commercial fleet
- Need to move the cask from operating reactor site to new home in 2027
- ~15t of SNF
- Upcoming NRC “Toll Gates” require cask to be opened in 2029 to supply data in 2038
- Working on options for where to move the cask.



Package Performance Demonstration

Why is DOE planning a PPD?

- Build trust and confidence in the safety of SNF transportation casks and SNF transportation by rail
- Record high-resolution video to use in DOE communication products and public outreach
- Explore additional opportunities to strengthen relationships

DOE is considering:

- Potential tests to be performed
- Potential test sites
- Potential transportation casks
- Potential analytical tools

Part of the CBS and public trust building



CONSENT-BASED SITING CONSORTIA PROGRESS

Consent-based siting consortia support DOE's efforts to facilitate inclusive community engagement and elicit public feedback on consent-based siting, management of spent nuclear fuel, and federal consolidated interim storage. The 12 awardees are comprised of various organizations to help reach communities across the country and remove barriers to participate in DOE's consent-based siting process. Awardees have made significant progress in carrying out community engagement activities and providing direct grants to communities wanting to learn more.



Progress: DOE's Consent-Based Siting Process General Timeline



Progress: Consent-Based Siting Consortia Timeline



Updates reflect activities from September 2023 up to June 2024.



To learn more about consent-based siting, please visit energy.gov/consentbasedsiting or send an email to consentbasedsiting@hq.doe.gov



Storage R&D

Consolidated into the Planned International Center for Research for Storage of SNF and HLW:

- Will be located wherever the HBU cask is located
- Need statistically significant data to be able to make conclusions
- We plan to collaborate with Germany, Belgium, UK and Japan
- Center will move when the CISF opens, tangible asset and jobs

Future R&D:

- R&D must be relevant and have a defined goal, purpose and conclusion
- R&D must be risk informed and buy down future liability
- Collaboration with US commercial industry through EPRI
- Utilize NEUP and SBIR program
- All storage R&D results need to be peer reviewed, approved by DOE and reviewed by GC for policy and legal considerations before they are discussed or released
- We will implement an NQA-1 QA program starting in FY 2025 for certain storage R&D

NE Collaboration with EM

- DOE NE 8 is hiring a new DOE lead and National Technical Director for storage R&D
- DOE EM is hiring a new Chief Technology Officer
- DOE NE has requested support from DOE EM and Naval Reactors for the total program plan
- DOE NE and DOE EM are discussing the consent-based process for a federal consolidated interim storage facility, and lessons learned from siting the Waste Isolation Pilot Plant, and Yucca Mountain
- NE collaborating with EM and SRNL in supporting of the Accelerated L Basin De-inventory program
- NE collaborating with EM Idaho in support of the SNF road ready packaging demonstration.
 - Loading demonstration for the DOE standard canister
 - Completing the Nuclear Regulatory Commission application for package approval of the DOE standard canister
 - Evaluating additional research on commercial SNF stored by EM in Idaho
- Exploring supporting the guided wave technology and other repair programs at Hanford

Conclusion

- We have spent over \$1B of taxpayer money and generated a lot of data
- Any future R&D we may conduct has to have a risk informed approach and have a clear programmatic need that reduces risk and liability
- We have limited budgets and we will prioritize
- We plan to cooperate closely with DOE EM

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Back-up Slides