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Subject: Transmittal of the 2024 Repository Siting Annual Report

Dear Mr. Nance:

The purpose of this letter is to provide you with the subject report pursuant to Permit Part 2, Section 2.14.3.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Mr. Michael Gerle, Director, Environmental Regulatory Compliance Division, is your point of contact regarding any technical questions or comments. Mr. Gerle can be reached at (575) 988-5372.

Sincerely,

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Enclosure

cc: w/enclosure

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# Repository Siting Annual Report

**Waste Isolation Pilot Plant Hazardous  
Waste Facility Permit Number:  
NM4890139088-TSDF**

**Permit Part 2, Section 2.14.3**

December 2024



# Repository Siting Annual Report

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## Acronyms and Abbreviations

AEC	Unites States Atomic Energy Commission
ATWIR	Annual Transuranic Waste Inventory Report
BECR	Biennial Environment Compliance Report
BRC	Blue Ribbon Commission
CBFO	Carlsbad Field Office
CH	contact-handled
CY	calendar year
D&D	decontamination and decommissioning
DOE	Department of Energy
EM	Office of Environmental Management
EPA	Environmental Protection Agency
ft <sup>3</sup>	cubic feet
FEIS	Final Environmental Impact Statement
INL	Idaho National Laboratory
LWA	Land Withdrawal Act
m <sup>3</sup>	cubic meters
NAS	National Academy of Sciences
NE	Office of Nuclear Energy
NEPA	National Environmental Policy Act
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NWPA	Nuclear Waste Policy Act
PCB	polychlorinated biphenyl
Permit	Waste Isolation Pilot Plant Hazardous Waste Facility Permit
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RH	remote-handled

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ROD	Record of Decision
SEIS	Supplemental Environmental Impact Statement
SNF	spent nuclear fuel
SPDV	site and preliminary design validation
SSCVS	Safety Significant Confinement Ventilation System
TSCA	Toxic Substances Control Act
TRU	transuranic
WIPP	Waste Isolation Pilot Plant

# Repository Siting Annual Report

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## 1.0 Introduction

The purpose of this report is to provide the New Mexico Environment Department (**NMED**) with the Repository Siting Annual Report pursuant to Waste Isolation Pilot Plant (**WIPP**) Hazardous Waste Facility Permit (**Permit**) Part 2, Section 2.14.3, *Repository Siting Annual Report*. Permit Part 2, Section 2.14.3 states the following:

*The DOE shall submit an annual report summarizing its progress toward siting another repository for TRU waste in a state other than New Mexico. The annual report shall summarize the steps the DOE has taken toward siting such a repository in another state and the report shall include documentation supporting the summary. Such documentation may include: with what disposal regulations another repository shall comply; consent-based or other siting process; timeline and milestones for identifying possible sites for another repository; National Environmental Policy Act actions; Congressional authorizations and budget appropriation requests; communications with EPA and other federal agencies or Congress about activities to establish another repository; land acquisition(s); state and public engagement activities; feasibility studies; design, construction, and operation plans; and plans, timelines, and milestones for independent technical expert reviews of the activities related to establishing another repository for TRU waste.*

This report is the first submission to fulfill this annual requirement. Because this is the first in a series of annual reports required by Permit Part 2, Section 2.14.3, this report provides an extended discussion on the history and experience of the WIPP Project. Applying lessons learned from the DOE's experience siting and operating WIPP, the nation's only transuranic (**TRU**) waste repository, will play an important role in any future efforts to site a second repository for TRU waste outside of New Mexico.

The report then examines some of the key criteria for DOE to consider in potential future efforts to site another repository for TRU waste by evaluating the DOE Office of Nuclear Energy's (**DOE-NE's**) Consent-Based Siting Process for Federal Consolidated Interim Storage of Spent Nuclear Fuel. This serves as a model that could be used to identify sites outside of the state of New Mexico that could be geologically and geographically suitable for future development of an additional deep repository for TRU waste disposition. Because any efforts to site a future repository will require prior Congressional authorization and funding, the report includes a needs assessment to analyze the schedule considerations and mission needs that would justify any such effort. The report next discusses the consent-based siting process developed by DOE-NE and identifies some of the key lessons learned from this process.

Finally, the report summarizes the steps DOE has taken over the last year regarding potential siting of a second repository and discusses the work DOE plans to conduct over the next year for inclusion in the next repository siting annual report.

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## 2.0 Background

The WIPP facility is an underground geological repository located in a bedded salt formation 2,150 feet beneath the surface of the Chihuahuan Desert. The WIPP project was authorized by Congress as a defense activity to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States (Public Law 96-164). The DOE mission regarding the WIPP Project is to provide safe characterization, transportation, and disposal of defense TRU waste in a manner that is protective of the workforce, public, and environment. Transuranic waste is defined statutorily as:

*Waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for (A) high-level radioactive waste; (B) waste that the DOE Secretary has determined, with the concurrence of the EPA Administrator, does not need the degree of isolation required by the disposal regulations; or (C) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with part 61 of title 10, Code of Federal Regulations. [Pub. L. 102-579 (1992)]*

The WIPP Project is further authorized under the WIPP Land Withdrawal Act [**LWA**; (Public Law 102-579)] to dispose of 6.2 million cubic feet [**ft**<sup>3</sup>, or 175,564 cubic meters (**m**<sup>3</sup>)] of defense-related TRU waste generated from atomic energy defense activities of the United States. Atomic energy defense activities [defined in the Nuclear Waste Policy Act (**NWPA**), 42 U.S.C. 10101 et seq.] encompass DOE activities performed, in whole or in part, to carry out defense functions, including naval reactors development; weapons activities; defense nuclear materials production, safeguards, by-products and waste management; and defense research and development (**R&D**).

The WIPP facility is located approximately 26 miles from Carlsbad, NM, and is the nation's only disposal site for defense-related TRU waste.

Because this is the first annual report required by Permit Part 2, Section 2.14.3, it contains relevant background information regarding the process of locating a TRU waste disposal site with emphasis on the experience and success accomplished with the WIPP Project. Utilizing lessons learned from the WIPP experience will be essential in future efforts to successfully site another repository for TRU waste.

## 3.0 WIPP Siting History

### 3.1 Why was the WIPP Chosen?

Siting for the WIPP facility traces its roots to the 1950s. In 1957, the National Academy of Sciences (**NAS**) recommended salt as the most promising geologic medium for disposal of radioactive waste for the following reasons (NAS 1957):

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- Salt provides stable geology,
- Easy to mine,
- Fractures are self-healing,
- Salt is impermeable,
- Salt is naturally plastic, so “creep” will encapsulate the waste,
- High thermal conductivity,
- Provides effective long-term isolation,
- Bedded salt has high compressive strength,
- Bedded salt permits dissipation of larger quantities of heat than is possible in other types of rock,
- Rock salt is approximately equal to concrete for gamma-ray shielding, and
- Salt is abundant and therefore economically and geologically feasible.

In 1973, the U.S. Atomic Energy Commission (**AEC**) chose the underground salt bed 26 miles east of Carlsbad for exploratory work in the search for an underground radioactive waste repository site (ORNL 1973). The WIPP facility’s location was selected because it met the NAS recommended criteria and was considered an ideal location based on the following:

- A facility was needed,
- Strong local community support,
- Geology,
- Remote location,
- Demographics (e.g., sparsely populated), and
- Minimal surface and groundwater.

The WIPP is situated at a depth of approximately 2,150 feet below ground surface in a thick and relatively homogeneous strata of bedded salt locally known as the Salado formation. Regional geologic data indicate that this formation extends roughly from southeastern New Mexico on a northeasterly track to south central Kansas.

## **3.2 WIPP Regulatory Framework**

The history and development of the WIPP facility demonstrate the stepwise process involved in identifying and opening the facility as well as the vital role of host community support in a successful siting process. This includes the identification of an appropriate disposal medium, selection, site characterization, facility design, construction, operation, and closure plan. The regulatory framework includes the legal and regulatory milestones that were necessary to gain authorization to begin operations. The history is summarized below.

Siting, constructing, and operating the WIPP facility involved two statutes and four significant regulatory actions. The statutes were the United States Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act



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of 1980 (Public Law 96-164) (hereafter, WIPP Authorization Act of 1980) and the WIPP LWA (Public Law 102-579). The regulatory activities include DOE's National Environmental Policy Act (**NEPA**) environmental reviews, the certification of DOE's compliance with the 40 CFR Part 191 disposal standards, the Resource Conservation and Recovery Act (**RCRA**) Permit, and the approval to dispose of waste containing polychlorinated biphenyls (**PCBs**) under the Toxic Substances Control Act (**TSCA**). The processes set in motion by the laws and regulations involved significant participation on the part of the general public, the local communities, and the state of New Mexico.

The WIPP Project was authorized by Congress in the WIPP Authorization Act of 1980. The development of the WIPP facility was initiated in January 1981, following a several decades-long site selection and site characterization process. The DOE announced its decision to proceed with a phased development of the WIPP facility, to be located in a salt deposit in Eddy County in southeastern New Mexico (DOE 1981a). The decision authorized the WIPP facility to demonstrate the safe disposal of radioactive waste from defense activities and programs of the United States. The WIPP LWA limited the total WIPP capacity to 6.2 million ft<sup>3</sup> of TRU waste. After completing a site and preliminary design validation (**SPDV**) phase, the construction phase at the WIPP facility began in 1983.

**NEPA:** Pursuant to NEPA requirements,<sup>1</sup> the DOE published the WIPP Final Environmental Impact Statement (**FEIS**) in 1980 (DOE 1980). The FEIS analyzed and compared the environmental impacts of various alternatives for demonstrating the safe disposal of TRU waste resulting from national defense activities. Based on the environmental analyses in the FEIS, the DOE published a Record of Decision (**ROD**) in 1981 (DOE 1981) to proceed with the phased development of the WIPP facility.

In addition to documenting the decision-making process, the FEIS established the initial safety case for the disposal system based on the best understanding of the geology, hydrology, rock properties, waste characteristics, possible disruptive events, conceptual design, and future states. It also assessed the impacts of regulations and permits needed to operate the facility and the impacts on the public.

The FEIS assumed the inventory of waste to be disposed at the WIPP facility would be waste stored at various sites and future newly generated waste from ongoing weapons-related programs. The end of the Cold War and the decision to decommission numerous DOE facilities implied a different inventory of waste from that covered by the FEIS. As the result, the DOE published a Supplemental Environmental Impact Statement (**SEIS-I**) (DOE 1990a), which addressed the revised composition of the

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<sup>1</sup> The DOE has prepared and implemented its own NEPA regulations (DOE 2011) to supplement those requirements contained in 40 CFR Parts 1500 through 1508. DOE Policy 451.1 (DOE 2017), *National Environmental Policy Act Compliance Program*, assigns responsibilities for NEPA compliance to specified DOE organizations and individuals.

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waste inventory, the transportation of waste to the WIPP facility, conducting a Test Phase at the WIPP facility, and management of mixed waste (TRU waste with hazardous constituents). The DOE published a ROD (DOE 1990b) resulting from the SEIS-I in 1990.

In October 1993, the DOE decided not to conduct the Test Phase at the WIPP facility and moved toward the initiation of waste disposal operations. In September 1997, the DOE published the SEIS-II (DOE 1997). The SEIS-II evaluated the circumstances that had changed since 1990 and newer generator site data that might result in different potential environmental impacts from WIPP facility disposal and closure operations.

The ROD for SEIS-II (DOE 1998) was issued to initiate the disposal phase. After completing several regulatory actions, which are summarized below, the WIPP facility began receipt and disposal of contact-handled (**CH**) TRU waste in March 1999 and remote-handled (**RH**) TRU waste in January 2007.

**Environmental Protection Agency (EPA) Certification:** The WIPP LWA established EPA as an external regulator for long-term performance of the WIPP facility to isolate and contain radioactive waste. The EPA disposal standards in 40 CFR Part 191 (EPA 1985) outline the performance requirements for disposal of TRU waste at the WIPP facility. EPA's WIPP Compliance Criteria in 40 CFR Part 194 (EPA 1998) describe the basis for EPA to certify that the WIPP disposal system would meet the disposal standards for at least 10,000 years. To demonstrate compliance with the disposal standards per the criteria, the DOE submitted a Compliance Certification Application to the EPA in October 1996 (DOE 1996), and on May 18, 1998, EPA issued a rulemaking with a certification decision stating that the DOE had successfully demonstrated that the WIPP disposal system would meet the disposal standards. The WIPP facility began receiving waste shipments on March 26, 1999, which initiated a recurring recertification process required by Section 8(f) of the LWA. Since the initial certification, DOE has submitted several Compliance Recertification Applications to the EPA.

**EPA Approval under TSCA:** The PCB storage and disposal regulations are listed in the applicable subparts of 40 CFR Part 761. An initial report requesting authorization to store and dispose of TRU waste contaminated with PCBs, in accordance with the chemical waste landfill provisions of 40 CFR §761.75, was submitted to EPA Region VI on March 22, 2002. This initial report included requests for waivers to the technical requirements for hydrological conditions, surface and groundwater monitoring, and leachate collection. On May 15, 2003, the EPA Region VI approved the disposal of TRU waste containing PCBs per the initial report. On February 5, 2005, the WIPP facility received the first shipment of PCB-contaminated TRU waste.

**NMED Approval under the RCRA and the New Mexico Hazardous Waste Act:** The NMED, pursuant to its authority to implement RCRA, has regulatory authority over the hazardous waste portion of TRU mixed waste. The EPA has authorized NMED to implement a hazardous waste program in lieu of, but equivalent to, the federal program.

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The DOE submitted a permit application to the NMED in 1995 (DOE 1995a). The Permit Application was for the storage of hazardous waste in two units (Parking Area Unit and WHB Unit) in accordance with 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart I), and for the disposal of hazardous waste in accordance with 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart X). In October 1999, NMED issued the WIPP facility a 10-year Permit that became effective on November 26, 1999 (NMED 1999). The NMED has updated the Permit several times to incorporate Permit modifications. The Permit has been renewed twice.

**Other Regulations:** The LWA requires the DOE to submit a Biennial Environment Compliance Report (**BECR**) every two years to the EPA summarizing the DOE's compliance at the WIPP facility with applicable environmental regulations. The most recent of these reports addresses 21 federal environmental laws and 13 state environmental laws (DOE 2024a).

### 3.3 WIPP Project Success

The WIPP Project has been successful in large part due to strong community involvement and support (Helman 2012) (U.S. NWTRB 2024).

Due to the operation of the WIPP facility, DOE Office of Environmental Management (**DOE-EM**) has been able to safely and compliantly remove and dispose of TRU waste from generator/storage sites across the country. DOE-EM continues to make steady progress in drawing down inventories of TRU waste at sites, such as the Los Alamos National Laboratory in New Mexico and the Idaho National Laboratory (**INL**) in Idaho. Most significantly, the Rocky Flats Environmental Technology Site was de-inventoried of TRU and TRU mixed waste (approximately 11,400 m<sup>3</sup> emplaced at WIPP) and the facility was reclaimed. The INL has significantly reduced its inventory as needed to meet the Idaho Settlement Agreement (DOE 1995b). Approximately 41,000 m<sup>3</sup> of waste has been emplaced from INL, received in about 7,100 shipments. To date, more than 78,000 m<sup>3</sup> of waste have been emplaced at the WIPP.

The WIPP also plays an important role for key DOE defense programs, such as those overseen by the National Nuclear Security Administration (**NNSA**), by providing disposal capacity for defense TRU waste generated as part of ongoing national security and scientific research missions.

The DOE-EM is committed to the WIPP mission as evidenced by the continued attention to a national TRU waste program<sup>2</sup> and ongoing infrastructure upgrades. DOE-EM is working to ensure the safe and effective execution of WIPP's vital mission for years to come. Major infrastructure construction projects at the WIPP facility are expected to be fully operational by the end of 2026. This includes the new Safety-Significant Confinement Ventilation System (**SSCVS**), which will provide up to 540,000 cubic-feet-per-minute of fully filtered ventilation for the underground, allowing concurrent

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<sup>2</sup> <https://www.wipp.energy.gov/national-tru-programs.asp>

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mining, waste emplacement, and ground control operations throughout the life of the facility. In addition, the new Utility Shaft will serve as an air intake entry point to support the mine and meet SSCVS airflow volume demands.

The DOE-EM is also working to restore authorized disposal space within the WIPP underground that has been lost over the operational life of the facility. The DOE-EM recently received the state of New Mexico's authorization to mine and use two new panels (Panels 11 and 12). Panels 11 and 12 will be replacement panels for space lost in Panels 1-7 and from the abandonment of equivalent Panel 9. These new panels change the underground footprint of the WIPP facility but do not represent an expansion of DOE's WIPP mission or the disposal capacity of the WIPP facility. The statutory limit for waste volume under the WIPP LWA and the type of waste accepted at WIPP—defense TRU waste—remain unchanged.

## 4.0 Process for Siting a Second TRU Waste Repository

### 4.1 Introduction

There are many challenges in identifying and successfully siting another repository. The experience identifying and developing the WIPP location illustrates the threshold criterion is the successful demonstration of the ability to protect human health and the environment. In addition, as the Blue Ribbon Commission (**BRC**) on America's Nuclear Future stated in the 2012 Report to the Secretary of Energy, "[e]xperience in the United States and in other nations suggests that any attempt to force a top down, federally mandated solution over the objections of a state or community—far from being more efficient—will take longer, cost more, and have lower odds of ultimate success." (BRC 2012)

The DOE is currently seeking to site federal consolidated interim storage capability for commercial spent nuclear fuel. The process being used by DOE-NE provides a potential model for the identification of another site to host a future TRU waste repository. Accordingly, since the Repository Siting Annual Report requirement was added to the WIPP Permit, DOE-EM engaged in the extensive work performed by DOE-NE on this subject to gain insight on the proposed processes and lessons learned by DOE-NE. Such information would then be considered in any future effort to site another TRU waste repository. However, it is important to note that Congressional authorization and funding is required before any siting process for a second TRU waste repository can be initiated. Accordingly, the drivers for such an authorization and appropriations request must first be considered before any consent-based siting process for a second TRU waste repository can be initiated.

### 4.2 New Repository Needs Assessment

As mentioned above, Congressional authorization and funding would be required to initiate a siting process. Effectively demonstrating the need for a second repository is a

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critical first step to securing the necessary Congressional authorization and funding for a second TRU waste repository. Here, the need for a second repository is assessed using the WIPP’s capacity to meet the projected TRU waste inventory and ongoing DOE defense programs.

The principal driver for a second TRU waste repository is TRU waste inventory projections. The DOE-EM analyzed the 2023 Carlsbad Field Office (**CBFO**) Annual Transuranic Waste Inventory Report (**ATWIR**) to determine when the inventory would support the need for opening a new repository. The ATWIR includes estimates reported by TRU waste generator sites as of the data cutoff date of December 31, 2022 (DOE 2023a).

Generator sites are asked annually to report comprehensive estimates of existing and to-be-generated waste volumes for as far into the future as possible. The ATWIR identifies estimated waste volumes in five general categories. These include:

- Emplaced and Temporary Storage (72,643 m<sup>3</sup>): TRU waste that has already been emplaced in the WIPP facility, staged for emplacement at the WIPP facility as of 12/31/22, or placed in temporary storage at Waste Control Specialists LLC, in Andrews, TX.
- WIPP-bound Stored and Projected Through 2033 (42,751 m<sup>3</sup>): As of the data cutoff date, TRU waste that appears to have no significant technical or legal constraints limiting the waste from being eligible for disposal in the WIPP facility after all waste characterization and certification criteria have been satisfied. This includes waste already generated and in storage at generator sites as well as waste projected to be generated in the future, up thru through calendar year (**CY**) 2033.
- WIPP-bound Projected Beyond 2033 (37,317 m<sup>3</sup>): WIPP-bound TRU waste projected to be generated beyond CY 2033.
- Potential Stored and Projected Through 2033 (9,517 m<sup>3</sup>): As of the data cutoff date, waste that has meaningful uncertainties regarding its eligibility, due to technical or legal considerations, for emplacement in the WIPP facility. This includes waste already in storage and projected to be generated in the future, up thru through CY 2033.
- Potential Projected Beyond 2033 (14,821 m<sup>3</sup>): Potential TRU waste projected to be generated beyond CY 2033.

The TRU waste volumes in these categories can be summed, as shown in Table 1 below, to estimate how much TRU waste may be available for disposal at the WIPP facility. More detail pertaining to these categories can be found in the ATWIR posted on the WIPP home page.

**Table 1 – LWA TRU Waste Volume Estimates**

ATWIR General Category	LWA TRU Waste Volume (m <sup>3</sup> )
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Emplaced and Temporary Storage	72,643
WIPP-bound Stored and Projected Through 2033	42,751
WIPP-bound Projected Beyond 2033	37,317
<b>Total Emplaced and WIPP-bound</b>	<b>152,711</b>
Potential Stored and Projected Through 2033	9,517
Potential Projected Beyond 2033	14,821
<b>Total ATWIR Volume</b>	<b>177,049</b>
<b>WIPP LWA Capacity Limit</b>	<b>175,564</b>
Total ATWIR Volume - WIPP LWA Capacity Limit =	1,485 (0.9% of capacity)

The 2023 ATWIR projects that the currently emplaced volume at the WIPP facility, combined with TRU waste currently planned to be shipped to the WIPP facility (i.e., WIPP-bound waste through 2033 and beyond), totals approximately 153,000 m<sup>3</sup>, less than the WIPP facility LWA's volume capacity limit of 175,564 m<sup>3</sup>.

The ATWIR also includes potential WIPP waste that, as of the data cutoff date, does not appear to be eligible for disposal at WIPP, due to technical, regulatory, or legal considerations. However, DOE-EM includes this volume in its projections to develop a comprehensive forecast. Taking account potential WIPP waste, the total waste volumes in the ATWIR exceed the LWA volume limit by less than 1 percent, as shown in Table 1 above. The total volume eventually sent to WIPP is expected to be well within the WIPP LWA limit, given that the ATWIR historically overestimates waste volumes. This is in large part because some waste being characterized/dispositioned is low-level waste and some potentially managed as TRU may ultimately not be eligible for disposal at WIPP. The ATWIR volumes are best estimates and are evaluated and revised annually as needed.

In summary, DOE has compiled comprehensive estimates in the ATWIR of both WIPP-bound and potential TRU waste for as far into the future as sites can project (approximately 2080). This population of all identified current and future defense TRU waste streams is expected to be within the authorized volume for WIPP disposal. Based on current knowledge, therefore, WIPP has adequate capacity for all known and potential defense TRU waste. Thus, effectively demonstrating the need to receive authorization and funding for a second TRU waste repository at this time may be challenging.

Although there is sufficient capacity for the TRU waste currently identified in the ATWIR, changes could occur over time. Site cleanup and related facility decontamination and decommissioning (D&D) activities are planned to be accomplished over decades; information gained or unexpected conditions encountered during site remediation, waste retrieval, and facility dismantling can add new waste streams or change estimated waste volumes. Additional facilities could be identified for D&D. Furthermore, there are present and future defense-related research and production activities with indefinite end points. For example, NNSA's recently published Enterprise Blueprint (NNSA 2024) indicates that programmatic and facility upgrades are planned through

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2050 to support ongoing operations for decades to come. Therefore, additional defense TRU waste capacity may be needed to accommodate future waste once the WIPP LWA capacity limit is met.

DOE must ensure ongoing and future activities related to the cleanup of defense-related TRU waste generated from past activities and the environmental legacy resulting from decades of nuclear weapons development is completed as efficiently and safely as possible. At the same time, DOE will need to continuously engage in planning efforts to ensure sufficient disposal capacity at the WIPP facility or another repository exists to manage TRU waste from future defense-related research and production activities, and related facility decontamination and decommissioning activities. Accordingly, DOE will continue to monitor projected waste inventories to identify potential gaps in capacity and ensure sufficient lead time exists to successfully site and open a second dedicated defense-TRU-only repository, if needed.

## **4.3 Long Term TRU Waste Disposal Needs Cannot Impede Ongoing Cleanup Activities**

Although processes and prerequisites to site another repository may be evaluated to support the long-term needs of generator/storage sites and defense related mission activities, this effort cannot interfere with DOE's ongoing activities to clean up the environmental legacy resulting from decades of nuclear weapons development. DOE will continue exploring ways to accelerate and optimize WIPP's repository usage in the near term to ensure safe, efficient, and full usage of its capacity as a national resource. The following are some examples of potential optimization strategies DOE will consider:

- Waste minimization initiatives. Encourage generator/storage sites to identify ways to reduce the volume of TRU waste such as job control/repacking waste.
- Compacting waste. The INL has successfully used super compaction to reduce the volume of waste destined for WIPP. This can be investigated at other sites.

There may be other cost-effective ways of optimizing the WIPP facility disposal capacity to ensure WIPP's present status as the nation's only repository for TRU waste does not adversely impact present or future mission needs. DOE acknowledges that identifying another repository for waste exceeding the WIPP LWA TRU waste volume capacity limit is one alternative to be explored at the same time DOE continues to safely and efficiently complete ongoing cleanup activities.

## **4.4 Lessons Learned on Consent-Based Siting from DOE's Non-TRU Waste Repository Development Efforts**

Given DOE's responsibility to manage radioactive wastes generated through Departmental activities, DOE-EM continues to explore options with other Department

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offices to ensure necessary disposal capabilities will be available as needed. As previously discussed, DOE-NE is currently conducting a comprehensive consent-based process for the development of federal consolidated interim storage capability for commercial spent nuclear fuel. DOE-NE is currently in the first phase of this process, planning and capacity building. Once the requisite Congressional authorization and funding are received, the starting point for siting another TRU waste repository could be to build similar capacity to support indications of interest from host communities—affected units of government, including the host state or tribe, regional and local authorities—willing to be considered for location of a facility. Accordingly, over the last year, DOE-EM engaged with DOE-NE’s consent-based siting process, including observing ongoing efforts to build capacity in communities interested in consent-based siting. DOE-NE’s consent-based siting process and the key lessons from this process are discussed below.

## 4.4.1 Background on DOE-NE’s Consent-Based Siting Process

The BRC on America’s Nuclear Future said in a 2012 report (BRC 2012) that a siting process is “most likely to succeed” if it is:

- Consent-based,
- Transparent,
- Phased,
- Adaptive,
- Standards- and science-based, and
- Governed by partnership agreements or legally enforceable agreements between the implementing organization and host states, tribes and local communities.

Based on these principals, the BRC outlined an approach that would entail:

- Encouraging expressions of interest from a large variety of communities that could offer an environment suitable for the planned facility;
- Conducting meaningful consultation with stakeholders on the status of the siting process;
- Developing a set of basic initial siting criteria, followed by additional sets of criteria to further narrow down potential locations; and
- Establishing a plan with reasonable milestones for major phases of program development and implementation.

In 2015, building on the work of the BRC, DOE-NE started exploring and seeking to define a consent-based siting process to identify locations for interim storage of spent nuclear fuel (**SNF**). In that effort, DOE-NE is using the following values and principles to guide the Department’s effort to site one or more interim SNF storage facilities, including:

- Prioritization of Health and Safety,
- Environmental Responsibility,



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- Regulatory Requirements,
- Value Relationship with Tribal Nations,
- Environmental Justice,
- Informed Participation,
- Equal Treatment and Full Consideration of Impacts,
- Community Well-Being,
- Right to Volunteer and Withdraw,
- Transparency, and
- Stepwise and Collaborative Decision-Making.

DOE-NE is currently in the first phase of its consent-based siting process, which focuses on planning and capacity building (DOE 2023b) (DOE 2024b). On December 1, 2021, DOE issued a request for information on “Using a Consent-Based Siting Process to Identify Federal Interim Storage Facilities Interim Storage Facilities” (DOE 2021) and has responded to comments regarding the siting process. In June 2023, DOE-NE announced grant funding for consent-based siting consortia (DOE 2024c) to facilitate inclusive community engagement and elicit public feedback on consent-based siting, management of spent nuclear fuel, and federal consolidated interim storage. By September 2024, twelve awardees had held 119 public engagements across the country.

## **4.4.2 Overview of DOE-NE’s Consent-Based Siting Process**

As the DOE-NE described in a 2023 report (DOE 2023c), siting is a process for determining where a facility (of any kind) should be physically located. The siting process determines key parameters such as which communities might host a facility, how a potential host community may be involved in the decision-making process, and where the facility could be built within the community.

Siting processes include social, economic, and technical considerations. The public can participate in the siting process in a variety of ways, including through public meetings and hearings, advisory panels, studies that assess community wellbeing and long-term planning, and other outreach or educational efforts.

On the technical side of the siting process, studies such as geologic site characterizations and environmental analyses are conducted to investigate whether a potential site and facility will protect human health and the environment and meet all applicable regulatory requirements. In addition, any major federal action related to propose a site, construct, operate, and ultimately close a storage or disposal facility, including associated transportation, must comply with the requirements of NEPA.

There are three broad phases in DOE-NE’s consent-based siting process:

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## 1. Planning and Capacity Building.

This initial phase focuses on building relationships along with increasing capacity and developing a common understanding of nuclear waste management. Importantly, DOE is not looking for volunteer host communities to express their interest in hosting a facility in this phase.

## 2. Site-Screening and Assessment.

The second phase transitions from planning and learning to broad discussions about general site criteria characteristics of importance and site selection considerations. This phase begins with DOE issuing a list of site-screening and preliminary assessment criteria and culminates with DOE issuing a national call for volunteer host communities followed by interested communities responding with an expression of interest.

## 3. Negotiation and Implementation.

The third and final stage of DOE's consent-based siting process include DOE's selection of one or more sites, and the subsequent negotiation of a consent-based agreement between a qualified and willing host community and DOE. This is followed by activities related to facility licensing, construction, and operation.

### **4.4.3 Key Lessons Learned from DOE-NE's Consent-Based Process**

DOE-EM is closely monitoring DOE-NE's development of a consent-based siting process for use as a template to identify regions that could be geologically and geographically suitable for future development of an additional deep repository for TRU waste disposition. Based on the lessons learned from DOE-NE's consent-based siting process, any future efforts to site a second repository for TRU waste should take measured steps in a well-outlined, phased process with direct engagement of potential host communities, while keeping options open, especially in the early phases of the siting process. After evaluating DOE-NE's process over the last year, three key lessons emerged:

#### 1. Adaptive Approaches to Consent Must Resist the Urge to Set Firm Deadlines.

One of the challenges of consent-based siting is that it is difficult to take decisive steps early on because the decide-and-defend/explain approach is antithetical to the concept of a consent-based process. Participation cannot be achieved without providing communities with sufficient resources and time to weigh the potential benefits and risks of hosting a facility, including the positive and negative social, economic, environmental, and cultural effects. As previously discussed, strong community support has been instrumental in the WIPP Project's success, and this support could not have been achieved without a well-informed community. Therefore, future siting efforts for a second repository will benefit from an adaptive process that provides adequate time for communities to gather the information they deem necessary to determine their interest in potentially hosting a repository.

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## 2. Include Public Input in the Development of a Consent-Based Process.

One of the early lessons/inputs from DOE-NE's consent-based discussion is that development of both the process and criteria can benefit from input by potential host communities. DOE-NE expended extensive effort to solicit public feedback prior to initiating the consent-based process for the development of federal consolidated interim storage capability for commercial spent nuclear fuel. This approach allowed members of the public, communities, stakeholders, and governments at the Tribal, state, and local levels to help design and build the process itself, which ultimately enhances the credibility of the process by establishing public trust and confidence at the outset of the effort.

## 3. Participation in the Early Stages of the Process Should Come Without Any Expectations.

Communities should be allowed to actively participate in the planning and capacity building stages of the consent-based process without any expectations or pressure to volunteer to host a facility. DOE-NE emphasizes the voluntary nature of the process and explicitly states communities will not be asked to volunteer to host a facility during the planning and capacity building phase. This emphasis allows interested communities to focus on learning about the potential social, economic, environmental, and cultural benefits and risks of hosting a facility at the beginning of the process without any pressure to make a decision.

## **5.0 Summary of Supporting Documentation Delineated in Permit Part 2, Section 2.14.3**

This section addresses, to the extent possible at this early stage, the aspects including supporting documentation delineated in Permit Part 2, Section 2.14.3. The Permit section states the following:

*...The annual report shall summarize the steps the DOE has taken toward siting such a repository in another state and the report shall include documentation supporting the summary. Such documentation may include...*

The list of possible aspects/supporting documentation delineated in Permit Part 2, Section 2.14.3, are addressed below.

### **5.1 With what disposal regulations shall another repository comply**

An important first step in siting another repository would be to identify the applicable regulations and consider the appropriate regulatory framework.

The WIPP Siting History discussed above provides the regulatory framework for a geologic TRU waste repository under current law and regulations. The WIPP experience

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provides a model for the potential regulations that would apply to the siting, construction, permitting, operating and closure of another repository.

In the current regulatory framework, long term performance for a future geologic repository would be subject to the generic disposal standards that currently apply to WIPP (i.e., 40 CFR 191) and would apply to any SNF, high-level waste or TRU repositories (or, in principle, other disposal approaches) except Yucca Mountain (which has separate standards directed by the Energy Policy Act Pub. L. 102-486). However, a future repository could be subject to different standards. For example, the BRC and others have called for EPA to update its generic standards<sup>3</sup> (BRC 2012). DOE-NE has established a Memorandum of Understanding with EPA to support technical information sharing that could inform such updated standards, subject to appropriations (EPA 2024). Therefore, while existing disposal regulations applicable to the WIPP facility serve as a known regulatory framework that could apply to a second repository, any future regulatory actions applicable to TRU waste disposal activities must continue to be monitored.

There may also be site-specific implementation criteria developed to interpret and apply standards to any future repository, such as the criteria EPA promulgated for the certification and re-certification for WIPP in 40 CFR 194. In the current regulatory framework, the DOE would be the implementing agency for a future repository for defense-only waste; however, for a potential future repository this regulatory framework could differ significantly from the WIPP Project, even if the underlying disposal standards (40 CFR 191 or equivalent) are similar.

The WIPP LWA exempts TRU mixed waste from the RCRA treatments standards. This exemption was granted because the WIPP was demonstrated to be robust via a No Migration Variance petition (DOE 1990c). The exemption is specific to the WIPP and cannot be assumed to be achievable with other sites. This could be another consideration in the regulatory/siting process for another repository or through identifying applicable engineered barriers in the repository design.

DOE has well established design and construction requirements for nuclear facilities. These are governed primarily by DOE performance directives and standards such as DOE O 420.1C, *Facility Safety*, and DOE O 430.1B, Ch-2, *Real Property Asset Management*. For a second TRU waste geological repository, the DOE may have to consider other non-DOE requirements, such as Mine Safety and Health Administration safety requirements.

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<sup>3</sup> See also <https://thebreakthrough.org/blog/the-epa-must-update-their-nuclear-waste-disposal-standards> and <https://www.ans.org/news/article-5265/american-nuclear-society-recommends-updating-epa-repository-regs/>.

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## **5.2 Consent-based or other siting process**

As discussed in Section 4, a consent-based process is the most current and relevant template for an approach to identify a site to host any future TRU waste repository. An important early step would be to communicate with applicable regulators, interested stakeholders and the public. Such input is crucial to further defining the process and key components for decision making. The voice of potential volunteer communities for a future repository could be expected to influence timeframes, siting criteria, regulatory processes, required technical studies and reviews, consultation agreements and more. Within a consent-based framework, it is challenging to define these siting aspects—much less repository designs and other factors that can be determined with certainty only after a site is selected—before achieving input from a broad community. This limitation is reflected in the remaining topics in this section. DOE-EM's engagement with DOE-NE's consent-based siting process and its potential application to future efforts to site another repository is discussed in detail in Section 4.4 above.

## **5.3 Timeline and milestones for identifying possible sites for another repository**

As the BRC acknowledged, “there is an inherent tension between recommending an adaptive, consent-based process and setting out deadlines or progress requirements in advance.” Nonetheless, the BRC agreed it is important to set flexible performance goals and milestones for major phases of program development and implementation to promote government accountability and public trust and suggested “a range of, say, 15 to 20 years to accomplish site identification and characterization and to conduct the licensing process for a geologic repository.” (BRC 2012) Experience in current siting processes may provide additional insights on achievable timeframes.

## **5.4 NEPA**

Once a site is identified, an early regulatory step by DOE would be to develop NEPA documentation for integration into the decision-making process. NEPA actions would be a necessary prerequisite to a decision to pursue a second repository. NEPA is further discussed in Section 3.2.

## **5.5 Congressional authorizations and appropriation requests**

Congressional authorization and appropriations would be required prior to initiating the siting process for a second repository. As discussed in detail in Section 4.2 above, a needs assessment plays an important role in determining the purpose and timing of any such action.

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## **5.6 Communications with EPA and other federal agencies or Congress about activities to establish another repository**

No communications or actions have been taken in the last year to seek Congressional authorization or appropriations based on current circumstances, including WIPP's ability to meet current capacity needs. Similarly, no communications with EPA or other federal agencies about the siting of a second repository have occurred over the last year. DOE will monitor any efforts by EPA to update its generic disposal standards.

## **5.7 Land acquisition(s)**

Like the WIPP facility, the land for the facility likely would be required to be withdrawn from federal or state purview for DOE use or acquired for the sole purpose of the repository. Based on the WIPP model, land use requirements would need to be tailored to address the unique land use activities and uses of the location of a second repository. For example, mining and oil and gas activities, such as drilling, may need to be considered, similar to the requirements addressed in the LWA (Public Law 104-201). No action can be taken on this unless and until the siting process is complete and a site for a second repository is identified. The LWA is also discussed in Section 3.2.

## **5.8 State and public engagement activities**

No state or public engagement activities have been initiated with respect to identifying another potential repository for TRU waste. However, as discussed above, the siting approach would consider, as a possible template, a consent-based process such as that being pursued by DOE-NE for federal consolidated interim storage of SNF. DOE-EM actively participated in the capacity building phase of this DOE-NE process over the last year and will continue to participate in this process in order to develop lessons learned that may be applied to potential efforts to site another repository for TRU waste. DOE also plans to discuss this report in a future WIPP Community Forum.

## **5.9 Feasibility studies; design, construction, and operation plans**

No feasibility studies have been initiated with respect to designing, constructing or operating another repository for TRU waste. In a consent-based siting process modeled on the DOE-NE approach, such studies would occur after an initial Planning and Capacity Development phase, during the Site-Screening and Assessment phase.

## **5.10 Plans, timelines, and milestones for independent technical expert reviews of the activities related to establishing another repository for TRU waste**

Planned activities for technical expert reviews are discussed in Section 6 below.



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## 6.0 Planned Actions for the Next Annual Report

The following work is being planned and will be addressed in the next annual report:

- Update inventory analysis.
- Review NAS and other reports on types of geologic media and repository designs being pursued world-wide for disposal of TRU or similar long-lived waste streams.
- Track and provide an update on DOE-NE activities and progress in the consent-based siting process for interim storage of SNF and high-level waste.
- Discuss this new Permit requirement and summarize this year's annual report in a future WIPP Community Forum.

## 7.0 Conclusion

Since opening in 1999, the WIPP Project has been vital to DOE-EM meeting its legal obligations to cleaning up nuclear sites across the country, including in New Mexico. Not only does the WIPP facility serve DOE-EM in advancing its important cleanup mission, but it also aids other DOE programs in the national security and scientific research missions of today and tomorrow. Current projections show, based on available inventory data, that the WIPP facility presently possesses sufficient capacity for all known defense-related TRU waste disposal needs. DOE will continue to update and monitor defense TRU waste inventory estimates to identify any potential possible gaps in disposal capacity at the WIPP facility with sufficient lead time to allow for the potential development of a second defense TRU waste repository.

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