



CASE STUDY 3:
DISPOSAL REQUIREMENTS
FOR THE WASTE ISOLATION
PILOT PLANT (WIPP)






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DISCUSSION QUESTIONS

The following are sample group discussion questions to consider when reading the group discussion:

-  How do we know the salt deposits will prevent the migration of waste to the environment?
-  How did the HSWA impact the WIPP facility and the subsequent issuance of the NMV?
-  What was the process DOE followed for applying for an NMV?
-  What did the NMV issued by EPA in November 1990 allow DOE to do?
-  What is DOE's waste characterization process?



WIPP HISTORY

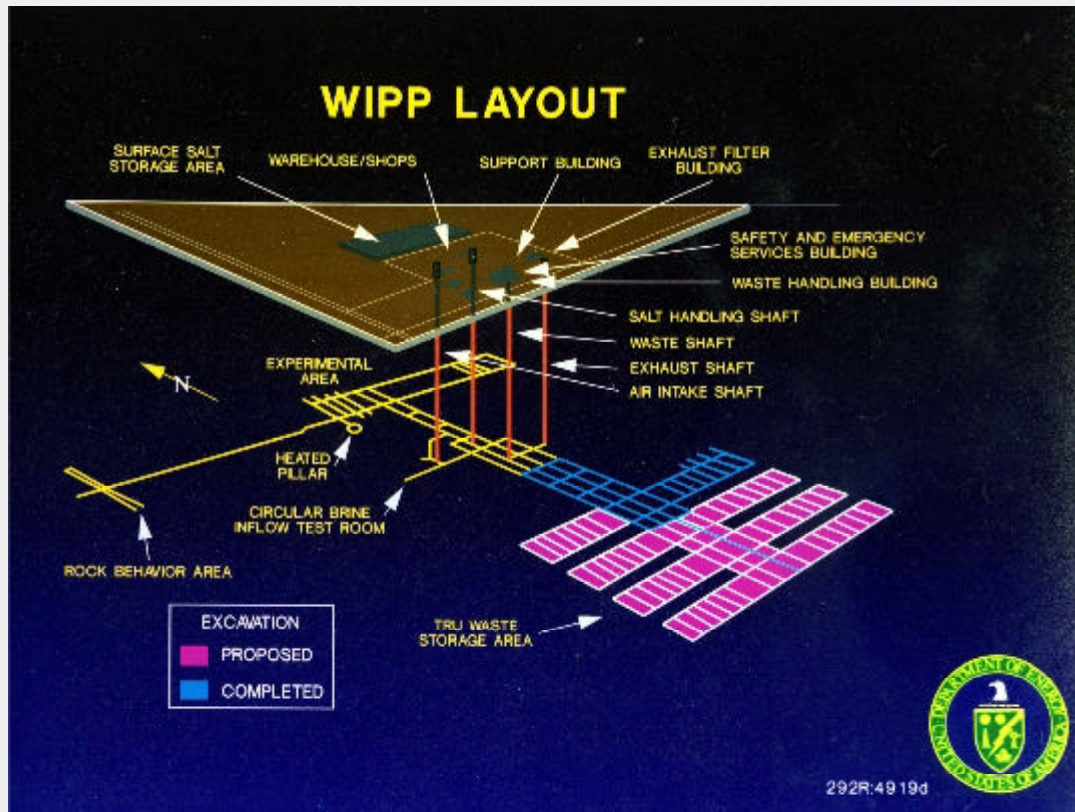
The Waste Isolation Pilot Plant (WIPP) is a research and development facility that will provide an underground geologic repository for the disposal of mixed transuranic (TRU) waste generated from nuclear weapons production. It is the only facility in the country that is specifically designed and constructed for permanent disposal of TRU waste.

The WIPP site is located in Eddy County, in southeastern New Mexico. The site is approximately 26 miles southeast of Carlsbad in an area known as Los Medanos (the dunes), a sparsely inhabited plateau with little water and limited land uses. The land was previously owned by the U.S. Bureau of Land Management (Department of the Interior). WIPP was authorized by Congress in 1979 (Public Law 96-164) as the nation's first research and development facility to demonstrate the safe geologic disposal of defense TRU wastes. In October 1992, Congress passed, and the President signed, the WIPP Land Withdrawal Act, which transferred ownership of WIPP lands to the DOE. The WIPP facility is in an area of low population density, with fewer than 30 permanent residents living within a 10-mile radius.





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The WIPP consists of aboveground and underground facilities, including extensive underground excavations in salt beds at a depth of 2,150 feet, 4 shafts, and surface facilities in which wastes will be received and handled. The underground geologic repository consists of 56 rooms (each 300 x 33 x 13 feet) grouped in 8 “panels” of 7 rooms each. These rooms will provide sufficient space to accommodate approximately 6.5 million cubic feet of TRU waste. Approximately one-third of that volume of waste currently exists and is being stored temporarily at 23 DOE laboratories. The remaining two-thirds is expected to be generated during the 25 years of the WIPP’s anticipated operational life span.

The 225 million-year old WIPP salt deposits are an important part of the effort to contain the wastes. Deep salt deposits are found primarily in stable geologic areas with an absence of water; these conditions mitigate the ability of contaminants to leach into soil or groundwater. The easily mined salt formations self-seal around voids (i.e., the storage rooms created by mining). Thus, waste stored will naturally become



encapsulated over time, and a natural barrier to contamination will be created. The impermeable nature of the salt structure prevents waste from leaching into the ground water.

NOTABLE WIPP MILESTONES

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| 1975 | Site was selected near Carlsbad, New Mexico. |
| 1979 | The WIPP was established by Public Law 96-164. |
| 1981 | The DOE started construction of the surface facilities and shafts and began underground excavation. |
| 1988 | DOE submits a No Migration Petition to EPA, requesting a variance to the Land Disposal Restrictions of RCRA. |
| 1990 | EPA grants DOE a No Migration Variance for the five-year test phase. |
| 1991 | The base facility was completed.

The Secretary voluntarily suspended the first shipment of waste because of filed lawsuits. |
| 1992 | On October 30, 1992, the President signed the WIPP Land Withdrawal Act, permanently transferring public lands to the DOE. The law resolves the land withdrawal issue and authorizes the underground Test Phase to begin, provided that certain prerequisites are completed. |
| 1993 | Decision to test TRU waste in aboveground laboratories. |
| 1995 | WIPP Safety Analysis Report (published in November 1995) provides analysis of routine exposures and potential accident scenarios. |



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- 1996** RCRA Part B permit application submitted (April).
- No-Migration Variance (NMV) petition submitted to EPA (June).
- Congress amended WIPP Land Withdrawal Act, deleting the need for a NMV petition (September).
- Compliance Certification Application submitted to EPA, demonstrating the waste will meet disposal requirements in 40 CFR 191 (October).
- 1998** DOE issues the Record of Decision for Disposal Phase Supplemental Environmental Impact Statement (SEIS) in January.
- DOE sued by a coalition of 39 environmental groups over the scope of the SEIS (February).
- EPA issues its Certificate of Compliance certifying that WIPP complies with Federal disposal regulations and can safely isolate transuranic waste for at least 10,000 years (May).
- State of New Mexico issues revised Draft RCRA Part B Permit (November).
- 1999** On March 26, 1999, the first shipment of radioactive waste arrived at WIPP.

The environmental impacts of the WIPP project were evaluated in the WIPP Final Environmental Impact Statement (DOE, 1980). Additional National Environmental Policy Act (NEPA) documentation was prepared in the form of an SEIS (DOE, 1990). A record of decision (ROD) for the SEIS was published in the Federal Register on June 22, 1990.

The 1990 ROD committed the DOE to prepare an additional SEIS (SEIS-II) prior to a decision to dispose of waste at WIPP and determined that the scope of SEIS-II would include an analysis of the long-term performance of WIPP in light of new information



obtained since 1990. It also stated that DOE would study the potential impacts to generator, storage, and treatment sites throughout the country of disposing of waste at WIPP.

SEIS-II is the third in a series of staged NEPA reviews and focuses on WIPP disposal of TRU wastes. SEIS-II analyzes impacts and alternatives for disposal at WIPP and transportation to WIPP. SEIS-II involves additional and different workers, time frames, transportation modes, alternatives, and affected environments.

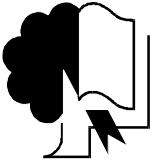
RCRA COMPLIANCE

Because the DOE does not have a treatment facility for mixed TRU wastes, the DOE must obtain a variance from RCRA (40 CFR 268) requirements to allow such untreated wastes to be emplaced at the WIPP facility.

An NMV petition was needed because most of the wastes that will be shipped to the WIPP facility will be mixed wastes that contain transuranic radioisotopes and chemical constituents listed or otherwise identified as hazardous under RCRA. According to 10 CFR Part 962 (the “Byproduct Rule”), all DOE radioactive wastes that contain RCRA-regulated hazardous waste constituents are subject to regulation under both RCRA and the AEA. Thus, although the mission of the WIPP facility is to provide a safe, permanent disposal site for mixed waste, RCRA requirements are now applicable to radioactive mixed wastes that have been stored at 10 DOE generator and/or storage sites for up to several decades. In determining which of these wastes are mixed and subject to RCRA requirements, in the RCRA Permit Application the DOE conservatively assumed that all wastes are mixed wastes.

HISTORY OF THE NO-MIGRATION VARIANCE (NMV) PETITION

In 1984, Congress enacted the Hazardous Waste and Solid Waste Amendments, which prohibit the land disposal of hazardous waste unless: (1) the waste is treated to meet treatment standards or other requirements established by the EPA, or (2) the EPA determines that the land disposal restrictions (LDRs) are not required in order to protect human health and the environment. With respect to the second condition, it must be demonstrated to a “reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal unit for as long as the waste remains



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hazardous.” If such a demonstration can be made, the EPA can approve an NMV petition submitted to the EPA in accordance with 40 CFR 268.6 requirements. An EPA determination to grant an NMV must take into account such factors as the long-term uncertainties of land disposal; the goal of proper management of hazardous waste; and the persistence, toxicity, mobility, and bioaccumulative potential of the wastes.

The WIPP facility qualifies as a land disposal unit (EPA, 1987a) under the 40 CFR 268.2 following definition:

“Land disposal” means placement in or on the land and includes . . . placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or concrete vault or bunker intended for disposal purposes.

The EPA issued the LDRs in stages. From 1986 through 1990, the EPA divided types of wastes into groups and issued restrictions in increments. The first group of wastes prohibited from land disposal were solvents and dioxins. The EPA issued regulations restricting the land disposal of these wastes on November 7, 1986 (51 FR 40572). California list wastes (primarily liquids containing cyanides, heavy metals, polychlorinated biphenyls (PCBs), halogenated organic compounds, and acids) were restricted on July 8, 1987 (52 FR 25760).

In 1988, the DOE formed a working group consisting of members from WIPP, DOE Headquarters, and State and EPA officials to explore methods of complying with the LDRs. The group determined that it would seek an NMV even though the EPA had never processed an NMV under RCRA.

THE PROCESS OF APPLYING FOR A NO-MIGRATION VARIANCE PETITION

The DOE had decided to comply with the treatment, storage, and disposal facility RCRA regulations before their compliance was actually mandated. The DOE submitted Part A of the RCRA permit application to both the EPA’s Region VI and the State of New Mexico. Neither regulating body took action on the submittal: New Mexico returned Part A to the DOE, and the EPA placed the application on file.

The first RCRA NMV petition required intensive efforts from both the DOE and the EPA. The DOE supplied employees to assist the EPA in facilitating the process, which lasted 18 months. In April 1990, the EPA announced that it would grant the NMV. The NMV was finalized in November 1990. The initial submittal included provisions



for the full operation of the WIPP, not just the Test Phase. The NMV that was eventually granted did not include the full operation and applied only to the Test Phase; therefore, a new petition would be required to be submitted before waste acceptance at the WIPP begins.

The State applied for mixed waste and Subpart X (Miscellaneous) authority in July 1990. The DOE completed a Memorandum of Understanding (MOU) to recognize the State as the regulator. The DOE then resubmitted Part A and Part B of the applications in 1991, and most recently, the 10-volume Revision 7 of the RCRA Permit Application, in 1996.

THE NO-MIGRATION DETERMINATION (NMD)

The Federal Register published the EPA's NMV on November 14, 1990. The EPA concluded the DOE had demonstrated, to a reasonable degree of certainty, that hazardous constituents will not migrate from the WIPP disposal unit during the underground Test Phase of the project and that the DOE had otherwise met the requirements of Title 40 CFR Part 268.6 for the WIPP facility. By granting the NMD, the EPA would have allowed the DOE to temporarily manage a small amount of defense-generated TRU mixed waste, otherwise prohibited from land disposal by Title 40 CFR Part 268, "Land Disposal Restrictions."

NEPA COMPLIANCE

The DOE had planned to conduct a WIPP Test Phase in the WIPP itself, but plans changed in 1993. The Test Phase would have involved the emplacement of small quantities of TRU wastes (less than 1 percent of the WIPP facility's capacity or less than 1,757 cubic meters) in the repository under controlled experimental conditions in order to evaluate several physical properties of waste-repository interactions. These evaluations would have determined if any additional engineering measures were required to ensure that the WIPP facility will meet long-term performance standards promulgated by the EPA in 40 CFR Part 191.

In 1993, the DOE decided to conduct the tests in a national laboratory and not to place wastes into the WIPP repository during the Test Phase. The decision provided a substantial cost savings to the DOE. However, this decision required DOE to negotiate



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new RCRA permits: the existing interim status provided for the Test Phase, not for permanent operation of the repository. Likewise, the NMD granted by EPA was applicable only for the WIPP Test Phase.

The final NMV petition for disposal operators was submitted to the U.S. EPA and published on June 14, 1996. It is a petition to receive a variance from the RCRA Land Disposal Restrictions (LDR) on the basis that the migration of hazardous constituents would not exceed health-based levels at the disposal unit boundary. (Such variance is no longer required pursuant to the National Defense Authorization Act for Fiscal Year 1997.) It also provides background information on the long-term ability of WIPP to isolate hazardous waste.

WASTE CHARACTERIZATION

There are two regulators for WIPP: EPA for the radioactive content of the waste (under 40 CFR 191, “Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes”) and the State of New Mexico (using their RCRA authorization from EPA).

Characterizing the radioactive content of waste can be accomplished through assay.

Characterizing the RCRA-constituent content can be more challenging. The wastes are not homogenous, so a sample from one drum from a facility will not necessarily match a sample from another drum from the same facility. Therefore, DOE has developed a waste characterization program.

Generators are required to characterize all wastes planned for disposal at WIPP using formal programs adhering to the requirements of the Waste Analysis Plan (WAP), the WIPP Waste Acceptance Criteria (WAC), and the TRU Waste Characterization Quality





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Assurance Program Plan (QAPP). Both sampling and analysis programs and acceptable (process) knowledge will be used in classifying the wastes. Some wastes have been in retrievable storage since 1970 and others, will be generated in the future.

At one time, DOE had planned to characterize 100 percent of the waste, but this was when waste quantities were small and only two DOE generators were involved. Current waste characterization requirements for disposal have been developed to balance the quantity of data required to satisfy the regulator, yet prevent extensive increases in generator personnel exposure and excessive expense. Thus, the WAP establishes new WIPP TRU waste characterization requirements for all DOE generator sites planning to dispose of their TRU waste.

Waste characterization will be done on a waste stream basis. The waste streams fit into three broad categories: (1) homogeneous solids, (2) soil/gravel, and (3) debris wastes. Techniques to be used include radiography, visual examination of opened containers, headspace gas sampling, physical sampling and analysis of a statistically determined amount of homogeneous wastes, and review of documented acceptable knowledge.

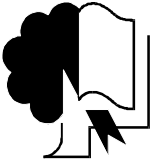
Radiography is used to non-invasively examine waste containers (required for all stored waste and judiciously applied to newly generated waste) for physical form of the waste and to detect free liquids and other prohibited items.

Visual examination, an invasive technique, will be conducted on a statistical sample of waste containers from each waste stream and used to inspect waste contents and verify radiography results.

Headspace gas sampling and analysis are used to determine the concentrations of hydrogen, methane, and other volatile organic compounds (VOCs) within the headspace of waste containers.

A statistically selected portion of homogeneous solids and soil/gravel wastes will be sampled for hazardous waste constituents and toxicity characteristics. Samples will be analyzed for VOCs, semi-VOCs, and metals.

Acceptable knowledge is used to classify debris waste. Knowledge of the original organics and metals used and the operations that generated these waste streams is sufficient to determine if the waste has a toxicity characteristic, hazardous constituents,



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PCBs, or RCRA-regulated metals. RCRA-regulated metals present in debris waste are associated with specific waste materials (e.g., lead in leaded rubber gloves). Radiography, visual examination, and headspace gas sampling are used to collect data to provide confidence in acceptable knowledge.

Generator waste characterization also includes quality assurance (QA) requirements, applied through meeting the QAPP requirements by implementing site-specific QA Project Plans (QAPjP), which are submitted to the WIPP for review and approval. The WIPP personnel will perform audits of the generator site waste characterization programs to verify that implementation of the QAPjP is consistent with the requirements of the QAPP and the WAP.

This characterization process will demonstrate that DOE knows the types of materials emplaced in WIPP so potential risks can be calculated.

WASTE DISPOSAL AT WIPP

By 1996, only two regulatory actions were necessary for the opening of WIPP: the EPA rulemaking on the DOE Compliance Certification Application and the issuance of the RCRA Permit by the State of New Mexico. Additionally, an SEIS-II for disposal operations needed to be prepared to meet the requirements of the NEPA; an SEIS-II was issued for public comment in September 1997, and its decisions formalized in the Record of Decision, issued in January 1998.

On September 23, 1996, President Clinton signed the fiscal year 1997 Defense Authorization Bill (Public Law 104-201). This law contained amendments to the 1992 WIPP Land Withdrawal Act which specified the sense of Congress for DOE to begin disposal operations at WIPP by November 30, 1997, provided that all applicable health and safety standards have been met and all applicable laws have been complied with. By law, the Secretary must notify Congress that the requirements of the Amendments Act have been met.

Since early fiscal year 1996, the DOE had based its TRU waste disposal planning on a WIPP opening date of November 1997. However, on March 31, 1997, the DOE announced a six-month delay in the opening date for WIPP from November 1997 to May 1998.



At that time, DOE was still awaiting a State of New Mexico RCRA Part B Permit (which was subsequently issued on November 13, 1998). Also at that time, DOE anticipated that previously filed lawsuits would be resolved so that waste could be transported to WIPP for disposal.

Although resolving the lawsuits required longer than originally anticipated, the first shipment of transuranic waste (from the Los Alamos National Laboratory) arrived at the site for disposal on March 26, 1999.

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