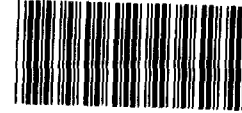


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NUCLEAR WASTE

**Delays in Addressing Environmental
Requirements and New Safety Concerns
Affect DOE's Waste Isolation Pilot
Plant**

Statement of
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Before the
Environment, Energy, and Natural
Resources Subcommittee
Committee on Government Operations
House of Representatives



Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to discuss the status of the Department of Energy's (DOE) program for conducting tests at its Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The facility is intended for the underground disposal of transuranic (TRU) waste generated and currently stored at facilities in DOE's defense complex.¹ My testimony today is based on both our previous and ongoing work on WIPP, most of which has been done at the request of this Subcommittee. (Attachment I is a list of relevant products.)

In summary, DOE has constructed a repository for the disposal of TRU waste at WIPP that it cannot use for that purpose until (1) the facility meets environmental requirements for repositories and (2) DOE has resolved certain safety concerns. Because of delays and technical problems in addressing these requirements and concerns, DOE will not be ready to dispose of wastes for several more years. This situation is largely of DOE's making. Specifically:

-- From 1981 through 1988, DOE concentrated on building WIPP and gave little attention to resolving environmental compliance issues. In 1989, after external oversight groups had raised concerns about these issues, DOE proposed tests with TRU waste in WIPP to help assess compliance with environmental requirements.

-- Since then, DOE has repeatedly had to revise and delay the tests because of unresolved technical and safety issues. Meanwhile, the natural movement of rock surrounding the underground excavated areas, including four rockfalls in

¹Transuranic waste is any material that is contaminated with man-made radioactive elements having atomic numbers greater than uranium, such as plutonium.

older excavations, has raised questions about the safety of waste storage operations and the retrieval of the wastes, if necessary, after the tests.

-- Finally, DOE has not stated where it would store TRU waste emplaced in WIPP for experiments in the event that the waste must be removed from WIPP if the facility does not comply with environmental requirements.

First, let me briefly describe the environmental requirements that govern the use of WIPP for disposal of TRU waste.

WIPP MUST COMPLY WITH
ENVIRONMENTAL REQUIREMENTS

DOE cannot use WIPP for permanent waste disposal unless it can demonstrate that the facility complies with the Environmental Protection Agency's (EPA) (1) standards for the disposal of radioactive waste, including TRU waste, in repositories and (2) regulations implementing the Resource Conservation and Recovery Act (RCRA) for hazardous wastes.

EPA issued draft disposal standards in December 1982 and final standards in September 1985. In general, the standards limit the amount of radioactivity that a repository can release to the environment. They do not address how repositories should be designed and constructed. The 1985 standards require DOE to assess WIPP's performance as a repository for a period of up to 10,000 years. For example, DOE must identify, and predict the probabilities of, processes and events that could lead to the release of radioactive materials from the repository area. The agency must also predict the cumulative releases of radioactive materials to the environment assuming the occurrence of these processes and events. Finally, DOE must compare the predicted releases to limits in EPA's standards. Because of the long time

period covered by the standards, demonstration of compliance is done by analysis. The standards neither require nor prohibit storage of nuclear waste for test purposes in a proposed repository to assist in demonstrating compliance with the standards.

In 1987, an appeals court vacated EPA's standards because of unexplained differences the court found between them and a provision of EPA's drinking water standards. The court required EPA to either reconcile the two sets of standards or explain the differences. Following this court decision, DOE and New Mexico agreed that the agency would base its assessment of WIPP's performance on the 1985 standards until new standards have been issued. EPA has circulated three working drafts of the revised standards, but has not formally published new draft standards for public comment nor established a firm schedule for issuing the final standards.

According to DOE, as much as 60 percent of its TRU waste may also be contaminated with chemicals identified as hazardous wastes under RCRA. DOE initially maintained that mixed wastes--wastes containing both radioactive and hazardous components--were only to be regulated under the Atomic Energy Act. However, in July 1986, EPA ruled that this waste is subject to regulation under both statutes, and in May 1987, DOE agreed.

EPA generally prohibits land disposal of many hazardous wastes unless they are first treated using acceptable methods. However, a variance, or exception, from this prohibition is possible. To obtain the variance for WIPP, DOE must demonstrate to EPA that the hazardous wastes will not migrate beyond the facility's boundaries for as long as they remain hazardous.

On November 14, 1990, EPA granted DOE a 10-year variance for WIPP so that the agency could conduct experiments there using up to 8,500 drums of TRU waste. DOE plans to determine by the end of

1997 whether WIPP meets EPA's disposal standards and RCRA's requirements. If DOE eventually determines that WIPP is suitable for use as a repository, it must apply for a long-term variance from RCRA's requirements. DOE would support such an application by demonstrating that the hazardous wastes would not migrate from the repository area.

DOE BUILT WIPP WITHOUT ADDRESSING
EPA'S DISPOSAL STANDARDS

The major cause of the dilemma DOE finds itself in today is that it built WIPP without an aggressive, concurrent program to determine if the facility would comply with EPA's disposal standards. Specifically, during construction of WIPP, DOE maintained that as a research and development facility, WIPP was not subject to those standards and that the standards apply only if the agency decides the facility can be used for the disposal of TRU waste. However, the facility that DOE constructed is a full-scale repository for disposal of TRU waste. The only research using TRU waste in WIPP that may be necessary before the facility can be used for the disposal of TRU waste is related to assessing WIPP's compliance with the disposal standards.

In December 1979, the Congress authorized DOE to build and operate WIPP "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States."² In a January 1981 Record of Decision on an environmental impact statement, DOE stated that it would use WIPP to dispose of TRU waste stored at its Idaho National Engineering Laboratory and then make the facility available to dispose of TRU waste from the agency's other facilities. DOE

²Department of Energy National Security and Military Application of Nuclear Energy Authorization Act of 1980 (P.L. 96-164).

added that WIPP would include an experimental underground facility for conducting experiments on defense wastes. However, DOE has never performed any experiments in WIPP using nuclear waste from its defense program.

In April 1981, DOE began a 2-year evaluation of the site for WIPP, and in July 1983 it decided to construct the facility. Initially, DOE mined two shafts and four underground rooms with interconnecting tunnels for use in investigating the hydrology, geology, and structure of the site and the effects of the repository environment on the waste containers--primarily 55-gallon metal drums.

By late 1988, DOE had constructed most of the surface buildings and two additional shafts. It had also mined the first of eight planned storage areas that would each consist of seven waste storage rooms. Because the surrounding salt rock "creeps," or moves, and will eventually fill excavated areas, DOE plans to mine the other waste storage areas concurrently with future waste disposal operations. In total, the facility is designed for the disposal of over 6 million cubic feet of TRU waste over an expected operating life of 25 years. DOE estimates that it has spent about \$1 billion on WIPP.

At about the same time that DOE decided to construct WIPP, it also designated the first 5 years of the facility's operations, then expected to begin in October 1988, as a research and development phase to demonstrate the safe disposal of TRU waste at levels representative of full-scale operations. Over the 5-year period, DOE planned to store in the facility up to 15 percent--about 125,000 drums of TRU waste--of WIPP's design capacity. Of this amount, up to 25,000 drums were to be used for then-undefined experiments to assess the facility's long-term performance. The other 100,000 drums were for demonstrating safe and efficient

waste-storage operations. After the 5-year period, DOE intended to decide if WIPP could become a disposal facility for TRU waste.

However, DOE did not begin detailed planning for assessing WIPP's performance with EPA's standards until early in 1989, or about 6 years after EPA had issued its draft disposal standards and 3 years after it had issued the final standards. Furthermore, although DOE had proposed conducting experiments with TRU waste in WIPP, it did not identify any such experiments until March 1988, and these experiments were not well-defined.

That same year, the National Academy of Science's WIPP Panel, New Mexico's Environmental Evaluation Group (EEG), and others questioned the wisdom of storing large quantities of TRU waste in WIPP before demonstrating compliance with EPA's standards.³ For example, the Academy recommended that DOE store no more wastes than is necessary for experiments until technical uncertainties about, for instance, the generation of gases by waste materials and the effect of brine (salt water) on the repository environment and waste contents, had been significantly reduced. However, DOE had not published a preliminary assessment of WIPP's long-term performance identifying (1) possible combinations of processes and events that might adversely affect the repository's performance, (2) the probabilities that these combinations might occur, and (3) areas in which DOE needed to conduct additional research to complete the performance assessment.

DOE responded by issuing a draft test plan in April 1989. The plan reduced the quantity of TRU waste proposed for a 5-year test and demonstration phase to a maximum of 67,000 drums. This included 7,100 drums of waste for experiments related to EPA's standards. In a December 1989 draft of the test plan, DOE further

³EEG was established in 1978 to independently review WIPP. Under a cooperative agreement with New Mexico, DOE funds the Group's reviews.

reduced the amount of TRU waste planned for experiments to about 4,500 drums. It deferred the demonstration of storage operations pending an evaluation of the operational experience gained while conducting the experiments. This plan also marked DOE's first effort to explain how it would integrate EPA's requirements for a variance from RCRA into its objectives for the test plan and its experiments with TRU waste.

DOE issued another test plan for WIPP in April 1990. The plan, like the earlier draft, proposed using about 4,500 drums of waste for experiments in WIPP. Also, consistent with a recommendation made by DOE's Advisory Committee for Nuclear Facility Safety, DOE decided in June 1990 not to proceed with an operations demonstration, if needed, until it has determined, with a high level of confidence, that WIPP complies with EPA's disposal standards.

MANY TEST PROGRAM ISSUES ARE UNRESOLVED

Once again, the quantity of waste to be stored in WIPP before DOE makes a compliance determination is uncertain, because technical problems have forced DOE to delay or defer some of the underground tests with TRU wastes. Also, concerns have been raised on whether it is safe to do the tests underground at WIPP after several recent rockfalls have occurred in the mined areas and excavated rooms have closed more rapidly than had been predicted.

Technical Problems Raise Questions About Proposed Tests

According to its April 1990 test plan, DOE would store about 600 drums of TRU waste in WIPP in 124 instrumented metal bins and about 3,900 drums of waste in 6 small rooms mined in the repository. These tests were expected to answer questions about the types and quantities of gases, such as hydrogen, that would be

generated from TRU waste stored in a repository environment characterized by the presence of brine. DOE added that other tests in WIPP using TRU waste may be identified later in the test program.

Subsequently, technical complexities caused DOE to again revise its test plans:

- DOE has not yet developed an effective method to seal entrances to the rooms and permit accurate measurements of gases. As a result, DOE has postponed these tests until late in 1993.
- DOE found that tests involving the injection of brine into bins could not be safely performed in WIPP because of the risk of accidental contamination.
- EPA and oversight groups want the waste contents to be statistically representative of TRU waste stored or generated at DOE's facilities and to present acceptable shipping, handling, and storage risks. For these reasons, DOE's efforts to identify the characteristics of all TRU wastes that might be disposed of in WIPP, including a representative selection of the wastes to be used in tests, have taken far longer than expected.

The Secretary of Energy, in his June 1990 Record of Decision on a supplemental environmental impact statement for WIPP, determined that the most suitable place to conduct the bin tests was underground at that facility. However, DOE does not now plan to conduct "wet" bin tests--tests involving TRU waste mixed with brine--in WIPP. Currently, DOE is considering using 60 bins, or 360 drums of waste, for these tests on the surface at WIPP or at some other DOE facility. Still other potential tests involving wet bins may be conducted at a facility other than WIPP, but DOE has

not yet decided on the location or how much TRU waste the tests will require.

Consequently, DOE's immediate plans are limited to conducting bin tests using "dry" waste--waste as received from waste generating facilities--in WIPP beginning later this year. DOE estimates that the amount of waste required for these tests is 86 bins, or the equivalent of 516 drums of TRU waste.

An April 1991 report by the Academy's WIPP panel noted that the bin tests are consuming far more resources than anticipated but are not progressing fast enough to yield information within an acceptable time frame. According to the report, delays may shorten the period for measuring data obtained on gas generation, which may increase the level of uncertainty associated with the data. Moreover, since mid-1989, EEG has urged DOE to begin measuring gas at the waste generating sites so as to avoid any delay in obtaining the information. DOE has not stated whether it will run abbreviated versions of the planned tests or extend its test program to accommodate these delays.

EEG has also raised other questions about the bin tests. For the dry bins, EEG noted that EPA requires concentrations of flammable gases, including hydrogen, to be limited to less than 50 percent of their lower explosive limit in air at the time of emplacement. During the test period, the bins may require frequent purging to reduce concentrations of gas. According to EEG, the purging may introduce errors in estimating the total volume of gas being generated. For the bins with added brine, EEG has noted that DOE is not yet able to safely sample liquids from the bins. DOE is attempting to develop a shielding device that will provide workers adequate protection against contamination when sampling the contents.

Another major uncertainty affecting DOE's test program is EPA's disposal standards. If the new standards, when issued, differ substantially from the 1985 standards, additional testing and analysis might be required to demonstrate compliance with the new standards. Regardless, DOE's performance assessment for WIPP could indicate that DOE might have to modify either the waste or the repository's design to meet the standards. In either case, DOE may have to extend beyond 1997 its decision on whether it can use WIPP as a disposal facility for TRU waste. DOE has formed a task force to study the cost, feasibility, and safety of modifying the form of the waste and/or WIPP to help the facility comply with EPA's standards. The task force's final report was to have been completed in February 1991 but is now scheduled for release in July 1991.

Closing of Rooms and Rockfalls

Raise Safety Questions

A more immediate issue is the safety of the WIPP facility. Over the last several years, the rate at which rock has "crept" into excavated areas is up to 4 times faster than originally predicted. This phenomenon may limit the time available for safely emplacing waste in mined areas. Also, EEG pointed out that upheaval of the rooms' floors, another common result of salt "creep," may make it difficult to stack the bins, each weighing up to 2 tons, in WIPP. DOE has had to dig up and reconstitute the floor in one room three times. This could mean rehandling and removing of the bins. About 2 months ago, DOE convened a panel of experts to study the problem of room closing. At this time, however, the panel's findings have not been released.

Furthermore, in June 1990, a 100-ton rock slab fell from the ceiling of one of the four rooms that DOE mined about 8 years ago for geologic and hydrologic testing. Another rockfall, this time of 1,400 tons, occurred in the same area in February 1991 even

though DOE had installed 2-foot bolts in the roof of the room to improve its stability. Two other rockfalls have been reported, the most recent occurring in May 1991.

Because of the rockfalls, EEG has raised concerns about the safety of the seven waste storage rooms that DOE mined about 5 years ago. According to EEG, using rooms of this age to perform experiments lasting several years raises important questions about the rooms' stability and workers' safety. Because the rock slab that fell in February ranged from about 8 to 11 feet in thickness, it is unclear whether 10-foot bolts that DOE installed in the ceilings of the waste storage rooms will maintain adequate safety for the period of the planned experiments and, if needed, a subsequent waste-retrieval period.

WASTE RETRIEVAL PLAN IS INCOMPLETE

Continued temporary storage of TRU waste at DOE's defense facilities has become a politically contentious issue between DOE and states hosting these facilities. For example, some states--particularly Idaho and Colorado--vigorously oppose additional storage and are making every effort to get DOE to remove existing wastes from within their boundaries. States' current opposition to continued storage of DOE's nuclear wastes indicates that DOE could also expect the states to oppose receiving wastes retrieved from WIPP. Thus, in the event that DOE would have to remove TRU waste stored in WIPP for its test program, alternative storage arrangements should be made before the waste is emplaced in the facility.

In our December 1989 report on WIPP, we recommended, among other things, that DOE provide the Congress with specific information on the agency's plans to retrieve waste from WIPP in case this becomes necessary. Subsequently, DOE issued a plan for retrieving stored waste that described the process it would follow to decide where

to store the waste. In our view, this plan is incomplete because it does not identify the specific locations where the retrieved waste would be stored. Addressing this issue completely now--before storage in WIPP occurs--is better than dealing with it later, when the waste may need to be retrieved from the facility for storage elsewhere. The unanticipated rate at which the storage rooms are closing emphasizes the importance of addressing this issue now. For example, DOE's May 1990 safety analysis report on WIPP stated that it could take about 5 to 10 years to retrieve waste from the facility. Thus, it is possible that the rate of room closure could affect the time available not only for the waste experiments, but also for retrieval operations.

OBSERVATIONS

Mr. Chairman, I would like to conclude my presentation with two observations. First, some have asserted that WIPP is a research and development facility; therefore, DOE should be permitted to conduct experiments with TRU waste in the facility. However, DOE's January 1981 decision and the agency's construction of a full-scale disposal facility indicate otherwise. WIPP is, and is intended by DOE to be, a repository for disposal of TRU waste. Yet DOE did not pursue assessment of WIPP's compliance with EPA's standards with the same vigor as it pursued construction. Only since 1988, when construction was almost complete, and oversight groups began to question DOE's ambitious waste-storage plans, has DOE been trying to catch up in determining compliance with environmental requirements.

Second, although DOE has designed experiments and developed processes to assess the long-term performance of WIPP and its compliance with EPA's standards, the agency's published test plans do not fully address current problems. For example, for both technical and safety reasons, it is not certain that DOE can perform the experiments in WIPP that it believes are critical to

determining compliance with EPA's requirements. If obstacles to those tests prove insurmountable, alternatives to the current test plans will be necessary. Yet WIPP's 25-year life has begun, and lengthy delays might compound DOE's problems in opening the facility for tests. Certainly, DOE's study of potential modifications to WIPP and/or the TRU waste is important in case the agency later finds that it cannot comply with EPA's disposal standards without such modifications. Integrating this work into DOE's performance assessment program at an early date would minimize additional project delays.

Mr. Chairman, this concludes my prepared remarks. I would be pleased to respond to any questions that you or Members of the Subcommittee may have.

RELATED GAO PRODUCTS

Nuclear Waste: Issues Affecting Land Withdrawal of DOE's Waste Isolation Pilot Project (GAO/T-RCED-91-38, Apr. 16, 1991).

Nuclear Waste: Storage Issues at DOE's Waste Isolation Pilot Plant in New Mexico (GAO/RCED-90-1, Dec. 8, 1989).

Status of the Department of Energy's Waste Isolation Pilot Plant (GAO/T-RCED-89-50, June 12, 1989).

Status of the Department of Energy's Waste Isolation Pilot Plant (GAO/T-RCED-88-63, Sept. 13, 1988).

Nuclear Waste: Department of Energy's Transuranic Waste Disposal Plan Needs Revision (GAO/RCED-86-90, Mar. 21, 1986).

Copies of these documents may be ordered by calling (202) 275-6241, or by writing to:

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