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Status of the Department of Energy's Waste Isolation Pilot Plant

Statement of
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Energy, and Natural Resources
Committee on Government Operations
House of Representatives

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Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss the status of the Department of Energy's (DOE) Waste Isolation Pilot Plant, or WIPP, located southeast of Carlsbad, New Mexico. The ultimate objective of the facility is to serve as a repository for the permanent disposal of transuranic[1] (TRU) nuclear waste generated by DOE in its atomic energy defense activities. TRU waste exists in a variety of physical forms, ranging from unprocessed trash, such as absorbent papers and protective clothing, to decommissioned tools. Because of the long period that these wastes are radioactive, they require isolation in a deep geologic repository.

My testimony today is based on our ongoing review, being done at the request of this subcommittee, of (1) the events surrounding the seepage of brine, or salt water, into the WIPP facility and (2) DOE's ongoing and planned research activities at the facility on high-level waste resulting from the reprocessing of spent nuclear fuel. According to DOE officials, there are no current plans to conduct experiments with actual high-level wastes; therefore, my testimony will focus primarily on the issue of brine seepage.

In our opinion, Mr. Chairman, there are many uncertainties involving WIPP performance that must be addressed before DOE can demonstrate that the facility is suitable as a repository for permanent disposal of TRU waste. Chief among them are the amount of brine seepage that would occur and the resultant effect on the integrity of the repository. It is important to recognize, however, that the technical resolution of the brine seepage issue is but one aspect of the larger process of determining whether the

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

WIPP facility will meet disposal standards for nuclear waste repositories issued by the Environmental Protection Agency (EPA).

To address the technical uncertainties and demonstrate effective waste storage operations, DOE had proposed that near full-scale operational quantities of TRU be stored at WIPP during the 5-year demonstration phase. More recently, it agreed to reduce the quantity of waste that would be stored in WIPP for demonstration purposes. However, DOE has not yet issued a detailed plan that clearly establishes if there is a need to emplace wastes in the facility, and if so, how much, to determine if WIPP meets the EPA standards. A well-conceived experimental program is essential to conservatively assessing compliance with the standards. Until DOE does this, we believe it is premature for the Congress to enact legislation that would authorize waste emplacement in WIPP and permanently withdraw the affected land from public use.

Before I discuss these matters, I believe it is important to briefly describe the current status of the WIPP facility.

STATUS OF WIPP

The WIPP facility may be roughly broken down into surface facilities, mine shafts, and an underground repository area consisting of tunnels, experimental rooms, and TRU waste storage rooms. The surface facilities, including the waste handling building, are essentially constructed and ready for waste emplacement operations. Three of the four shafts have been completed and the other one--an air intake shaft--is nearing completion. The WIPP repository will consist of 56 rooms, arranged in 8 panels, and an experimental area. DOE has completed mining and preparation of the experimental area and the first waste emplacement panel and is beginning to mine a second panel. Each panel will consist of seven waste storage rooms, each 300 feet

long, 33 feet wide, and 13 feet high, surrounded by access tunnels. The total cost of the project through fiscal year 1988 is expected to be about $700 million (year-of-expenditure dollars).

Until recently, DOE planned to start receiving TRU waste at WIPP in October 1988. That date has now slipped into the first quarter of fiscal year 1989. During the first 5 years of operation, DOE plans to emplace up to 125,000 55-gallon drums of contact handled TRU waste. This is about 15 percent of the total volume of TRU waste--estimated to be 6.3 million cubic feet--that would be disposed of at WIPP. According to WIPP project officials, the purposes of this activity were to (1) demonstrate the safety of TRU waste handling operations, (2) validate the repository's design, and (3) gather technical information for use in assessing the long-term environmental performance of the WIPP facility. The assessment is necessary for DOE to determine whether the facility satisfies EPA waste disposal standards. DOE plans to make a determination that the EPA standards have been met before it uses the facility as a repository for permanent waste disposal.

At present, however, there are several actions that must be taken before DOE can proceed with its demonstration program using containers of TRU waste. Briefly, they are:

-- Land withdrawal. Before beginning operations, DOE must obtain authorization from either the Department of the Interior, which owns most of the land on which WIPP is located, or the Congress, which could enact legislation withdrawing land for waste storage at WIPP. DOE's access to 8,960 acres of federal land where the WIPP facility is located is governed by a temporary (8 years) administrative withdrawal of land from public use issued by the Department of the Interior in June 1983. The WIPP facility also includes 1,280 acres of New Mexico land which must be transferred to DOE before WIPP begins waste emplacement

operations. The administrative withdrawal issued by Interior prohibits DOE's use of the land for transportation, storage, or disposal of radioactive wastes. Consequently, to store TRU wastes in the WIPP facility during the planned 5-year demonstration period, DOE must obtain either revised temporary land withdrawal authorization from Interior or permanent land withdrawal by an act of the Congress. The Congress is now considering land withdrawal legislation (S. 1272 and H.R. 2504).

-- Certification of transportation containers. DOE has agreed with the state of New Mexico to obtain certification from the Nuclear Regulatory Commission (NRC) that the types of shipping containers to be used in transporting wastes to WIPP meet NRC standards. Currently DOE is preparing a report analyzing transportation safety for submission to NRC. DOE expects NRC certification of the shipping containers in the next few months.

-- Determining that WIPP is operationally safe. In accordance with its internal procedures, DOE must make a formal determination that the facility complies with all applicable environment, safety, and health standards and requirements before it can be operated. Based on its review, DOE's Office of Environment, Safety, and Health (ES&H) believes that the final Safety Analysis Report prepared by DOE's Office of Defense Programs, the Office having operational responsibility for WIPP, does not fully support the report's conclusion that WIPP is operationally safe. DOE is currently addressing the issues raised by ES&H.

-- Development of operational and experimental plan. Lastly, before beginning waste emplacement operations DOE intends to prepare an operational plan, including a plan on

conducting experiments on TRU wastes. DOE is currently preparing this plan.

I will now discuss the purpose of the WIPP facility to provide perspective that is essential for understanding the significance of the brine seepage issue and for determining the actions that DOE should take to deal with this issue.

WIPP PURPOSE NOW LIMITED TO TRU WASTE DISPOSAL

When WIPP was conceived in the mid-1970s, its basic purposes were to (1) demonstrate the adequacy of salt formations for isolating DOE's TRU wastes; (2) provide a facility for experiments, including some with defense high-level waste, to develop an understanding of the behavior of defense wastes in a repository environment; and (3) possibly dispose of defense high-level wastes in the facility. Subsequently, DOE decided to consider conducting experiments with spent (used) fuel from commercial nuclear power plants at the facility and to consider disposing of a limited amount of spent fuel in the facility.

The Congress did not agree with this combined defense and commercial role, however, and in December 1979 enacted legislation authorizing 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]

On the basis of an October 1980 final environmental statement on the WIPP facility, DOE decided, in January 1981, to proceed with WIPP. In the record of that decision, DOE stated that the facility

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

would dispose of TRU waste stored at its Idaho National Engineering Laboratory and would then be available to dispose of TRU waste from other DOE facilities. DOE added that WIPP would include an experimental underground facility for conducting experiments on defense wastes, including small volumes of high-level waste. The high-level waste would be removed at the completion of the experiments.

On the basis of these statements, it appears that DOE intended that the facility be used for the disposal of TRU wastes and research and development on the disposal of a variety of types of defense wastes, including high-level wastes.

Since DOE's January 1981 decision, other nuclear waste legislation and related executive action have, in our opinion, essentially eliminated WIPP's role as a research and development facility for high-level defense waste. Specifically, under a provision contained in the Nuclear Waste Policy Act of 1982, the President decided, in April 1985, that high-level defense waste would be disposed of in one or more repositories to be developed under that act for the disposal of spent fuel from commercial nuclear power plants. At that time, DOE was considering various rock formations as a potential site for a repository for commercial spent fuel, including a salt formation located in Deaf Smith County, Texas. In December 1987, however, the Congress amended the Nuclear Waste Policy Act to, among other things, direct DOE to limit its investigation of the potential commercial spent fuel and high-level defense waste repository sites to Yucca Mountain, Nevada. The Yucca Mountain site is composed of compressed volcanic ash, called tuff, rather than salt. The fact that DOE is no longer investigating a salt formation for a commercial spent fuel and high-level defense waste repository calls into question the need for further research and development on high-level defense waste disposal at WIPP.

Finally, when DOE began the WIPP project, EPA had not issued any standards for permanent waste disposal. In August 1985, however, EPA issued regulations, as directed by the Nuclear Waste Policy Act of 1982, setting environmental standards for the management and disposal of spent fuel, high-level waste, and TRU waste in repositories. The standards consist of subpart A--which limits human exposure to radiation from the management, storage, and preparation of waste prior to its disposal--and subpart B--which sets radiation limits after the wastes have been disposed of. For example, subpart B limits individual exposure to radiation from all sources, including drinking water, for 1,000 years after disposal.

As a result of a legal challenge to the EPA standards, however, in July 1987 the U.S. Court of Appeals (First Circuit) vacated and remanded to EPA subpart B. The Court found that EPA had failed to adequately consider requirements of the Safe Drinking Water Act by allowing, in subpart B, contamination of groundwater with radiation levels in excess of the "no endangerment" provision of EPA's drinking water standards. The Court directed EPA to either reconcile the differences between the drinking water standards and subpart B of its repository standards or explain why they are different. EPA estimates that it will take about 2 years to comply with the Court's decision. DOE intends to comply with the final form of the EPA standards before WIPP becomes a permanent disposal facility.

In summary, although the Congress authorized WIPP as a research and development facility to demonstrate the safe disposal of defense wastes by performing research on a variety of defense wastes, including high-level wastes, subsequent events have essentially eliminated WIPP's high-level defense waste research and development role. WIPP's current role is dedicated to storing and eventually disposing of TRU waste. However, WIPP cannot be used as

a permanent repository for TRU waste until it complies with EPA's disposal standards, once the standards have been reissued.

With that perspective, Mr. Chairman, I will now turn to the issue of brine seepage in the WIPP repository.

THE BRINE SEEPAGE ISSUE

For several years, DOE has planned an initial 5-year operational period at WIPP to demonstrate the safe storage of TRU wastes. At the conclusion of this period, DOE planned to decide whether to retrieve the waste or to use WIPP for permanent waste disposal. The emergence of the brine seepage issue, however, has focused increasing attention on the nature and importance of the demonstration phase. For example, one concern is whether DOE should emplace TRU waste in the facility before resolving the brine seepage issue and determining whether the facility meets EPA's waste disposal standards.

DOE first encountered brine seepage in WIPP excavations in 1983. Thereafter, the state of New Mexico's Environmental Evaluation Group (EEG), a group funded by DOE to conduct independent technical evaluations of WIPP environmental and safety issues, concluded that the salt formation at the WIPP site contained more moisture than DOE had anticipated. Then, in 1986 a member of the National Academy of Sciences' WIPP Panel presented an analysis of the issue showing that in a few hundred years sufficient brine might seep into the repository rooms to saturate them.

The issue was raised publicly late in 1987 when the Scientists Review Panel on WIPP, a group composed primarily of scientists at the University of New Mexico, announced the results of its study of the issue. The review panel concluded that the salt formation at WIPP contains much more water than DOE had anticipated and that,

over time, a liquid mixture of brine and nuclear waste could form and eventually reach the environment through unintentional human intrusion or fractures in repository shaft and tunnel plugs and seals. This could occur, according to the review panel, because of pressurization of waste rooms resulting from gases generated within TRU waste drums and the gradual closing of the waste emplacement rooms due to the creeping action of the surrounding salt. The review panel contends that under these conditions WIPP would not comply with EPA's disposal standards for repositories.

At the request of the New Mexico congressional delegation, DOE asked the Academy's WIPP Panel to review the brine seepage issue. The panel reviewed WIPP project documents and met in February 1988 with representatives of DOE, Sandia National Laboratories, (a technical consultant to DOE), EEG, and the Scientists Review Panel and others. Representatives of Sandia stated that their calculations indicate that the projected brine accumulations (11,000 gallons per room in 100 years) at the WIPP facility will be absorbed by backfill material that DOE plans to use in repository rooms after waste emplacement. EEG, however, believes that the uncertainty over projected brine seepage is sufficient to warrant serious study before a large quantity of waste is placed in the repository. The group recommended, among other things, that DOE (1) publish preliminary analyses demonstrating compliance with the EPA standards, (2) obtain empirical data on brine seepage into WIPP waste disposal rooms, and (3) evaluate the effects of gas generation on room closure rates and brine seepage.

The Scientists Review Panel reported that the permeability (the capability of brine to pass through the salt) values used by Sandia in projecting brine seepage may be too low. Using somewhat higher values would result, it said, in a projection of 100,000 gallons of brine per room in 100 years. The panel recommended, among other things, that DOE conduct surface-based experiments to

determine gas generation rates and the effectiveness of backfill materials before emplacing TRU waste in the repository.

The Academy panel concluded in a March 3, 1988, report to DOE that the formation of a brine liquid and its potential release to the environment is improbable but not impossible. Further, it said that if such an unlikely event was to occur, it would not be catastrophic because it would result only in brief surface contact between a few individuals and slightly radioactive liquid. The panel added, however, that such a release might constitute non-compliance with EPA's disposal standards. Nevertheless, it said that DOE must have a well-conceived experimental program in areas such as brine seepage, gas generation, and room closure rates to reduce uncertainties; the program would serve as a basis for conservatively assessing whether WIPP can comply with EPA's standards.

Specifically, the Academy panel recommended that DOE give priority to better defining the planned experiments to be done during the 5-year demonstration period. It pointed out that DOE had not yet published detailed descriptions of the intended experiments and, without seeing such descriptions, neither the Academy nor any other scientific group has a basis for making a meaningful judgment about DOE's ability to reduce current uncertainties. Despite this conclusion, however, the Academy panel also said that some experiments will require the use of TRU waste in the repository. In this regard, it agreed with EEG that no more drums than those to be used in well-described and necessary experiments be placed underground. The Academy panel made a number of specific recommendations to DOE related to the development of plans for WIPP experiments. For example, the Academy recommended that DOE design its experiments to lessen uncertainties rather than to verify preconceived ideas about their probable results. It also offered possible solutions to the brine seepage issue that DOE

might study, such as potential methods for controlling the amounts of gas generated by TRU wastes.

DOE stated that it would aggressively respond to the Academy panel's recommendations and present a comprehensive 5-year test plan to the Academy for formal review in June 1988. To date, however, the plan has not been issued.

In discussing the need to perform full-scale underground tests with TRU wastes, DOE said that such tests would provide the scientific data needed to supplement its understanding of the repository environment and to improve its understanding of waste/facility interactions. According to DOE, underground tests will ensure that the effects of temperature and moisture on gas generation by the various TRU waste forms are properly addressed. Additionally, DOE said that concerns involving panel structural conditions and brine inflow can be more accurately addressed in a full-scale configuration, without the need to simulate these conditions above ground in large and expensive tests. By conducting tests in the actual environment, according to DOE, the initial conditions for long-term performance assessment calculations, required to determine compliance with EPA disposal standards, can be accurately specified.

EEG, on the other hand, noted that the only experiment that DOE has proposed that might require emplacement of TRU wastes in WIPP consists of monitoring gases expected to be generated by radioactive and biological decay of the contents of the waste drums. The group is not satisfied with the technical validity of the proposed experiment because it believes that for technical reasons, the experiment would not accomplish what it is designed to do and 5 years is insufficient time to obtain meaningful results.

Finally, the opinion of the Scientists Review Panel is that DOE could perform more meaningful experiments above ground in a

controlled environment. It concluded that because DOE does not plan to backfill storage rooms or use brine in its experiments, it will obtain little information on the actual reaction of TRU waste and brine.

DOE discussed its position on the quantity of TRU wastes to be stored at WIPP during the demonstration period in an August 9, 1988, letter to the Senate Committee on Energy and Natural Resources commenting on S. 1272. DOE said that it opposes the bill's provision to limit the storage of TRU waste to 3 percent of WIPP's total capacity, a limit of about 25,000 55-gallon drums, until DOE demonstrates compliance with EPA standards. The demonstration phase, according to DOE, is not only to demonstrate compliance with EPA standards but also to demonstrate the safe disposal of waste at near full-scale operations. DOE added that this latter objective would be adversely affected by the 3-percent limit. Lastly, although DOE said that while it continues to believe that the limit should be set at 15 percent of WIPP capacity, which would amount to about 125,000 55-gallon drums, it would support a proposed amendment to S. 1272 that would (1) set an initial limit of 3 percent of capacity and (2) increase the limit to 9 percent upon concurrence by the National Academy of Sciences that brine seepage and gas generation would not adversely affect WIPP performance.

OBSERVATIONS AND CONCLUSIONS

Up to this point in my testimony, Mr. Chairman, I have discussed the status of the WIPP facility, provided perspective on the purpose of the facility, and presented some of the details on the brine seepage issue as seen through the eyes of DOE and others. We have not yet developed specific recommendations on the immediate course of action that DOE should take to address and resolve questions about the appropriate near-term use of the WIPP

facility. However, I will close my statement by making a few observations and conclusions on this subject.

We have reservations about DOE's position that the safety of WIPP should be demonstrated at near full-scale operation. Whether or not WIPP can meet EPA's current standards--let alone the revised standards, which could be even more stringent--is an open question. DOE must be prepared to answer several questions about the consequences of WIPP being judged unsuitable after the demonstration phase is complete. Some of the questions involve (1) the feasibility of retrieving the waste if, for example, the drums deteriorate; (2) the costs of retrieval; and (3) decisions about where the retrieved wastes would be stored. In view of the above, we believe that DOE should limit the amount of waste stored at WIPP during the demonstration phase to that needed for experiments directed at determining whether or not WIPP can meet EPA's revised standards.

We believe that the overriding issue that needs to be resolved in the next few years is whether WIPP will meet EPA's standards for permanent disposal of TRU wastes. Resolving this issue requires that DOE develop methods and obtain site-specific data to adequately assess the long-term performance of the facility as a waste repository and compare the assessment results with the EPA standards.

In our view, therefore, DOE now needs to develop and issue a plan for determining compliance with EPA's standards that addresses the following:

-- DOE should describe its strategy for determining compliance with EPA disposal standards, including recognition that (1) final standards will not be reissued until some future time and (2) the final standards could be more stringent than those remanded by the Court.

-- DOE should provide a detailed technical approach to addressing the potential for excessive brine accumulation, including whether or not obtaining the necessary data requires experiments on TRU waste stored in WIPP waste emplacement rooms. If so, DOE should clearly state the technical basis for the approach and describe its plans to ensure that the waste can be retrieved and the storage area decommissioned in the event that DOE determines that WIPP does not meet EPA standards.

Also, in developing the plan, it would be appropriate, we believe, for DOE to obtain and address comments from the National Academy of Sciences' WIPP Panel, EEG, and the public.

Until DOE has developed a plan for determining compliance with EPA standards that provides technical justification for storing waste underground, land withdrawal authority for such storage is not required. Further, until the final EPA repository standards are in place and DOE determines that WIPP meets those standards, enactment of legislation for permanent land withdrawal is premature. If after enactment of such legislation it is determined that WIPP is unsuitable as a repository because it cannot meet the standards, additional legislation would be necessary to return the land to public use. In view of this possibility, the Congress may wish to either (1) include a provision in the legislation that would allow DOE to perform underground experiments using TRU wastes, but make permanent land withdrawal conditional upon a positive finding by DOE that WIPP meets EPA's standards or (2) postpone action on the legislation until such a finding is made.

Finally, Mr. Chairman, over the last several years we have taken the position that DOE's defense complex facilities should be independently reviewed. Recent developments within the DOE complex have reinforced this view. With respect to WIPP, independent

oversight would increase public confidence that DOE is taking a prudent course of action to ensure that WIPP can be operated safely.

Mr. Chairman, this concludes my testimony. I would be pleased to answer any questions that you and other subcommittee members may have.

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