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RADIOACTIVE AND HAZARDOUS WASTE ISSUES IN NEW MEXICO: THE FUTURE OF W.I.P.P.

Chief Natzille A/B

Friday, September 25, 1992 • 8.45 a.m. - 11:30 a.m.

3.0 General MCLE Credits

Cosponsored by
The Natural Resources, Energy & Environmental Law Section
The Public Law Section

Program Co-Chairs: *Thomas C. Bird, Esq.*
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Albuquerque, New Mexico

Corliss G. Thalley, Esq.
New Mexico Office of the Attorney General
Santa Fe, New Mexico

Course Description:

This timely program will present wide ranging topics related to the storage of radioactive and hazardous waste in New Mexico, with specific focus on the Waste Isolation Pilot Plant. The aim of the program is to provide participants with various perspectives on the future of hazardous waste storage in New Mexico, and to provide a forum for discussing these important issues. Some of the specific topics which may be addressed by the faculty include:

- current legislative activity involving WIPP & radioactive waste disposal
- promulgation of federal regulations involving radioactive waste disposal
- state regulation of radioactive waste disposal
- anticipated actions involving WIPP
- state, federal, and Indian roles with respect to Monitored Retrievable Storage

The faculty will include representatives from both the public and private sectors, and will provide a balanced perspective on the controversies involved in this arena.

Faculty:

LINDSAY A. LOVEJOY, JR., ESQ. is an Assistant Attorney General with the Environmental Enforcement Division. A 1969 graduate of Yale Law School, he clerked for District Judge Robert R. Merhige, Jr., in the Eastern District of Virginia in 1969-70. In 1970-77 he practiced at Simpson, Thacher & Bartlett in New York, primarily in major litigation, and ultimately came to New Mexico in 1977 in connection with uranium contract litigation. He practiced in 1978-81 with Bingaman, Davenport & Lovejoy, largely in uranium-related cases, and 1981-90 with Carpenter, Crout & Olmsted, in natural resource-related litigation. In 1991 he joined the Attorney General's Office.

GINI NELSON, ESQ. has been an Assistant Attorney General with the New Mexico Environment Department and its predecessor agency since 1986, working primarily with hazardous and radioactive waste management issues. She has B.A. and M.A. degrees in Sociology, and received her J.D. from the National Law Center at George Washington University in Washington, D.C. in 1983.

DR. MATTHEW SILVA is a chemical engineer with the Environmental Evaluation Group (EEG), which conducts an independent technical evaluation of the Waste Isolation Pilot Plant (WIPP). The WIPP Project, located in southeastern New Mexico, is being constructed as a repository for permanent disposal of transuranic radioactive waste generated by the national defense programs. Dr. Silva holds a B.S. degree in Basic Science and M.S. degree in Petroleum Engineering from the New Mexico Institute of Mining and Technology and a Ph.D. in Chemical Engineering from the University of Kansas.

CHRISTOPHER J. WENTZ is a Nuclear Waste Policy Analyst for the New Mexico Energy, Minerals & Natural Resources Department, in Santa Fe, where he currently staffs and coordinates all activities of the State of New Mexico's Radioactive Waste Task Force. This statutory, cabinet-level Task Force negotiates on behalf of the State on all issues pertaining to the siting, development, and operation of the Waste Isolation Pilot Plant (WIPP).

920924.5

The Waste Isolation Pilot Plant and the State of New Mexico

1. Origins of the WIPP project; the 1981 litigation and the State-DOE agreements.

2. The Task Force and the Radioactive Waste Interim Committee.

3. 1988 legislative efforts lead to a revised test phase.

4. Administrative land withdrawal modification for test purposes.

5. Negotiation of the Third Modification to the State-DOE agreement. - - No written materials included for this part

6. Hazardous waste permitting history of WIPP; HSWA, LOIS, and the no-migration variance.

7. 1991-92 litigation concerning administrative land withdrawal.

8. 1991-92 litigation concerning RCRA interim status.

9. 1991-92 congressional action.

10. Next steps: Transportation safeguards and emergency response preparedness.

11. Next steps: RCRA permit development and enforcement.

12. Next steps: EPA disposal standards.

13. Next steps: The Performance Assessment.

14. Lessons learned about the State's position vis-a-vis federal facilities.

1. Origins of the WIPP project; the 1981 litigation and the State-DOE agreements:

a. 1957 National Academy of Sciences report supports disposal of radioactive waste in salt.

b. Lyons, Kansas, proposal 1971-72: Not pursued by reason of excessive oil and gas drilling, permitting water flow between water-bearing formations, possibly carrying radionuclides.

c. 1976 ERDA investigations at WIPP. Few drill holes present.

d. Nov. 26, 1976: ERDA requests withdrawal of WIPP site to prevent granting of further mineral leases which might lead to drilling. Term is indefinite. Two years segregation obtained.

e. Dec. 14, 1977: DOE and BLM make cooperative agreement to allow exploration and study of WIPP site: 5 year term.

f. Mid-1978: DOI investigates limits of own land withdrawal power, suggests that DOE seek legislation.

g. Oct. 12, 1978: DOE "renews" land withdrawal application. Term again indefinite; two further years segregation obtained.

h. 1979: BLM (DOI) adopts policy that it will take no action committing the WIPP site to permanent withdrawal.

i Dec. 29, 1979: Public Law 96-164, DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980:

A. DOE to proceed with WIPP construction project. WIPP authorized as a defense activity, authorized for R & D to demonstrate safe disposal of defense radioactive wastes, exempt from NRC regulation.

B. DOE to consult and cooperate with State. DOE to seek to enter into written agreement with State by Sept. 30, 1980, providing to State the right to comment on and make recommendations with regard to public health and safety aspects before certain key events, DOE to consider and act upon comments, agreement to be periodically revised.

C. Agreement and amendments to be transmitted to Armed Services Committees.

j. 1980: BLM (DOI) determines that "under no circumstances" is radioactive waste to be allowed by DOI to enter the WIPP site.

k. August 1980: DOE decides to limit its action to "characterization" of the WIPP site.

l. Oct, 1980: DOE Site and Preliminary Design Validation ("SPDV") program, including drilling two shafts and underground excavation.

m. Nov. 6, 1980: DOE requests land withdrawal for 8 years for SPDV purposes.

n. Jan. 22, 1981: DOE Record of Decision to proceed with WIPP project.

o. April 2, 1981: DOE and BLM make cooperative agreement authorizing SPDV program; no expiration date.

p. May 14 1981: State of New Mexico vs. DOE, DOI lawsuit filed. Claims advanced by the State include:

A. Failure to obtain State's concurrence before commencement of WIPP construction by signing a BLM-DOE cooperative agreement authorizing construction to begin with the sinking of two initial shafts, contrary to representations by DOE officials and PL 96-164;

B. Refusing to sign an enforceable agreement with the State resolving State concerns, thereby impairing the State's ability to function as a sovereign and violating PL 96-164;

C. Violation of N.M. L. 1981, ch. 374, §6, which calls for state concurrence in storage or disposal of radioactive waste;

D. Failure to prepare an adequate environmental impact statement, to supplement the EIS based on the SPDV program, or to allow sufficient time for state comments;

E. Violation of the Federal Land Policy and Management Act, by making a unlawful de facto withdrawal of the WIPP site.

q. July 1, 1981: Stipulated Agreement, Agreement for Consultation & Cooperation, and Working Agreement provides:

   A. Construction decision to take place only sixty days after all interested parties can review SPDV result, other studies.

   B. DOE to make good-faith effort toward resolution of state off-site concerns before construction:

      1. state liability;
      2. road upgrading;
      3. emergency preparedness training;
      4. transportation monitoring;
      5. baseline health studies;
      6. post-operation monitoring.

   C. Binding enforceable consultation & cooperation agreement, without waiving judicial review.

   D. FLPMA compliance, including public hearings.

r. July 1, 1981: Consultation & Cooperation Agreement (State-DOE): Invokes PL 96-164; designates Key Events: provides time frame for review; dispute resolution provision. State represented by Chairman, Radioactive Waste Consultation Task Force. Reports to be provided. Conflict resolution involves hearing officer appointment, submissions, report, decision by DOE Secretary.

s. July 1, 1981: Working Agreement for Consultation & Cooperation (State-DOE): Specifies Key Events and information to be provided. Safety Analysis Report to be review by EEG.

t. March 23, 1982: DOI withdraws WIPP site for 8 years for SPDV purposes. PLO 6232 (3/23/82) states that lands are withdrawn "for the purpose of performing a Site and Preliminary Design Validation Program (SPDV) in connection with a [WIPP] project of the [DOE] and to protect the lands pending a legislative withdrawal if appropriate."

u. March 23, 1992: DOI report to Congress for PLO 6232:

   A. "The present action is solely for the Site and Preliminary Design Validation and is not for the [WIPP] nor will it involve the storage of nuclear waste in any form without further documentation and evaluation."

B. "Should the site prove suitable for the WIPP, then withdrawal to accommodate the WIPP will be necessary for a term longer then permitted under existing withdrawal laws and extension. This would then necessitate Congressional withdrawal in perpetuity."

v. Dec. 7, 1982: DOI (Asst. Sec. Garrey Carruthers) advises DOE that DOI "will not authorize or allow the proposed WIPP site at Los Medanos to be used for the temporary storage or permanent burial of any defense-related nuclear waste in the absence of appropriate legislation reserving, or directing the Secretary of the Interior to reserve, the site for the storage or burial of nuclear waste."

w. Dec. 28, 1982: Supplemental Stipulated Agreement Resolving Certain State Off-Site Concerns Over WIPP. (State-DOE) Covers:

A. State liability; Price-Anderson Act; DOE cleanup obligations;

B. Emergency response preparedness; DOE assistance; joint training; in-kind assistance;

C. Independent monitoring of WIPP by the State; transportation oversight; WIPP site access; off-site inspections; State role in selecting highway routes; notification of shipments.

D. WIPP operations environmental monitoring by State; baseline, operational, and postoperations monitoring; DOE financial assistance; DOE funding of EEG.

E. Upgrading and repair of State highways; DOE to make good faith effort to seek special appropriation of $57.9 million to upgrade specified routes.

Agreement contingent on DOE proceeding with project, congressional funding. Binding agreement filed in court.

x. Jan. 10, 1983: DOE requests land withdrawal for 8 years for construction, with a prohibition on radioactive waste.

y. March 22, 1983: (Revised) Working Agreement for Consultation & Cooperation (State-DOE): Revised Key Events and Milestones.

z. June 29, 1983: DOI withdraws WIPP site for 8 years for construction, with a prohibition on radioactive waste. PLO 6403 states:

A. Lands withdrawn "for the purpose of the construction of full facilities for the [WIPP] of the [DOE] and to protect the lands pending a legislative withdrawal if appropriate."

B. "This order does not authorize the use or occupancy of the lands hereby withdrawn for the transportation, storage or burial of any radioactive materials, except as to radiological instruments normally used for nondestructive testing and geophysical logging."

C. Eight year term; expires 6/29/91.

aa. June 9, 1993: DOI report to Congress for PLO 6403:

A. "The withdrawal authorizes the construction of the full WIPP facility but does not allow for disposal or experimentation with nuclear waste."

B. "DOE has not sought authority to dispose of or experiment with nuclear waste by an administrative withdrawal." This is because of the 20 year time limit and the feeling that such a controversial, long-term and significant land use commitment is appropriately the responsibility of Congress."

C. "The specific purpose of the withdrawal is to allow for facility construction."

D. "While the withdrawal would authorize full WIPP construction, it does not authorize deposition or experimental use of nuclear wastes."

E. "While it does not appear to be contrary to law to authorize full WIPP operation by an administrative withdrawal," congressional action is preferred.

F. "The position of BLM and DOE with respect to a withdrawal authorizing the deposition of and experimentation with nuclear waste is that it needs to be by a specific Act of Congress."

G. "The withdrawal will allow DOE to complete the full WIPP facilities and then present Congress with a completed facility while seeking authorization to store and experiment with nuclear waste."

bb. Nov. 30, 1984: First Modification to Consultation & Cooperation Agreement (State-DOE): Addresses new subjects:

A. Limits WIPP to defense waste. Special procedures for high (100 to 1000) rem/hr. RH-TRU Waste.

B. DOE ongoing responsibility for post-closure control.

C. DOE will not allow subsurface mining, drilling resources exploration within WIPP site. Deviated drilling only at depths of 6000 ft. or more.

D. DOE to comply with all state, federal and local environmental standards. Compliance by waiver, etc., shall not prevent State from imposing similar requirements.

E. WIPP mission subject to amendment by legislation.

Also modifies Working Agreement to provide for retrievability demonstration, add to Key Events and Milestones.

cc. Aug. 4, 1987: Second Modification to Consultation & Cooperation Agreement (State-DOE):

A. DOE not to permit subsurface mining, drilling, resource exploration; prohibition precludes drilling under the site. Salt tailings disposal to be environmentally sound.

B. DOE to comply with 40 CFR 191 Part A (management) EPA standards upon receipt of any waste.

C. DOE to provide plan by Feb. 1, 1988 for compliance with 40 CFR 191 B assurance requirements.

D. Prior to receiving more that 15% of TRU waste at WIPP, DOE shall demonstrate compliance with EPA 40 CFR 191 B disposal standards.

E. While 40 CFR 191 B standards are on remand, DOE agrees to continue performance assessment planning as though remanded 1985 standards remain applicable.

F. DOE to use engineered barriers to isolate waste.

G. Waste to be transported in NRC-certified packages.

dd. Aug. 4, 1987: Amendment to 1982 Supplemental Stipulated Agreement (State-DOE): DOE to make good faith effort to support State in seeking $190 million Congressional appropriation to construct new WIPP routes:

A. Hobbs Relief route

B. Los Alamos/Santa Fe Relief Route

C. Roswell Relief Route

D. Santa Fe Bypass

E. Artesia Relief Route

F. Carlsbad Bypass

ee. March 22, 1988: 1988 Modification to Working Agreement (State-DOE): Specifies hydrologic testing to be performed.

ff. April 26, 1988: Agreement of Principles for Emergency Response Assistance related to WIPP (State-DOE): DOE to provide ind-kind and cash assistance of approximately $460,000 over next two years.

State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
Santa Fe, New Mexico 87505

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

ROLES AND RESPONSIBILITIES in the WIPP PROJECT

Presented to

State Bar of New Mexico
1992 Annual Convention
Ruidoso, New Mexico

by

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Santa Fe, New Mexico 87505

A. STATE GOVERNMENT

One of the primary responsibilities of the State of New Mexico is to protect public health, safety, and the environment. The State operates the New Mexico WIPP Transportation Safety Program.

1. (Executive Branch) N.M. Radioactive Waste Consultation Task Force

Established in 1979, the Task Force consists of 6 Cabinet-level agencies that have integral roles in the New Mexico WIPP Safe Transportation Program. Its duties include negotiating on behalf of the State with the federal government in areas relating to the siting, licensing and operation of new federal disposal facilities for regulated radioactive wastes.

VILLAGRA BUILDING - 408 Galisteo
Forestry and Resources Conservation Division
P.O. Box 1948 87504-1948
827-5830
Park and Recreation Division
P.O. Box 1147 87504-1147
827-7465

2040 South Pacheco
Office of the Secretary
827-5950
Administrative Services
827-5925
Energy Conservation & Management
827-5900
Mining and Minerals
827-5970

LAND OFFICE BUILDING - 310 Old Santa Fe Trail
Oil Conservation Division
P.O. Box 2088 87504-2088
827-5800

a. Energy, Minerals & Natural Resources Department (EMNRD)

* EMNRD Secretary chairs the Task Force.

* EMNRD staff coordinates all Task Force activities, including administration and management of all federal WIPP funding for transportation safety; technical/policy analyses of WIPP issues; and public meetings, including annual WIPP Public Awareness Tours.

b. Department of Health (DOH)

* The Primary Care and Emergency Medical Services Bureau of DOH has established and maintains a comprehensive, effective program to provide emergency medical services throughout New Mexico. The Bureau provides guidance, training, and equipment to emergency medical technicians, paramedics, ambulance services, and hospital personnel.

* DOH chairs the WIPP Medical Working Group, which was established by the Task Force to enhance the level of emergency medical preparedness along the WIPP route.

c. Environment Department (NMED)

* NMED regulates management of radioactive mixed waste at WIPP. It is authorized to issue a disposal permit for WIPP under the N.M. Hazardous Waste Act.

* In the event of a WIPP accident NMED will provide radiological technical assistance and equipment in addition to its other emergency medical response preparedness activities.

* NMED field personnel work at the WIPP site, and perform a variety of monitoring and oversight functions.

d. Department of Public Safety (DPS)

* DPS administers the State's Emergency Management Act, "...to provide that adequate hazardous materials emergency management capability exists to protect the health and safety of New Mexico citizens and the environment."

* DPS is responsible for central coordination and communication in the event of a WIPP accident. The 24-hour Headquarters Communications Center of the New Mexico State Police is operated by DPS.

* The DPS "WIPP Coordinator" is responsible for the development of WIPP-specific guidance, procedures, and protocol for emergency responders; scheduling and provision of annual WIPP training, liaison with Local Emergency Planning Committees (LEPCs); and procurement and distribution of emergency response equipment and supplies.

e. State Highway and Transportation Department (SHTD)

* SHTD is responsible for planning, design, engineering, construction, and maintenance of highways in New Mexico, including those to be used as WIPP transportation routes.

* In 1991, SHTD assisted the State Highway Commission in designating New Mexico WIPP transport routes.

* In the event of a WIPP accident, the SHTD will assist in traffic control and in obtaining any required heavy equipment.

f. Taxation and Revenue Department, Motor Transportation Division (MTD)

* MTD regulates all common, contract, and private carriers operating in New Mexico to ensure compliance with all applicable motor transportation safety and weight laws and regulations.

* MTD personnel audit the DOE's contract carrier, Dawn Enterprises on a regular basis and will be conducting mechanical and radiological inspections of the WIPP vehicles should shipments commence.

g. Fire Marshal's Office (SFO) [*ex officio*]

* While the Fire Marshal's Office is not a statutory member of the Task Force, it plays a critical role in the area of WIPP emergency response preparedness, particularly with respect to guidance, training, and equipment.

* Because paid and volunteer firefighters represent a significant percentage of emergency response resources along the WIPP route, the Fire Marshal's Office provides an essential coordination role.

* The SFO operates the New Mexico Fire Academy in Socorro, where WIPP training is offered annually, and assists in the scheduling and notification of other WIPP emergency response courses.

* The SFO maintains a listing of WIPP-related equipment inventories of fire protection organizations along the WIPP transport route.

2. (Executive Branch) State Emergency Response Commission (SERC)

* The SERC was established in 1989 and consists of 7 members appointed by the Governor.

* The Commission supervises implementation of the federal Emergency Planning and Community Right-To-Know Act of 1986 (SARA Title III). This law ensures the availability and dissemination of current information on the nature and location of hazardous chemicals. Some WIPP wastes are regulated by the Act.

* The SERC provides direction to the Hazardous Materials Safety Board.

3. (Executive Branch) Hazardous Materials Safety Board (HMSB)

* The HMSB is comprised of the training officers of 7 State government entities: the State Police, now a division within the Department of Public Safety (DPS); the Military Division of the Military Affairs Department; the State Highway and Transportation Department; the Emergency Management Bureau of DPS; Environment Department; Fire Marshal's Office; and the Primary Care and Emergency Medical Services Bureau of the Department of Health.

* The Board reviews hazardous material accidents in New Mexico and identifies areas for improving emergency response; and establishes a curriculum for hazardous materials emergency response training.

C. LOCAL GOVERNMENT

Local governments have a critical role in effective response to a WIPP accident as municipal and county firefighters, law enforcement officers, and emergency medical personnel would likely be among the first at the scene. It is essential that State and local governments coordinate closely to ensure smooth, phased response.

1. Local Emergency Planning Committees (LEPCs)

   * Several State agencies, including the Fire Marshal's Office and the Department of Public Safety, communicate regularly with LEPCs along the route to provide assistance in planning for and responding to a WIPP transportation emergency.

2. Elected/Appointed Officials

   * Liaison with local government officials, including mayors, city councillors, county commissioners, and legislators, is an integral part of State agency activities.

D. INDEPENDENT TECHNICAL OVERSIGHT

Because WIPP is an experimental facility and because of the State's interest in verifying the safety of all WIPP activities, a number of independent technical oversight groups are closely monitoring repository operations and activities.

1. <u>New Mexico Environmental Evaluation Group (EEG)</u>

   * The EEG is the only full-time organization conducting an independent technical review of the WIPP project. The EEG has offices in both Albuquerque and Carlsbad. The Carlsbad office directs an environmental monitoring program at the WIPP site.

   * EEG has published approximately 50 technical reports on WIPP issues since its inception in 1978. Reports are available to the public.

2. <u>National Academy of Sciences (NAS)</u>

   * The NAS formed a WIPP Panel was formed to review scientific and technical aspects of the project. Originally involved in site selection and site characterization, the Panel has recently focused on the assessment of repository performance and plans for the test phase.

3. Defense Nuclear Facilities Safety Board (DFNSB)

* This Board was established to review and evaluate DOE standards for design, construction, operation, and decommissioning of defense nuclear facilities.

E. PUBLIC INTEREST GROUPS

A number of environmental organizations and public interest groups have been active in closely monitoring, and making recommendations on a wide array of WIPP issues. They provide an important source of WIPP-related information.

1. Local 1199, Healthcare Workers (AFSME)
   (Albuquerque) 265-8578

2. Citizens for Alternatives to Radioactive Dumping (CARD)
   (Albuquerque) 266-2663

3. Concerned Citizens for Nuclear Safety (CCNS)
   (Santa Fe) 986-1973

4. New Mexico Alliance
   (Las Vegas) 454-8334

5. Southwest Research and Information Center
   (Albuquerque) 262-1862

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HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT

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Societe des Ingenieurs et Scientifiques de France
Swedish Nuclear Fuel and Waste Management Company
Swedish Nuclear Power Inspectorate
Swiss Society of Engineers and Architects
U.S. Geological Survey
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ENVIRONMENTAL EVALUATION GROUP

AN EVALUATION OF THE PROPOSED TESTS WITH RADIOACTIVE WASTE AT WIPP

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ABSTRACT

The Waste Isolation Pilot Plant (WIPP) is a planned repository for permanent disposal of transuranic (TRU) radioactive waste that has resulted from the defense activities of the U.S. Government over the past 50 years. Only the waste that is currently stored in an easily retrievable mode at ten U.S. Department of Energy (DOE) laboratories around the country will be shipped to WIPP. The waste consists of various kinds of trash including paper, rubber, rags and metal that is contaminated with radionuclides with very long half-lives. The decision to dispose of the waste permanently will be made based on projections of the behavior of the waste and the repository for 10,000 years or more. DOE has proposed shipping a limited amount of waste to WIPP for a five year Test Phase to monitor gas generation before demonstrating compliance with the U.S. Environmental Protection Agency (EPA) Standards for long-term isolation. It is not necessary that these tests be carried out at WIPP. In fact, in view of many as yet unresolved operational difficulties in carrying out these tests at WIPP, it seems prudent to rely on data being gathered from laboratory tests on gas generation currently in progress. Further, because of the expectations that the disposal decision will have to be made with many uncertainties, it would be prudent to seriously consider engineered modifications to the waste and/or the repository to assure long-term containment.

INTRODUCTION

The Waste Isolation Pilot Plant (WIPP) was authorized in 1979 (Public Law 96-164) as "a defense activity of the Department of Energy, administered by

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the Assistant Secretary of Energy for Defense Programs 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 exempted from regulation by the Nuclear Regulatory Commission." Since "disposal" means permanent isolation of radioactive waste and is to be assured for 10,000 years,[1] the actual demonstration of safe disposal would not be complete for 10,000 years after emplacement in a repository. The "demonstration" would therefore have to be based on predictions of long-term future behavior of the geologic and engineered barriers system of waste isolation, and not a physical one like that in a manufacturing plant.

The WIPP repository is located in southeastern New Mexico, 40 km east of Carlsbad, New Mexico, at a depth of 653 meters in the lower part of a 600 meter thick Permian age (225 million years old) salt formation known as the Salado Formation. The Salado extends from a depth of 260 meters to a depth of 860 meters at the WIPP site. Geologic characteristics of the site are described by Chaturvedi and Rehfeldt (1984)[2] and Chaturvedi et al (1991)[3].

The U.S. Department of Energy (DOE) has called this proposed repository a "Pilot Plant" ever since the southeastern New Mexico area was selected for it in 1974. However, the facility has been designed and built to permanently dispose of all the existing inventory of defense transuranic (TRU) waste currently stored in a retrievable mode (60,000 cubic meter) at the DOE defense laboratories, as well as the TRU waste expected to be generated for the next 25 years.[4] The total planned inventory for the repository is approximately 178,000 cubic meters of contact-handled (CH-TRU) and 7,100 cubic meters of remote-handled (RH-TRU) waste. In terms of the number of containers, that is approximately 850,000 drums (208 liter or 55 gallon capacity each) of CH-TRU and 7500 canisters (3 meter long, 0.66 meter outside diameter, 850 liter capacity) of RH-TRU waste. The planned radioactive inventory is 14 million curies, of which 9 million curies is for CH-TRU waste and 5 million curies is for RH-TRU waste.

DOE has designated the first 5 years of waste emplacement at WIPP as a "Demonstration Phase" or "Test Phase" and has consistently maintained that experiments utilizing actual waste in the WIPP underground are necessary before a determination can be made to use the facility as a permanent repository. This paper evaluates the proposed program for experiments with waste for completeness, necessity, operational feasibility, and schedule feasibility.

EVALUATION OF LONG-TERM INTEGRITY

Transuranic waste contains radionuclides heavier than uranium, many of which have very long half-lives, such as 24,000 years for Plutonium-239. A repository of such wastes should

therefore maintain its integrity for very long time periods. The U.S. Environmental Protection Agency (EPA) promulgated the Standards for 10,000 year assessment of the integrity of transuranic and high-level waste repositories in November, 1985.[1] These Standards were "vacated" by the first circuit court of Boston in June 1987 and EPA has not yet promulgated the revised standards. EPA chose an evaluation period of 10,000 years because it appeared long enough to distinguish between good and poor geologic repositories, but is geologically short enough to be predictable. The fact that there are no currently promulgated Standards does not affect the discussion of the requirements for assessing the long-term integrity of a repository.

The suitability of the WIPP site and the repository design will be judged through probabilistic assessment of the impact of potential scenarios for release of radionuclides from the repository to the biosphere. It requires detailed information on the geologic and hydrologic setting of the site; effect of future climate changes on the hydrology; and, detailed characteristics of the waste, containers and backfill material and predictions of future changes in these. Experiments utilizing waste in the repository (or elsewhere) can only be justified if they are designed to produce, in a reasonable time, information necessary or useful in making the probabilistic assessment of the long-term performance of the repository.

PLANS FOR TESTING WITH WASTE

While DOE has consistently maintained that WIPP is a research and development facility, it has not been easy to identify experiments to be performed with transuranic waste. Several reports on proposed WIPP <u>in situ</u> tests were published by Sandia National Laboratories between 1982 and 1987, but they described either the high-level waste emplacement or tests with heaters, etc. but not with transuranic waste.[5,6,7,8,9] DOE had announced plans to start shipping TRU waste for experiments beginning October 1988 and 7 rooms (91.5 m x 10 m x 4 m each) had been excavated for this purpose during the 1986-88 period. However, a January 1987 Sandia National Laboratory Memo of Record to DOE on "Preliminary Details of the WIPP Radioactive Tests" described only the high-level waste experiments and did not describe any experiments with TRU wastes.[10]

DOE first proposed the idea of measuring the rates of gas generation from CH-TRU waste drums in WIPP underground rooms in October, 1987,[11] although the first draft of a plan to do this was not available until March, 1988.[12] This plan called for four rooms filled with CH-TRU drums, for a total of about 24,000 drums. Due to a large number of deficiencies in the plan and the lack of connection between the goals and the design, this plan was abandoned and never published. In April, 1990, DOE published a conceptual outline of

gas generation tests that included the Bin Scale and the Alcove Scale tests.[13] The Bin-Scale tests were proposed to be performed in rectangular steel boxes (bins) in which CH-TRU waste from four to six 55-gallon (208 liter) drums would be emptied and brine and/or backfill would be added to some of the bins. DOE acknowledged that the Bin-Scale tests do not have to be performed at WIPP, but proposed to do so for expediency.[14] The Alcoves were proposed to be smaller rooms, 1/4 size the full-size rooms, each of which could hold 1100 CH-TRU drums for gas measurements.[15]

Soon after the publication of the Bin-Scale plans, the need for providing statistical justification to establish "representativeness" of the experimental waste with the full repository waste was realized. This required changes in the conceptual plans, resulting in the publication of Addendum #1 to the Bin-Scale tests in February, 1991.[16] A "Rationale" report for the Bin Tests was published in May, 1991.[17] The original plan for the Bin Scale tests involved 600 CH-TRU drums of waste.[14] The revised plan is more flexible, and proposes using between 105 to 225 bins of waste.[16] Assuming 6 drums for each bin, the total would be 630 to 1350 drums. No updated version of the Alcove test plans has been published since the January, 1990 Sandia report.[15] In early 1990, it became clear that there were many operational problems in performing the Wet Bin and Alcove tests. DOE changed the approach from performing these tests (Alcove, Bin and Laboratory) "in parallel" as originally planned[13] to a "phased approach".[18] DOE issued a Safety Analysis Report Addendum in August, 1991 that addressed only the Dry Bin Test.[19]

NEED FOR DATA ON GAS GENERATION

The potential for long-term adverse impact of gas generation from TRU waste on the WIPP repository was recognized by the WIPP scientists as early as 1979.[20] Based on the experiments performed prior to 1979, the best estimate of total gas-production rate from bacterial degradation of organic materials and chemical corrosion of the metals in the waste and the mild steel 55-gallon drums, is 2.5 moles/drum/year.[21,22] This estimate does not include gas generation from radiolysis, which has been assumed to be negligible by DOE, although that may not be the correct assumption.[22] The only efforts (after 1979) for measuring gas generation in TRU waste were reported by Clements and Kudera (1985)[23], based on measurements from drums at Idaho National Engineering Laboratory (INEL), and by Roggenthen et al. (1990) at the Rocky Flats Plant.[24] These measurements were not designed to simulate long-term repository conditions.

The potential for damage to the integrity of the repository caused by the gases produced by degradation of TRU wastes was recognized very clearly by WIPP scientists as early as 1979. Molecke[20] described the problem most succinctly, as follows.

"Long term concerns are the driving force behind the majority of the WIPP-specific gas generation studies... In the long term, generated gases are no longer removed by ventilation and concentration and potential pressurization could result - particularly if rates of gas dissipation (via formation permeability) are very low... If the pressure buildup is sufficient, the overburden rock-salt-evaporite sequence may be fractured or a shaft seal may fail. This could lead to a release of potentially contaminated gases (aerosol or vapor entrained) to the surrounding geosphere, or provide a pathway for water intrusion into the repository."

The Environmental Evaluation Group (EEG) also identified, in 1979, the need to develop scenarios for release from the repository, due to gas pressurization.[25] This concern was repeated by EEG in 1981 during review of the WIPP Environmental Impact Statement.[26] For a 10-year period between 1979 and 1989, the issue of gas generation from TRU wastes remained dormant. In recent years, DOE has stated that the measured salt permeabilities from cores were much higher than the <u>in situ</u> permeabilities measured later and therefore it was assumed that the waste-generated gases would not pressurize the repository. Chaturvedi (1989, Sec. 3.5)[22], noted that is only partly correct. A more accurate assessment appears to be that DOE as well as the review groups (including EEG) assumed, without rigorous analysis, that the effect of this phenomenon would not cause problems. In fact, a detailed analysis of the effect of gas on the repository behavior was not performed until 1989.[21]

In late 1988, DOE decided to prepare a Supplemental Environmental Impact Statement (SEIS) for WIPP. To support this effort, Sandia National Laboratories analyzed selected scenarios for breach of the repository.[21] It was during this effort that the close relationship between gas generation, brine inflow, room closure and rock permeability was realized. The analysis showed that given the very low <u>in situ</u> permeabilities of salt (10^{-8} to 10^{-9} darcy), brine inflow may not create a problem, but the repository might become pressurized if the gases could not escape. This analysis has been cited by DOE as justification for performing the Bin and Alcove tests. DOE has argued that better data on gas production rates in actual repository conditions are needed to reduce uncertainties in predictions of long-term performance.[18] However, the performance assessment calculations to date have not identified the level of gas generation that creates a problem to long-term integrity.[27] It has been estimated that 0.1 to 0.3 moles/drum/year of gas generation will create sufficient pressure to exceed the lithostatic pressure at the repository.[28] Since the best estimate for the rate of gas generation is 2.5 moles/drum/year, it

appears most likely that the gas pressure will exceed the lithostatic pressure. Where then is the "uncertainty in predictions of long-term performance"?

The uncertainty lies in the fact that gas production is closely linked with salt creep and brine inflow in a complex set of biological, chemical, hydrological and rock-mechanics processes that are strongly interdependent. An accurate prediction of what happens in the next several hundred years would require an understanding of several (1) basic parameters (e.g., salt and interbed permeabilities, amount of brine available for inflow in the repository, amount of organics and metals in the waste and radionuclide inventory and amounts, etc.), (2) processes (e.g., the mechanism of brine-flow in salt and interbeds, requirement of moisture for biodegradation and corrosion, gas dissipation in the host rock, etc.) and (3) interdependence of factors (e.g. effect of gas pressurization on brine inflow and room closure, effect of reduction in brine inflow on the rate of gas production, effect of room closure on brine inflow and gas pressurization, etc.). Because of the complexity of factors involved and because of the nature of the geologic media and processes, there simply cannot be one single set of reliable predictions for the future conditions in the repository. At best, a number of potential scenarios can be formulated.

A good beginning in this direction has been made by the work of Davies, Brush and Mendenhall (1991).[29] Their analyses of coupled processes shows a strong relationship between gas production, brine inflow and room closure. For example, in the absence of gas production, brine inflow to a repository room (91.5 m x 10 m x 4 m) would steadily increase to reach a total of 670 m^3 in 1400 years. With a fixed gas generation rate of 3 moles/drum-year, brine inflow would reach a peak of about 40 m^3 in about 100 years, after which sufficient gas pressure would exist in the room to stop the flow of brine, so that the cumulative brine volume is reduced to a trickle in about 400 years. The question arises, will the reduction in available brine significantly retard or stop gas production after a few hundred years, and if so, will brine inflow start again? Through a simulation that assumes a variable gas generation rate based on the availability of brine (assuming a constant room geometry at an intermediate room-closure rate), Davies et. al. (1991) projected that the maximum gas pressure in the room will reach 16 MPa (15 MPa is the lithostatic pressure at the repository level) in about 1200 years. At a fixed rate of gas generation, the peak pressure would be 21 MPa, 500 years after closure, but would gradually decline to atmospheric pressure 1100 years from closure.

This very complex relationship could perhaps be most simply stated as follows. The estimated total gas generation potential for each CH-TRU drum is 1500 moles per drum, 900 moles from

corrosion of metals and 600 moles from microbial activity on organic material (assuming radiolysis to be inconsequential).[21,22] If the right conditions continue to exist, each drum will produce 1500 moles of gas, sooner or later. The rate may vary depending upon the availability of moisture and other minor factors. However, if sufficient gas is produced initially, it may become self-limiting by not allowing brine to flow into the room. If all available moisture is depleted and additional inflow is blocked due to gas pressure, bacterial degradation might be drastically reduced or stopped. Similarly, metallic corrosion rates will slow down or stop. Room closure may reduce the void volume and increase gas pressure. Since we do not yet have a good understanding of many of the parameters, processes and interactions, it is very difficult to make accurate predictions of what conditions would develop with time. In fact, it appears very unlikely that a sufficient level of understanding of the interaction of these complex processes can ever be achieved to make accurate predictions. Final decisions about the use of WIPP as a permanent repository may have to be made with much uncertainty about future behavior.

There is another complicating factor that has been briefly touched upon by Davies et al (1991).[29] WIPP has to comply with both the Standards for radioactive materials (40 CFR 191)[1] as well as with the Resource Conservation and Recovery Act (RCRA - 40 CFR 268). The primary transporting agent with respect to 40 CFR 191 is brine. Waste-produced gases are not radioactive and cannot transport significant quantities of radionuclides, although gas pressurization may provide an additional driving force. More gas and consequently less brine may therefore be advantageous with respect to 40 CFR 191. But the reverse may be true with respect to RCRA, since the volatile organic compounds (VOCs) can partition into a gas phase and migrate through existing fractures or new fractures created by gas pressurization. Of course, with respect to solid or liquid hazardous chemicals in the waste that require brine for transport, more gas and less brine would be preferable.

The above discussion leads to an inescapable conclusion. The best situation to create in the repository would be to minimize the possibility of gas production <u>and</u> protect the waste from being attacked by brine and a possible formation of slurry. This can be achieved by getting rid of the organics, minimizing initial void volume, and removing or minimizing the metals in the waste and the containers. Several possible engineered alternatives have been proposed to achieve these objectives, that will have to be carefully examined.[30]

The proposed Bin and Alcove experiments are most likely to confirm what is already known about the physics, chemistry and biology of gas generation. Bins with more organics, metals and brine will produce more gas and

the dry glassware will produce none. The experiments cannot predict the long-term scenario of gas-production/brine-inflow/room-closure interactions, because the future repository environment cannot be predicted with certainty, and the experiments cannot be run for long enough time periods to simulate several hundreds or thousands of years. The most that can be expected from the experiments is a better understanding of the factors affecting gas production. The laboratory-scale experiments currently being performed are more suitable for this objective.[31]

LOCATION OF THE EXPERIMENTS

Bin-scale experiments do not have to be performed at WIPP, but DOE has claimed that it would take longer time and will be more expensive to prepare facilities to perform these tests at one of the DOE laboratories where waste is currently stored.[14,32] These arguments have been given since 1989. If the efforts to prepare the facilities at INEL or Rocky Flats Plant (RFP) had begun in 1989, DOE could easily be obtaining data by now. This preoccupation with performing the tests at WIPP is most clearly illustrated by the DOE decision to proceed with the Radionuclide Solubility test at WIPP.[33] After going through a process of site comparison for this test in August 1991, DOE found that WIPP was the worst of the six sites compared in five out of nine site-selection criteria and was not the best according to any of the criteria, but still selected WIPP to be the site for this test.

Seven full-size (91.5 m x 10 m x 4 m) test-rooms were excavated at WIPP in the 1986-88 period. At that time, the plan was to fill each room with up to 6000 drums of CH-TRU waste. Now DOE plans to use two of these seven rooms for the Bin-Scale tests. According to the original plan for these rooms, no routine access by personnel was required to these rooms and the 5 year test was scheduled to begin in 1988 for a 5-year period ending in 1993 or 1994. The rooms are now deteriorating due to salt creep and fracturing. Similar rooms excavated in 1983 in the northern part of WIPP to study structural behavior have already become unsafe for routine access and a major roof-fall involving 1500 tons of rock has occurred in one of them. To bolster structural safety, DOE has installed an elaborate and expensive roof-support system in one of the test-rooms that is being prepared for the first 78 bins. There are doubts, however, whether the roof-support system will be able to provide safe conditions for the 2 year waste emplacement, 5 year test and 1 to 2 year retrieval period. The floors of the rooms also heave and have to be periodically milled and levelled with crushed salt. It is not clear how this can be done with Bins in the rooms. The walls of the rooms are also unstable and spall.

To prepare for the Alcove tests, DOE excavated four access-drifts north of the seven test-rooms in 1988-89. These too are

becoming unstable. Since the alcoves need to be sealed from the rest of the mine and it has not yet been possible to develop a suitable seal, the fate of the alcove-tests is uncertain. These tests must be performed at WIPP and nowhere else.

The laboratory tests to study the affect of various factors on gas generation from TRU wastes are progressing satisfactorily at several laboratories around the country, and producing useful results.[31]

OPERATIONAL DIFFICULTIES

In addition to the question of the structural stability of the rooms, a number of unresolved operational difficulties exist with respect to the Bin and Alcove tests.

Waste Characterization

The process of waste characterization to prepare bins from existing waste at the Idaho National Engineering Laboratory (INEL) is moving extremely slowly. After one year effort, only 3 bins consisting of rashig rings and glassware waste have been prepared by the end of 1991. At this rate, it is difficult to see how sufficient waste can be assembled within 2-3 year period for a 5-year test.

Due to WIPP's Waste Acceptance Criteria (WAC) and DOE's transportation regulations, only 3000 drums of CH-TRU waste from a retrievable inventory of 130,000 drums at INEL, are available for the bin experiments. Such a small inventory will not provide representative waste. The regulatory problems have to be resolved by DOE.

New facilities, including new remote-handling equipment, are needed at INEL to characterize high organic waste. These are scheduled for completion in Fall, 1992. Facilities and procedures to characterize process sludge waste are also needed. These are scheduled for completion in 1993.

Effect of Purging

DOE has adopted a conservative safety approach of not allowing the concentration of flammable gases in the bins to exceed 1/2 of lower explosibility limit (LEL). Once this limit is exceeded, the plan is to purge the bin until the concentration is below 1/2 LEL (e.g. 2% for hydrogen).[19] Calculations performed by SNL scientists show that even for dry, low organic waste producing 0.1 moles/drum/year of gas, purging may be required once every six months. For moist high organic waste producing 2.5 moles/drum-year, 2% H_2 concentration is expected to be reached every 9 to 10 days. Each purging cycle would require 3 to 5 days with additional time needed for gas analyses. Data would be lost during each purge cycle and the tests reset to initial time after each purging operation. Purging would also eliminate the synergistic effect of already generated gases on additional gas gen-

eration and the trace gases might be lost without detection, thus making the data indefensible for long-term predictions and modeling. Oxidation potential in a bin would be controlled by purging and that would make the conclusions based on anaerobic corrosion or microbial degradation indefensible. All interactions at high-gas concentrations would be prevented and the observed rates and predictions could not be defended as "bounding".[34]

This is a major operational question to be resolved if the Bin tests should have any meaning. The resolution would require a redesigned bin for all wet and most of the dry bin tests, to allow flammable gas concentrations to rise above the lower explosive limit on the basis that no air (oxygen) would be allowed to get inside the bins that might create a flammable mixture.

Leak Rate Criterion

To maintain anaerobic conditions, the Bin Test Plan (Molecke 1990) specified a requirement to limit the oxygen content in almost all test bins to a level of less than 10 ppm during the expected 5-year duration of the test program, or 2 ppm per year.[14,16] The criterion applies not only to the bin itself but to the entire assemblage i.e. the bin, external instrumentation loops, assorted hardware, hoses, couplings, etc.[16] This leak-rate limitation has not yet been achieved in the existing bins. SNL scientists are working on developing appropriate seals to accomplish this task.

Brine Sampling

The Bin Test Plan provided for taking frequent brine samples from many of the bins to study solubility of radionuclides and leaching characteristics of both the radionuclides and chemical hazardous components of TRU waste. It was recognized in early 1990 that such procedures created safety and regulatory problems if performed at WIPP. Nonetheless, DOE announced in October, 1991 that the Bin tests requiring brine sampling will be performed at WIPP. Many operational and regulatory requirements have to be satisfied before this test can begin at WIPP. It is interesting to note that the Performance Assessment sensitivity calculations indicate that radionuclide solubility is one of the two most critical parameters for which experimental values are needed.[27] As stated earlier, DOE's own analysis shows that several DOE laboratories, including Los Alamos National Lab (LANL), are better equipped and more suitable locations to perform the tests requiring brine sampling.[33]

Alcove Seals

Alcoves are planned to be smaller rooms (30.4 m x 7.6 m x 4 m, i.e. 100 ft x 25 ft x 13 ft) in which about 1100 CH-TRU drums would be emplaced and the room would be sealed at the entry to

prevent uncontrolled mixing of the gases produced from the waste with the mine air. After several efforts to develop a seal, however, it has not been possible to seal these rooms. DOE has now planned to develop and design a rigid concrete seal system. Because the WIPP host rock starts fracturing soon after excavation, however, it appears doubtful that a seal would remain effective even if it is effective soon after excavation and installation. The feasibility of the Alcove test therefore remains doubtful.

Characterization of Drums for Alcoves

As proposed by Molecke (1990)[15], alcove tests require several types of as-received and prepared waste. No effort appears to have been made by DOE to start assembling, characterizing and preparing these wastes. If the experience of characterization of simplest waste-form for the bin tests is any guide, it is going to be a difficult, arduous and time-consuming task.

Retrievability

DOE issued a Retrieval Plan for WIPP test phase waste in 1990.[35] This plan is unsatisfactory in many respects. It does not specify the location where retrieved WIPP waste would be taken. It does not describe the process for retrieving the bins and hardware and preparing waste for final disposal if that decision is made. It does not describe how the waste would be retrieved if reprocessing is required before disposal. The age and instability of the test rooms is also a concern for retrievability.

SCHEDULE

Ever since the plans for <u>in situ</u> testing of CH-TRU waste for gas generation started developing in 1988, DOE has maintained that data from these tests are needed to be used in performance assessment calculations to forecast future repository behavior. In support of this position, DOE officials have made the following statements at the Hearings of the U.S. Congress.

"Data from the experiments conducted in WIPP under this plan will allow us to develop and validate a credible performance assessment." (Jill Lytle, DOE Deputy Assistant Secretary, at the Environment, Energy and Natural Resources Subcommittee of the House Government Operations Committee, 9/13/1988, p. 76).

"And only after completion of such a test program will there be sufficient data to support a determination that the WIPP facility could be a suitable waste repository." (Hon. James D. Watkins, Secretary, Department of Energy, at the Senate Energy and Natural Resources Committee Hearing on WIPP, 4/3/90, p. 26).

In "the first in a series of top-level strategy documents to be developed for WIPP" that "will become the planning base for all WIPP Project management", however, DOE presents a schedule that does not provide for the

test phase results to be available for use in the performance assessment calculations. The Strategy for the WIPP Test Phase[18] states,

> "The completion of performance assessment is now scheduled for the end of calendar year 1996, but could occur as early as 1993 if a revised Subpart B of 40 CFR 191 is promulgated in a timely manner and regulatory compliance can be determined with sufficient confidence. Similarly, the disposal decision is scheduled for the end of calendar year 1997, but may be made as early as 1995."

Figure 8 of that document[18] shows that the dry bins containing sludges will begin to arrive at WIPP in mid-1993, wet bins in 1993 and 1994, and the alcove test emplacement is not scheduled to begin until late 1993. From other discussions in this paper, it should be obvious that the 5 year test cannot end before the end of the century under the most optimistic assumptions, and that the scheduled completion of performance assessment in 1994 would not benefit from the WIPP waste experimental data.

CONCLUSIONS

It is not necessary to conduct experiments with radioactive waste at WIPP. Laboratory data on gas generation, waste solubility, and extensive modeling of coupled processes are needed for performance assessment. Decisions on using WIPP for a permanent repository will have to be made with many uncertainties. It would be prudent to start thinking about engineered modifications of the waste, the containers and/or the repository now, rather than wait for data gathered from in situ experiments with waste.

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4. Administrative Land Withdrawal Modification for Test Purposes

a. Feb. 24, 1989: DOE submits application to BLM State Director, seeking to modify June 29, 1983 withdrawal:

   A. to change the purpose to provide that the land is withdrawn for the conducting of a test program using radioactive waste at the site;

   B. to delete the prohibition on radioactive waste at the site;

   C. to increase DOE's exclusive control area;

   D. to extend the term through June 29, 1997 to provide sufficient time for tests and retrieval, "if necessary."

   Application states that time required for radioactive tests and retrieval is eight years.

b. April 14, 1989: DOI Secretary (Lujan) acknowledges DOI policy against introduction of radioactive waste by administrative withdrawal: "The DOE, however, desires to proceed with the next phase of WIPP without delay, even if Congress fails to act."

c. April 25, 1989: Draft Plan for WIPP: Performance Assessment and Operations Demonstration: First proposal for underground bin-scale tests.

d. June 19, 1989: BLM notes that modification of land withdrawal would establish "a national repository for permanent storage of nuclear waste."

e. July 19, 1989: State Task Force comments, objecting to DOE application to modify public land order.

f. Aug. 8, 1989: BLM acknowledges in EIS responses that "BLM does not have the expertise or the funding to oversee and review the test phase."

g. Aug. 8, 1989: DOI advises DOE that final EIS needs to address effects of legislative land withdrawal, since DOI must be assured that environmental impacts of administrative procedure are considerably less.

h. Nov. 2, 1989: DOI (BLM) notes that it must review the retrieval plan to see if the waste would be removed by June 1997, expiration date of the withdrawal application.

i. Nov. 6, 1989: BLM advises DOI that "retrievability is a major issue since the proposed administrative withdrawal is scheduled to terminate in 1997."

j. Jan. 1990: Test Plan: WIPP Bin-Scale CH TRU Waste Tests: Broad-scale underground test plan for dry bin, wet bin, and leaching/solubility tests.

k. Feb. 13, 1990: DOI "Land Report" recites that "All waste will be stored in a readily retrievable manner."

l. Feb. 1990: DOI Secretarial briefing papers state: "Retrievability isn't realistic unless DOE determines that the site is unacceptable. Besides cost factors of retrievability, there would be much controversy and difficulty in finding a place to store this waste." Also: "It would be difficult for DOI to deny future requests for an extension of the land withdrawal."

m. April 4, 1990: DOI Office of Environmental Affairs advises DOE that EIS is inadequate for failure to discuss the alternative of legislative land withdrawal.

n. May 1990: Waste Retrieval Plan, Waste Isolation Pilot Plant: Scope is limited to operational aspects of retrieving waste, preparing for shipment. Contains no schedule, no decision criteria for retrieval, no post-retrieval storage sites, no discussion of room stability problem, no method to deal with radioactive liquids (e.g., in wet bins).

o. June 13, 1990: DOI Secretary Lujan determines that EIS is adequate. DOI will initiate review of land withdrawal application.

p. June 28, 1990: DOE Carlsbad office determines that "the need exists to amend this application for an additional period of time. Considering the possibility that waste retrieval will take place, while probably having to over-pack the drums from the alcoves, a period of time several years longer will be needed to assure that waste retrieval could occur in time."

q. July 6, 1990: DOE discusses with BLM "issuing the withdrawal for ten years to ensure retrieval of the waste if the test is not successful." DOE determines that, since an amendment would require republication and a 90 day comment period and possible further comments, it would not seek to amend.

r. Sept. 19, 1990: BLM Record of Decision states that BLM will recommend administrative land withdrawal, recites

that the "Test Phase involves emplacing, in a fully retrievable manner, a limited quantity of TRU waste underground at the WIPP."

s. Sept. 19, 1990: DOE forwards Waste Retrieval Plan to DOI.

t. Oct. 1, 1990: DOI (BLM, Carlsbad) prepares draft Report to Congress to be sent pursuant to FLPMA.

u. Jan 22, 1991: DOI modifies Public Land Order 6403 (1983) to expand the stated purpose to include conducting the test phase with "retrievable" radioactive waste, extend the term through June 29, 1997, and delete the prohibition on use of the land for transportation, storage or burial of radioactive waste. Record of Decision issued. No radioactive waste to be transported to or emplaced at WIPP until DOE obtains all required permits, or certifies that all environmental permitting requirements have been met, and BLM issues a Notice to Proceed.

v. Jan 22, 1991: DOE files RCRA permit application, Part A with NMED and US EPA.

w. Feb. 26, 1991: RCRA Part B permit application filed by DOE with NMED, US EPA: DOE states that, if waste must be removed, it could take up to 8 years to identify a storage site, and waste retrieval would take about 3 years.

x. March 6, 1991: House Committee on Interior and Insular Affairs passes resolution disapproving administrative land withdrawal, stating that Congress should determine the terms and conditions of introduction of radioactive waste, and directing the emergency withdrawal of WIPP site from receipt of radioactive waste.

y. March 19, 1991: DOI Sec. Lujan advises House Interior Vice Chairman George Miller that DOI will withhold introduction of radioactive waste for 90 days to give Congress an opportunity to act.

z. March 28, 1991: DOI gives notice of proposed modification of WIPP public land order, suspending receipt of radioactive waste for 90 days.

aa. April 17, 1991: Sandia National Laboratories Memorandum of Record:

A. Bin and instrumentation design not "inherently safe"; not adequate for operations above 50%

of lower flammability limit; can only be used for tests with low-gas-generating waste;

B. Bins must also be purged if gas concentration reaches 50% of the lower flammability limit.

C. This means that the test data "will be of little use" for the performance assessment.

bb. June 1991: Report of the Geotechnical Panel on the Effective Life of Rooms in Panel 1: DOE said tests require 9 more years. Experts will not give assurance that test room will last more than an additional 2 years. Rock bolting given no credit for extending room life. DOE also says that in an emergency 6 months are needed to withdraw waste.

cc. June 13, 1991: Reps. Kostmayer and Miller introduce HR 2637, WIPP land withdrawal bill.

dd. July 1, 1991: New Mexico Attorney General Tom Udall comment letter to BLM State Director Larry Woodard. States that environmental requirements have not been met, since WIPP does not have interim status under state Hazardous Waste Act.

ee. July 1, 1991: NMED (by Kathleen Sisneros) advises DOE (Arlen Hunt) and Westinghouse (LaMar Trego) of NMED's "preliminary determination" that WIPP does not have interim status under state Hazardous Waste Act.

ff. Aug. 2, 1991: S. 1671 introduced by Sen. Domenici and Sen. Bingaman.

gg. Aug. 21, 1991: DOE (M. Frei) bin preparation schedule, shows last dry bin being prepared for characterization in mid-1995.

hh. Sept. 1991: DOE WIPP Five Year Site Specific Plan: States that retrieval may take twice as long as emplacement. One scenario involves five years for emplacement and ten years for retrieval.

ii. Sept. 19, 1991: Room 1, Panel 1 Supplementary Roof Support External Design Review:

A. Design supports only the "dead weight" of the roof. (¶ 4.1)

B. Rather than a 3" clearance hole, a minimum 4 1/2" hole is required to accommodate shear displacements. (¶ 4.2)

C. If the anchor zone becomes unstable, alternative supplemental support may be needed. It is "critical" to monitor this zone continuously. (¶ 4.8)

D. Notes that DOE has not developed criteria for determining when the support system has failed and room must be evacuated. (¶ 4.7)

E. (However) design meets specification of seven year life. (¶ 5)

jj. Oct. 3, 1991: DOE (Bruce Twining) advises State Radioactive Waste Consultation Task Force (Chmn. Anita Lockwood) of forthcoming shipment of waste to WIPP. DOE Sec. Watkins advises Gov. King.

kk. Oct. 3, 1991: DOE certifies compliance with all environmental requirements; DOI issues Notice to Proceed, Environmental Assessment, Analysis of Comments, Notice of Decision not to modify Public Land Order.

ll. Oct. 10. 1991: DOE Strategy for the Waste Isolation Pilot Plant Test Phase:

A. Completion of performance assessment scheduled for 1993-96. (p. i)

B. Testing may need to be extended beyond the disposal decision for purposes of "confirmation." (p. 8)

C. It is not "clear how much time will be needed to collect suitable and sufficient data from the tests." (p. 9)

D. Bin scale test chart shows no date for removal of the waste. (p. 19)

E. DOE has not decided to what extent alcove tests will be conducted. (p. 25)

F. Alcove tests require an adequate seal. (p. 26)

STATE BAR OF NEW MEXICO 1992 ANNUAL CONVENTION
HAZARDOUS WASTE ISSUES IN NEW MEXICO: THE FUTURE OF WIPP

6. Hazardous Waste Permitting History of WIPP
Presented by Gini Nelson

I. Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 et seq., as amended.

A. Federal statute designed to provide "cradle-to-grave" control of hazardous waste, focusing on active facilities. Imposes notification and management requirements on generators and transporters of hazardous wastes, and on owners and operators of treatment, storage and disposal (TSD) facilities.

B. Hazardous waste definition includes the hazardous component of "mixed waste," i.e., waste that is a mixture of hazardous waste regulated under RCRA and radioactive waste regulated under the federal Atomic Energy Act (AEA).

C. There are two (2) categories of TSD facilities -- interim status facilities and permitted facilities.

1. Interim status facilities are those that are currently operating without final RCRA permits based upon a legislative decision to allow continued operation of existing facilities until RCRA permits can be issued. These facilities must meet a three-part test:

a. in existence on November 19, 1980, or the effective date of statutory or regulatory changes that render the facility subject to the need for a RCRA permit,

b. notify EPA pursuant to RCRA § 3010(a) of its hazardous waste management activities, and

c. file a preliminary permit application.

2. A facility's interim status ends when the facility receives a final RCRA permit. A new TSD facility, or an existing facility that fails to qualify for interim status, must obtain a full RCRA permit before commencing construction.

D. Loss of Interim Status (LOIS).

1. The federal Hazardous and Solid Waste Amendments of 1984 (HSWA) (see infra Part III for further discussion on HSWA) accelerated the RCRA permitting of interim status TSD facilities by automatically terminating interim status for any existing land disposal facility on November 8, 1985, unless the owner of operator had by that date submitted a Part B application for a final permit and a

certification that the facility was in compliance with groundwater monitoring and financial responsibility requirements. RCRA, § 3005(e)(2).

2. Similarly, each land disposal facility in existence on the effective date of a later statutory or regulatory change under RCRA that renders the facility subject to the requirement to have a RCRA permit must submit the Part B and the applicable certifications within one year after the date on which the facility first becomes subject to the permit requirement, or the facility loses interim status by operation of law. RCRA, § 3005(e)(3).

3. Congress further required EPA, or an authorized state (see infra Part II for discussion of RCRA "authorized" state programs), to issue final permits for land disposal facilities by November 1988. Similarly, final permits for interim status incinerators were mandated by November 1989, and for all other interim status TSD facilities by November 1992. If EPA or the state fails to meet these deadlines, the TSD facility can continue operations provided a timely Part B application was filed, otherwise it loses interim status by operation of law.

II. Relationship of the New Mexico Hazardous Waste Act (HWA), § 74-4-1 et seq. NMSA 1978, as amended, to RCRA.

A. The state Hazardous Waste Act and the federal RCRA both apply in New Mexico. However, if a state hazardous waste regulatory program is at least as stringent as the federal one, the U.S. Environmental Protection Agency (EPA) may "authorize" the State to enforce RCRA indirectly for EPA by the State's directly enforcing the state law, instead of EPA enforcing RCRA in the state. If the authorized State fails to properly enforce its law, EPA may then enforce RCRA in the state.

B. New Mexico has an authorized RCRA program. The HWA is the state analog to RCRA. The New Mexico Environment Department (NMED) enforces the HWA in this State; EPA does not enforce RCRA, unless NMED fails to properly enforce the HWA.

C. Because RCRA and its regulations are complex and promulgated over significant periods of time, EPA authorizes a State at different times for different portions of the evolving RCRA program. Thus, a State can be "authorized" under federal law for some portions of RCRA, but not for others. If a portion of the existing State law is not as stringent as RCRA, for example, EPA may not authorize the State to enforce that portion of its law in lieu of EPA enforcing RCRA in the State, and it may take away "authorization" if the State law weakens, in comparison with RCRA. If a state program is

not authorized, or loses authorization, the State does nothing differently, it simply continues to enforce state law. EPA, however, must enforce the federal law in the state.

D. For example, New Mexico's "authorization" was in jeopardy during the existence of the WIPP exemption in the HWA, because of RCRA's applicability to mixed waste.

1. The New Mexico Legislature in 1987 promulgated the following exemption: "Nothing in the Hazardous Waste Act shall be construed to apply to any radioactive waste processed and certified for emplacement in the mined geologic repository at the waste isolation pilot plant." (§ 74-4-3.2 NMSA 1978, enacted by L. 1987, ch. 179, § 2, approved Apr. 8, 1987, with emergency clause).

2. The Legislature repealed the provision in 1989 (1989 N.M. Laws, ch. 4, §§ 1, 2, approved Feb. 23, 1989, with emergency clause).

E. In summary, having an "authorized" program means that New Mexico is enforcing state law (HWA), and that the EPA is not enforcing the federal law (RCRA).

III. Federal Hazardous and Solid Waste Amendments of 1984 (HSWA).

A. Amended RCRA to, among other things, require EPA to establish treatment standards for all listed and characteristic hazardous wastes destined for land disposal according to a strict schedule. This portion of HSWA is know as the Land Disposal Restrictions (LDR).

1. For wastes that are restricted, HSWA requires EPA to set concentration levels or methods of treatment, both of which are called "treatment" standards," that substantially diminish the toxicity of wastes or reduce the likelihood that hazardous constituents from wastes will migrate from the disposal site. After the effective date of a restriction, wastes that do not meet the treatment requirements are prohibited from land disposal.

2. Land disposal means placement in or on the land and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault or bunker intended for disposal purposes.

3. Wastes disposed of before Nov. 8, 1986 do not have to be removed from a land disposal unit for treatment; however, if restricted wastes are removed from a land disposal unit, the wastes must meet the applicable treatment standard before subsequent placement in or on the land.

B. HSWA-Permitted Variances From the LDR.

1. HSWA provides six (6) ways to delay the effective date of the LDR prohibitions:
   a. National Capacity Variance (40 C.F.R. § 268.30-§ 268.35)
   b. Case-by-Case Extension (40 C.F.R. § 268.5)
   c. Treatability Variance (40 C.F.R. § 268.44)
   d. Equivalent Method Variance (40 C.F.R. § 268.42(b))
   e. No-Migration Petition (40 C.F.R. § 268.6)
   f. Surface Impoundment Exemption (40 C.F.R. § 268.4).
2. No-Migration Petition (40 C.F.R. § 268.6). Petitioner must demonstrate, to a reasonable degree of certainty, that such disposal will not allow migration of hazardous constituents from the disposal unity for as long as the waste remains hazardous. The demonstration must include the components outlined in 40 C.F.R. § 268.6(a) and meet the sampling, testing, and analysis criteria outlined in 40 C.F.R. § 268.6(b). Each petition must include a monitoring plan, as outlined in 40 C.F.R. § 268.6(c)(1)-(5), that describes the monitoring program installed at and/or around the unit to verify continued compliance with the conditions of the variance. A successful no-migration petition will allow land disposal of a specific waste at a specific site.

C. New Mexico statutes and regulations include all relevant LDR requirements. EPA has not yet, however, authorized the state program for HSWA, and, thus, EPA directly enforces HSWA in New Mexico.

IV. WIPP's Conditional No-Migration Variance.

A. Virtually all of the wastes intended for emplacement at WIPP are hazardous wastes subject to the LDR requirements. Because LDR is a HSWA requirement, which EPA directly enforces in New Mexico, the U.S. Department of Energy (DOE) applied to EPA for a RCRA no-migration variance.

B. DOE made no parallel application to the State regarding State law LDR requirements.

C. EPA granted DOE a variance, which limits emplacement of untreated waste subject to LDR to 1% of WIPP's final capacity, i.e., 8500 drums, for the purposes of testing and experimentation only, and is valid for a maximum of ten (10) years. The Final No-Migration Determination is published at 55 Fed. Reg. 47,700 (Nov. 14, 1990).

D. EPA conditioned its approval on DOE's only placing hazardous waste within the scope of the test phase operations described in its no-migration petition and its performance assessment test plan (see infra Part 13).

E. The approved petition further requires DOE to remove the

hazardous waste from WIPP if it cannot demonstrate the long-term acceptability of the disposal site by the end of the test period. The variance will be made permanent if DOE can demonstrate WIPP's compliance with the final regulations concerning disposal of radioactive wastes (the "Subpart B" regulations, see infra Part 12).

F. EPA stated that, in making its no-migration finding, it:

1. concentrated on whether releases of non-radioactive hazardous constituents from the "WIPP unit", defined to be the boundary of the four mile by four mile land withdrawal area within the Salado Formation for purposes of groundwater migration, and the top of the Salado Formation for air emissions, might occur during the test phase, had addressed all possible routes of release, but had focused in particular on the potential for volatile organic constituents released during testing to migrate out of WIPP through the ventilation exhaust shaft, and that because of the nature of the tests to be conducted at WIPP and their relatively short duration, EPA had concluded that the releases of hazardous constituents from WIPP through brine, salt, or other geological media is implausible during the test phase.
2. EPA further stated that the retrievability of waste placed in WIPP during the test phase is central to EPA's finding, and that EPA had reviewed both the technical feasibility of retrieval and the practicability of DOE's retrieval plan, and had concluded that retrieval of wastes from WIPP could be accomplished safely, and that DOE's commitment to retrieving the wastes and taking it above ground, if necessary, was satisfactory.
3. Finally, EPA stated that it had considered the general design, construction, and mine maintenance program at WIPP and had concluded that the mine is well-designed and will remain stable during the test period and well beyond.
4. The Natural Resources Defense Council, State of Texas, Environmental Defense Fund, Hazardous Waste Treatment Council, Concerned Citizens For Nuclear Safety, and Southwest Research and Information Center had filed joint comments opposing EPA's Proposed Conditional No Migration Variance (published in the Apr. 6, 1990 Federal Register), but did not appeal the final variance, even though many of the EPA's proposed positions that they had objected to were not changed in the final determination.

V. WIPP's HWA/RCRA Permit.

A. The no-migration variance is necessary, but only

supplemental to the fundamental requirement that WIPP have either interim status or a permit under the HWA (state law) and RCRA (federal law).

1. Under the federal "state program authorization" provisions, if WIPP has a valid hazardous waste permit from New Mexico, a State with an authorized program, the state permit is accepted by EPA in lieu of a separate, EPA-issued federal permit. If New Mexico did not have an authorized program, DOE would need to get both a state HWA permit and a federal RCRA permit.
2. New Mexico's HWA permit is, therefore, effectively the RCRA permit, but is issued pursuant to state law.

B. WIPP: Interim Status vs. Permit.

1. RCRA Interim Status.
   a. EPA in a September 23, 1988 Federal Register notice clarified RCRA interim status requirements for mixed waste facilities, as a follow-up to EPA's July 3, 1986 Federal Register notice clarifying RCRA applicability to the hazardous component of mixed waste.
      (1) In states where EPA directly enforces RCRA, EPA established the September 23, 1988 notice as the effective "regulatory change" triggering the permit requirement for federal RCRA purposes. In such states, facilities had until September 1989 to make required submittals.
      (2) EPA determined, however, that it had no jurisdiction over mixed waste in base-authorized States. EPA took the position that, because mixed waste should technically be part of the base authorized program (because mixed waste jurisdiction is based on the definition of hazardous waste which is part of the base-authorized program), EPA could not directly enforce the mixed waste requirements in base-authorized states, just as it could not directly enforce any other part of an "authorized" program requirement. At same time, EPA acknowledged that it had not reviewed state programs for mixed waste in particular in giving base program authorizations, and, further, was requiring a subsequent, separate authorization of states for mixed waste.
      (3) With regard to base-authorized states, EPA decided it would treat the date of

the State's authorization for mixed waste as the relevant regulatory change for federal interim status purposes, but only on the condition that the facility, at the time of EPA's authorization of the State's mixed waste program, had complied with all applicable state law concerning the acquisition and retention of interim status, and, further, that the state requirement could not be later than the date of the mixed waste authorization.

(4) In other words, a facility would have to be in compliance with an authorized state's requirements for mixed waste facilities at the time EPA authorized the state for its mixed waste program, and those requirements could be satisfied no later than the date of authorization.

b. EPA states that WIPP has interim status under RCRA. EPA uses the date of the State's authorization for the mixed waste program as the relevant date and does not consider whether there was an independent state law deadline for the submittals relevant to interim status.

2. HWA Interim Status.

a. Section 74-4-9 NMSA 1978 states: "Any person owning or operating a hazardous waste facility who has met the requirements for interim status under 42 U.S.C. 6925 [RCRA, § 3005(e)] shall be deemed to have interim status under the Hazardous Waste Act."

b. Section 42 U.S.C. § 6925(e), RCRA § 3305(e) is the LOIS provision (<u>see</u> <u>supra</u> Part I.D.), requiring certain submittals within one year of the regulatory change that makes a facility subject to the requirement to have a permit.

c. NMED preliminarily determined by letter dated July 1, 1991 that WIPP may not qualify for interim status under the HWA. As of August 20, 1992, NMED had not changed its initial determination that WIPP may not have interim status under state law.

(1) NMED preliminarily determined that DOE and Westinghouse should have submitted the Part B of WIPP's permit application by February 23, 1990, at the latest. February 23, 1990 is one year after the 1989 repeal of the WIPP exemption in the HWA, which NMED interpreted as the last relevant change in law bringing WIPP into

the regulatory arena.

d. DOE asserted, in response to NMED's July 1, 1991 letter, and upon information and belief as of August 20, 1992 has continued to assert, that WIPP has interim status under the HWA because the state law filing requirement regarding mixed waste only became effective law in the State when EPA authorized the State's mixed waste program, which occurred on July 25, 1990. Thus, DOE argues that New Mexico law ties the interim status requirements to changes in federal law, not to changes in state law.

e. To further complicate, DOE and Westinghouse had received "mixed signals" from NMED's predecessor agency -- at at least one point prior to February 1990, DOE had attempted to file part of the mixed waste permit application for WIPP, and the application was returned to DOE.

f. However, regardless of mixed signals, interim status is like a state of grace -- the regulatory agency can neither grant it nor take it away. Under HSWA, facilities get interim status, by operation of law, if they make required, timely submittals, and they lose interim status, by operation of law, if they fail to make required, timely submittals. Interim status, once lost, cannot be regained.

g. While DOE has stated publicly that it has interim status under state law, DOE has made a WIPP permit application, and NMED is proceeding to review that application.The only discretion the regulatory agency has it what form of enforcement action, if any, it takes if a facility has neither interim status nor a permit.

7. 1991-1992 litigation concerning administrative land withdrawal.

a. Oct. 3, 1991: DOE Secretary gives notice of shipment of radioactive waste to WIPP; requests and receives administrative land withdrawal.

b. Oct. 9, 1991: State files suit in United States District Court for the District of Columbia, alleging:

A. FLPMA violation, based on failure of DOI to determine that the proposed use would be completed within the time period of the withdrawal.

B. FLPMA violation, based on failure of DOI to determine that the purpose for which the withdrawal was first made requires the extension.

C. FLPMA violation, based on DOI's failure to obtain the technical capability and resources need to evaluate the withdrawal request.

D. FLPMA violation, based on DOI's failure to report to Congress pursuant to §1714(c)(2).

E. FLPMA and NEPA violations, based on DOI's policy reversals as to:

1. Allowance of radioactive waste pursuant to administrative withdrawal.

2. Requirement of prior compliance with environmental laws.

3. Requirement that EIS analyze legislative withdrawal.

4. Requirement that administrative withdrawal include a report to Congress.

F. FLPMA violation, based on DOI allowing administrative withdrawal despite knowledge that land use (test phase) could not be completed within the time available.

G. NEPA violations, based on DOE and DOI proceeding with test phase and allowing administrative withdrawal despite inadequate EIS.

c. Oct. 9, 1991: State moves for temporary restraining order and preliminary injunction, alleging:

   A. Meritorious claims, inter alia, in that DOE and DOI had sought to circumvent Congress's authority over the public lands by initiating a permanent use despite lack of statutory authority, and extending a withdrawal for a new and different purpose.

   B. Irreparable injury, in that waste will be irretrievable due to collapse of test room and unavailability of interim storage location.

   C. Lack of injury to DOE, since dry bin tests provide no useful information and may be performed elsewhere.

d. Oct. 20, 1991: Ceiling of experimental test room at WIPP collapses; 70 ton block of salt falls; DOE had only one month's warning.

e. Oct. 28, 1991: Environmental groups and congressmen move to intervene as plaintiffs.

f. Oct. 28, 1991: Federal Government defendants respond to motion for preliminary injunction, move for summary judgment.

g. Nov. 1, 1991: State of Texas moves to intervene as plaintiff.

h. Nov. 12, 1991: State responds to Federal Government motion papers of Oct. 28, 1991.

i. Nov. 15, 1991: Oral argument. The following visual aids were employed by the State to show:

   A. Violations of law.

   B. Risk of irretrievability.

   C. DOE's lack of need for tests.

Federal Land Policy and Management Act

43 U.S.C. § 1701: (a) The Congress declares that it is the policy of the United States that --

* * *

(4) the Congress exercise its constitutional authority to withdraw . . . Federal lands for specified purposes and that Congress delineate the extent to which the Executive may withdraw lands without legislative action;

43 U.S.C. § 1714(f): [withdrawals] may be extended . . . only upon compliance with . . . subsection (c)(1) . . . and only if the Secretary determines that the purpose for which the withdrawal was first made requires the extension, and then only for a period no longer than the length of the original withdrawal period. The Secretary shall report . . . to the Committees on Interior and Insular Affairs of the House of Representatives and the Senate.

43 U.S.C. § 1714(c)(2): With the notices required by subsection (c)(1) . . . , the Secretary shall furnish to the committees -- [a twelve item report].

National Environmental Policy Act

40 C.F.R. § 1502.14: . . . [A]gencies shall:

(a) Rigorously explore and objectively evaluate all reasonable alternatives . . .

(b) Devote substantial treatment to each alternative considered in detail . . .

DOI and DOE Violations of Law

DOI: DOI "will not authorize . . . the temporary storage of any . . . nuclear waste in the absence of appropriate legislation" *(Ass't DOI Secretary, 1982; DOI Secretary, 1989)*

- vs -

DOE: "due to the failure of the Congress to enact legislation to withdraw public lands at WIPP . . . , I am requesting the Notice to Proceed" *(DOE Secretary (Oct. 3, 1991))*

FLPMA

- DOI did not find, nor could it, that the purpose of the 1983 withdrawal required the extension (43 U.S.C. § 1714(f))
- DOI did not find, nor could it, that the withdrawal would be for "no longer than" the original withdrawal period (id.)
- DOI did not make the required Report to Congress (43 U.S.C. § 1714(c) and (f))
- It is intended and probable that the nuclear waste will never be retrieved, and Congress' exclusive right to dispose of such land will be bypassed (Art. IV, Sec. 3.)
- DOE and DOI misrepresented the length of tests in ROD and to Congress
- DOE miscertified re environmental permits

NEPA

- DOI and DOE failed to analyze the legislative withdrawal alternative (42 U.S.C. § 4332)
- DOI failed to evaluate "retrievability" (Ex. 66, DOI 1990)
- DOE/DOI failed to supplement FSEIS re room collapses
- DOI failed to evaluate length of withdrawal
- DOI failed to disclose its inability to monitor hazardous waste problems
- DOI failed to acquire the required capability to evaluate EIS

APA

- Unexplained reversals of policy on (1) legislative withdrawal; (2) consideration of legislative alternative; (3) DOE "self-certification"; and (4) Report to Congress

Irreparable Injury

- DOI/DOE introduction of nuclear waste is a degradation of public land in New Mexico and an absolute exclusion of other uses, which bypasses Constitutional power of Congress.

- High retrievability risk. Retrievability is "unrealistic." No place to which to take it back. DOE/DOI should bear burden of showing that injury to land will be undone.

- Harm to the public's trust in government in sensitive area -- radioactive waste.

- Risk that waste will be irretrievable means the power of Court or Congress to restore the land will be nullified -- a fait accompli.

- Transportation of nuclear waste over the public highways, without adequate protection of human life and health.

- The emplacement of nuclear waste in the WIPP without EPA disposal standards poses present risks.

"Retrievability" Won't Wash

1. DOI says: "**Retrievability isn't realistic** . . . cost factors . . . controversy . . . difficulty in finding [another] place . . . ." (1990, Ex. 55)

2. Motivation: Test/retrieval plan created only after 1988 legislative failure.

3. Motivation: DOE's own witness -- "obsession" and "overzealousness in trying to move waste into WIPP." (Bahr. p. 9)

4. WIPP was designed to collapse: Long-term test contrary to basic design. (Ex. 58, ¶2.1)

5. Rooms are collapsing!

6. DOE's own panel: Won't say that the rooms will survive for the tests. (Ex. 32, p. 5-2)

7. Warning: DOE's own experts: No "warning system" devised to give DOE the six months' safe access required to retrieve the waste. (Ex. 33, p.5; Ex. 32; Miller ¶5, McKinnon ¶¶ 22-23)

8. DOE's own bolt "support system" masks the warning. (Baker ¶46, Abel ¶50, Serata ¶2) DOE ignores.

9. Latest -- 70-ton collapse on October 20, 1991 -- was said to have been anticipated by only one month. (DOE never mentioned it.)

10. Expert Affidavits: Test rooms are presently in pre-collapse state and will collapse early in test period. (Serata ¶¶2, 20, 25-26, 30, 35; Abel ¶¶2, 29-30, 46, 51)

11. Tests: No scientific value. (Gelhar ¶¶31, 44; Roedder ¶¶25, 33; Scheetz ¶¶2, 26, 39-41)

12. DOE has no incentive to heed warnings or to retrieve waste!

Congress Is Actively Involved

H.R. 2637 (Ex. 22) and S. 1671 (Ex. 96)

Additional Protective Provisions:

- EPA to issue standards for disposal of radioactive waste
- EPA to find that DOE "tests" are necessary to meet disposal standards
- DOE to prepare a waste retrieval plan
- EPA, National Academy of Sciences, Environmental Evaluation Group, and State of New Mexico to review and comment on test plans
- Limit of 0.5% of capacity for test waste emplaced in the WIPP
- $600 million or other compensation for road improvements, loss of mineral values, and medical emergency preparedness
- Mine Safety and Health Administration to inspect WIPP rooms; and Bureau of Mines to certify their stability
- DOE retrieval plan with specified storage location, with EPA approval
- Withdrawal terminates if EPA disposal standards not met; 10-year limit

Action:

- Senate passes S. 1671 (11/5/91); House Bill approved by the Interior Committee; marked up yesterday (11/14/91) by Energy and Power Subcommittee.

j. Court's inquiries on Nov. 15, 1991 focused upon:

A. Status of congressional action.

B. Whether collapse of rooms was expected, in the use of WIPP for permanent disposal.

C. Date of first waste shipment; entitlement to notice.

D. How long are test rooms expected to last?

E. Have support systems been tested?

F. How much warning of collapse is there?

G. Why not wait for Congress?

H. Where does the waste go after retrieval?

I. Must the bin tests be performed in WIPP?

J. How long do the bin tests take?

K. Nature of test room, its support.

k. Nov. 26, 1991: Memorandum and Order granting Preliminary injunction.

A. As to likelihood of success: No DOI determination was made, or could have been made, that the purpose for which the withdrawal was first made requires the extension. The extension materially altered the purpose of the 1983 withdrawal. The modification power is restricted by the provisions and limitations of FLPMA §1714, under which an extension is necessitated by the original purpose.

B. Also as to likelihood of success: Defendants have not convinced the Court that the waste can be retrieved. Record shows a "great likelihood" that the waste will not be retrievable after the test phase, and there is evidence that it cannot be retrieved after 18 months.

C. Inability to retrieve waste, due to collapse of rooms, impending collapse, or loss of required clearance, constitutes irreparable injury because Congress would not be able to

act under the same circumstances as when the WIPP site was under a previous withdrawal.

D. An injunction would not cause injury to third parties, because the same amount of money would be spent on WIPP regardless of whether the test phase goes forward. Public interest is also opposed to a fait accompli.

l. Nov. 26, 1991: Environmental and congressional intervenors move for partial summary judgment on FLPMA issues, seeking permanent injunction.

m. Dec. 13, 1991: Federal Defendants note appeal from preliminary injunction.

n. Feb. 3, 1991: Memorandum and Order (Jan. 31, 1992) granting permanent injunction. With regard to FLPMA grounds:

A. DOI Secretary cannot extend a withdrawal for a new purpose not required by the purpose of the original withdrawal.

B. Power to modify a withdrawal is a general power and cannot be used to circumvent the specific restriction on extensions, which would otherwise be nullified.

C. Determination that the purpose of the original withdrawal required the extension could not have been made. The extension "directly contradicted" the purpose of the 1983 withdrawal, which said that radioactive waste was not authorized.

o. July 10, 1992: Opinion of D.C. Circuit (per curiam) affirming decision on FLPMA grounds. As to FLPMA arguments:

A. The limitation on extensions to the original purpose will be applied by reference to the stated purpose of the initial withdrawal, i.e., here, limited to construction with a prohibition on radioactive waste.

B. The "modification" argument would only justify a change in the purpose of an original withdrawal, not an extension, since an extension is limited to "the purpose for which the withdrawal was first made." Thus, an

extension cannot be granted to accomplish the purpose of a modification.

C. The argument that any extension which has the purpose of protecting the land should be lawful under FLPMA is erroneous, because it would nullify the "purpose" limitations in §1714(f) and ignores the §1714(c) requirement of a full report on the proposed land use.

D. The §1714(c) reporting requirement for initial withdrawals supports the conclusion that extensions--which require no such report--are limited to the purpose of the initial withdrawal.

E. An injunction is appropriate where the defendants reduced, contrary to FLPMA, Congress's opportunity to intervene to reject the withdrawal by concurrent resolution.

8. 1991-92 Litigation Concerning RCRA Interim Status
Presented by Gini Nelson

I. The suit filed by the New Mexico Attorney General on October 3, 1991 did not include a RCRA claim. A RCRA citizens suit was brought by the environmental organization-intervenors, however. The citizen-suit plaintiffs alleged that DOE did not have a permit for the management of TRU waste at WIPP, as required by RCRA, and that WIPP lacked interim status.

II. The district court granted a permanent injunction, which included granting summary judgment for the plaintiffs in the RCRA citizen suit. Memorandum Decision Granting Permanent Injunction, C.A. No. 91-2527 (D.D.C. Feb. 3, 1992).

III. Opinion of the D.C. Circuit reversing decision on RCRA grounds (while affirming on FLPMA). State of New Mexico, et al. v. James D. Watkins, Secretary Department of Energy, et al., No. 91-5387 (D.C. Cir. July 10, 1992)(per curiam). The Court's ruling is limited to federal RCRA; the Court acknowledged in a footnote that the state agency has not made a final determination of the applicable triggering date for state law interim status purposes.

IV. Copy of D.C. Circuit opinion is attached, and will be discussed in more detail during the presentation.

Notice: This opinion is subject to formal revision before publication in the Federal Reporter or U.S.App.D.C. Reports. Users are requested to notify the Clerk of any formal errors in order that corrections may be made before the bound volumes go to press.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

Argued May 15, 1992 Decided July 10, 1992

No. 91-5387

STATE OF NEW MEXICO, *et al.*

v.

JAMES D. WATKINS, SECRETARY
DEPARTMENT OF ENERGY, *et al.*, APPELLANTS

No. 92-5044

STATE OF NEW MEXICO, *ex. rel.*
TOM UDALL, ATTORNEY GENERAL

v.

JAMES D. WATKINS, SECRETARY
DEPARTMENT OF ENERGY, *et al.*, APPELLANTS

Bills of costs must be filed within 14 days after entry of judgment. The court looks with disfavor upon motions to file bills of costs out of time.

No. 92-5045

ENVIRONMENTAL DEFENSE FUND, *et al.*

v.

JAMES D. WATKINS, SECRETARY
DEPARTMENT OF ENERGY, *et al.*, APPELLANTS

Appeal from the United States District Court
for the District of Columbia

(C.A. Nos. 91-02527 and 91-02929)

John A. Bryson, Attorney, Department of Justice, with whom *Barry M. Hartman*, Acting Assistant Attorney General, *Martin W. Matzen*, Attorney, Department of Justice, and *Marc Johnston*, Attorney, Department of Energy, were on the brief, for appellants in 91-5387, 92-5044, and 92-5045.

Tom Udall, Attorney General of the State of New Mexico, with whom *Manuel Tijerina*, *Michael Dickman*, *Lindsay A. Lovejoy, Jr.*, *Frederic S. Nathan, Jr.*, *Bernhardt K. Wruble*, and *John S. Moot* for State of New Mexico and *Nancy Olinger* for State of Texas were on the joint brief, for appellees, State of New Mexico, *et al.* in 91-5887 and 92-5044. *Renea Hicks* for State of Texas also entered an appearance for appellees.

Adam Babich, with whom *Deborah S. Reames* and *Howard I. Fox* for Sierra Club Legal Defense Fund and *Dan W. Reicher* for Natural Resources Defense Council were on the joint brief, for appellees Environmental Defense Fund, *et al.* in 91-5887, 92-5044, and 92-5045.

Before: MIKVA, *Chief Judge*; RUTH B. GINSBURG and HENDERSON, *Circuit Judges*.

Opinion PER CURIAM.

PER CURIAM: In these consolidated cases, the Departments of Energy and the Interior appeal from an injunction preliminarily granted on November 26, 1991 and made permanent on January 31, 1992, barring the implementation of Public Land Order 6826; issued in January 1991, Land Order 6826 provided for the deposit for test purposes of defense-related hazardous, radioactive waste in an experimental, underground New Mexico facility. We affirm the permanent injunction.

The dispute matured in October 1991, when the Department of Energy (DOE) received permission from the Department of the Interior (Interior) to begin transporting transuranic (TRU) waste[1] to DOE's Waste Isolation Pilot Plant (WIPP), a facility constructed on federal land in New Mexico. Congress had authorized WIPP's construction "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes from defense activities." Pub. L. No. 96-164, 93 Stat. 1259, 1265 (1979). DOE sought to transport the TRU waste in order to conduct a test phase, which involved temporary burial of the hazardous, radioactive material in underground WIPP rooms.

New Mexico, joined by intervenors (the state of Texas, three members of Congress, and four environmental organizations), sued to restrain the transportation and deposit of the waste. The complainants argued primarily that, in proceeding to a test phase, DOE and Interior had failed to observe constraints Congress placed on administrative

[1]The production of nuclear weapons yields "high-level" waste, which is characterized by intense heat and penetrating radiation, and "transuranic" (TRU) waste, which creates little heat and is generally less radioactive than high-level waste. TRU waste remains radioactive for very long periods of time; its isolation from the human environment is essential to protect the public health and safety.

withdrawals of federal lands in the Federal Land Policy and Management Act of 1976 (FLPMA), 43 U.S.C. §§ 1701 *et seq.*[2] The environmental organization-intervenors in the FLPMA action also initiated a separate action, one month later, under the citizen suit provision of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6972(a)(1)(A). The citizen-suit plaintiffs alleged that DOE did not have a permit for the management of TRU waste at WIPP, as required by RCRA, *id.* § 6925(a), and that WIPP lacked "interim status," which would temporarily exempt the facility from RCRA's permit requirements. *See id.* § 6925(e); 40 C.F.R. § 270.

The district court, addressing only the FLPMA action, entered a preliminary injunction. *Memorandum Decision Granting Preliminary Injunction,* C.A. No. 91-2527 (D.D.C. Nov. 26, 1991), amended Dec. 18, 1991. Several weeks later, the court made the injunction permanent, this time granting summary judgment for the plaintiffs in the RCRA citizen suit and for the complainants on one of the FLPMA claims. *Memorandum Decision Granting Permanent Injunction,* C.A. No. 91-2527 (D.D.C. Feb. 3, 1992). The court ordered Interior to cease implementing Land Order 6826 and DOE to cease activities relating to the WIPP test phase to the extent those activities involved the introduction or transportation of TRU waste into the state of New Mexico.

I. Background

A. FLPMA Provisions Governing Federal Land Withdrawal

WIPP is located on roughly 9000 acres of federal land administered by the Bureau of Land Management (BLM). FLPMA authorizes the Secretary of the Interior to "make, modify, extend, or revoke withdrawals [of federal land]

[2]The suit additionally alleged violations of various National Environmental Policy Act (NEPA) and Administrative Procedure Act (APA) prescriptions.

but only in accordance with the [Act's] provisions and limitations." 43 U.S.C. § 1714(a). A withdrawal exempts the covered land from the operation of public land laws. *Id.* § 1702(j). Withdrawals of 5000 acres or more may be made "only for a period of not more than twenty years," subject to specified advance reporting by Interior to Congress, publication for notice and comment in the Federal Register, and, in the case of new withdrawals, opportunity for public hearing. *Id.* § 1714(b), (c) & (h). FLPMA preserves for Congress the legislature's power, under the Constitution, to dispose permanently of federal lands, *see* U.S. CONST. art. IV, § 3, cl. 2,[3] and it provides for congressional nullification, by concurrent resolution, of administrative withdrawals. *See* 43 U.S.C. § 1714(c)(1).

An administrative withdrawal of federal land may be extended "only if the Secretary determines that the purpose for which the withdrawal was first made requires the extension, and then only for a period no longer than the length of the original withdrawal." *Id.* § 1714(f). The Secretary must report all withdrawal extensions to House and Senate committees.

B. Land Withdrawals for the WIPP Facility

In 1982, Interior issued Public Land Order 6232 withdrawing the WIPP land for eight years "for the purpose of performing a Site and Preliminary Design Validation Program (SPDV) ... and to protect the lands pending a legislative withdrawal if appropriate." 47 Fed. Reg. 13,340 (Mar. 30, 1982).[4] In 1988, DOE sought a second with-

[3]The parties agree that the 1979 act authorizing the construction of the WIPP facility, *see supra* p. 3, does not permanently withdraw the WIPP land.

[4]Pursuant to NEPA, DOE had issued a Final Environmental Impact Statement (FEIS) in 1980 analyzing the consequences of proceeding with the WIPP project. The proposal examined called for excavation of several rooms about 2150 feet below ground in salt formations that had been generally stable for hundreds of millions of years, evaluation of the formations' ability to contain the waste, and, if results were satisfactory, permanent disposal. The FEIS considered three phases: the SPDV phase, construction, and disposal. A waste deposit test phase, following completion of construction and prior to the final disposal phase, was added later. *See infra* pp. 6-8.

drawal to construct WIPP. Interior obliged, issuing Public Land Order 6403 "for the purpose of the construction of full facilities for [WIPP] . . . and to protect the lands pending a legislative withdrawal if appropriate." 48 Fed. Reg. 31,038 (July 6, 1983) (*1983 Land Order*). Valid through June 29, 1991, the order further provided that it did "not authorize the use or occupancy of the lands hereby withdrawn for the transportation, storage, or burial of any radioactive materials." *Id.* The Secretary reported to Congress, in June 1983, confirming that "[t]he withdrawal authorizes the construction of the full WIPP facility but does not allow for disposal or experimentation with nuclear waste." The report explained:

> DOE has not sought to obtain authority to dispose of or experiment with nuclear waste by an administrative withdrawal. This position has been maintained by DOE and BLM because of the statutory 20-year time limit imposed on administrative withdrawals in excess of 5,000 acres and the feeling that such a controversial long-term and significant land use commitment is most appropriately the responsibility of Congress.

Pursuant to these withdrawals, DOE sank two shafts to the repository level, excavated several rooms, and evaluated the reaction of the salt formations. Salt formations, it has been the operative assumption, should prove suitable for disposal of radioactive waste because their low permeability serves to prevent leakage and their plasticity in response to pressure allows fractures in the formations to heal themselves. The salt, it is anticipated, will gradually encase the waste deposited in the underground rooms ("salt creep"), isolating it from the accessible environment. The rooms, in effect, will collapse around the waste due to geologic pressure.

C. DOE's Test Phase

In 1985, EPA issued its "no migration" rules, which required DOE to be assured that, for 10,000 years, radiation escaping from a waste repository not exceed specified

levels. *See* 42 U.S.C. § 10141(a); 40 C.F.R. § 191.11-.18.[5] To satisfy the reasonable assurance requirement, DOE decided that a WIPP performance assessment was needed; gathering the necessary data, according to DOE, required a test phase, during which TRU waste would be placed in sealed bins in one of the excavated rooms. In 1987, DOE drafted a bill that would authorize the waste deposit testing, but Congress, to date, has not passed such legislation.[6]

Meanwhile, activity in the experimental SPDV rooms indicated that salt creep proceeds more rapidly than the FEIS had predicted. In addition to salt creep, fractures appeared. These fractures caused blocks or chunks of salt to fall to the floor, potentially blocking access to the rooms. In a 1990 supplement to the FEIS (SEIS), preparatory to proceeding to a test phase, DOE further studied the environmental consequences of the disposal (both temporary and permanent) of TRU waste in WIPP. DOE found that a disturbed rock zone develops around the excavated room, leading to fracture-producing stresses; DOE concluded, however, that the fractures would not overwhelm the beneficial effects of salt creep.

DOE regarded the fractures as "a short-term concern for personnel safety" that could be addressed by scaling down the walls of the rooms and installing rock bolts and wire mesh in the ceilings. The SEIS stated that during the test period, waste in the WIPP "must be readily and safely retrievable." Rock-bolting would enhance retrieva-

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[5]On judicial review, EPA's standards were vacated in part. *See* Natural Resources Defense Council, Inc. v. EPA, 824 F.2d 1258 (1st Cir. 1987). Pending post-remand action, DOE and New Mexico agreed that the agency would proceed as though the regulations were effective. *See* Brief for the Appellants at 8 n.2.

[6]A House bill, subsequently introduced, would have required DOE to demonstrate compliance with EPA standards for radioactive waste disposal prior to shipment of any waste to the site. *See also* Status of the Waste Isolation Plant Project, Hearings before a Subcommittee of the Committee on Government Operations, House of Representatives, 100th Cong., 2d Sess. (Sept. 13, 1988).

bility. DOE's Record of Decision described the test phase as "emplacing, in a fully retrievable manner, a limited quantity of TRU waste underground." 55 Fed. Reg. 25,692 (June 22, 1990).

D. Modification and Extension of the *1983 Land Order*

In January 1989, DOE applied to BLM for a modification and extension of the *1983 Land Order* to facilitate the test phase. In its letter to Interior, DOE sought approval: (1) "to change the purpose of the land withdrawal . . . to provide that the land is withdrawn 'for . . . *the conducting of a test program by the DOE using radioactive waste at the site*' " (DOE's emphasis); (2) to delete the provision in the *1983 Land Order* prohibiting the transportation, storage or burial of radioactive material in connection with WIPP; and (3) to extend the withdrawal through June 1997.[7]

In August 1990, BLM, through its New Mexico state director, reviewed the SEIS and concluded that the test phase could be implemented. The Assistant Secretary agreed and issued Public Land Order 6826. 56 Fed. Reg. 3038 (Jan. 28, 1991). By its terms, Land Order 6826 "modifie[d] Public Land Order No. 6403 . . . to (1) expand the stated purpose of the order to include conducting the test phase of the project using retrievable, transuranic radioactive nuclear waste at the site; (2) increase [DOE's] exclusive use area . . . ; (3) extend the term of the withdrawal through June 29, 1997 (the term of the . . . withdrawal [then existing was] 8 years and [was] for

[7]"Because of the significance of the WIPP project to the resolution of the radioactive waste disposal problem in this country," DOE stated that the agency "would prefer to have *Congressional* authority to use the public land to continue this important project." (DOE's emphasis.) DOE indicated its continued readiness to work with Congress on the appropriate bill, but sought the modification and extension "to allow the receipt at WIPP of radioactive waste for the demonstration phase in the event Congress does not act on the bill this year." Congress has not yet enacted the legislation. *See also supra* note 6 and accompanying text.

construction of facilities) so as to provide sufficient time to conduct the experimental test phase; and (4) delete paragraph 5 of Public Land Order No. 6403 which prohibits the use of the land for the transportation, storage, or burial of radioactive materials." Interior sent Congress the requisite report on the withdrawal extension.

Various Interior communications indicated that retrievability was a major concern.[5] The timing of retrieval and the length of the test phase were also examined. A June 1990 DOE memorandum indicated that the 1997 end-date requested in the modification and extension would be inadequate for the test phase and withdrawal; the memorandum stated that "a period of time several years longer will be needed to assure that waste retrieval could occur in time." In February 1991, shortly after the Land Order 6826 extension, DOE stated in a RCRA permit application that finding storage for the retrieved waste "could take up to eight years" after initiation of retrieval, and that retrieval would take more than three years from the date of the decision to retrieve. DOE also reported that some bins would not be loaded for tests until mid-1995, that bin tests last about five years, and that DOE had not determined the duration of further tests closely simulating the disposal phase configuration (alcove tests).

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[5]Briefing papers prepared for the Secretary of the Interior in February 1990 listed two of the "cons" in granting DOE's modification/extension. First, "[i]t would be difficult explaining to the public why [Interior] changed its 1983 policy on authorizing radioactive waste at the WIPP site. The basis for the policy was that authorization to proceed with the country's first permanent repository for radioactive waste would require legislation." Second, absent legislation allowing permanent withdrawal, passed prior to June 1997, "DOE would probably request an extension of the withdrawal rather than retrieve the waste. Retrievability isn't realistic unless DOE determines that the site is unacceptable. Besides cost factors of retrievability, there would be much controversy and difficulty in finding a place to store this waste."

E. Estimating the Life of the Test Phase Room

One of the rooms (SPDV 1) excavated during the SPDV phase in 1988 had experienced sporadic rock falls, followed by complete blockage in 1989. Lacking support installations such as rock bolts, the room was expected to collapse fully in the summer of 1990; it did so in February 1991, when a 1200-ton rock salt block fell to the floor.

The room to be used for the test phase (Room 1, Panel 1), excavated initially in 1986-87 and further in 1988, has dimensions identical to the collapsed SPDV 1. DOE originally anticipated that the room would be in use for other purposes for five years, after which it would be filled with TRU waste drums and sealed. DOE's decision to proceed first with bin-scale tests required that the room last for a significantly longer period. In April 1991 (a few months after the Land Order 6826 extension), DOE convened a Geotechnical Panel to assess the life of Room 1, Panel 1, and recommend measures for extending the life of the room to accommodate the bin-scale tests. The panel made various recommendations and suggested an engineering design evaluation to select the precise combination of modifications.

The design team concluded that the requisite support could be supplied by a system of rock bolts anchored with resin, with measuring devices attached to each bolt. In September 1991, DOE submitted the team's design to an independent Design Review Panel, which estimated that the design would provide a useful life "of at least seven years from the time at which the proposed [support system] is installed." The system is now in place.

F. RCRA Treatment of TRU Waste and WIPP

RCRA comprehensively regulates, from generation to disposal, waste designated as hazardous. *See* 42 U.S.C. § 6921(a), (b); 40 C.F.R. Part 261. States may take primary responsibility for RCRA implementation by installing an EPA-approved hazardous waste management program. 42 U.S.C. § 6926(b). New Mexico's "base" pro-

gram, effective since January 1985, largely replicates the federal program.[9]

Facilities that treat, store, or dispose of hazardous waste must have a RCRA permit. *Id.* § 6925(a). Congress, when it passed RCRA, allowed existing facilities that deal with hazardous waste to continue operations, in "interim status," during the pendency of permit applications. As amended in 1980 and 1984, RCRA provides that facilities of two kinds may qualify for "interim status": (1) those "in existence" on November 19, 1980; and (2) those that become subject to the permit requirements because of RCRA statutory or regulatory changes adopted after the facility commences operations. *Id.* § 6925(e)(1)(A). Interim status requires the filing of a two-part application by certain dates. 40 C.F.R. §§ 270.10(e)(1), 270.73(d).

RCRA provides that its prescriptions shall not apply to substances and activities regulated under the Atomic Energy Act (AEA), 42 U.S.C. §§ 2011 *et seq.*, unless RCRA regulation is not inconsistent with the AEA. 42 U.S.C. § 6905(a). The radioactive materials in TRU waste are regulated under the AEA. The waste's hazardous components fall within RCRA's domain. The question arose whether TRU waste, in view of its compound character, was subject to regulation under both acts.

In a 1980 rulemaking, EPA stated its "mixture rule," which subjects to RCRA regulation any waste containing a mix of solid waste, as defined in RCRA, and substances listed as hazardous under RCRA. The RCRA definition of "solid waste" excludes "source, special nuclear, or byproduct material as defined by the [AEA]." *Id.* § 6903(27). In DOE's view, the first two materials (source and special nuclear) presented no definition problem (their definitions refer to specific substances, such as uranium, thorium, plutonium, enriched uranium), but the third (byproduct material) did. The AEA defines byproduct material as

[9]A base program reflects RCRA requirements prior to passage of the Hazardous and Solid Waste Amendments of 1984, Pub. L. No. 98-616, 98 Stat. 3221 (1984). *See* 42 U.S.C. § 6926(g).

"any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material." 42 U.S.C. § 2014(e). The waste stream from producing or utilizing special nuclear material may carry, in non-separable form, substances that both contain radioactive elements and are hazardous under RCRA. TRU waste fits that bill.

In 1985, DOE proposed to interpret "byproduct material" to include not only radioactive elements, but also any waste stream from the process of making special nuclear material, even if the stream included hazardous waste. 50 Fed. Reg. 45,736 (Nov. 1, 1985). DOE's proposed interpretation, had it become operative, would have removed TRU waste from RCRA regulation.

The next year, EPA published a notice on the extent to which state programs, to receive EPA approval, must assert authority over wastes contaminated with radiation. 51 Fed. Reg. 24,504 (July 3, 1986) (*1986 Notice*). EPA had not previously required state programs to regulate radioactive mixed wastes. In the notice, EPA announced its determination that RCRA applies to radioactive mixed wastes. DOE's final interpretation of the AEA "byproduct material" term, in contrast to DOE's proposed interpretation, is consistent with EPA's view. *DOE Final Rule*, 52 Fed. Reg. 15,937 (May 1, 1987) (stating that any waste stream containing both radioactive elements regulated by AEA and nonradioactive elements deemed hazardous under RCRA would be subject to both regulatory schemes, to the extent consistent with AEA).

In 1988, EPA issued another notice, this time addressing interim status for facilities like WIPP that handle radioactive mixed wastes. 53 Fed. Reg. 37,045 (Sept. 23, 1988) (*1988 Notice*). In states with base programs, EPA concluded that facilities treating only radioactive mixed waste (*i.e.*, no other hazardous waste) would not be subject to RCRA regulation until the state received the necessary supplemental authorization. The date of that

authorization would count as the triggering regulatory change for purposes of determining interim status.

The New Mexico legislature had previously excluded WIPP from the state's RCRA regulatory regime. N.M. STAT. ANN. § 74-4-3.2 (Supp. 1988). This exception, which impeded the state from receiving EPA's authorization to regulate radioactive mixed waste, was repealed in February 1989. Effective July 1990, New Mexico received EPA's authorization to regulate such waste. The director of the New Mexico program then advised DOE of the permit filing requirements for the WIPP facility to qualify for interim status. DOE submitted the permit application forms within the deadlines set by New Mexico.[10]

G. The District Court Decisions

In ruling on the preliminary injunction, the district court concluded that plaintiffs and intervenors would likely succeed on two of their FLPMA claims: first, that Interior had improperly modified and extended the 1988 withdrawal, in violation of FLPMA § 204(f), 43 U.S.C. § 1714(f); and second, that, in view of the uncertainty surrounding retrievability of the waste, any deposit of TRU waste could constitute a *de facto* permanent withdrawal of public land, in violation of FLPMA § 204(c)(1), 43 U.S.C. § 1714(c)(1). *Memorandum Decision Granting Preliminary Injunction* at 5-12. Addressing other factors in the preliminary injunction equation, the court found that the risk of irretrievability of TRU waste indicated irreparable injury. *Id.* at 18. If the waste proved irretrievable,

[10] A year later, however, a new state director suggested that the trigger date for DOE's filings was the date New Mexico repealed WIPP's exemption. The state agency asked EPA to state "the legal standard EPA would use to determine whether WIPP has federal interim status." EPA responded that repeal of the state law was not a regulatory change under RCRA, because RCRA referred to changes under the Act; the relevant date for the WIPP facility would be the July 1990 EPA authorization for New Mexico's regulation of radioactive mixed waste. New Mexico has not finally determined the applicable starting date for DOE's interim status filings.

the court suggested, the decision reserved to Congress, whether to allow a permanent withdrawal of public land, would be preempted. *Id.* The court found no harm to third parties and a strong public interest in issuing the injunction, *i.e.*, the injunction would preserve the legislature's constitutional prerogative to decide whether to withdraw public land permanently. *See id.* at 14.

Nor, in the district court's judgment, did DOE identify any counterbalancing factor making preliminary relief improper. The court rejected DOE's assertion of overriding public burden stemming from the agency's expenditures ("to date over one billion dollars have been spent on the WIPP project and an additional thirteen million dollars will be expended monthly in order to maintain the WIPP site"). "[I]t is uncontested," the court said, "that the same amount of money will be expended on the WIPP project regardless of whether the test phase goes forward." *Id.*[11]

In ruling on the permanent injunction, the district court addressed one FLPMA claim and one RCRA claim. First, the court held, the WIPP facility is not eligible for interim status under RCRA. *Memorandum Decision Granting Permanent Injunction* at 5-10. Noting that DOE might proceed to introduce waste into WIPP after receiving a RCRA permit, the court also ruled on the FLPMA modification/extension issue. As to that claim, the court concluded that the 1989 land order allowing the test phase violated FLPMA. *Id.* at 11-13. In so ruling, the district court emphasized the prescription that withdrawal orders may be extended only when "the purpose for which the withdrawal was first made [so] requires." *Id.* at 11-12 (quoting 43 U.S.C. § 1714(f)). In terms substantially similar to those used in the preliminary injunction, the court permanently barred Interior from implementing Land Order 6826 to the extent it authorized the introduction of TRU

[11]Appellate counsel for DOE did not dispute New Mexico's assertion at oral argument that DOE is currently conducting tests at WIPP not involving deposit of radioactive waste, and that the ongoing activity would have taken place in any case.

waste into WIPP, and enjoined DOE from introducing or transporting the waste into New Mexico. *See supra* p. 4.

We conclude that, although the district court's ruling on the RCRA claim must be reversed, that court's ultimate holding, that the Secretary of Interior exceeded his authority under FLPMA, is correct and justifies the relief ordered. We consider first the eligibility of the WIPP facility for interim status under RCRA, and then turn to the FLPMA claim and the relief ordered by the district court.

II. Interim Status under RCRA

RCRA gives "interim status" to hazardous waste treatment, storage, and disposal facilities that were in existence prior to November 19, 1980 (the effective date of RCRA) or the effective date of a "statutory or regulatory change" that first subjects the facility to RCRA's permit requirements, provided that the facility has met certain other requirements. *See* 42 U.S.C. § 6925(e). Interim status allows the facility to operate, without a permit, during the application process. As EPA has made clear, interim status is not granted by EPA; it is statutorily conferred. The agency's decision that a facility qualifies for interim status "is in essence a statement of opinion which reflects [EPA's] decision not to take enforcement action against the facility. Such a pronouncement does not ultimately dispose of the issue of whether the facility has interim status." EPA Guidance Memorandum re: Interim Status at 2-3 (quoted in *Memorandum Decision Granting Permanent Injunction* at 8 n.4).

The district court held that the WIPP facility did not have interim status under RCRA because it was not in existence prior to November 19, 1980 or a "statutory or regulatory change" that subjected the facility to RCRA regulation. The court pointed out that the radioactive mixed waste to be deposited at DOE's plant contains hazardous compounds such as carbon tetrachloride, mercury, and methyl alcohol that were regulated under RCRA long before the existence of the WIPP facility. *Memorandum*

Decision Granting Permanent Injunction at 9-10. Using reasoning similar to that underlying EPA's "mixture rule," *see* 40 C.F.R. § 261.3(a)(2) (1991) (mixture of hazardous waste and other solid waste will be treated as hazardous waste under RCRA), *vacated and remanded, Shell Oil Co. v. EPA*, 950 F.2d 741 (D.C. Cir. 1991), the court held that, because components of the radioactive mixed waste were subject to RCRA regulation before WIPP came into existence, the facility could not qualify for interim status. *Memorandum Decision Granting Permanent Injunction* at 10. The court further concluded that EPA's 1986 decision requiring state RCRA programs to regulate radioactive mixed wastes, *see supra* p. 12, was not a "regulatory change," because it was not issued pursuant to the APA and, therefore, did not "create or change RCRA regulations." *Id.* at 9. In the court's view, the 1986 decision simply clarified that RCRA regulated mixtures of hazardous wastes.

In addressing DOE's challenge to the district court's ruling on the RCRA claim, we first must determine whether the RCRA statute itself clearly encompasses radioactive mixed wastes; for if it does, WIPP, which came into existence after RCRA was enacted, cannot qualify for interim status. Because we conclude that the statute is not crystalline on the coverage of radioactive mixed wastes, however, we next consider whether EPA's 1986 decision was a statutory or regulatory change, following which WIPP may qualify for interim status.

A. Radioactive Mixed Wastes under RCRA

Section 1004(5) of RCRA defines "hazardous waste" as:

> [A] *solid waste* or *combination of solid wastes*, which because of its quantity, concentration, or physical, chemical or infectious characteristics may —
>
> (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
>
> (B) pose a substantial present or potential hazard to human health or the environment when improp-

> erly treated, stored, transported, or disposed of, or otherwise managed.

42 U.S.C. § 6903(5) (emphasis added). Section 1004(27) excludes from this definition of "solid waste" all "source, special nuclear, or byproduct material as defined by the Atomic Energy Act." *Id.* § 6903(27). By excluding AEA-covered source, special nuclear, and byproduct materials from the definition of solid wastes, RCRA exempts facilities handling that waste from its permit requirements. EPA correspondingly has excluded AEA-covered source, special nuclear, and byproduct materials from its definitional regulations listing RCRA-covered hazardous wastes. *See* 40 C.F.R. § 261.4(a)(4). But neither the statute nor the regulations specifically speak to radioactive wastes mixed with other wastes that are categorized as "hazardous" under RCRA. Similarly, section 1006(a) of RCRA, 42 U.S.C. § 6905(a), contemplates joint regulation under both RCRA and the AEA in certain circumstances, but does not indicate *how* Congress intended the two regulatory regimes to coexist. We can find, in short, nothing in the text of RCRA (or its legislative history) offering a clear indication that Congress intended the statute to regulate (or exclude from regulation) radioactive mixed wastes.

Nor are we persuaded by the various arguments made by the RCRA citizen suit claimants in support of their contention that RCRA, from its inception, has covered these substances. The RCRA claimants first refer to DOE's own analysis of RCRA, contained in the Department's final rule defining "byproduct material," which concluded that RCRA was intended to regulate radioactive mixed wastes. *See DOE Final Rule*, 52 Fed. Reg. 15,937 (May 1, 1987). Based on DOE's full examination of RCRA and the statute's legislative history, the Department ultimately determined, in 1987, that Congress intended to "provide for the regulation under RCRA of all hazardous waste including waste that is also radioactive." *Id.* at 15,940. DOE noted that *Train v. Colorado Pub. Interest Research Group*, 426 U.S. 1 (1976), a case that had been

recently decided at the time Congress was considering RCRA, resolved a similar issue under the Clean Water Act (CWA). The practical effect of this decision, according to DOE, was "a regime of concurrent regulation" by which EPA and the states were left free "to regulate, under the Water Act, the nonradioactive component of liquid effluents from nuclear facilities, while reserving to the Nuclear Regulatory Commission and DOE's predecessor agency all regulatory authority over the source, special nuclear and byproduct materials contained in those same effluent streams." *DOE Final Rule*, 52 Fed. Reg. at 15,939. DOE inferred that Congress "anticipated a similar result under RCRA." *Id.*

Because RCRA is not DOE's enabling statute, however, we need not defer to that Department's interpretation of RCRA, and we find several reasons to look elsewhere for guidance. We note initially that DOE viewed the issue differently in 1985; its proposed rule would have removed TRU waste from RCRA regulation. *See supra* p. 12. Further, DOE's reliance in its final rule on *Train* seems questionable. Congress' use in RCRA of the same terms that the Court considered in *Train* (notably, the terms "source, special nuclear, or byproduct material") does not necessarily mean that Congress intended to incorporate the result of *Train*. If Congress had in fact wanted to incorporate *Train*, it had more explicit ways to do so. Most obviously, Congress could have referred to the case by name somewhere in the legislative history. As DOE acknowledged, there is no such reference. Second, *Train* dealt only with the question whether the term "pollutant," which, by statute, included "radioactive materials," also included source, special nuclear, or byproduct material when Congress had clearly regulated those nuclear wastes under the AEA. *Train* never specifically addressed "mixed" wastes (*i.e.*, source, special nuclear, or byproduct material mixed with wastes that would otherwise qualify as "pollutants" under the Clean Water Act). In short, neither DOE's analysis nor *Train* provides convincing argument that RCRA, inevitably and from the start, regulated radioactive mixed wastes.

The RCRA claimants also urge that the exemption for source, special nuclear, and byproduct materials is, in any case, essentially irrelevant. They assert that this exemption simply was not meant to affect RCRA regulation of radioactive mixed waste. Referring to another regulatory exemption excluding "domestic sewage" as well as "any mixture of domestic sewage and other wastes," the RCRA claimants point out that EPA explicitly excludes mixed wastes when it intends to do so. *See* 40 C.F.R. § 261.4(a)(1)(i), (ii). Even if we were to accept this argument, however, it addresses only EPA's regulation. The RCRA claimants show us nothing in the RCRA statute itself that addresses mixtures one way or another. EPA, however, the agency charged with RCRA's administration, has now definitively interpreted RCRA as covering these substances. *See* State Authorization to Regulate the Hazardous Components of Radioactive Mixed Wastes Under the Resource Conservation and Recovery Act, 51 Fed. Reg. 24,504 (July 3, 1986) (*1986 Notice*).

In view of the statute's ambiguity, we are committed to defer to EPA's reasonable interpretation. *See Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 844 (1984). The question, then, is *when* did EPA first determine that RCRA covers radioactive mixed wastes?

B. Was the *1986 Notice* a Regulatory Change?

DOE asserts that EPA first issued a determination that radioactive mixed wastes were regulated by RCRA in its *1986 Notice*. The district court, however, appears to have concluded that EPA meant to regulate these mixed wastes under RCRA much earlier. In the district court's view, EPA's "derived from rule" (providing that solid waste derived from the treatment, storage, or disposal of a hazardous waste is a hazardous waste) and its "mixture rule" (providing that a hazardous waste mixed with other solid wastes remains a hazardous waste) establish that mixed hazardous wastes were covered by RCRA since those rules were promulgated in 1980, long before the existence of

WIPP. *Memorandum Decision Granting Permanent Injunction* at 9-10.

It is true that EPA has invariably applied its mixture rule to materials containing a combination of hazardous wastes, as defined by RCRA, and other solid and non-solid wastes. *See* 40 C.F.R. § 261.3(a)(2)(iv) (the mixture rule), *vacated and remanded, Shell Oil Co.*, 950 F.2d 741; *Chemical Waste Management, Inc. v. EPA*, 869 F.2d 1526, 1539 (D.C. Cir. 1989) (upholding EPA's interpretation of its mixture rule to include mixtures of hazardous wastes and material *not* defined as a solid waste under RCRA, such as soil). But EPA has never specifically applied the mixture rule (or the derived from rule) to AEA-covered radioactive mixed wastes.

Furthermore, EPA itself recognized, in 1988, that its *1986 Notice* was "EPA's first official pronouncement to the general public that RCRA permitting requirements are applicable to radioactive mixed waste." Clarification of Interim Status Qualification Requirements for the Hazardous Components of Radioactive Mixed Waste, 53 Fed. Reg. 37,045, 37,046 (Sept. 23, 1988) (*1988 Notice*). Nor can the RCRA claimants identify any EPA decision prior to the *1986 Notice* interpreting RCRA to regulate radioactive mixed waste. Thus, it appears that the first time EPA definitively applied RCRA to this material was, indeed, in its *1986 Notice*. If the *1986 Notice* was a "regulatory change," therefore, WIPP may qualify for interim status. *

The district court held that the *1986 Notice* was not a "regulatory change" because it was not issued pursuant to the APA and, therefore, "did not create or change RCRA regulations." *Memorandum Decision Granting Permanent Injunction* at 9. We see nothing in RCRA, however, that defines a regulatory change in this manner. In fact, we see nothing in the statute or its legislative history that defines a regulatory change at all.

The statutory provision allowing interim status qualification for facilities that were "in existence on the effective date of statutory or regulatory changes" became law in

1984. The legislative history surrounding the amendment is scant, but presumably Congress sought to allow facilities to continue operations, instead of forcing their immediate shut down, upon becoming subject to RCRA's permit requirements through a change in RCRA's regulatory scheme. An interpretation of "regulatory change" that included only formal amendments to the statute or its regulations would be inconsistent with such a fair notice and opportunity-to-adjust purpose.

Furthermore, EPA interpreted "regulatory change" in its *1988 Notice* to include changes other than formal amendments. Specifically, EPA regarded the *1986 Notice* as a "relevant regulatory change." The *1988 Notice* states:

> EPA believes that facilities in operation or under construction as radioactive mixed waste treatment, storage, or disposal facilities on July 3, 1986 may qualify for interim status under section 3005(e)(1)(A)(ii) of RCRA. The Agency interprets this provision as applying to such facilities in existence on July 3, 1986 because the July 3, 1986 notice was the first official pronouncement to the general public that RCRA permitting requirements are applicable to radioactive mixed waste. In view of the level of confusion surrounding regulation of radioactive mixed waste prior to that time, EPA will treat the July 3, 1986 notice as the relevant regulatory change for establishing that facilities in existence on that date may qualify for interim status if other applicable requirements are met.

53 Fed. Reg. at 37,046. The RCRA claimants argue that EPA's statement that it will "treat" the *1986 Notice* as a regulatory change was simply a "decision rooted in enforcement policy," not an interpretation of the RCRA statute. But neither the *1986 Notice* nor the *1988 Notice* limits EPA's decision to one of enforcement policy. In fact, the *1988 Notice* states that EPA "*interprets*" section 3005(e)(1)(A)(ii) as including the *1986 Notice*, because it was the first time EPA officially applied RCRA to radioactive mixed wastes. *See Id.* (emphasis added). Because

RCRA does not define the type of change that qualifies as a "regulatory change" under the statute, we defer to EPA's reasonable interpretation, and therefore reverse the district court's decision that WIPP was not eligible for interim status under RCRA. The precise date of the regulatory change for the WIPP facility is a matter the district court, because of the character of its analysis, did not reach, and we have no occasion to address that question. *See supra* note 10.

III. FLPMA Claim

DOE makes two arguments in challenging the district court's holding that the modification and extension of the WIPP site withdrawal violated section 204 of FLPMA, 43 U.S.C. § 1714. First, DOE argues that Interior lawfully extended the withdrawal under subsection 204(f) because "the purpose for which the withdrawal was first made require[d] the extension." Brief for the Appellants at 41-43. In DOE's view, the 1983 withdrawal for the purpose of constructing the disposal facility necessarily included "testing and demonstrating the feasibility of radioactive waste disposal" at WIPP. *Id.* at 42. Second, DOE argues that Interior "properly modified the withdrawal to allow testing ... and then properly extended the withdrawal to continue the protection of the land." *Id.* at 43. In DOE's view, section 204 grants Interior broad discretion to modify a withdrawal. DOE further argues that because Congress did not define "modify" and because section 204 restricts Interior's modification power in limited instances only, Interior's interpretation is reasonable and entitled to deference under *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984).[12]

[12]At oral argument, as we indicated *supra* note 3, counsel for appellants acknowledged that the 1979 appropriations act authorizing DOE to "proceed with the Waste Isolation Project Plant construction project ... for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes," Pub. L. No. 96-164, 93 Stat. 1259, 1265-66, did not constitute a permanent withdrawal for the purpose of storing radioactive wastes.

A. Standard of Review

In evaluating Interior's construction of section 204, we follow the formulation set out in *Chevron*. First, we determine "whether Congress has directly spoken to the precise question at issue." *Id.* at 842. If so, we proceed no further, for courts "as well as the agency, must give effect to the unambiguously expressed intent of Congress." *Id.* at 842-43. If not, we defer to Interior's construction of the statute so long as it is reasonable. *Id.* at 844.

B. Statutory Framework

We restate here background introductorily set out in the opening section. *See supra* pp. 5-6. FLPMA section 204 grants Interior authority to withdraw lands from the operation of public land laws. Subsection 204(a) authorizes the Secretary of the Interior "to make, modify, extend, or revoke withdrawals but only in accordance with the provisions and limitations of this section." 43 U.S.C. § 1714(a). Subsection 204(c) provides the procedure for the withdrawal of a parcel of more than 5000 acres. This subsection requires that when such a withdrawal is made, "[t]he Secretary shall notify both Houses of Congress ... no later than its effective date." *Id.* § 1714(c)(1).[18] A withdrawal of over 5000 acres is also subject to a comprehensive reporting requirement. *See id.* § 1714(c)(2). The report must include, *inter alia*, "a clear explanation of the *proposed use* of the land involved which led to the withdrawal" and "an inventory and evaluation of the current natural resources uses and values of the site and adjacent public and nonpublic land and how it appears they will be affected by the proposed use, *including particularly aspects of use that might cause degradation of the environment*." *Id.* § 1714(c)(2)(1) & (2) (emphasis added).

The only provision in section 204 that substantively limits Interior's authority to modify a withdrawal is subsection 204(j). It prohibits Interior from modifying three

[18]This section also provides for the disapproval of a withdrawal by concurrent resolution of Congress. *See* 43 U.S.C. § 1714(c)(1).

types of withdrawals: (1) those created by Act of Congress; (2) those creating national monuments; and (3) those adding lands to the National Wildlife Refuge System. *Id.* § 1714(j).

In contrast, subsection 204(f), which governs withdrawal extensions, is much more restrictive. It provides that "[a]ll withdrawals and extensions thereof . . . having a specific period shall be reviewed by the Secretary toward the end of the withdrawal period and may be extended or further extended *only upon compliance with the provisions of subsection (c)(1)* . . . of this section . . . and only if the Secretary determines that *the purpose for which the withdrawal was first made requires the extension,* and then only for a period no longer than the length of the original withdrawal period." *Id.* § 1714(f) (emphasis added).

C. Analysis

DOE's first contention is that extension was necessary to carry out the purpose for which the withdrawal was first made, that is, the construction of the disposal facility. According to DOE, construction necessarily includes "testing and demonstrating the feasibility of radioactive waste disposal." Brief for the Appellants at 42. This argument is refuted by the record. The 1983 land order authorizing the withdrawal expressly provides that the "order does not authorize the use or occupancy of the lands hereby withdrawn for the transportation, *storage, or burial of any radioactive materials,* except as to radiological instruments normally used for nondestructive testing and geophysical logging." Public Land Order 6403, para. 5, 48 Fed. Reg. 31,038, 31,038-39 (July 6, 1983) (*1983 Land Order*) (emphasis added). Moreover, when DOE requested the withdrawal, it stated that "[t]he purpose for which the lands . . . are to be reserved is to construct the WIPP R&D facility which is intended to demonstrate the safe disposal of defense radioactive wastes; however, *no radioactive waste will be stored or disposed of under the terms of this withdrawal.*" Letter from R.G. Romatowski,

Department of Energy, to Charles Luscher, State Director, Bureau of Land Management, U.S. Department of the Interior, para. 7 (Jan. 10, 1983) (emphasis added).[14] These clear declarations of the limited purpose of the 1983 withdrawal manifest that the purpose did not include the storage of radioactive materials on even a trial basis. Accordingly, we reject this argument.

Alternatively, DOE argues that, because section 204 grants Interior broad discretion to modify a withdrawal, Interior acted lawfully when it modified the purpose of the withdrawal to include testing with radioactive wastes. This argument, however, does little to advance DOE's cause because the 1983 withdrawal was effective only until June 29, 1991. *See 1983 Land Order*, para. 6. Thus, even if Interior lawfully modified the 1983 withdrawal to allow for testing, an extension was required to continue testing past the June 29, 1991 expiration. Interior must have realized this because on January 29, 1991, it not only modified the original withdrawal but also extended it until June 29, 1997. *See* Modification of Public Land Order 6503, 56 Fed. Reg. 3088 (Jan. 28, 1991); *see also* Record of Decision (ROD), Waste Isolation Pilot Plant Project (WIPP), 56 Fed. Reg. 3114, 3114-15 (Jan. 28, 1991). Subsection 204(f), however, authorizes an extension "only if the Secretary determines that the *purpose for which the withdrawal was first made* requires the extension." 43 U.S.C. § 1714(f) (emphasis added). This language is clear — an extension is to be granted only to

[14]Also noteworthy is the December 7, 1982 letter of Garrey E. Carruthers, Assistant Secretary for Land and Water Resources, Department of the Interior, to Herman E. Roser, Assistant Secretary of Energy. The letter discussed the approval of the authorization to construct the WIPP facility. Paragraph four stated:

> The new administrative withdrawal order will not authorize the use of the [WIPP] site for the temporary placement or permanent burial of nuclear waste. The present intent of this Department is to provide land use authority, if appropriate, for a permanent facility within which defense-related nuclear waste may be placed, but the order will not authorize the use of the site for the actual placement or burial of nuclear waste.

accomplish the purpose of the original withdrawal; it cannot be granted to accomplish the purpose of a modification.

DOE argues nonetheless that the extension was necessary "to continue the protection of the land" from the operation of the land laws. Brief for the Appellants at 43. But the same can be said of every withdrawal. If continued "protection of the land" were all it took to justify an extension, then Congress' restrictive prescription in subsection 204(f) would be reduced to insignificance. Indeed, DOE itself indicated a different understanding; its application for the extension cites the specific purpose of testing. Subsection 204(c)(2)'s reporting requirement further manifests that DOE misconstrues the subsection 204(f) instruction. That provision requires that the withdrawal report include "a clear explanation of the proposed use of the land." 43 U.S.C. § 1714(c)(2)(1). The report must also include "an inventory and evaluation of the current natural resources uses and values of the site ... and how it appears they will be affected by the proposed use, including particularly aspects of use that might cause degradation of the environment." *Id.* § 1714(c)(2)(2). Congress would hardly have required a report giving a "clear explanation of the proposed use" as well as aspects of the proposed use which "might cause degradation of the environment" if it did not intend that the purpose of a withdrawal encompass a proposed use far more specific than "protection of the land."

One can debate whether the purpose of a withdrawal includes the protection of the land from the operation of the land laws. Even so, subsection 204(c) manifests that the purpose of the withdrawal necessarily includes as well, or at least, the use to which the land will be put. Here, the original purpose of the withdrawal did not include the use of the WIPP site to store hazardous materials on even a temporary basis, a "use that might cause degradation of the environment." *See id.* § 1714(c)(2)(2). Indeed, the original purpose, as described by DOE, specifically excluded waste storage. Consequently, Interior has

not met subsection 204(f)'s requirement that the extension be authorized only if "the purpose for which the withdrawal was first made requires the extension." *Id.* § 1714(f).

Our conclusion is further supported by comparing section 204's notification and reporting procedures for withdrawals with those for withdrawal extensions. When a withdrawal is initially authorized, the Secretary must notify both Houses of Congress of the withdrawal "no later than its effective date," *id.* § 1714(c)(1), and submit a report addressing the twelve issues set forth in subsection (c)(2). *See id.* § 1714(c)(2). When the Secretary extends a withdrawal, on the other hand, he must comply only with the notice provision of paragraph (c)(1). *See id.* § 1714(f). In our view, the different requirements are explained by subsection 204(f)'s demand that "the purpose for which the withdrawal was first made require[ ] the extension." *Id.* So long as the extension is granted for the original purpose, Congress does not need an additional report.

The reporting requirement is not just a formality. It is instead a fundamental part of the scheme by which Congress has reserved the right to disapprove administrative withdrawals. Unless a full report to Congress has been made at the time of withdrawal regarding the proposed use of the land and its effects, an extension is unauthorized. An extension must be justified by reference to the original purpose of the withdrawal. The extension here was not confined to "the purpose for which the withdrawal was first made." *Id.* § 1714(f). Because Interior modified the purpose and extended the withdrawal of the WIPP site to include storage of radioactive waste without *ever* reporting to Congress on the effects of this use, the district court properly concluded that the extension violated FLPMA.[15]

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[15]We recognize that Interior is not required to file a new report when it modifies a withdrawal. *See* 43 U.S.C. § 1714(c) & (j). Because the 1983 withdrawal was scheduled to expire before the

IV. Relief

We have affirmed the district court's ruling that DOE and Interior acted unlawfully in extending a withdrawal order for a purpose beyond that "for which the withdrawal was first made." *See* 43 U.S.C. § 1714(f). The purpose of the *1983 Land Order* was *to construct* the WIPP facility. That purpose cannot be stretched to include the temporary or permanent deposit of radioactive waste at the WIPP site.

The *1983 Land Order* left no doubt about its limitation. The order specifically did "not authorize the use . . . of the [withdrawn] lands . . . for the transportation, storage, or burial of any radioactive materials." Fully cognizant of the precisely confined authority under which the executive was operating, DOE's Secretary represented to Congress: "The withdrawal authorizes the construction of the full WIPP facility but does not allow for disposal or experimentation with nuclear waste."

DOE and Interior correctly observe that a federal court is obliged to fit each equitable remedy ordered to the nature of the violation found. *See* Reply Brief at 18; *cf. Weinberger v. Romero-Barcelo*, 456 U.S. 305, 313-19 (1982) (*upholding* district court's exercise of discretion to grant relief short of an immediate cessation order where nature of violation and purpose of statute under consideration did not *require* a pause in challenged activity); *Amoco Production Co. v. Village of Gambell*, 480 U.S. 531, 541-46 (1987) (similarly focusing on statute's underlying substantive policy in upholding district court's denial of preliminary injunction). The district court's permanent injunction here, however, meets the requirement that it

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planned completion of the test phase and an extension was therefore required, we are not confronted with the question whether Interior has the power to modify a withdrawal by changing its purpose without reporting to Congress on the subsection 204(c)(2) issues. We note only the concern a responsible administrator will have to construe a statute as a harmonious whole.

match "the necessities of the particular case." *See Hecht Co. v. Bowles*, 321 U.S. 321, 329 (1944). The injunction at issue simply holds DOE and Interior to the precisely limited permission they sought and received, and to the pledge to Congress they made — to construct a facility, but not to deposit waste until new authority so allows.

The Departments, heavily relying on *Romero-Barcelo*, 456 U.S. at 310, urge that the violation with which they are charged is merely "technical." We do not so regard their resort to a modification/extension escape from the more arduous course (legislation or, at least, a new administrative withdrawal order) Congress laid out. Congress declared in FLPMA:

> [I]t is the policy of the United States that —
>
> . . .
>
> (4) the Congress exercise its constitutional authority to withdraw or otherwise designate or dedicate Federal lands for specified purposes and that Congress delineate the extent to which the Executive may withdraw lands without legislative action.

43 U.S.C. § 1701(a)(4). By reducing, without right, the notice and opportunity for Congress to intervene, the agencies have not violated FLPMA in a trivial way. Rather, they have disregarded clear legislative directions on a matter fundamental to the Act. *Cf. Romero-Barcelo*, 456 U.S. at 314 (purpose and language of governing statute should inform district court's determination of appropriate remedy).

Congress retained for itself control over the use and disposition of federal land. The confinement of withdrawal order extensions to "the purpose for which the withdrawal was first made" is a prime means of securing that control. The stop order issued by the district court, accordingly, is a meet remedy in the circumstances this case presents.

The Departments have suggested no adequate substitute redress. Money damages, even assuming, *arguendo*, no government immunity bar, would not be responsive to

the environmental and separation of powers concerns complainants raise. *Cf. Amoco Production Co.*, 480 U.S. at 545 ("Environmental injury, by its nature, can seldom be adequately remedied by money damages and is often permanent or at least of long duration[.]"). Nor have DOE and Interior shown countervailing considerations that would justify leaving the complainants essentially remediless. DOE and Interior recite that "the progress of a project of critical national importance has been disrupted," and that "[m]illions of dollars ... have been lost as the facility stands ready to begin with the Test Phase but is unable to proceed because of the injunction." Brief for the Appellants at 74. As the Departments themselves acknowledge, however, *see id.* at 59, the permanent injunction merely bars them from taking an unauthorized shortcut. The district court's order does not inhibit activity at WIPP pursuant to a lawful administrative withdrawal or a congressional directive. Concerning unrecoverable costs, we have already noted that DOE is not simply marking time; it is currently conducting tests at WIPP, relating to assessment of the facility's performance, that do not involve the transportation or deposit of radioactive waste. *See supra* p. 14 and note 11; *cf. Amoco Production Co.*, 480 U.S. at 545 ($70 million that oil companies had committed to exploration would be lost without chance of recovery if court granted injunctive relief).

DOE and Interior spend many pages attacking the district court's preliminary injunction memorandum opinion, because it dwelt on, and, according to the Departments, improperly evaluated the risk that radioactive waste, once deposited, might prove irretrievable.[16] We do not reach that issue, for it did not enter the permanent injunction calculus. The preliminary injunction, we hold, has been superseded by the permanent stop order. By its very nature, the preliminary ruling was a tentative order that

[16]DOE does not deny, however, that retrieval of test-deposited TRU waste would be difficult and time consuming, nor has DOE indicated where the waste would be stored once retrieved.

persisted until, but not after, a definitive injunction was decreed. *See SEC v. First Financial Group of Texas*, 645 F.2d 429, 433 (5th Cir. 1981); *Louisiana World Exposition, Inc. v. Loque*, 746 F.2d 1033, 1038 (5th Cir. 1984).

Conclusion

For the reasons stated, we reverse the district court's decision to the extent that it rules in favor of the plaintiffs in the RCRA citizen suit, but affirm that court's ultimate holding that the Secretary of the Interior exceeded his authority under FLPMA. We correspondingly affirm the district court's final order permanently enjoining DOE and Interior from proceeding with Public Land Order 6826 "insofar as [that order] authorize[s] the introduction of transuranic nuclear waste into ... the state of New Mexico."

It is so ordered.

9. 1991-92 Congressional action

a. Jan. 10, 1991: Rep. Richardson introduces bill to suspend effectiveness of administrative land withdrawal.

b. April 11, 1991: DOE - sponsored bill introduced provides:

   A. DOE to develop and implement test plan.

   B. DOE to determine when WIPP may be used for disposal.

   C. DOE to determine whether it is in compliance with EPA disposal standards; EPA to comment only.

c. April 16, 1991: House Interior Committee, subcommittee on Energy & the Environment hearing (Washington, D.C.). Gov. King and Attorney General Udall testify in favor of legislation requiring WIPP to meet EPA disposal standards before waste is emplaced.

d. May 16, 1991: Rep. Richardson announces he will not co-sponsor bill introduced by Rep. Skeen, which would allow introduction of 1% of WIPP capacity for tests prior to compliance with disposal standards.

e. May 23, 1991: HR. 2637, Kostmayer-Miller bill, appears in draft; the basis from which most subsequent House bills emerged.

   A. EPA must issue new radioactive waste disposal standards within 3 mos. (draft), 9 mos. (final).

   B. EPA must determine that tests are necessary to comply with disposal standards.

   C. DOE may introduce up to 1/2% of WIPP capacity for tests.

   D. EPA must approve retrieval plan, including location for interim storage.

   E. Ongoing EPA supervision of test and disposal phases.

   F. Ten year withdrawal only; further legislation needed for disposal phase.

f. June 4, 1991: Senator Bingaman and Domenici's offices commence work on a draft WIPP land withdrawal bill, in conjunction with state officials and DOE. Various formulas are proposed to regulate the introduction of waste for tests prior to a demonstration of compliance with EPA disposal standards.

g. June 12, 1991: HR 2637, Kostmayer-Miller bill, passed out of subcommittee. After much discussion, mostly nonpublic, a provision requiring State to issue a RCRA permit before waste is received is not included. Bill now contains approximately $300 million in compensation to State.

h. June 13, 1991: Synar subcommittee of House Committee on Government Operations holds oversight hearing. Entire Expert Panel on the Life of Panel One testifies on room stability problem.

i. June 18, 1991: DOE Sec. Watkins writes Rep. Richardson, asking committee to fulfill its promise to send a bill to the House floor. Raises prospect of administrative land withdrawal.

j. June 18, 1991: House Armed Services Defense Nuclear Facilities Panel holds hearing on WIPP readiness.

k. June 26, 1991: House Interior Committee markup of subcommittee draft of HR 2637. Committee includes requirement of post-retrieval storage location in retrieval plan, also certification of room stability. Again, no provision on RCRA permit requirements. H.R. 2637, House Interior bill, provides:

    A. Test plan reviewed by EPA, approved only if necessary to determine that WIPP complies with EPA disposal standards.

    B. Retrieval plan must designate interim storage locations; EPA must approve.

    C. Final disposal standards must be in effect before waste is brought for tests.

    D. Test waste limited to 1/2% of capacity.

    E. Bureau of Mines must certify that test rooms will remain stable for the duration of tests.

    F. EPA must certify compliance with disposal standards before waste may be disposed of.

G. Withdrawal limited to 10 years.

H. Congress must authorize disposal.

I. EPA has 9 months to issue disposal standards.

l. July 23, 1991: Sec. Lujan remarks to press that he could authorize administrative withdrawal of the WIPP site within a week. Sen. Bingaman announces that he and Sen. Domenici are "nearing completion" of a bill.

m. July 89 - Aug. 2, 1991: Land withdrawal bill drafting sessions at Sen. Bingaman's office, including representatives of State, EEG, and NMAG office.

n. Aug. 2, 1991: S. 1671 introduced (Domenici-Bingaman bill). Provides, inter alia:

A. Tests with radioactive waste limited to 0.5% of WIPP capacity.

B. Data to be useful, timely for use in determination of compliance with disposal standards.

C. Prior review and comment concerning experimental plan by EPA, State, NAS, EEG. Approval not required.

D. EPA to issue draft disposal standards in 3 months, final in one year. If standards are not issued, 1985 standards become applicable.

E. EPA to issue regulations concerning demonstration of compliance with disposal standards within one year.

F. EPA to determine whether WIPP complies with disposal standards within 7 years.

o. Aug. 14, 1991: Sens. Domenici and Bingaman write to Sec. Watkins, asking him to desist from administrative withdrawal until the end of the 1991 session.

p. Sept. 19, 1991: DOE Sec. Watkins writes to House Interior Chairman Miller, stating the he will withhold his request for administrative land withdrawal until September 27 to reach agreement with the Senate Energy Committee. Both House and Senate bills are "too prescriptive." If agreement is reached with Senate, can withhold request to DOI for "an additional brief period"; will assess the situation again in early November.

q. Sept. 19, 1991: Sens. Domenici and Bingaman announce that they will "do all we can to oppose an administrative withdrawal."

r. Sept. 21, 1991: Sens. Domenici and Bingaman, as members of the Senate Energy Committee, hold WIPP hearing in Albuquerque.

s. Oct. 2, 1991: DOE Sec. Watkins insists in discussions with Sens. Domenici and Bingaman that S. 1671 must permit up to 1% of WIPP capacity to be used for tests. Sen. Domenici concurs; Sen. Bingaman does not.

t. Oct. 28, 1991: Senate Energy Committee reports S. 1671 WIPP bill with following changes since introduction:

   A. Review periods for test plan shortened to 30 days.

   B. Test waste permitted up to 1% of WIPP capacity, also allowed for confirmation purposes.

   C. Pre-enactment review of test plan is authorized.

   D. EPA disposal standards to be issued within 2 year.

   E. EPA criteria for determination of compliance to be issued within 2 years.

   F. Compliance must be determined within 8 years.

u. Oct. 30, 1991: DOE Sec. Watkins writes to House Energy & Power Subcommittee Chairman Sharp, stating that HR 2637, as reported by Interior Committee, contains numerous unacceptable provisions, e.g., requirement that EPA issue disposal standards before tests begin, limits on test phase quantity to 1/2%, temporary withdrawal, retrieval plan with storage location. DOE would recommend that President Bush veto such a bill. Attachment states that room stability cannot be certified.

v. Nov. 5, 1991: S. 1671 passed by Senate.

w. Nov. 7, 1991: House Subcommittee on Energy & Power holds hearings on HR 2637.

x. Nov. 14, 1991: House Subcommittee on Energy & Power reports HR 2637 to full committee.

y. Nov. 20, 1991: House Energy Committee marks up and reports HR 2637, based on Kostmayer-Miller bill, and:

A. Requiring EPA determination of test plan necessity to be carried out by APA rulemaking.

B. Requiring EPA approval of retrieval plan to be carried out by APA rulemaking.

C. Requiring EPA determination of compliance with disposal standards to be carried out by APA rulemaking.

D. Limits financial aid to State to $40 million already appropriated.

E. OSHA certification by rulemaking that emergency response training complies with 29 CFR §1910.120.

F. Authorization for $10 million 1992 appropriation to EPA to fund functions, additional amounts in later years.

z. Nov. 21, 1991: House Armed Services Committee marks up and reports HR 2637, adopting amendment in the form of a substitute paralleling S. 1671 and adding:

A. DOI certification of room stability for successive 2-year periods.

B. EPA certification that test waste will be retrievable for successive 2-year periods.

C. Biannual EPA reviews during disposal phase to ensure compliance with all environmental laws.

D. Limits test waste to 0.55% of WIPP capacity.

aa. Nov. 23, 1991: Reps. Miller, Kostmayer, Spratt, Richardson meet and agree to put House Energy version of HR 2637 to floor vote with two amendments allowed to be offered under a closed rule:

A. Requirement that facility meet EPA disposal requirements before any waste is introduced.

B. Substitute House Armed Services Bill.

Reps. Sharp, Synar, Dingell have not approved the agreement.

bb. Nov. 25, 1991: Rep. Sharp will not agree to proposal to bring House Energy bill to the floor with 2 amendments. DOE remains insistent that at least 1% of capacity be available for tests, that it cannot accept the requirement of room stability certification or temporary withdrawal. DOE will not meet with House members. House, Senate staffs meet, conclude that no agreement on a bill is possible in the short term. Senators write to House Committee Chairmen, expressing hope that discussions will continue.

cc. Feb. 5, 1992: Gov. King releases press statement that, after meeting with DOE officials and the State Delegation, he is hopeful a WIPP bill will reach the floor of the House early in the current session.

dd. April 9, 1992: Gov. King writes to House Energy Chairman Dingell, seeking assistance in passage of land withdrawal legislation. Suggests that legislation allow up to 1.5% of WIPP's waste capacity for tests.

ee. April 22, 1991: DOE Sec. Watkins writes to House Interior Chairman Miller, stating that time is of the essence: DOE has been prepared since October 1991 to begin the test program, and without acceptable legislation Watkins will be forced to lay off workers.

ff. May 29, 1992: House Armed Services Committee submits its bill to House Rules Committee as a proposed floor amendment to the Defense Department authorization bill. Chairmen Dingell and Miller both offer to testify against such a proposal but register concern that House Rules will allow the amendment.

gg. June 1, 1992: House Armed Services agrees to withdraw its bill as a proposed amendment to the Defense Department authorization bill in exchange for agreement to take both the Armed Services and Energy Committee bills to the House floor with possible other amendments. (e.g., requiring EPA standards to be met before tests).

hh. June 1, 1992: DOE negotiating with House Interior Committee about a "deal" under which the test phase could begin before EPA issues disposal standards, up to 1% of capacity could be used for tests, and a permanent withdrawal would be made. DOE proposes RCRA exemption.

ii. June 11, 1992: DOE meets with several House committee staffs; DOE cannot accept temporary withdrawal, EPA oversight of test phase, APA procedures, or reinstatement of 1985 EPA standards.

jj. June 15, 1992: DOE terminates negotiations with House committees about an agreed bill.

kk. June 17, 1992: National Academy of Sciences WIPP Panel issues report, concluding that "the plan to conduct a large number of expensive bin tests and to terminate the experiments after five years has no discernible scientific basis. The possibility that the underground bin tests, as currently planned without brine sampling, will contribute to advances in the understanding of the overall long-term performance of a repository at WIPP is small."

ll. June 18, 1992: Three House Committees agree on compromise WIPP bill, basically the House Energy bill with:

A. Permanent withdrawal, subject to legislative veto period.

B. EPA to issue final disposal standards in six months.

Floor voting rule is to allow the "EPA standards" amendment.

mm. June 18, 1992: League of Conservation Voters sends letter to all House members, stating that the vote on the amendment requiring EPA standards to be met before waste is introduced may be included on the League's "National Environmental Scorecard."

nn. June 22, 1992: Asst. Sec. Leo Duffy of DOE writes to Dr. Frank Press, President of the National Academy of Sciences, asking NAS to "clarify its position on the need for underground testing at the WIPP."

oo. June 23, 1992: Dr. Frank Press, President of the National Academy of Sciences, writes to Leo Duffy, DOE Secretary Watkins, and three House Committee Chairman, assuring them of the WIPP panel's "continued support for an underground testing program with TRU wastes at WIPP."

pp. June 24, 1992: House chairmen and subcommittee chairmen send "Dear Colleague" letter to House members, stating that they will oppose any amendments to the agreed-on compromise bill.

qq. June 25, 1992: Parts of Sandia National Laboratories' 1992 test plan become public. Sandia suggests that only 12 bins of waste be introduced, unlike previous "dry bin" test plan. New plan would also involve new waste

characterization criteria. Alcove tests not recommended since not "cost-effective."

rr. June 26, 1992: Rod Ewing of NAS WIPP panel writes to Dr. Frank Press, President of NAS, disagreeing with Press's support of underground tests with radioactive waste.

ss. July 21, 1992: House passes compromise WIPP bill, rejects EPA standards amendment by vote of 148 to 253.

tt. July 30, 1992: Senate appoints conferees, including Sens. Johnston, Domenici, and Bingaman.

uu. Aug. 5, 1992: First meeting of House-Senate conference. Issues referred to staffs for discussion.

vv. Aug. 11, 1992: Second meeting of House-Senate conference. After inconclusive staff discussions, Senate offers proposal for EPA approval of test plan, simultaneous with issuance of disposal standards and without notice and public comment. Also, proposed retrieval plan would omit interim storage locations. EPA is to act upon the test and retrieval plans within six months. Any judicial review is limited to the Courts of Appeals. House rejects the offer.

State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
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BRUCE KING
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STATE OF NEW MEXICO'S

WIPP TRANSPORTATION SAFETY PROGRAMS

Presented to

State Bar of New Mexico
1992 Annual Convention
Ruidoso, New Mexico

by

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Introduction

Within the next year or so, the U.S. Department of Energy (DOE) may begin shipping defense transuranic (TRU) wastes to the Waste Isolation Pilot Plant (WIPP), a mined geologic repository in southeastern New Mexico. Over 28,000 truck shipments, originating at 10 DOE sites throughout the nation, are ultimately destined for the WIPP facility. The transportation of these contact- and remote-handled radioactive wastes will traverse at least 20 states and the lands of 22 independent Indian tribes during the 25-year operational life of the project.

New Mexico is unique among all states along the WIPP corridor in that 1) all transportation routes from the various DOE waste generating/storage sites converge in our state; and 2) over 1,000 miles of highway within our borders are designated as routes to be used for the WIPP shipments--more miles than any other state. Thus, the transportation-related impacts of the project on New Mexico will be greater than that of other WIPP corridor states.

The State of New Mexico, in conjunction with DOE and other affected state, tribal, and local governments, has been actively planning to meet the new demands created by this unprecedented shipping campaign. The primary entity through which this planning activity has been conducted is the N.M. Radioactive Waste Consultation Task Force. [*see* Radioactive and Hazardous Materials Act, as amended, Sections 74-4A-2 through 14 NMSA 1978]

The primary goal of the Task Force's cooperative planning effort is the development and implementation of a comprehensive, effective WIPP transportation safety program focusing on accident prevention, emergency response preparedness, and public awareness and involvement. The collaborative program discussed herein should greatly minimize the attendant transportation risks and concurrently enhance public confidence in the safety of WIPP shipments.

Program Descriptions and Accomplishments

ACCIDENT PREVENTION

A. Ensure High-quality Drivers and Carrier Compliance with Contract and Regulatory Requirements

Because of the large number of shipments projected over WIPP's 25-year life (i.e., almost 30,000 shipments) and the hazardous nature of the cargo, it is imperative that the transportation of TRU wastes to WIPP be made as safe as possible. We sincerely believe that most truck accidents can be prevented by highly qualified, well-trained drivers and diligent vehicle maintenance. The DOE's contract carrier and its employees will therefore play a pivotal role in ensuring safety of these shipments. While we recognize that human error cannot be eliminated, it can be significantly reduced through strict adherence to all applicable transportation regulations, procedures, and guidelines.

The State of New Mexico has assumed the lead role among the WIPP corridor states in addressing this issue. To ensure high-quality drivers and carrier compliance with all contract and regulatory requirements, we established and implemented an "audit" program. Consultation and cooperation with the DOE, its carrier, and other WIPP corridor states is an important part of the program's continuing development. This transportation safety program is housed within the N.M. Taxation and Revenue Department's Motor Transportation Division (MTD), the division responsible for ensuring motor carrier safety within our borders.

The program is comprised of three phases: pre-audit, initial audit, and ongoing audits.

a. Pre-Audit Activities

1) A checklist was developed for evaluating driver qualifications and vehicle maintenance based on applicable federal/state regulations and exiting contract requirements, including the following:

* Driver Qualification requirements, 49 CFR Part 391
* Commercial Drivers License requirements, 49 CFR Part 383
* Routing and training requirements, 49 CFR Part 177.825
* Contractual and other requirements, as per the DOE/Dawn Enterprises WIPP Transportation Contract and corresponding Management Plan

2) Reviewed how the training needs of the carrier and its drivers were being met. A draft plan for monitoring training was developed.

3) Criteria and standards for evaluating the carrier's recordkeeping procedures were developed.

4) Reviewed pre-audit activities and products with other DOE, other states, and Indian tribes at quarterly meetings of the Western Governors' Association (WGA) Technical Advisory Group for Nuclear Waste Transportation.

b. Initial Audit Activities

1) Preliminary audits of the carrier's driver qualification, training, and vehicle maintenance files were conducted. This activity provided an assessment of the carrier's recordkeeping procedures and an evaluation of the carrier's drivers. It also served to test the checklists.

2) Performed inspections on all of the DOE's trailers for transporting the wastes to WIPP; and on "dry-run" simulated shipments in 1991 and 1992.

3) Monitored formal and informal training being conducted or contracted out by the carrier.

4) Reported on the initial findings of the audit and trailer inspections, and revised the checklists.

c. On-going Audits

The audit/inspection activities referenced above will continue to be conducted on a quarterly basis, with all findings and recommendations shared with other states, Indian tribes, local governments, and the public upon request.

B. Conduct Independent Inspections of Drivers, Vehicles and Cargo

The State of New Mexico believes the safety of WIPP shipments can be significantly enhanced through the carrier's strict compliance with all applicable contract and regulatory requirements (e.g., the Federal Motor Carrier Safety Regulations). In particular, we are interested in coordinating with other corridor states, the DOE and its carrier, and the DOT to ensure diligent vehicle maintenance and recordkeeping; driver compliance with hours-of-service/record-of-duty status requirements; proper marking and labeling of the package, and placarding of the vehicle; and independent oversight/inspection of all transport operations.

To facilitate this effort, New Mexico and several other WIPP corridor states are participating in a pilot study entailing the development and application of standard vehicle inspection criteria/procedures for TRU radioactive waste shipments. This study is being coordinated by the Commercial Vehicle Safety Alliance (CVSA) pursuant to a cooperative agreement with the DOE. [*see* U.S. Department of Energy, Chicago Operations Office, "Pilot Study of the Draft Vehicle Inspection Procedures," Cooperative Agreement No. DE-FC04-86CH10305, September 1, 1989] The project has provided inspection criteria/procedures (both mechanical and radiological) and a training curriculum that can be implemented by the WIPP corridor states to promote the uniform and consistent inspection of vehicles carrying TRU wastes to the repository.

The CVSA has established four committees to assist in planning and implementing the study: 1) Research Design; 2) Inspection; 3) Training; and 4) Data Analysis. The State of New Mexico is currently represented on the Research Design and Inspection Committees, with future participation in the activities of other CVSA committees anticipated.

The State agency involved in the WIPP shipment inspection program is the Motor Transportation Division (MTD) of the N.M. Taxation and Revenue Department. It will conduct both mechanical and radiological inspections of the WIPP shipment. The Hazardous and Radioactive Waste Bureau of the N.M. Environment Department (NMED) is providing technical assistance in the radiological inspection component of the program. Following are the primary accomplishments that have been achieved to date:

a. Participated in the meetings and activities of the DOE/CVSA Research Design Committee, producing a report entitled "Research Design for the CVSA Pilot Study of Highway Vehicle Inspection Procedures for the Transportation of Radioactive Materials," February 1, 1991. This document will be used to guide the pilot study of WIPP shipments.

b. Assisted CVSA and the Conference of Radiation Control Program Directors (CRCPD) in the development of mechanical and radiological inspection criteria/procedures for WIPP.

c. Planned for the training of State inspectors in the use of WIPP-specific inspection criteria, procedures, and equipment.

d. Purchased the requisite supplies and equipment to accomplish initial inspections of WIPP shipments.

C. Keep WIPP Shipments Off the Road during Inclement Weather and other Adverse Driving Conditions

To minimize the risk of WIPP transportation accidents stemming from inclement weather, road construction activities, and other hazardous driving conditions, New Mexico and the other WIPP corridor states developed procedures for the assessment and handling of such adverse conditions. [*see* Western Governors' Association, WIPP Transport Advisory Group, "Procedures and Protocol for Bad Weather and Road Conditions for WIPP Shipments," February 1991; Principal Investigator: Richard C. Moore, P.E., Consultant to the State of Wyoming, Cheyenne, Wyoming]

The referenced procedures and protocols focus on the optimization of shipping schedules, shipment dispatching, and effective coordination/communication between DOE and those states along the WIPP transportation corridor. The DOE has incorporated these recommended guidelines in its own set of procedures for the WIPP shipping campaign.

The State of New Mexico also participated in other related activities of the WGA WIPP Transport Advisory Group, including the review of DOE shipping schedules; and the compilation of information regarding planned highway construction activity along WIPP routes in New Mexico. Work was also initiated on the development of procedures for the timely exchange of information on imminent road closures/re-openings due to changing weather conditions. These procedures outline a process for federal-State coordination in the handling of WIPP shipments impacted by such closures/re-openings en route to the repository.

D. Apply Established Criteria in Identifying and Selecting Safe Parking Areas for WIPP Shipments

Once dispatched from a DOE waste generating or storage facility, a WIPP shipment may encounter adverse weather conditions, mechanical failures, or other unanticipated problems. In such cases, continued travel may be impossible or inadvisable.

Because emergencies can and do occur, New Mexico and other western WIPP corridor states developed criteria and guidelines for the selection of safe parking areas. [*see* Western Governors' Association, WIPP Transport Advisory Group, "Criteria for Safe Parking Areas for WIPP Shipments," June 1990, and "Guidelines for Selecting Parking Areas for WIPP Shipments," January 1991; Principal Investigator: Lori E. Friel, Attorney, Western Interstate Energy Board, Denver, Colorado] Copies were provided to DOE and its carrier for their use.

These criteria and guidelines delineate a three-tier hierarchy for selecting safe parking areas: 1) predesignated U.S. Department of Defense (DOD) sites; 2) specific types of facilities (e.g., ports-of-entry, National Guard armories), possibly but not necessarily predesignated by a state; and 3) locations identified through application of a series of "avoidance factors," including highly populated areas, residential neighborhoods, and schools.

At present, there are a limited number of predesignated areas for the parking of WIPP shipments along the transportation routes. These parking areas were established as a result of a working agreement between the DOE and the DOD [*see* "Interagency Agreement between the United States Department of Energy and the United States Department of Defense for the Temporary Parking of TRU Waste Shipments at Military Installations," October 2, 1989] Only two such DOD facilities for safe parking are located along WIPP routes in New Mexico (i.e., Kirtland Air Force Base in Albuquerque and Fort Wingate Army Depot near Gallup). For this reason, personnel in the State Highway and Transportation Department are investigating other potential safe parking areas along the initial WIPP route for possible recommendation to DOE and its carrier.

It is important to note that federal regulations ultimately govern any such route deviations for "emergency" conditions. The applicable regulations, 49 CFR 177.825(b)(2), state that in most cases route deviations must be made in accordance with specified radiological risk minimization criteria. Notwithstanding the primacy of federal regulatory authority, the State of New Mexico has requested that the WIPP carrier contact the New Mexico State Police for concurrence and/or additional guidance regarding the use of any proposed safe parking areas.

E. Ensure Advanced Notification of Shipments

The State of New Mexico has worked out an advanced notification procedure with the DOE. This procedure consists of a monthly written (mail/fax) schedule of projected shipments; a seven-day advanced notice of each shipment posted on the TRANSCOM system (described below); and a direct phone call from the TRANSCOM Center in Oak Ridge, Tennessee, when a shipment is 30 minutes from any New Mexico border. These notices will be made directly to the

Headquarters Communications Center at the N.M. Department of Public Safety in Santa Fe for further dissemination to affected agencies.

In addition, the State has initiated contact with local response personnel along the WIPP route to determine and address their advance information requirements regarding WIPP shipments.

F. Provide Access to Information on Shipment Status

In the mid-1980s, the DOE initiated development of a transportation tracking system in response to three institutional concerns about shipments of large quantities of radioactive materials: routing, prenotification, and emergency response.

This Transportation Tracking and Communications System (TRANSCOM) combines the technologies of satellite monitoring and communications, computer database management, user networks, and commercial telephone service. The system is designed to provide both DOE and approved non-DOE users (e.g., federal TRU waste storage/generator sites and State/tribal governments, respectively) easy access to near real-time information on shipment location and other associated parameters.

To date, the State has established two TRANSCOM monitoring stations: one at the Santa Fe office of the N.M. Environment Department (NMED); and one at the Headquarters Communication Center of the N.M. Department of Public Safety (DPS), also located in Santa Fe. New Mexico has expended federal funds for costs incurred in TRANSCOM system operations.

Through the WGA WIPP Transport Technical Group, the State also reviewed the structure of the TRANSCOM system and the software programs; identified potential/existing problem areas; and provided recommendations for system enhancement. Such constructive feedback has already resulted in the upgrading of the TRANSCOM software and will continue to facilitate the development and operation of an efficient, reliable shipment notification system.

G. Designate Selected New Mexico Highways as WIPP Routes

In September 1989, the Office of the New Mexico Attorney General made a determination that the State "has not formally designated preferred transportation routes as contemplated by U.S. Department of Transportation regulations governing the transportation of radioactive wastes." [*see* Letter of September 18, 1989, from Jonathan Barela, Director, Legal Counsel Division, Attorney General's Office, to Anita Lockwood, Chairman, N.M. Radioactive Waste Consultation Task Force]

The applicable DOT regulations (Title 49, Code of Federal Regulations, Section 177.825) define a "preferred route" as "...either or both an Interstate System highway for which an alternative route is not designated by a State routing agency...or a State-designated route selected by a State routing agency" in accordance with certain conditions and guidelines. Moreover, the DOT regulations specifically note that a State routing agency may designate preferred routes as an alternative to, or in addition to, one or more Interstate system highways. In New Mexico, the State Highway Commission (SHC) is the State routing agency.

In early 1991, the SHC initiated the route designation process in New Mexico. It scheduled a series of public hearings for June to solicit both oral and written testimony on the proposed designation of WIPP transportation routes. After considering all of the testimony presented during the comment period, the SHC rendered its decision on August 14, 1991. [*see* "New Mexico State Highway and Transportation Rule Designating Highway Routes for the Transport of Radioactive Materials," SHTD Rule No. 91-3, filed with the State Records Center on August 23, 1991] The SHC designation was subsequently filed with the U.S. Department of Transportation in Washington, D.C., in accordance with federal law, becoming effective on September 3, 1991. In general, the use of these SHC-designated routes should minimize the overall radiological risk to the citizens of New Mexico.

EMERGENCY PREPAREDNESS

H. Ensure the Provision of Mutual Aid among DOE and Corridor States

Mutual aid agreements have the potential to significantly enhance the emergency response capabilities of New Mexico and other WIPP corridor states. Such agreements maximize the availability and efficient use of both human and physical resources in the event of a WIPP-related accident. Through sharing of information, personnel and equipment, the states and the DOE can collectively provide a level of response that may otherwise be impossible to finance and support on an individual basis.

In accordance with the "Federal Radiological Emergency Response Plan", the DOE is the "Cognizant Federal Agency" in the event of a WIPP accident at or en route to the repository. [*see* Federal Register, Vol. 50, No. 217, November 8, 1985, p. 46542] Consequently, it would assume primary responsibility for coordinating all federal support; providing radiological and monitoring assistance to State/local governments in the assessment of an accident (e.g., technical advice, personnel, equipment); and decontaminating the site at its expense.

However, the FRERP does not provide the level of detail desired by the State of New Mexico. Specific information pertaining to such areas as notification, available federal resources, and field coordination procedures was sought by the State.

For this reason, the State deemed it appropriate and desirable to review the Regional Radiological Assistance Plan (RAP) of the DOE Albuquerque Operations Office and to discuss the issue of mutual aid with both DOE and adjacent states. The N.M. Department of Public Safety (DPS) initiated the review and discussions due to its statutory authority in this area. [*see* Section 74-4B-4E. NMSA 1978] As a result, the procedures and protocol for rendering such aid have been clarified, providing all parties a better understanding of what is expected should a WIPP emergency arise.

I. Emergency Response Planning, Guidance and Procedures

The State of New Mexico has developed and adopted a "Hazardous Materials Emergency Response Plan," pursuant to the authority of the New Mexico Emergency Management Act, as amended. [*see* Sections 74-4B-1 through 12 NMSA 1978] This Plan, along with corresponding procedures for its implementation, serve as a guide for use by New Mexico emergency response personnel in managing, coordinating, and controlling a hazardous materials accident. It has been implemented successfully on numerous occasions since 1984.

Notwithstanding the existence of this plan and its corresponding set of procedures, the State believed it prudent to develop WIPP-specific guidance for responders, listing those emergency response procedures to be followed in the event of a transportation accident involving radioactive materials of the type and nature destined for the repository. Such guidance has been developed, with tabletop and field exercises used to test those State agency personnel who would have a role in applying the guidance and responding to a WIPP accident. [*see* "New Mexico WIPP Transportation: Accident Emergency Response Guide" and the "WIPP Transportation Operations Procedures Manual", developed by the N.M. Department of Public Safety, Emergency Management Bureau, in coordination with other State agencies]

The intent of this guidance, which will be reviewed and updated on a periodic basis, is to facilitate a timely and proper response to WIPP transportation emergencies, thereby enhancing protection of both responders and members of the general public.

Another element in the State's program planning effort to adequately prepare for a WIPP transportation accident is the identification and listing of available emergency response resources, including both personnel and equipment, in police/fire departments and hospitals along the WIPP route. New Mexico therefore initiated the compilation of such resource information on a computer database system known as the Emergency Information System (EIS).

This system was subsequently established as the standard software system for all State agencies in their respective emergency management efforts. [*see* Executive Order 91-09, signed by Governor Bruce King on April 22, 1991] Moreover, the EIS both complements and supplements the TRANSCOM system which the State will utilize. Initial focus has been on the WIPP route to be used for shipments during the Test Phase. The N.M. Department of Public Safety is spearheading this effort. Additional software packages have been purchased for other State agencies with roles in emergency response (i.e., the Department of Health, Environment Department, and the State Fire Marshal's Office).

J. Emergency Response Training/Retraining

The State of New Mexico recognizes that an adequate, effective response to any WIPP transportation emergency requires in-depth planning and coordination. Training of emergency response personnel -- in both the classroom and the field -- is a necessary and integral component of this effort.

To date, the DOE has provided for the requisite training and retraining of first responders and other emergency management personnel, including those at hospitals along the WIPP route. This training was initiated in 1988 and consists of a suite of seven courses, six taught by Westinghouse employees and one by representatives of the Radiation Emergency Assistance Center/ Training Site (REAC/TS) in Oak Ridge, Tennessee, an internationally recognized entity in responding to radiological emergencies.

The State of New Mexico coordinated closely with DOE's contractor, Westinghouse, in 1) reviewing and revising course materials, as appropriate and necessary; 2) scheduling the training courses, including the selection of locations, dates, and times; 3) maximizing attendance at the courses (e.g., through reimbursement of participants' travel expenses and the scheduling of courses in the evening and on weekends); and 4) ensuring a thorough understanding of WIPP emergency response procedures and protocol.

To complement and reinforce the knowledge gained through the WIPP training, the State believes it prudent to conduct periodic, WIPP-specific emergency response tabletop/field exercises. Only through such tabletop/field exercises can the State test and evaluate its emergency response capabilities as they relate to WIPP shipments.

In anticipation of developing and implementing a State-directed exercise program for New Mexico, representatives of the N.M. Radioactive Waste Consultation Task Force participated in WIPP emergency response exercises coordinated by the State of Colorado in 1990. Preliminary planning of the New Mexico exercise program was then initiated. In July and August 1991, tabletop exercises were held in preparation for the conduct of a full-blown field exercise. That WIPP-specific field exercise, involving local, State and federal emergency response personnel, occurred in Artesia on September 14, 1991. Another is planned for this year. All WIPP training courses and the conduct of tabletop/field exercises are to continue over the operational life of WIPP.

The State of New Mexico is committed to improving emergency response preparedness for a WIPP accident through the solicitation of outside professional expertise and independent review panel oversight. Toward that end, a "WIPP Medical Working Group" has been established. Emergency room physicians, nurses, and other appropriate medical personnel are represented on the group, as are DOE and State of New Mexico officials.

To date, a 9-point plan aimed at improving WIPP emergency medical preparedness has been developed. This plan calls for the execution of cooperative agreements among hospitals along the WIPP route; the distribution of DTPA (a chelating agent useful in treating individuals who may have ingested TRU radionuclides) to hospitals; the development of WIPP-specific radiological response plans for implementation by hospital personnel; the provision of additional WIPP-specific supplies, equipment, and training, including the conduct and evaluation of drills in each hospital's emergency room; and federal funding support to defray those costs incurred by hospitals in preparing for a WIPP emergency. The Primary Care and Emergency Medical Services Bureau of the N.M. Department of Health, with assistance from the State Environment Department, is the "lead" agency in this effort.

K. Procure and Maintain Emergency Response Equipment

Over the past few years, the State of New Mexico has acquired and distributed emergency response equipment which can be used effectively in a WIPP transportation emergency (e.g., emergency response kits, radiation detection and protection equipment, self-contained breathing apparatus, portable air supply compressors).

However, because of the many miles of New Mexico highway to be used for WIPP shipments and the numerous small communities along the transportation route, there are additional equipment needs for personnel and organizations who may be involved in handling a WIPP emergency (e.g., those involved in fire suppression, search and rescue, law enforcement, emergency medical management).

Hence, the N.M. Department of Public Safety, in coordination with the Fire Marshal's Office, the Department of Health, and the Environment Department, conducted a preliminary inventory of existing emergency response/medical equipment along New Mexico WIPP route to be used during the Test Phase. As a result of this effort, additional equipment was placed out along the WIPP route for use by the various emergency response organizations and personnel. Periodic assessments of WIPP equipment requirements are planned throughout WIPP's operational life.

PUBLIC INFORMATION/EDUCATION

L. Public Information, Education & Coordination

There are numerous State agencies which have roles in the monitoring, assessment, and regulatory oversight of various aspects of the project, including transportation operations. Others are involved in the planning, engineering, construction, and designation of highways to be used as WIPP transportation routes. Still others are working to ensure the State is adequately prepared for any WIPP-related emergency.

In light of all the information being generated on WIPP and the involvement of so many project participants, it is difficult to keep abreast of corresponding activities, public hearings/meetings, and actions taken by these entities. Moreover, the State believes some citizens' questions are not being answered properly, are being misdirected, or are not getting asked. Hence, there is a real need to keep up-to-date and compile relevant information on key WIPP issues, subsequently presenting it in a form which is readily understandable to the general public.

There is also a pressing need to reach out to New Mexico citizens--especially those in communities on the WIPP routes--and discuss/address with them face-to-face issues of concern surrounding the Project. We believe this can be accomplished effectively through continued public meetings of the N.M. Radioactive Waste Consultation Task Force and the interim legislative Radioactive and Hazardous Materials Committee; and through both active and passive public awareness programs (e.g., direct interaction with communities to solicit their participation/involvement in addressing WIPP concerns).

11. Next Steps: RCRA Permit Development and Enforcement
Presented by Gini Nelson

I. Interim status issues aside, a permit under the HWA is required for the following reasons:
   A. The HWA provides the authority to regulate the hazardous component of mixed waste, i.e., mixed hazardous and radioactive waste.
   B. Congress and the New Mexico Legislature intend that all facilities get permits and that operations under interim status be limited.
      1. Interim status regulations are general and are not tailored by the regulatory agency to a specific site or operation.
         a. For example, NMED issued a hazardous waste permit to Los Alamos National Laboratory (LANL) in 1989 that contained three specifically developed conditions applicable to an on-site incinerator in which LANL intended to incinerate hazardous waste.
            (1) LANL also intended to incinerate radioactive waste, and mixed waste, in the same incinerator.
            (2) Following the public hearing on the proposed permit, at which concerns were expressed about the possibility of releases of radioactivity from the hazardous waste burns, NMED added to the final permit the following special conditions pertaining to the solely hazardous waste burns:
               (a) that the permittee survey each batch of waste to determine its radionuclide content, i.e., to verify that it was not radioactive;
               (b) that the permittee monitor radioactivity from the incinerator's exhaust stack during any hazardous waste burn, i.e., to determine whether the hazardous waste burn was a vehicle for the release of radionuclides; and
               (c) that the permittee assure that exhaust gas radioactivity measured during operation under the permit

does not exceed certain background levels, i.e., that if the burn was causing a release of radionuclides, the burn had to be stopped until the problem, whatever it was, was corrected.

2. Further, interim status regulations do not impose the same requirements for the protection of the environment, and for the monitoring of the impact to the environment, as the permitting regulations.
   a. For example, the permitting standards include:
      (1) location standards that limit siting a TSD facility near active faults or in floodplains, and
      (2) incorporate a stringent ground water protection program (Subpart F) to insure that corrective action is taken if the TSD facility ever causes an increase in ground water contamination of any of the substances listed in Appendix VIII to 40 C.F.R. Part 261.
3. Thus, operation under interim status is less stringently regulated and less protective of health, safety and the environment than operation under a permit.

II. Substantive requirements under a permit. A permit must include:
   A. Requirements for the operation of the facility which provide for the protection of ground water, surface water, air quality, and soil.
      1. Depending on the proposed operation of the facility, the requirements could include management of waste only in areas that are bermed to prevent contact with precipitation run-on or only on a concrete pad to prevent contact of the waste material with underlying soil.
   B. A monitoring program, where appropriate, to assess impact to the environment.
      1. The requirements for the monitoring program would be based on the proposed operation of the facility, and could consist of routine sampling and analysis of ground water or surface water.
   C. Closure requirements which provide for protection of human health and the environment after the facility ceases operation.
      1. Depending on the activities that took place at the site, the permit could require that monitoring programs continue or that a permanent structure be constructed to prevent residual contamination from being exposed to wind or rain.
   D. Waste analysis requirements, in order to ensure proper

handling of the waste.

E. Security, to prevent unauthorized entry into the facility.

F. Requirements to inspect the facility by the owner or operator on a routine basis.

G. Personnel training program requirements on hazardous waste management procedures.

H. Location standards, for areas prone to seismic activity and flooding.

I. Requirements for the proper handling of ignitable, reactive, and incompatible wastes.

J. Requirements for preparedness and prevention activities and equipment to minimize the possibility of a fire, explosion, or release of hazardous waste into the environment.

K. Requirements for a contingency plan and emergency procedures in case of a fire, explosion, or release of hazardous waste into the environment.

L. Manifest requirements for the tracking of waste shipped to and from the facility.

M. Record keeping and reporting requirements for the documentation of day-to-day operations.

N. Corrective action requirements for the protection of human health and the environment in the event of a release of hazardous waste or constituents from the repository.

III. Procedural requirements. In order to issue a permit to WIPP, NMED must conduct the following:

A. Administrative and technical review of the permit application to ensure conformance with the regulations.

B. Formal correspondence with DOE and Westinghouse regarding deficiencies in the permit application.

C. Preparation of an initial decision on the permit application, resulting in either a Notice of Intent to Deny, or a Draft Permit, containing all conditions, compliance schedules, monitoring requirements and technical standards for treatment, storage, and/or disposal provided for in 40 C.F.R. Part 270.

D. Public notice of the initial decision, providing review of the draft permit if prepared and an opportunity for public review and hearing.

1. The public hearing will afford all interested persons a reasonable chance to submit significant data, views or arguments orally or in writing and to examine witnesses testifying at the public hearing.

2. The NMED Secretary is required to give due consideration and the weight she deems appropriate to all relevant facts and circumstances presented at any public hearing.

E. Preparation and issuance of a final decision on the

permit application, either as a denial or a final permit, and a response to comments received, specifying which provisions, if any, of the draft permit have been changed in the final permit decision,and the reasons for the change, and briefly describing and responding to all significant comments on the draft permit or the permit application raised during the public hearing.

F. The final permit decision becomes effective thirty (30) days after notice of the decision has been served on the applicant, or such later time as the Secretary may specify, although a later specified effective date does not extend the time for appeal of a permit decision as provided by the HWA>

G. HWA, § 74-4-6.A (new section enacted in the 1992 legislative session) provides that any person who is or may be affected by any final administrative action of the NMED secretary may appeal to the court of appeals for further relief within thirty days after the action. All appeals shall be upon the record before the Secretary.

IV. HWA Permit Status.

A. DOE has submitted an application for a permit under the HWA for the test phase of WIPP.

1. NMED has determined that the WIPP application is administratively complete.
2. As of August 20, 1992, NMED staff was reviewing the application for technical completeness.
3. NMED staff is assisted by a technical contractor, A.T. Kearney, on technical review of the WIPP permit.

B. NMED has already announced its intention to hold extensive public informational hearings as well as public hearings on its initial decision.

V. Permit Enforcement.

A. The HWA gives NMED expansive inspection and enforcement rights with regard to any person who generates, stores, transports, disposes or, or otherwise handles hazardous waste.

B. NMED can bring several types of enforcement actions under the HWA, including administrative orders and civil actions.

1. Whenever on the basis of any information the NMED Secretary determines that any person has violated, is violating or threatens to violate any requirement of the HWA, its regulations, or any condition of a permit, the Secretary may:

a. issue an administrative order requiring compliance and/or assessing a civil penalty for any past or current violation not to exceed ten thousand dollars ($10,000) per day per violation. The order may also suspend or revoke the hazardous waste permit.

(1) The NMED Secretary has delegated the authority to issue such compliance orders to the Director of the NMED Water and Waste Management Division.

(2) If a violator fails to take corrective actions within the time specified in the compliance order, the Secretary may assess a penalty not to exceed twenty-five thousand dollars ($25,000) for each day of continued noncompliance with the order, and suspend or revoke any hazardous waste permit.

(3) Any order so issued becomes final unless the person named in the order submits a written request to the NMED Secretary for a public hearing.

(a) The administrative appeal proceeds before the Secretary pursuant to the Rules Governing Appeals From Compliance Orders Under the Hazardous Waste Act and the Solid Waste Act, HED 90-10 (Rules).

(b) The Rules provide for an answer and a proceeding on the record before an independent hearing officer who makes a recommended decision to the Secretary.

(c) Secretary must make a final decision on the appealed matter as soon as practicable, but not later than thirty (30) days, after conclusion of the administrative proceedings.

2. Alternatively, the Secretary may commence a civil action in district court for appropriate relief, including a temporary or permanent injunction. HWA, § 74-4-12 provides for civil penalties not to exceed ten thousand dollars ($10,000) for each day of violation.

C. There are also criminal provisions for permit violations, found at § 74-4-11.

<u>The WIPP and the State of New Mexico</u>

12. EPA Disposal Standards

(Lokesh Chaturvedi)

Radioactive Waste Repository Licensing

Synopsis of a Symposium
sponsored by the
Board on Radioactive Waste Management

Commission on Geosciences, Environment, and Resources

National Research Council

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NEW MEXICO ENVIRONMENTAL EVALUATION GROUP PERSPECTIVE ON TRANSURANIC AND HIGH-LEVEL WASTE DISPOSAL REGULATIONS

by

Robert H. Neill, James K. Channell and Lokesh Chaturvedi

Symposium on Radioactive Waste Repository Licensing
U.S. National Academy of Sciences
Board on Radioactive Waste Management

Washington, D.C.
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Providing an independent technical analysis of the Waste Isolation Pilot Plant (WIPP), a federal transuranic nuclear waste repository.

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ABSTRACT

It is necessary to have regulations to provide a framework to judge the suitability of sites for deep geologic disposal of high-level and transuranic radioactive waste. Reasonable confidence in the prediction of site behavior for 10,000 years or more is achievable using well-established principles of geosciences. EPA's approach of probabilistic release limits with flexibility in the implementation of the Standard is a sound one. EEG believes that the numerical basis of the Standard is set at a level that is reasonably achievable for a good site that is properly engineered, and should not be significantly relaxed.

INTRODUCTION

Since society requires the use of ionizing radiation in such diverse fields as medicine, energy conversion, and scientific research, these beneficial uses also result in non-beneficial radiation exposure to people. Hence, the field of radiation protection was developed for the express purpose of minimizing unnecessary radiation exposure.

As a subset, the basic purpose of a nuclear waste repository for unwanted radioactive residuals is to isolate these materials from the biosphere to minimize unnecessary future radiation exposure to people and to protect the environment. As in other radiation sources, the quest for zero exposure remains elusive, and government must decide today on an allowable level of exposure that people may be involuntarily subjected to in the far distant future. Then, we need to agree on a method to predict the exposure, and to design a repository that would ensure waste isolation for thousands of years.

The Environmental Protection Agency (EPA) devoted a very significant amount of time and effort between 1978 and 1985 to develop a set of Standards for the management and disposal of spent nuclear fuel, high-level (HLW) and transuranic (TRU) radioactive wastes. After about 25 iterations of the Standard involving vigorous public debate and input from EPA's Science Advisory Committee, the U.S. Department of Energy (DOE), the U.S. Nuclear Regulatory Commission (NRC), the National Academy of Sciences Board on Radioactive Waste Management (NAS-BRWM), several states and many independent scientists, the EPA promulgated a set of Standards (Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191) in September, 1985. When promulgated, these Standards represented a consensus among the scientific community.

Subpart B of the Standards was vacated by the U.S. Court of Appeals for the First Circuit in June 1987 following a suit by several environmental advocacy groups on grounds that it was less stringent than the Clean Water Act of 1971, and no explanation was provided by EPA for this discrepancy. The Standards were remanded to the EPA for revision and repromulgation. The EPA Standards (40 CFR 191) apply to the Waste Isolation Pilot Plant (WIPP) in New Mexico, that is a planned repository for defense transuranic waste. Since WIPP will not be licensed by the NRC, the corresponding NRC Standards (10 CFR 60) will not apply to WIPP. Shortly after the EPA Standards were vacated in 1987, the State of New Mexico entered into an agreement with DOE (second modification to the July 1, 1981 Agreement for Consultation and Cooperation on WIPP by the State of New Mexico and DOE, August 4, 1987) to continue to evaluate WIPP against the vacated 1985

Standards, because the technical requirements of the revised Standards were not expected to differ substantially from those of the original one.

During the past couple of years, some groups of scientists, particularly the Advisory Committee for Nuclear Waste (ACNW) of NRC, and the NAS-BRWM have expressed doubts about the feasibility of implementation of the EPA Standards. The following discussion addresses the major issues that have been raised with respect to the Standards and presents EEG's views for each of these.

PHILOSOPHICAL CONCERNS REGARDING GEOLOGIC ISOLATION

Geological Predictability

Selecting a site, designing, and building a geological repository where radioactive waste would be disposed without any intention to recover, is a unique enterprise in the history of man-made engineering projects. The central assumption of deep geological disposal is that the waste would remain entombed in the rock and would not return to the biosphere in any appreciable quantities that may pose a significant risk to people and the environment. Prediction of geological integrity is therefore essential in selecting and characterizing a site before emplacing the waste.

Geological processes are measured in millions of years, and thousands of years in the past or in the future constitute relatively short periods of time for which reasonable predictions, albeit qualitative, can be made. If a site is selected in a tectonically stable region, without significant quantities of groundwater or natural resources, prediction of future behavior would be relatively easy and accurate. One cannot be absolutely certain about detailed predictions for such time periods, but basic integrity of a properly selected site can be established. Of course, it is misleading and self-defeating to project that uncertainties can be reduced to levels that are unattainable and care should be taken not to promise such a goal to the regulators or to the public.

Inherent in the concept of geologic isolation is the acceptance of our ability to predict geological integrity of a site for the long-term future. Hence, we are puzzled by the statement by NAS-BRWM (1), " . . . geophysical models are being asked to predict the detailed structure and behavior of sites over thousands of years. The Board believes that this is scientifically unsound and will lead to bad engineering practice."

Flexibility in Site Characterization

In the early planning stages of site characterization for HLW repositories, too little time was allocated for this activity and detailed plans were formulated as though all the issues to be resolved could be predicted before characterization studies began. Based on the WIPP experience, Chaturvedi (2) pointed out in 1986 that as detailed information begins to accumulate about a site, specific issues would come to light that would require resolution through additional studies directed to address those issues. During the WIPP site characterization process, several features such as deep-seated brine reservoirs, breccia chimneys, salt dissolution, and deformation, were explored and their impacts on the site integrity were evaluated after the Environmental Impact Statement was published and a record of decision to build the repository was issued by DOE.

Chaturvedi (2) also pointed out that the questions of regional geologic setting cannot be addressed by shafts and underground excavations. However, underground in situ studies do have a major role to play in fully characterizing a site. In situ studies at WIPP revealed the creep rate to be three to four times faster than that originally predicted, significant fracturing parallel to clay and anhydride interbeds in salt was observed, and the amount of brine in salt and in fractured interbeds was found to be much more than predicted from surface studies.

NAS-BRWM (1) has correctly pointed out that all complexities in site characterization cannot be anticipated at the beginning of geological studies. We agree with the suggestion that flexibility of schedules and designs should be maintained and discovery of unanticipated features or predicted events should be handled through conservative changes in design. Again, using the WIPP experience as a guide, emergence of gas generation from waste as a critical issue due to the permeability of salt being much lower than assumed, may result in the abandonment of carbon steel containers that would produce hydrogen after corrosion, and additional conservative engineering and repository design changes may have to be implemented.

SPECIFIC CONCERNS WITH 40 CFR 191

Implementation of the Standards

NAS-BRWM (1), ACNW (3) and NWTRB (4) have recently described the EPA Standards as overly stringent that require a degree of certainty that cannot be realized. They appear to suggest replacement of probabilistic risk assessment for geologic repositories by "expert judgement."

In this context, review of efforts to assess the compliance of the WIPP project with the Standards should be illuminating. Since 1979 EEG has published a number of reports involving releases to the environment following closure of WIPP. All analyses have been primarily deterministic, although many of them incorporate uncertainty analyses, consider probabilities, and discuss the results in light of 40 CFR 191.13 (containment requirements).

Although no one has published analyses of the ability of WIPP to meet scenarios not involving human intrusion, neither EEG nor DOE have yet identified any expected or unlikely naturally occurring event which appears to seriously threaten the proposed limits of the Standards. Because of this, we will limit our discussion to the implications of various human intrusion scenarios.

WIPP is more vulnerable to the human intrusion scenario than many other potential repository sites for several reasons:

1. It is located in a resource rich area, has a history of mineral extraction, and contains a rare potassium salt, langbeinite; so the highest exploratory drilling rate suggested in Appendix C of 40 CFR 191 should be assumed;

2. Pressurized brine appears to underlie approximately 50% of the waste storage room area. Brine reservoirs, if intercepted by an exploratory borehole, have the potential to flood portions of the repository which contains soluble waste and discharge thousands of cubic meters of brine into an overlying aquifer or to the surface;

3. The planned disposal method of emplacing Contact-Handled TRU (CH-TRU) waste in warehouse fashion (i.e. containers adjacent to each other and stacked three high) provides a large surface area to be exposed to an exploratory drill hole. The assumptions in Appendix C of Working Draft 2 (of 40 CFR 191) lead us to prediction that 3.5 to 4.0 exploratory boreholes will drill into waste containers during the period of 100 to 10,000 years after WIPP closure;

4. The present design includes panel seals that would isolate the waste into only 10 compartments. Under some scenario assumptions this allows a large fraction of the waste to be involved in a single scenario, even if panel seals perform perfectly;

5. Waste containers have a design life of only 20 years and there are presently no plans to treat the various waste forms. Existing waste has a high porosity, is leachable

and dispersible, and may generate unacceptable quantities of gas. Gas generation may induce connections between panels, result in fractures in the formation, and delay room closure;

6. Load Management, i.e. the optimum placing of the various types and concentrations of waste in order to minimize the effect of human intrusion, is not planned.

Scenarios analyzed by EEG have considered:

1. the effects of a brine reservoir interacting with the repository and the surface;

2. the drilling through stacks of high-curie drums;

3. the drilling into a disposal room where the waste is in a brine slurry.

Our deterministic calculations indicate that releases "might" exceed the proposed Standard. However, we have not considered any potential engineered enhancements (which include both waste form modification and engineered barriers) involving items (3) through (6) above because DOE was not planning to incorporate them. Also, there are on-going experiments and evaluations for several parameters including solubility, retardation coefficient (Kd) values, brine inflow to the rooms, the amounts of gas generation, dissipation of gas after generation, the effects of gas pressurization on repository rooms and transmissivity in the rustler aquifer. These studies should lead to more precise values that could justify the use of less conservative assumptions in some cases. However, a better understanding of the gas generation problem, which has not been factored into any scenario to date, could result in more conservative assumptions.

DOE is currently evaluating a number of engineering modifications and is continuing to evaluate key parameters. At this time, it appears that DOE should be able to show compliance with the Working Draft 2 Standards if they are willing to incorporate necessary engineering enhancements and obtain a better understanding of several key parameters. Conversely, we believe that if the 1985 Standards had been significantly less rigid, than the DOE would have had no incentive to consider engineering enhancements or to better understand the post-closure behavior of the repository.

Sandia National Laboratories (5) has recently completed an assessment of WIPP's ability to meet compliance with the Standards and have concluded, "SNL has reasonable confidence that compliance is achievable with the Standard as first promulgated." While EEG has not accepted this assessment because several key

scenarios have not yet been analyzed, it does appear that the Standard is set at about the right level of stringency and should not be significantly relaxed.

Basis of the Standard

The Standard has been criticized as having been based on simplified assumptions of a hypothetical repository that do not incorporate the complex factors in a real geologic setting.

We believe that the numerical basis of the Standard is set at a level that is reasonably achievable for a good site that is properly engineered. Although, the Standard was developed through hypothetical assumptions, the comparison of deaths from uranium ore bodies and the estimation of no more than 1,000 premature cancer deaths over 10,000 years were made to see if the chosen Standards led to reasonable consequences. Note that WIPP is located in a mineral rich area with an underlying brine reservoir, and that DOE had planned to perform as little engineering enhancement as possible and incorporate few, if any, engineered barriers. From this perspective it seems that the initial estimates that WIPP could not easily meet the Standards suggest that the level is set about right.

Probabilistic Approach

The Standard has been criticized for taking a probabilistic approach and establishing numerical release limits for situations that can never be fully understood or predicated.

EEG believes that the probabilistic approach in the Standards is appropriate, It is, of course, a unique way of setting standards and the difficulty in estimating and defending the chosen probabilities is appreciated. However, we think that even imperfect numbers are more precise and easier to explain to the public than "Reasonable Assurance" or "Expert Judgement." Further, the Standard allows a definitive procedure for eliminating events that have a very low probability of occurring.

Responding to comments from NRC and others, EPA has allowed considerable flexibility for implementation of the Standard. Quantitative prediction of releases from a repository were to be incorporated into an overall probability distribution only, "to the extent practicable." Also, a "reasonable expectation" of repository performance is required rather than absolute proof. NRC staff has noted the existence of these discretions in the Standards as recently as October, 1989 (6).

reduce the health effects discrepancy between the above two cases. However, it may be hard to come up with such a definition because surface activities and groundwater use would need to be considered as well as aquifer outflows to surface water.

Summary

We believe that any drastic change in the 1985 Standard would delay the issuance of a final Standard for several years. Also, the probability that a new Standard may be remanded would be much greater if it significantly departs from the remanded 1985 Standard. A several year delay in issuance of a new Standard would cause uncertainties at WIPP. The State of new Mexico has agreed to permit DOE to evaluate compliance with the 1985 Standards until new Standards are promulgated. This agreement was made with the expectation that the new Standards would be similar to the vacated Standards. A substantive change in the Standards would make it more difficult to defend proceeding with WIPP prior to repromulgation of the Standard.

The DOE should accelerate efforts to publish analyses of the ability to meet (or not meet) compliance with these five year old Standards, both for the Yucca Mountain HLW repository and for WIPP.

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The WIPP and the State of New Mexico

13(a). The Performance Assessment

(WIPP Experience)

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EVALUATION OF LONG-TERM INTEGRITY OF A NUCLEAR WASTE REPOSITORY-THE EXPERIENCE OF WIPP

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ABSTRACT

The Waste Isolation Pilot Plant (WIPP) is being constructed as a geologic repository for defense transuranic waste in U.S.A. The process of assessing long-term integrity of this repository has provided lessons that may be useful in such assessments for other repositories under consideration. The most important lesson is that the assessment should begin at the earliest stages of site characterization through modeling of potential release scenarios, and the site characterization and performance assessment should become parts of an iterative process. Important issues affecting performance assessment should be identified and thoroughly investigated at the earliest stage possible. Also, the nature of the waste and the container should be evaluated for long-term integrity at an early stage of repository site investigations.

INTRODUCTION

Deep geologic isolation of nuclear waste containing radionuclides requiring long periods to decay is now a concept preferred by most countries of the world with accumulated inventories of such wastes. Even though many different rock-types in diverse geologic settings are being explored for potential repository locations, the critical issues in ensuring integrity of a repository to prevent the release of radioactivity to the biosphere are similar.

The Waste Isolation Pilot Plant (WIPP) is a repository intended for disposal of transuranic (TRU) waste generated by the defense programs of the United States, built and managed by the U.S. Department of Energy (DOE). The WIPP repository is being excavated in bedded salts of Permian age (225 million years old) in southeastern New Mexico. The geological site characterization, construction and long-term risk analysis for the repository is probably more advanced than any other location being investigated around the world. Since 1979 the New Mexico Environmental Evaluation Group (EEG), a multidisciplinary group of 10 scientists and engineers funded by DOE, has provided the only full-time independent technical oversight of the WIPP Project.

Site investigation for WIPP began in 1974. During the past 17 years, the site has been well-characterized through extensive geological investigations including about 50 exploratory holes, miles of geophysical exploration profiles, several field geohydrology studies, laboratory investigations and underground *in situ* rock mechanics and hydrologic measurements. These studies have provided a basic understanding of the geohydrologic conditions at the site. Some potentially unfavorable conditions have been found. This has required concentrated efforts to identify, define and resolve the site suitability issues raised by these findings. Long-term risks to people and the environment are being assessed through probabilistic modeling of potential scenarios for release of radionuclides from the repository to the environment. The site characterization issues and the interim results of risk assessment are described below. The purpose of this discussion is to offer some lessons learned from the experience at WIPP that may be useful for siting and evaluating other high-level and transuranic waste repositories.

CHARACTERISTICS OF THE WIPP SITE

The WIPP repository is located in the southwestern United States in the State of New Mexico, between the cities of Carlsbad and Hobbs. The area is located in the well-known Permian Basin that yields large quantities of oil and gas. The repository has been excavated in the lower part of a 600 meter thick Salado Formation that was deposited in a shallow Permian age sea, 225 million years ago. The repository is located at a depth of 653 meters. The Salado consists primarily of rock salt, with rich potash deposits located in its upper part, about 150 meters above the repository. Natural gas and oil have been extracted in the area from deposits that occur at depths of 1200 meters to 5400 meters. Because of the existence of proven mineral resources in the area, the possibility of interception and breach of the repository by drillers looking for these resources in the future has to be considered.

Overlying the Salado Formation is the Rustler Formation. It is 95 meters thick at the WIPP site and consists of anhydrite and siltstone with two water-bearing, fractured,

dolomite beds. The lower one of the two, called the Culebra Member, has higher permeability and contains more water. It is 8 meters thick at the repository and is located from 218 meters to 225 meters below the surface (430 to 438 meters above the repository). The upper water-bearing dolomite bed is known as the Magenta Member and is located between 185 meters and 193 meters below the surface. Much of the WIPP site characterization effort has been spent on the hydrologic characterization of the Rustler water-bearing zones because these are expected to provide potential pathways for radionuclide migration to the biosphere in case of a breach of the WIPP repository.

An important geologic feature of the WIPP site is the presence of pressurized "brine reservoirs" in the upper part of the Castile Formation (underlying the Salado Formation) that have been encountered in several boreholes surrounding the WIPP site. The first exploratory borehole for WIPP (ERDA-6), drilled 7 km northeast of the center of the present site in 1975, encountered pressurized artesian brine and the site was abandoned. Another borehole (WIPP-12) located 1.6 km north of the center of the present site was drilled to a depth of 850 meters to the top of the Castile Formation in 1978. Accepting EEG's suggestions to explore the anticlinal structure indicated by seismic surveys at this location, DOE deepened this borehole in November, 1981. The hole encountered a pressurized brine reservoir at a depth of 920 meters. The initial flow rate of brine, under artesian pressure, was 1,600 liters per minute and after extensive testing, DOE estimated that the brine reservoir penetrated by WIPP-12 contains 2.7 billion liters (17 million barrels) of brine. Since it had been planned to construct the repository in the northern part of the site within 140 meters of WIPP-12, DOE accepted EEG's suggestion to once again relocate the repository to its present location, 2 km south of the previous location.

At EEG's insistence, DOE had electromagnetic geophysical surveys performed over the WIPP repository area. The results (Earth Tech. Corp., 1988) show a clear indication of the presence of brine under parts of the WIPP repository. Based on a) the encounter of brine in 13 out of 60 boreholes in the vicinity of the WIPP site, one of which (Belco-Hudson) is only 5 km southwest of the repository, b) the encounter at WIPP-12 and, c) the geophysical survey results, it is necessary to assume that pressurized brine exists at a depth of approximately 250 meters below the repository.

The question of the amount of brine expected to seep from the repository salt into the excavations is another important parameter that needs to be understood for reliable predictions of future behavior of the repository. It appears that the Salado salt may be saturated with brine and that the repository may be filled with brine once the ventilation of the facility ceases to remove moisture (Chaturvedi, et al., 1988). The effects of this on a human intrusion scenario could be unacceptable (Bredehoeft, 1988). DOE is therefore performing a series of <u>in situ</u> tests to determine the permeability and porosity of the salt beds of the WIPP repository and to actually measure the amount of brine-inflow.

When completed, the WIPP repository will consist of eight panels with seven rooms in each panel. Each room is designed to be 91.5 meters (300 feet) long, 10 meters (33 feet) wide, and 4 meters (13 feet) high. CH-TRU waste will be emplaced in 55-gallon ($0.21m^3$) steel drums and boxes stacked three high in the rooms and in the drifts connecting the rooms. Waste of odd-sizes and shapes will be emplaced in specially designed boxes. Remote-handled (RH-TRU) waste will be emplaced in 0.91 meter (36 inch) diameter horizontal holes in the walls of most of the rooms. A total of 850,000 drum-equivalents of CH-TRU and 7500 canisters of RH-TRU will be disposed in the WIPP repository. About 1/3 of the waste has been generated and is temporarily stored at DOE weapons laboratories awaiting transfer to WIPP. The rest is projected to be generated during the next 25 years.

Measurements in WIPP excavated areas show that the creep rate of WIPP salt is about 3 to 4 times the originally predicted rate. Results of 8 years of convergence rate data in the four SPDV (Site and Preliminary Design Validation) rooms that were excavated in 1983 shows that the roof to floor closure is between 8 and 10 cms per year and the wall to wall convergence is about 1 cm per year. The repository horizon as well as several meters above and below it contains several layers of anhydrite and clay seams. As the salt deforms to fill an excavation, fractures appear along these "impurities". With additional deformation, the fractures widen and cross-fractures at angles to the bedding planes appear. The roof starts sagging, the floor heaves up and fractures develop parallel to the walls.

Even with rock-bolts, the excavated rooms are expected to last only about 8 years after excavation, before roof-falls may begin to occur. Additional support needs to be provided for longer periods of room stability.

ASSESSMENT OF LONG-TERM INTEGRITY

In the USA, the U.S. Environmental Protection Agency (EPA) promulgated standards (Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191) in 1985 for assessing long-term integrity of a proposed repository. The Standards were voided by a court in 1987 and have to be repromulgated. However, the repromulgated standards are not expected to differ significantly in basic approach and philosophy from the initially promulgated ones. The following discussion is therefore based on the 1985 Standards.

Subpart B of the standard (40 CFR 191) applies to disposal of radioactive waste, meaning permanent isolation "with no intent of recovery, whether or not such isolation permits the recovery of such fuel or waste (40 CFR 191.02e). Subpart B of the Standard contains four "requirements", viz., containment requirements, assurance requirements, individual protection requirements, and groundwater protection requirements.

Containment Requirements

The Containment requirements are based on probabilities of cumulative releases of different radionuclides to the accessible environment for 10,000 years after disposal. This requirement relies heavily on probabilities and allows small amounts of radioactive releases at higher probabilities and larger amounts at lower probabilities. Performance assessment to meet this requirement will consist of the following steps. All aspects of a waste disposal system should first be evaluated. These include the waste type, form and radionuclide content; physical and chemical durability of the containers and overpack, if any; physical and chemical properties of the backfill; expected integrity of the plugs and seals; characterization of the geologic system including rock types, fractures, water, discontinuities, etc.; and the geohydrologic system of potential pathways of contaminant transportation after a breach. Once the site has been carefully characterized and various components of a possible breach path are well understood, scenarios for breach of the repository can be developed. Many of the scenarios involve a combination of human and natural events, since, according to the Standard, the knowledge of the repository cannot be assumed for more than 100 years after closure.

Once a large number of scenarios have been developed, they should be screened according to the probabilities of the events and processes constituting them and only those with a probability of one chance in 10,000 of occurring in 10,000 years need to be evaluated for consequence modeling. Some of these events and processes may be omitted from the performance assessment if there is a reasonable expectation that the remaining probability distribution of cumulative releases would not be significantly changed by some ommissions.

The consequence analysis consists of analyzing the release of radionuclides to the accessible environment on the basis of a selected scenario. Rational assumptions based on the most accurate and up-to-date information should be made for the breach of the waste package, movement out of the repository and transportation through an aquifer or directly to the surface. Factors such as the source-term, waste-form solubility and corrosion, retardation by backfill, performance of plugs and seals, decay of radionuclides and their daughters, groundwater flow and the movement of radionuclides by groundwater, retardation of radionuclides by the host rock, effects of gas generation, etc. will have to be considered for consequence analysis.

Since the consequence analysis will be based on predictions for the next 10,000 years, there are many sources of uncertainty in the predictive model. For each scenario and consequence model, an uncertainty analysis should therefore be performed to identify the controlling parameters of an analysis and to quantify the uncertainty in the results of the model caused by uncertainty in these parameters.

The performance assessment calculations completed to date indicate that certain parameters such as radionuclide solubility and retardation coefficients (or retardation factors) for different radionuclides in the Rustler aquifer predominantly control the postulated releases to the environment. Also, preliminary assessments indicate that under certain assumptions, human intrusion scenarios (assuming drilling into the site by future generations) result in violation of the release limits imposed by the Standards. Work is in progress to narrow the range of parameters by experimental data. Repository design or waste form may have to be modified if WIPP does not meet the Standards with the current design. The repository will not be used for permanent isolation of TRU waste if it is unable to meet the Standards even after repository design or waste form modification.

Assurance Requirements

The Assurance requirements are included in the Standard to provide the confidence needed for long-term compliance with the Containment requirements. For facilities to be licensed by the Nuclear Regulatory Commission (NRC), these requirements do not apply but comparable regulations are contained in the Siting Criteria of the NRC regulations (10 CFR Part 60.122). WIPP will therefore be the first and perhaps the only repository where EPA's Assurance requirements are applicable. These requirements require active institutional controls such as permanent markers, records, etc.; use of both engineered and natural barriers in the design; and avoidance of sites with reasonable expectation of future exploration for scarce or easily accessible resources unless favorable characteristics compensate for the greater likelihood of being disturbed in the future.

Before the EPA Standards were issued, DOE had decided to postpone making decisions on the questions of active and passive institutional controls and monitoring after disposal until one year before decomissioning of the repository. Compliance with the Standards, however, includes development of plans for post decomissioning controls and monitoring. Similarly, DOE has not yet made a commitment on the use of engineered barriers in the WIPP design. The containers for the contact-handled transuranic (CH-TRU) waste will be conventional 0.21m3 (55 gallon) steel drums which are not expected to last beyond a few

tens of years in the corrosive salt environment. No decisions on the use of getters in the backfill have been made although research is in progress on the physical and chemical properties of various mixtures of bentonite clay and crushed salt. The requirement for avoiding mineral resources in selecting a disposal site cannot be met by WIPP without the provision contained in the standard, "unless the favorable characteristics of such places compensate for their greater likelihood of being disturbed in the future." (40 CFR 191.14f). There are potash deposits 200 meters above and natural gas (and possibly oil) accumulations several thousand meters below the repository. As a part of demonstrating compliance with the Standards, it will have to be shown that the favorable characteristics of the WIPP site compensate for a greater likelihood of the site being disturbed in the future.

Individual Protection Requirements

The Individual Protection Requirements relate to the "undisturbed performance" (predicted behavior without human intrusion or unlikely natural events) of a repository for 1000 years after disposal and require that the annual dose equivalent to any member of the public in the accessible environment should not exceed 25 millirems to the whole body or 75 millirems to any critical organ. Scenario development and consequence analyses will have to be performed to show compliance with this requirement, similar to those needed for the containment requirements, with the addition of assumptions related to the mechanism of ingestion by people in order to calculate individual doses.

Groundwater Protection Requirements

The Groundwater Protection Requirements relate to the undisturbed performance of the repository for 1000 years after disposal such that the usable groundwater resources are not polluted. Compliance with this requirement requires scenario development and consequence analyses to determine radionuclide concentrations in any "special source of groundwater" affected by the repository. No special sources of groundwater exist in the WIPP area that satisfy the EPA definition, so this requirement may not apply to WIPP.

LESSONS LEARNED FROM WIPP

Several sites worldwide are at different stages of evaluation for potential locations of repositories for high-level, intermediate-level or transuranic waste. These are located in different rock-types, climates, hydrologic conditions, tectonic settings, and demographic situations. Thus, for example, Sweden, Canada, U.K. and India are looking at granitic bedrock. Germany is investigating a salt dome, and France is considering clay, salt and granite as potential media. The basic concept of long-term geologic isolation, however, requires a process of assessing long-term integrity of a proposed repository. Experience at WIPP may be useful to other organizations that will go through this process. The following major lessons have been learned from the WIPP experience.

1. The assessment of long-term risks should begin from the start of site-characterization of a potential repository site. Initial scenarios for releases of radionuclides to the biosphere will not be comprehensive and the data to be used for analyzin the consequences or releases will not be available at the start of site characterization, but the exercise will help keep the focus for the site characterization efforts. Such a focus is essential for judging the relative importance of geological features and processes. If this approach is followed site characterization and performance assessment will become parts of an iterative process, resulting in acquisition of sufficient relevant data to make a decision about using the site for a repository. At WIPP, the performance assessment for long-term integrity did not begin until late in the site characterization process. This has resulted in the need to perform additional site characterization and has delayed the project.

2. Important issues affecting performanc assessment should be identified and thoroughly investigated at the earliest stage possible. At WIPP, issues such as the existence of pressurized brine reservoirs beneath the repository and the characteristics of an aquifer overlying the repository horizon wer not thoroughly investigated until late in th site characterization process.

3. Characteristics of the waste and the container should be thoroughly understood ar their effect on long-term performance assess ment should be analyzed at an early stage o repository site assessment. The potential for gas generation from the WIPP waste and corrosion of the mild steel drums may requi changing the drums and treatment of the waste. This problem was not fully addressed at WIPP until recently.

Considerable loss of time and expense might be avoided if these lessons learned from the WIPP experience are applied by investigators of other nuclear waste repository sites.

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The WIPP and the State of New Mexico

13(b). The Performance Assessment

(Latest Evaluation)

EEG'S PRELIMINARY COMMENTS ON THE 1991 PERFORMANCE ASSESSMENT REPORTS (SAND91-0893, 4 Vols.) FOR THE WIPP

July 31, 1992

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EEG's PRELIMINARY COMMENTS ON THE 1991 PERFORMANCE ASSESSMENT WORK PERFORMED BY SNL FOR THE WIPP

July 31, 1992

I. Introduction

The Environmental Evaluation Group is impressed by the productivity of the Sandia National Laboratories WIPP Performance Assessment Group (SNL) in the second year of detailed performance assessment for WIPP. The four volumes of SAND91-0893 display a massive effort to continue to synthesize a large amount of work and data in the areas of site characterization; in situ hydrologic and rock mechanics studies underground; waste characterization; conceptual models of natural phenomena; and, expected behavior of geologic and engineered barriers. A workable mechanism is developing, to document the expected evolution of conditions in the repository after decommissioning. Although much work remains to be done, we share the Sandia scientists' optimism that this continued effort will result in providing the best possible basis to assess WIPP's compliance with the EPA disposal standards for high-level and transuranic nuclear waste repositories (40 CFR 191, Subpart B).

EEG review of the 1991 P.A. is not complete. For example, detailed comments are provided only on the first four chapters of volume 1, and volume 4. However, these comments are being provided at this time to enable SNL to utilize our thoughts and concerns as they begin to make decisions on the selection of data, scenarios and models, before the calculations begin for the 1992 iteration.

We have mixed feelings about the organization of the Sandia reports (4 volumes of SAND91-0893). The organization appears quite logical, but still it requires much effort to gather all the information about a particular scenario analysis or to track all the steps of a calculation. For example, the possibility of direct release of waste to the surface through drill-cuttings is first mentioned in Chapter 4 of Vol. 1. Some of the assumptions and considerations as well as the results are provided in Chapter 7 of Volume 2, but one has to search in volume 3 for the input data used for this analysis, even though the input data used in the cuttings code to characterize the drilling mud, drill string, and waste properties was fixed for all cases. However, the fact that four activity levels in the waste was used for this analysis does not become clear until one studies the sensitivity analysis in Volume 4 (Chapter 4). Similarly, the fact that the gas effects considered in the analyses are limited only to the retardation of brine inflow and the structural effects are not considered is not clearly stated anywhere in the scattered discussion of gas effects. We have no specific suggestions to improve the organization except to recommend that the needs of the reviewer should be kept in mind and information should be presented and cross-referenced (by Chapter, Section, and page) so that related information is easily found. In addition, it may be helpful to provide a much expanded

Executive Summary (an entire chapter or perhaps a full volume) in which the assumptions, data, scenarios and procedures are more clearly presented in one place.

This review is organized in four sections. Following the Introduction, Major Conclusions are provided. Certain important issues are identified for consideration in future P.A. efforts in the third section. This is followed by "page by page" comments. The last section of these review comments consists of the EEG reply to the SNL response to the EEG's comments on the 1990 reports. This arrangement has caused some duplication, but in the interest of clarity, it should be acceptable.

II. Major Conclusions

The 1991 P.A. calculations lack conservatism in assumptions of scenarios, use of parameters and assignment of probabilities, even compared with the 1990 effort. Examples of non-conservative assumptions include: use of 5 km distance for the Culebra transport rather than the site boundary, use of drilling rate median value of one-half of the maximum in 40 CFR 191, not considering any intrusion for the first 1000 years, not considering a scenario involving contaminated brine flows to the surface, use of unjustified K_d values, assumption of double-porosity flow with matrix diffusion to calculate travel times through the Culebra, undisturbed performance analyses only for the expected case, etc. In this sense, the 1991 P.A. reports are not an improvement over the 1990 effort.

We continue to remain unconvinced about zero releases following undisturbed performance scenarios. We believe this is due to a combination of misinterpretation of the 40 CFR 191 definition of undisturbed performance and use of non-conservative values of certain input parameters.

With respect to the analysis of human intrusion scenarios, it appears that the releases from direct removal of drill-cuttings to the surface would be much more severe if a more realistic distribution of radionuclide concentrations in the waste planned for WIPP is sampled and the first intrusion is assumed to occur at a realistic time interval before 1000 years.

The 1991 performance assessment has assumed several parameters and physical and chemical processes which have helped to keep CCDFs within the Standards' Containment Requirement limits, but no clear justification is provided for these very non-conservative choices. Expert judgement has been used in lieu of experimentally determined values.

Another area of EEG concern with the 1991 P.A. calculation is the apparent discrepancies in the estimates of the WIPP inventory of various radionuclides. Uranium-233 inventory assumption provides perhaps the most glaring example that would dramatically affect the total integrated discharges for various scenarios.

As we did in 1991, we would again like to recommend that the 1992 and subsequent P.A. iterations include simulations of engineered modified waste forms to provide guidance to the DOE planners. And, to conclude this listing of EEG's major concerns with the 1991 P.A. effort, statements such as "Summary of CCDFs (mean and median curves) lie an order of magnitude or more below the regulatory limits" (p. ES-6, etc.), are misleading at this stage of performance assessment. Portions of the modeling system and data base are incomplete, conceptual model uncertainties are not fully included, final scenario probabilities remain to be estimated, and the level of confidence in the results has not been established.

III. Important Issues

Input Data

EEG has not yet thoroughly reviewed Volume 3: Reference Data to check the reasonableness of the range of various parameters proposed by individual SNL investigators and the connection between the ranges proposed and the results of the experiments on which they are based. We have serious concerns, however, about the values used for some of the more sensitive parameters which directly affect the outcome of the performance assessment.

Retardation of various radionuclides during transport through the Culebra aquifer is a case in point. For last year's effort, P.A. has relied on the "expert judgement elicitation" of two Sandia lab employees. The only existing k_d measurements on the Culebra rock were made using powdered samples which EEG criticized and rejected in 1979. However, one of the two experts used those data for his expert judgement in 1991! And even though the numbers suggested by the third expert (also a SNL employee) are between 1 and 3 order of magnitude more conservative, his assumptions of 1% clay in the matrix of the Culebra dolomite and 100% clay filled fractures has no demonstrated scientific basis. It is interesting to note that the P.A. group disregarded the numbers provided by this third expert, but accepted his recommendation to assume a median value of 50% of fractures filled with clay based on a suggested normal distribution between 10% and 90%. No scientific justification for this distribution has been provided.

The P.A. calculations of scenarios with releases through the Culebra dolomite have also relied on the assumption of double porosity flow with matrix diffusion. While the mechanism of matrix diffusion has been successfully assumed in the interpretation and modeling of hydrologic flow tests data, it has never been demonstrated to exist either experimentally or through modeling. The CCDF plots are highly sensitive to the combined assumptions of 1) the presence of clay in the matrix and in the fractures of the Culebra dolomite, 2) mechanics of double porosity flow with matrix diffusion, and 3) high degree of physical and chemical retardation of radionuclides during such transport. In fact, the sensitivity analyses indicate that without these assumptions, the CCDF curves for the scenarios involving flow through the

Culebra would violate the containment standards. It is essential, therefore, that very good experimental and theoretical demonstration of the occurence of these processes be provided.

Undisturbed Performance of Repository/Shaft

Chapter 4 in Volume 2 devotes 83 pages to a description of the evaluations that have been performed to date. The calculations have been extensive and have involved 4 computational models (Boast II, Panel, Sutra, and Staff2D). The objectives of the calculations this year (summarized on page 4-81 of Volume 2) are primarily cross verification between models and initial approximations of gas generation effects.

All results indicate that migration of nuclides even a few meters up a shaft are orders of magnitude less than the allowable releases in 40 CFR 191. The assumptions are considered conservative but are not claimed to be bounding. These preliminary findings reinforce earlier conclusions that no non-human intrusion scenarios will result in releases and will thus never be a factor in showing compliance with the Standard.

EEG believes a conclusion that non-human intrusion scenarios will never be a problem and can thus be ignored is still unproven. Our reasons for this are discussed below.

This section is entitled "undisturbed performance". The discussion on page 4-63 of Volume 1 about undisturbed performance is misleading. The definition of undisturbed performance is quoted from the 1985 Standard as not including unlikely natural events. This is the correct definition, but it is to be applied only to the Individual Protection Requirements (191.15) and the Groundwater Protection Requirements (191.16). The containment Requirements (191.13) apply the same probability limits to natural events as they do to disruptive events such as human intrusion. Therefore, the Performance Assessment needs to consider events with probabilities as low as 0.0001 in 10,000 years when constructing the CCDF.

The evaluation of "undisturbed performance" in the 1991 Preliminary Comparison clearly does not consider low probability conditions. For example, all modeling was done with the assumption that the degree of brine saturation in the wastes was 30% or less. The result was relative permeabilities in the waste that are orders of magnitude less than in the surrounding formation.

The values used for permeability in the anhydrite and halite were those from the median/average of the range used for human intrusion scenarios and sampling was apparently not done from the distribution. Likewise the solubility values used were around the center of the range and orders of magnitude below the 90 percentile levels shown in table 3.3-11 of Volume 3.

It may turn out that calculations will show that truly bounding (or very low probability) conditions will still result in trivial releases from non-human intrusion events. SNL should,

however, perform uncertainty and sensitivity analyses for the undisturbed case. An alternate approach might be to calculate truly bounding scenarios to see if it is possible to dispense with non-human-intrusion scenarios without further refining of calculations. These calculations should include a fully saturated room with solubility, and the formation and shaft permeability values at or near the 1.0 cumulative probability level.

Uranium-233 Inventory

The 1991 Comparison lists a design inventory for Uranium -233 of 305 Ci (103.7 Ci CH and 201.5 Ci RH). This value is derived from the 1990 IDB (Integrated Data Base) where weight fractions of the major radionuclides of the mixes are reported. The IDB did not report the inventory of each radionuclide. The value in the 1987 IDB was about 7800 Ci.

The only detailed inventory document we are aware of is DOE/WIPP 88-005 ("Radionuclide Source Terms for the Waste Isolation Pilot Plant"). This report was never, to our knowledge, issued as a final report. However, we have been told by Westinghouse personnel that it is the major data base that was used to develop subsequent IDB reports. This document gives the following values:

CURIES OF URANIUM - 233

Facility	CH - TRU		RH - TRU		
	stored	NG	stored	NG	
ORNL	2608.0	4459.0	0.0		
INEL	574.0	1.0	18.9	4.0	
LANL	48.0	0.0	0.0	0.0	
	3230.0	4460.0	18.9	4.0	= 7713 ci TOTAL

Also in 1983, EEG obtained an estimated radionuclide composition for all TRU stored at INEL. The estimate for U-233 was 862 Ci total, with less than one curie of this in RH-TRU.

It has been our experience that it is difficult to "back numbers out" of the IDB. The various tables are summaries of data and are not internally consistent. In order to calculate the curies of a radionuclide one has to assume that the grams per cubic meter of transuranics in each mix are the same. For example, when this assumption is made in Tables 3.5 and 3.8 of the

1990 IDB for ORNL CH-TRU, one calculates 25,400 Ci of alpha radioactivity. Table 3.5 lists 17,500 Ci.

Uranium-233 is one of the more critical radionuclides for performance assessment because of its expected greater solubility and lower retardation coefficient. The importance of uranium radionuclides to the Performance Assessment is indicated in Table B-4 (Volume 2) where 94.5% of the Total Integrated Discharge is attributed to U-234 and 4.3% is attributed to U-233. The U-234 inventory of 3315 Ci is from the decay of 9.26 million curies of Pu-238. A U-233 inventory 25 times greater than that used in this report would increase the Total Integrated Discharge from 0.065 to 0.13.

SNL needs to carefully review estimates of the inventory for Uranium-233 and other radionuclides. Data should continue to be updated and obtained more directly than from the IDB values.

Cuttings Removal

EEG recommended in 1991 that the highly variable radionuclide concentrations in the waste be considered in evaluating the curies of TRU waste brought to the surface in borehole cuttings. The 1991 comparison responded to this recommendation by dividing the waste into four activity levels. An average activity was obtained from sampling on this activity distribution. This average activity was used in Appendix B, Volume 2 for the 60 vector runs with the 45 sampled parameters (which included drill bit diameter). Since the sampled average values differed very little from the simple average (about +2.2% at 1,000 years and +4.0% at 3,000 years) the end result of using a sampled average value was negligible in the Appendix B Tables. However, the activity levels were factored into the CCDF construction and the results appear reasonable.

The sensitivity analysis for cutting removal (in Chapter 4 of Volume 4) concludes that drill bit diameter is not a very sensitive parameter. We agree and recommend that in the future consideration be given to sampling directly on the four activity levels in the waste and use a constant drill bit diameter of about 0.34 m. Also, the quantity of waste removable under various room and brine conditions needs to be better understood (see page by page comments for Volume 4).

The four activity levels chosen seem reasonable (and probably slightly conservative) when compared to the waste inventory curies in Table 3.3-5 (Volume 3) and volumes in Table 3.4-5 (Volume 3). However, it is noted that the level 4 activity at 3,000 years and later could not be attained by containers that met the initial criticality limits (200 FGE for a 208 liter drum) because most of the activity would have to come from Pu-239 or Pu-240.

The statement is made on page 4-7, lines 34-37 of Volume 4 that a single borehole would not result in a normalized release that exceeds 1.0 and that an intrusion at an earlier time might

exceed 1.0. It would be more accurate to say that a single borehole at 1,000 years could theoretically reach 1.0 and that earlier intrusions could definitely exceed 1.0. This is because drums loaded to the maximum permitted PE-Ci and FGE levels with (for example) 987 Ci Am-241, and 11.4 Ci Pu-239, and 1.1 Ci Pu-240 would have 1262 Ci brought to the surface (1.06 normalized release) from a .944 m (eroded diameter) borehole. Also, permissible loading levels of Pu-238 (1100 Ci in a 208 liter drum) could result in normalized releases exceeding 1.0 for greater than 210 years. Because of the early time effect of cuttings and brine flows brought to the surface EEG believes that SNL should sample on time as they did in the 1990 comparison and not make the first intrusion at 1000 years in all 60 vectors.

Gas Effects

DOE has maintained since 1988 that data on gas generation from TRU waste is needed to narrow uncertainties in the performance assessment. In fact, almost the entire justification for starting waste emplacement at WIPP has been based on the need for data to assess compliance with 40 CFR 191 Subpart B. Naturally, one would look to the performance assessment analyses to verify these claims. The P.A. reports so far have not supported the DOE assertion that in situ gas generation data is needed to narrow or remove uncertainties in performance assessment. In fact, although it is not clearly mentioned in any of the 1991 P.A. reports, the only effects of gas generation used are those that are beneficial to P.A. (reduces the releases to the environment). This is because the gas effects have been used only to further reduce the assumed rates of brine inflow, which proves to be beneficial to P.A. The structural effects of gas production that could result in opening of fractures and providing new pathways and mechanisms for releases have not been considered in the P.A. calculations so far.

The net result of assuming the "good" effects of gas and not the "bad" ones, yields results which counter the DOE claims of the need for more in situ gas data. What is the point in undertaking the expense of gas generation tests when the gas generation from waste is actually beneficial in demonstrating compliance with 40 CFR 191? Would it not be better to use these resources to obtain experimental data on radionuclide retardation, solubility, and the nature of porous media flow through the Culebra, the parameters that have the maximum impact on P.A.?

Of course, the assumption that the gas generation would retard brine inflow and thus would help in reducing the releases to the environment is simplistic. The conditions in the repository are expected to evolve as a result of complex interplay of brine inflow, salt creep, disturbed rock zone (DRZ) development, physical disintegration and chemical decomposition of the waste, and gas generation. To predict the range of possible future conditions, and various pathways of development of such conditions, would require complex modeling of coupled processes such as that presented by Davies, Brush and Mendenhall in SAND91-2378.

EEG recommends that the 1992 P.A. should include gas generation effects and the results should be used to assess the need to collect more gas generation data in situ "to reduce uncertainties in performance assessment."

Waste Form Modification

The calculations published by the WIPP Engineered Alternatives Task Force (EATF - DOE/WIPP91-007) indicate that waste form modification could improve repository performance by reducing radionuclide releases into the accessible environment by up to four orders of magnitude, depending on the release scenario and the waste form modification. However, the EATF was unable to make specific recommendations for waste treatment noting that more work needed to be completed by the SNL performance assessment effort. The 1991 performance assessment calculations by SNL did not include simulations of the engineered alternatives to the waste form although the need for performing those calculations was acknowledged. EEG recommends that the 1992 and future P.A. iterations should include assumed waste-form modifications to better assess the merits of such modifications in demonstrating compliance with 40 CFR 191.

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