



ENVIRONMENTAL EVALUATION GROUP

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER

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NATURAL RESOURCES DEPT.
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SEP 19 1988

September 16, 1988

OFFICE OF THE SECRETARY

TO: Robert Hawk, Chairman, Radioactive & Hazardous Materials
Committee, NM Legislature
Alex Valdez, Office of the Governor
Tom Bahr, Chairman, Radioactive Waste Task Force
Hank Bohnhoff, Deputy Attorney General

FROM: Robert H. Neill, Director

The following is intended to keep you posted on recent developments on WIPP in Washington this past week.

A copy of my September 8, 1988 testimony to the Subcommittee on Energy and Power, Committee on Energy and Commerce, U.S. House of Representatives is enclosed of a hearing on the WIPP Land Withdrawal Bill. Congressman Bill Richardson presided and asked the DOE, EPA and EEG representatives to meet and try to reach an agreement on the amount of waste that may be brought to WIPP before demonstrating compliance with the EPA disposal standards, (40 CFR 191, Subpart B). I met with EPA and DOE on the 9th and Lokesh Chaturvedi and I met with DOE on the 13th and 14th. The negotiations did not yield a satisfactory compromise because DOE officials still maintain that they need to bring more than 3% of the total waste before showing compliance with the EPA standards. As you know, the Bingaman/Domenici substitute S. 1272, WIPP Land Withdrawal Bill, approved by the Senate Energy and Natural Resources Committee, allows up to 3% and the Richardson H.R. 2504 substitute approved by the House Interior and Insular Affairs Committee allows none. Our discussions with DOE headquarters officials did provide an opportunity to discuss the technical aspects of this decision and the meetings were constructive and cordial.

Dr. Lokesh Chaturvedi testified at a hearing on WIPP oversight held by the Subcommittee on Environment, Energy and National Resources of the Committee on Government Operations chaired by Congressman Mike Synar and a copy of his testimony is enclosed.

Copies are also enclosed of the GAO, DOE's Office of Safety Appraisals (OSA) and Brookhaven National Laboratory's testimony presented to the Synar Committee.

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September 16, 1988
Page 2

While we are examining in detail the points raised at the Synar Subcommittee hearings, the following is our initial reaction to the issues.

1. Safety Analysis Report (SAR) - EEG is reviewing a draft of the final SAR and we have many critical comments on the document. We agree with the DOE-OSA analysis that because of a lack of proper documentation of the quality assurance inspections it will take the reviewers greater effort and time consuming research to be convinced of the safety of the project design, structures and components.
2. Change of design basis - We do not think that this change by Bechtel and the lack of documentation (Brookhaven 8/25/88 letter and trip report, p.3) is a show-stopper. The criticism is valid but it is now a moot point because there now exists actual data from underground excavations for five years.
3. Mixed Waste - The criticism of jurisdictional uncertainty for RCRA compliance of WIPP is valid but the Senate version of the bill assigns jurisdiction to EPA until the State is in a position to take the responsibility.
4. Lack of Experimental and Operational Plan - We think that this is the most important issue on WIPP currently. DOE should publish the plans for experiments as well as operations involving waste during the five year R and D period, as soon as possible.

If you need clarification of the above remarks, please do not hesitate to call.

RHN:LC:lsb
enclosures

cc: Dr. Laurence Lattman, President, NM Tech



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Subcommittee on Energy and Power
Committee on Energy and Commerce
U.S. House of Representatives

Hearing on H.R. 2504, the WIPP Land Withdrawal Act

By

Robert H. Neill

Director

September 8, 1988

Mr. Chairman, Members of the Subcommittee:

Thank you for the opportunity to appear here today to testify on the WIPP Land Withdrawal Bill. I would like to commend all of the principals in trying to come up with fair, equitable and reasonable legislation; particularly the Members of the New Mexico delegation.

My remarks will be confined to those elements in the proposed legislation that affect the New Mexico Environmental Evaluation Group (EEG).

EEG Organization

By way of background, the EEG was established in October 1978 to conduct an independent technical review of the potential radiation exposure to people from the proposed WIPP Project near Carlsbad in order to protect the public health and safety and insure that there is minimal environmental degradation. It is a full-time, multi-disciplinary group of scientists and engineers, with supporting staff, including geology, hydrogeology, environmental engineering, quality assurance, environmental monitoring, health physics, and radiological health, and I have been the Director for these 10 years. The review is funded entirely by the Department of Energy. The group is neither a proponent nor opponent of WIPP. Since WIPP is exempt from licensing by the Nuclear Regulatory Commission (NRC), EEG is the only full-time review group independently evaluating WIPP. We have published thirty-nine major reports to date on site characterization, breach scenarios, transportation, monitoring and regulatory review, and a list of those reports is attached.

EEG also conducts an environmental monitoring program for background radioactivity in air, water and soil, both on-site and in the surrounding communities. Both DOE and EEG have monitoring stations in the exhaust air discharge which will document the presence (or absence) of a release of radioactivity.

Major Accomplishments

Since EEG does not have any regulatory authority on WIPP, we can only recommend actions to DOE for their consideration. In spite of this limitation, DOE has responded to EEG criticism through changes in the location, design, transportation, and monitoring activities at WIPP.

1. Relocation of the repository. Following the discovery in November 1981 of an estimated 17 million barrel brine reservoir in the Castile Formation approximately 1000 feet below the planned location of radioactive waste, EEG recommended the relocation of the repository 1 1/4 miles to the south in an area with greater geological stability away from the brine reservoir. Nine months later DOE relocated the repository.
2. Redesign of the shipping container for CH-TRU waste. In the summer of 1985, EEG informed DOE that the rectangular shipping container TRUPACT-I was unacceptable for use in New Mexico since it failed to meet safety regulations requiring double containment issued by the NRC for the transportation of more than 20 curies of plutonium. Additionally, the

venting feature violated Type B packaging requirements. Although DOE agreed to redesign the shipping container to meet these two noncomplying features, the Department later (1) funded the American National Standards Institute (ANSI) to consider developing a standard which would permit single containment and venting, (2) petitioned DOE Headquarters to provide an exemption for these two requirements, and (3) petitioned the U.S. Department of Transportation as well to issue a less restrictive standard for the two requirements. EEG opposed all three actions and DOE subsequently announced that the design would be voluntarily submitted to NRC for licensing.

3. Modification of the DOE Waste Acceptance Criteria for the receipt of transuranic wastes.
4. Additional geotechnical studies and tests from 1982 to 1988 to further delineate site characterization.
5. Technical forums to address unresolved issues and achieve agreement on needed tests and analyses.
6. Changes in the underground radiation monitoring equipment to permit full detectability of alpha emitting radionuclides.

Reestablishing an Independent EEG

Following a series of administrative downgrading events of the EEG scientific reviews that resulted in the loss of five out of eight key personnel, Senators Jeff Bingaman and Pete Domenici introduced legislation in March 1988 to remove EEG from the administrative control of State government and to place the organization with the New Mexico Institute of Mining and Technology. New Mexico Governor Garrey Carruthers concurred with the action and assigned the EEG contract to New Mexico Tech. Subsequently, the action was included in the Department of Defense Authorization Bill and approved by both the House and Senate. Since the DOD Authorization Bill was vetoed by the President, the provisions have been included in both S.1272 and H.R.2504, the WIPP Land Withdrawal Bill.

We believe the language in the August 1988 substitute amendment for S.1272 approved by the Senate Energy and Natural Resources Committee and in the substitute amendment of Mr. Richardson on H.R.2504 adopted by the House Committee on Interior and Insular Affairs provides assurance that the assignment of EEG to New Mexico Tech is permanent and cannot be administratively rescinded. Additionally, the recruitment and retention of good professional staff needs the bedrock of a commitment to scientific independence.

The following are specific comments on various provisions of Title I of H.R.2504:

Section 104 - Experimental Programs

Requiring the Department of Energy to publish their proposed plans for experiments at WIPP in consultation with NAS, EPA, and EEG makes good sense as well as the requirement for EEG to publish its analyses of the DOE plans.

Section 105 - Compliance with EPA Standards

The bill is silent on EEG's role in determining compliance with the EPA standards for storage and disposal of TRU wastes and we believe the bill should require EEG to make a determination of compliance and publish the results. Silence could be construed to mean that Congress did not intend EEG to have a meaningful role in this area, which would affect EEG's ability to get information and data from DOE in a timely manner for performance assessment analyses.

Ability to Invoke Conflict Resolution

We believe that EEG should be provided the authority to invoke conflict resolution on matters relating to health and safety as stated in the substitute amendment to H.R.2504 adopted by the House Committee on Interior and Insular Affairs since there is no technical regulatory authority over WIPP. The exemption by Congress of NRC licensing for the disposal of defense

transuranic waste (WIPP) is inconsistent with the requirement by Congress for NRC licensing of the disposal of both defense uranium mill tailings and defense high level wastes. Since EEG is the only full-time review agency on the WIPP Project, there should be some authority provided to the organization.

Limitation on Radioactive Waste

The Department of Energy has indicated that their determination of compliance with the EPA standards for the disposal of TRU and High Level Wastes (Subpart B, 40 CFR 191), will not be completed until 1993 and that WIPP will be a facility for operational demonstration and research and development during the first five years. To date, only one experiment has been identified which would measure gas generated from CH-TRU waste to be emplaced in five rooms. That would amount to less than 3% of the total waste volume (approximately 25,000 drums). We expressed our dissatisfaction in a July 13, 1988 letter to DOE on the lack of merit of this experiment and questioned whether data would be available from the five rooms for performance assessment analysis since the cutoff point for data is mid 1991.

No experiments have been identified for the RH-TRU waste which comprises 36% of the radioactive inventory nor are there any estimates of the needs for operational confidence.

High Level Waste Experiments

We believe that H.R.2504 should be amended to exclude high level waste experiments as required in the substitute amendment S.1272 for the following reasons:

1. No need. Since Congress eliminated salt as a medium for disposal of HLW in the December 1987 amendments to the Nuclear Waste Policy Act, there is no technical merit in studying the disposal of HLW in salt.
2. No applicability to TRU waste. Results of HLW experiments would not be particularly applicable to RH-TRU disposal since there are differences in the geometry of the packages, the fission product inventory, concentrations, waste form, thermal gradients, and geochemistry. Besides, DOE has not identified any experiments requiring RH-TRU at WIPP during the five-year Research and Development (R & D) period.
3. Radiological risk. Since some of the experiments may be conducted with bare waste in which the integrity of the canister is intentionally compromised, there is a radiological risk associated with the emplacement and retrieval. There may be complications associated with NRC licensing for the transportation of such material.
4. Little economic benefit. A dozen shipments of HLW would have little economic impact in a sea of 25,000 shipments scheduled for TRU waste.
5. Not required for HLW disposal. The DOE is not planning on conducting HLW experiments in support of disposal of HLW in the repository in Nevada nor does NRC require such experimentation for a license.
6. Not required by Congress. High level waste experiments were not required in the authorizing legislation for WIPP (PL 96-164).
7. Benefits not published. DOE has never published any plans for the information to be derived, applicability of the results, and economic or technical benefits to justify the transportation and experimentation with

17 million curies of HLW with a maximum external gamma dose rate of 30,000 rem per hour.

8. DOE Inspector General recommended cancellation. The DOE Inspector General's 1984 report recommended that the experiments be cancelled because of their limited usefulness.

Thank you for the opportunity to testify.



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An Analysis of the Status of WIPP

Invited Testimony

by

Lokesh Chaturvedi

Deputy Director, EEG

to

Environment, Energy and Natural Resources Subcommittee

of the

Committee on Government Operations

U. S. House of Representatives

September 13, 1988

Mr. Chairman, Members of the Subcommittee:

Thank you for the opportunity to testify on the Environmental Evaluation Group's (EEG) analysis of the status of WIPP. In my testimony, I will confine myself to brief remarks on the issues that you have raised in your letter of September 2, 1988, to me. I will, of course, be glad to discuss any of these issues further in clarification of my remarks.

Background of EEG

I believe it will be helpful to you if I took some time to give you a background of the organization that I have been a part of since 1979 and that I represent today. EEG was established to provide an independent technical evaluation of the Waste Isolation Pilot Plant (WIPP) project to the State of New Mexico with funds provided by the U. S. Department of Energy (DOE). The multidisciplinary group of eight scientists and engineers has been performing this evaluation to assess the suitability of the WIPP site, potential short and long-term danger to the environment, suitability of the plant design, suitability of the container that will be used for transporting the waste over the nation's highways, acceptability of the waste from various generator sites, and related matters. We have published the results of our analyses and recommendations for improvement through EEG reports, thirty-nine to date, and in the open scientific literature. Three years ago, we started monitoring the environment near the WIPP site for background radioactivity in the air, water and soil. We will continue this monitoring, on-site and off-site, when the radioactive waste starts arriving at WIPP, to detect and measure any releases that occur.

EEG's philosophy has been to be constructive in its criticism and I am happy to report that DOE has accepted most of our major suggestions during the past ten years, ranging from a relocation of the repository to a redesign of the shipping cask for the transuranic waste. In spite of the dislocation and loss of some key personnel caused by unfortunate events of the past year, our small group has maintained its effectiveness and scientific integrity. We remain committed to continue our work to find an environmentally acceptable solution to the nation's defense transuranic radioactive waste problem.

I will now address the issues that you wish to discuss today.

1. Status of DOE's five-year plan for WIPP and the need for experiments requiring waste emplacement

The DOE describes WIPP as a Research and Development facility, but we have not been able to receive a final plan of research requiring waste emplacement at WIPP to date. After many reminders from us during the past several years, we received the first draft of a five-year plan that contains only four pages of an outline of an experiment that requires emplacement of waste underground. EEG expressed concerns about the validity of these experiments in a letter to DOE dated July 13, 1988, but we have not yet received a reply from DOE. We are concerned that if a large amount of waste is emplaced underground without simultaneously emplacing backfill material around and over the drums, there will be an unnecessary shuffling of the drums underground for backfill emplacement later. In addition, there is a possibility of DOE deciding in favor of reprocessing the drums (compaction, cementation, or glassification) to be in compliance with the EPA Standards.

In that case, the drums will have to be brought to the surface for reprocessing before final emplacement. The wisest course, therefore, seems to be to emplace a large quantity of waste underground only after a decision on reprocessing has been made and a backfill material has been selected. It is necessary to complete the calculations of "performance assessment" (to show compliance with Subpart B of the EPA Standards, 40 CFR 191) to make a decision on the selection of these "engineered barriers." My underlying assumption in the preceding statement is that WIPP will be able to comply with the EPA Standards with the addition of more stringent "engineered barriers" in the design. If that assumption is found to be incorrect, it would make even more sense to not have to retrieve a large quantity of waste from the repository.

2. The repository brine issue and the possible presence of brine reservoir below WIPP

These two issues relate to the possibility of a breach of the repository hundreds or thousands of years in the future.

Repository Brine:

The "repository brine issue" is that the salt formation in which the WIPP repository is located, appears to be saturated with brine that will slowly move into the excavations and may form a "slurry" of brine and waste in a few hundred years after closure of the repository. Calculations performed by the scientists at Sandia National Laboratories (SNL) in 1987 concluded that, given the best-known inventory of WIPP waste, the rates of brine inflow, gas

generation and salt creep, between 5 and 15 m³ (1300 to 4000 gallons) of "slurry" of brine and waste released to the surface will violate the EPA Standards. These calculations were presented and discussed at a meeting of the National Academy of Sciences Panel on WIPP in September, 1987. Revised calculations published by SNL this year indicate that there would not be sufficient brine seepage to form a slurry before the waste and backfill is compacted due to salt creep. Because of the uncertainties in these calculations, EEG recommended more in situ measurements of permeability of WIPP salt and direct measurements of brine inflow in a specially designed room underground. These experiments are being performed now. In addition, we have recommended consideration of reprocessing of the drums to reduce the void volume in the repository and DOE is examining that option.

Brine Reservoir:

The WIPP repository is located in the lower part of a 2000 ft. thick geological formation known as the Salado Formation. The Salado extends from approximately 850 ft. to 2825 ft. below the surface at the WIPP site and the repository is located at 2150 ft. below the surface. The approximately 1250 ft. thick Castile Formation underlies the Salado Formation, starting at a depth of 2825 ft. Within ten miles of the WIPP site, there have been thirteen reported encounters of pressurized brine in the upper anhydrite layer of the Castile Formation. An encounter typically consists of artesian flow of several hundred gallons a minute of brine at the surface. The first selected site for WIPP was abandoned in 1975 when the first WIPP borehole (ERDA-6) encountered brine. In 1981, another borehole (WIPP-12) was deepened at the suggestion of EEG, and it too encountered pressurized brine at

3000 ft. below the surface. Further testing estimated the reservoir encountered by this borehole to contain 700 million gallons of brine. Since the WIPP repository as designed at the time would have been only 500 ft. south of WIPP-12, the site was again relocated southwards so that the nearest waste emplacement would be more than one mile south of WIPP-12.

In 1983, EEG recommended surface-based geophysical exploration to attempt to delineate the extent of the brine reservoir encountered by WIPP-12. DOE performed this study in 1987 and the results show that brine appears to be present about 800 ft. below portions of the present repository location.

It is essential that consequence analyses of breach scenarios involving a pressurized brine reservoir under the repository be performed and published as soon as possible. This will be a necessary part of the calculations to determine WIPP's ability to comply with the EPA Standards.

3. Other items which must be resolved on WIPP prior to the receipt of radioactive waste

◇ The TRUPACT needs to be certified by the Nuclear Regulatory Commission. We are closely following the testing and the certification process and will perform our own evaluation of its adequacy.

◇ The Continuous Air Monitoring system which provides a current measurement of the concentrations of radioactivity in the atmosphere of the Waste Handling Building and underground is still not operational. An earlier design of this system has been modified as a result of deficiencies pointed

out by EEG. However, the present system has still not been thoroughly tested to indicate that it will be able to measure the low concentrations of TRU radioactivity required in the presence of atmospheric salt particles and background radioactivity from radon daughter products.

- ◊ Two major facilities at the site are not yet completed. These include the air intake shaft and the Safety and Emergency Services Facility building, both of which are expected to be completed by January 1989.

Mr. Chairman, this completes my prepared statement. I will be happy to respond to any questions.

Wash Chaturvedi
Lead at Synar hearing

DOE F 188.3
(12-84)

9/13/88

United States Government

Department of Energy

memorandum

SEP 2 1988

REPLY TO
ATTN OF: EH-322

SUBJECT: Review of Draft WIPP Final Safety Analysis Report

TO: Dennis L. Krenz, AL

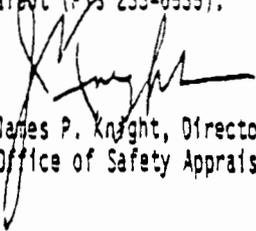
The Office of Safety Appraisals is reviewing the Final Safety Analysis Report (FSAR) for the Waste Isolation Pilot Project (WIPP) at Carlsbad, New Mexico, with assistance from Brookhaven National Laboratory (BNL) and Oak Ridge Associated Universities. This memorandum contains the information that was informally provided to your staff prior to our visit to your office and to Carlsbad during August 8-12, 1988, in connection with our FSAR review.

We reviewed the draft chapters of the FSAR and found that they do not contain sufficient information for us to independently conclude that the facility can be operated safely. Attachment 1 identified items that need to be addressed in the FSAR. As we discussed during our visit, the FSAR does not provide the specifics of what will be done (or has been done) to assure facility safety. We pointed out that the FSAR should address all aspects of facility safety, not only nuclear safety, and the FSAR needs to be thoroughly revised to accurately describe the operations that are planned and the scope of the FSAR. The FSAR also needs to be a complete record (with appropriate references) of the safety analyses and safety requirements that are the bases for concluding that the facility can be operated safely. For example, the FSAR needs to fully describe the monitoring instruments and safety equipment that are required to assure facility safety or mitigate the consequences of an accident.

In the course of our review we will be auditing supporting documents, with particular focus on the items in Attachment 2 prepared by BNL. If we need documents in addition to those obtained during our visit, we will let you know.

The most recent schedule provided to us anticipated facility start-up by October 1, 1988. We understand that the schedule has been changed and we would like to know when the FSAR will be finalized so we can plan our review efforts.

If you have any questions on the attachments or our visit, please contact Owen Thompson (FTS 233-4024) or Frank Talbot (FTS 233-6535).



James P. Knight, Director
Office of Safety Appraisals

Attachments:

1. Questions and Comments from EH-30 on Draft WIPP FSAR
2. Audit Items Related to WIPP FSAR, Prepared by BNL

cc w/attachments:

- Richard W. Starostecki, EH-30
- James P. Knight, EH-33
- Thomas B. Hindman, DP-12
- Lewis R. Newby, DP-22
- Walter A. Frankhauser, DP-122
- Arthur G. Follett, DP-122
- Gerald H. Daly, DP-124
- J. Tillman, WIPP
- T. Lukow, WIPP
- John J. Schinkle, AL/SPD
- N. Bailey, AL/SPD

(12-44)

United States Government

Department of Energy

Memorandum

DATE SEP 1 1988

REPLY TO
ATTN OF: EH-332

SUBJECT: Site Visit to Albuquerque Operations Office (AL) and the Waste Isolation Pilot Plant (WIPP)

TO: James P. Knight, EH-33

THRU: *Edward F. Branagan, Jr.*
Edward F. Branagan, Jr., EH-332

During the week of August 8-12, 1988, we visited AL, the WIPP site, and the Department of Energy (DOE) WIPP archives in the Old Bank Building in Carlsbad. We were accompanied by support contractors from Brookhaven National Laboratory (BNL). The participants (Attachment 1) included staff and managers from AL, DOE-WIPP, and Westinghouse, along with a Bechtel engineer (Howard Taylor), who had been involved with WIPP for many years.

Prior to the site visit, we reviewed draft chapters of the Final Safety Analysis Report (FSAR) and provided questions and comments from EH-30 to AL (Attachment 2). We also provided a description of proposed audit items prepared by BNL (Attachment 3).

The purpose of the visit was to discuss the EH-30 questions and comments with AL and WIPP staff to assure mutual understanding so that our concerns would be addressed in the finalized FSAR. A second purpose was to assess the AL independent review of the safety analyses and to audit selected design and construction documents that support the analyses.

Activities

On Monday, August 8, we met with AL and Westinghouse staff and managers in Albuquerque to describe the planned activities and identify documents needed for review.

On Tuesday, we discussed the EH-30 questions and comments on the FSAR. We then looked at selected documents from the Safety Programs Division (AL-SPD) relating to pre-operational appraisals of WIPP. We understand that the Facility Construction Management Division (AL-FCMD) may have additional review documents relating to design and construction of WIPP. AL-SPD staff will try to find relevant documents for us to audit.

On Wednesday, we visited the WIPP site near Carlsbad. EH-30 staff (Thompson and Talbot) took a brief site tour while the BNL staff returned to Carlsbad to review documents in the WIPP archives maintained by Westinghouse in the Old Bank Building. This source of documents had not previously been identified to EH.

On Thursday, in Albuquerque, we discussed the EH-30 questions and comments again and agreed on resolutions, many of which will be provided as changes in the FSAR. We also met with AL management for a close-out meeting at which we presented the summary as described below.

Summary

The review effort focused on both the documentation of the AL independent review activities and the documents that provide the FSAR bases. For both of these activities we looked separately at the safety aspects of design, construction, and operation.

1.1 AL Independent Review of the Bechtel Design

We were told that there were numerous independent reviews of the Bechtel design of the facility including the Waste Handling Building, reviewed by the U.S. Army Corps of Engineers, Fort Worth District, and development of the design basis earthquake (DBE), reviewed by Sandia National Laboratory (Sandia). These efforts, however, appear to be ad hoc and we have not seen evidence of a comprehensive safety review of design. Also, we did not find documentation of these independent reviews.

We were told that there was a Bechtel Corporate review of the Bechtel design which may satisfy certain independent review requirements but, again, we have not yet found documentation.

There reportedly were some AL independent reviews of designs; AL-SPD will attempt to find relevant documents for us to audit.

In summary, we were unable to find documentation of an adequate independent review of the design of the WIPP facility.

1.2 AL Independent Review of Construction under the Corps of Engineers as Construction Manager

The Corps of Engineers was construction manager for WIPP. We were told that AL-FCMD was involved in construction overview activities but we could not determine if they had performed technical reviews or only programmatic (e.g., contractual) reviews. AL-SPD will attempt to locate relevant documents for us to audit. At this time, we have been unable to find documentation of an adequate independent review of construction of the WIPP facility.

1.3 AL Independent Review of Westinghouse Operations

There have been a number of AL-SPD appraisals of aspects of WIPP operations. We saw files on fire protection, and others on ventilation. BNL is preparing a summary of files made available to us. Additionally, WIPP-SPD is preparing for a comprehensive pre-operational appraisal with a team of about 20 specialists. The appraisal will cover verification of facility conformance with as-built drawings, and inspection of structures, systems, and components for operational readiness, and compliance with DOE Orders, applicable codes, and the FSAR.

The pre-operational appraisal is expected to be conducted in October or November (a planned date for the end of July was postponed because the facility was not ready), and will be documented in a comprehensive evaluation report. EH-30 will review the AL-SPD report in assessing the safety of operational aspects of the WIPP facility.

We have been assured by AL that the AL-SPD pre-operational appraisal of WIPP described to us will be a well-documented, comprehensive, independent review of operational safety.

2.1 Audit of Bechtel Design

We discovered a large number of Bechtel design documents in archives under Westinghouse control in the vault of the Old Bank Building in Carlsbad. Documents are filed by date of entry into the archives and thus individual documents are very difficult to find; however, with assistance from the Bechtel representative we located many documents and requested microfiche copies of about 60 (100+ microfiche cards).

In the absence of documentation of a comprehensive independent review of design (item 1.1 above) our audit of design documents will be more extensive than anticipated.

2.2 EH-30 Audit of Construction Management by Corps of Engineers

We had insufficient time to look at the Corps of Engineers' records of construction because they were only found late in the day. Accordingly, we are being provided copies of the complete set of records for our review. (Sixty-nine microfilm rolls were found during our site visit; we subsequently were notified that Westinghouse found a total of 124 microfilm rolls.)

Our concern with construction aspects of the facility is primarily a quality assurance (QA) issue. We need assurance that the construction quality was adequate to assure facility safety. At this time, there is the potential for finding serious deficiencies in the QA documentation that could require extensive field investigations and testing to reconstruct a data base that would provide the required level of assurance of quality of construction. Any significant problems identified in this area during our review will be brought to management's attention immediately. (Subsequent to the site visit, we learned of a Type A accident involving the WIPP fire water pumphouse on June 24, 1986 (EH accident investigation file 86-13-A). The accident was caused by failure to properly install the fire water system pipes. This occurrence raises questions about general construction quality.)

Type A
\$100,000
to 200,000
loss

2.3 EH-30 Audit of Westinghouse Operations

EH reviews of operations will be deferred until the AL-SPD pre-operational appraisal report is available, at which time the extent of independent auditing needed by EH-30 will be determined.

3.0 Documentation of the Safety Analyses in the FSAR

We informed AL that the FSAR does not provide adequate documentation of the safety analyses and the bases for the conclusion that the facility can be operated safely. We emphasized that we had identified specific concerns which are not all inclusive--the FSAR needs substantive enhancement.

One area of major concern is the description of planned operations is not clear (and was not totally clear to us even after further explanation) and assurance of retrievability is not provided. The FSAR must describe how retrievability will be assured until either the waste is finally retrieved or the facility is qualified as a repository. That is, there must be assurance that the facility will not become a repository by default because wastes cannot be reasonably or safely retrieved.

Another area of major concern is that the FSAR does not comprehensively treat all safety concerns that might reasonably be raised. All external events that might be credible should be considered and the mitigating design measures (if necessary) discussed; lightning strikes and aircraft crashes should be included. All onsite hazards (including magnitude), in addition to radioactive materials, should be discussed. For example, the FSAR does not address the presence (or absence) of hazardous, toxic, pyrophoric, or explosive materials. Finally, failure modes and effects analyses have been made for some structures and systems; the FSAR needs to contain a summary of all structures and systems (with references elsewhere in the FSAR as appropriate) showing that no potential failure mode for any system has been omitted.

We noted that the draft FSAR is particularly deficient with regard to details of monitoring equipment that assures facility safety, and details of safety equipment to mitigate the consequences of accidents (comment No. 2, Attachment 2). We were told that the FSAR (particularly Chapter 10) will be enhanced to address these concerns.

We expect WIPP to respond to our comments and questions with brief statements to assist the Office of Defense Programs (DP) in tracking items. Many of our items will be resolved by revisions to the FSAR and the WIPP response should indicate this. We may need to iterate with WIPP on some responses because we are not sure there is mutual understanding of our concerns.

Conclusions

1. We have not found adequate documentation of independent reviews of the safety aspects of the WIPP design and construction. Therefore, we will perform detailed independent audit reviews of selected documents that support the safety analyses for structures and systems that we determine are critical to the start of operation.

2. We will address separately the remaining structures and systems that we find are not critical to the start of operations involving low TRU waste throughputs during the operations demonstration phase (5-year period). For these structures and systems we will defer the detailed independent review requirement (to be met by AL) until the facility is ready for the permanent disposal phase provided that there is reasonable assurance that these structures and systems will perform their intended function based on compliance with relevant codes, acceptable pre-operational appraisals, and the planned low production. (Much of the work during the 5-year operations demonstration phase will be testing and research.)
3. The goals of the pre-operational appraisal program described to us by AL are to verify that the as-built construction conforms to the final design, to verify compliance with the FSAR, and to assure that the operating procedures are adequate to assure facility safety. AL has told us that the documentation of this effort will show that AL has performed an adequate independent review of the safety of planned operations. We will review the AL documentation prior to facility start-up.
4. The documentation of the safety analyses, the FSAR, needs to be enhanced as discussed previously. To the extent possible, we will help WIPP meet its schedule for FSAR issuance by commenting on revisions as requested.
5. We observed that documentation of AL reviews often did not provide adequate details of the review--often the reports simply stated that a document was reviewed. In the future, more details should be provided to substantiate the AL findings of acceptability, including a description of the scope and depth of the review, a summary of the independent calculations made, and identification of items not reviewed in detail (with the reasons for not reviewing important items).
6. We were told that AL traditionally has reviewed documents provided by WIPP. We suggested that AL be aware of the need to be pro-active in its independent review activities, i.e., have AL select areas for review. This is being done for the pre-operational appraisal effort.

Footnote

It appears that retrievability is to be assured for a long time by essentially isolating the emplaced waste packages from the hydrogeologic environment. The RH TRU packages will be placed in sealed, plugged tubes; the CH TRU packages will be well-painted drums, isolated from the adjacent salt, and supported above the salt floor on noncorrosive pallets (about three-fourths of an inch thick). Accordingly, radionuclide migration from the waste packages is not expected during the operations demonstration (5-year) phase. Thus, actual repository conditions are not being evaluated and actual repository performance will not be demonstrated.

The DOE mission in P.L. 96-164 is to ". . . demonstrate the safe disposal of radioactive wastes . . ." This will be done by the performance assessment showing reasonable assurance that the standards applicable to the repository (such as 40 CFR Part 191) will be met. The performance assessment will be based on site data such as hydrogeologic information, not a demonstration of the behavior of the emplaced waste. However, the emplacing of TRU wastes underground is part of the demonstration of the waste disposal system including waste processing and certification, transportation, and facility operation.

Management should be aware of the potential for misconceptions about what the emplacement of TRU wastes will demonstrate. Note, however, that this concern does not impact our assessment of facility safety which will be based on the activities described in the FSAR.

Frank X. Talbot
Nuclear Safety Technology
Division
Office of Safety Appraisals


Owen O. Thompson
Nuclear Safety Technology
Division
Office of Safety Appraisals

Attachments

1. Participants in Site Visit
2. Questions and Comments from
EH-30 on Draft WIPP FSAR
3. Audit Items Related to WIPP
FSAR Prepared by BNL

cc w/attachments:

Richard W. Starostecki, EH-30
Lewis G. Hulman, EH-34
Edward F. Branagan, Jr., EH-332
Carol M. Borgstrom, EH-25
Thomas B. Hindman, DP-12
Walter A. Frankhauser, DP-122
Dennis L. Krenz, AL
J. J. Schinkle, AL/SPD
J. Tillman, AL/WIPP

Attendance List for WIPP Project Site Visit

August 8-12, 1988

M	T	W	TH	Name	Organization	Telephone
X	X	X	X	Morris Reich	BNL	FTS 666-2448
X	X			Joe P. Harvill	Westinghouse	FTS 571-2396
X	X	X	X	Nolan Bailey	DOE/AL-SPD	FTS 846-1107
X	X	X	X	A. J. Philippacopoulos	BNL	FTS 666-2115
X	X	X	X	C. G. Constantino	BNL	FTS 666-2026
X	X	X		Malcolm T. Wane	BNL	FTS 666-2026
				W. B. Johnston	AL-consultant	
X	X	X		Ray Nations	DOE-WIPP	FTS 571-2114
X	X			Jim Shurik	DOE/AL-SPD	FTS 846-1316
X	X			Mark Duff	DOE/HQ/DP-12	FTS 233-5456
X	X	X		Jere R. Galle	DOE/WIPP	FTS 571-2112
X		X	X	Steve Thompson	DOE/AL-SPD	FTS 846-1308
		X		Howard Taylor	Bechtel	415-768-9430
	X	X		Bob Kellerman	Westinghouse	FTS 571-2287
X	X	X	X	Frank Talbot	DOE/HQ/EH-33	FTS 233-3565
X	X	X	X	Owen Thomopson	DOE/HQ/EH-33	FTS 233-4024
X	X			John Schinkle	DOE/AL	FTS 844-7877
		X		Tim Cambell	Westinghouse (QA)	FTS 571-2485
		X		Mike Daugherty	DOE/WIPP	FTS 571-2209
		X		Tommy D. Miller	Westinghouse (QA)	FTS 571-8197
		X		Vincent Likar	Westinghouse (QA)	FTS 571-2206
			X	Denny Krenz	DOE/AL	FTS 844-7121
			X	Ray Miller	DOE/AL-SPD	FTS 844-7877



*Wah Chaturvedi
Recd. at the Synar hearings
9/13/88*

See §. 5 (b), 3 (i), 2 (d)

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.

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Department of Nuclear Energy

August 25, 1988

Mr. J. P. Knight
Director, Office of Nuclear Safety
Office of Nuclear Safety
EH 33
M/S G106
Germantown, MD 20545

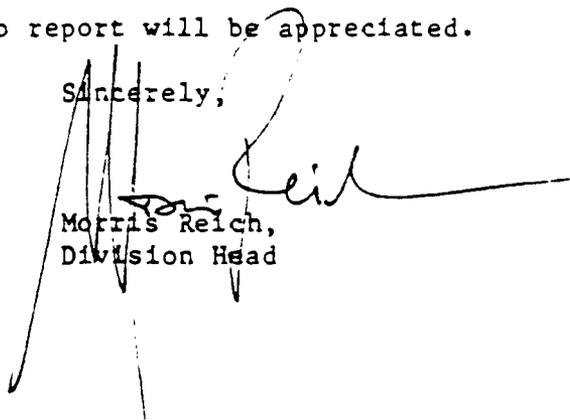
Dear Mr. Knight:

Enclosed please find a trip report describing the activities that took place during our recent visit to the WIPP Project (August 8-11, 1988).

As described therein, we have requested copies of various documents concerning design and construction of the facility. This information (in microfiche/microfilm format) is important for our review of the safety of the WIPP facility. We will begin the review process as the information arrives at BNL.

Your comments regarding the trip report will be appreciated.

Sincerely,


Morris Reich,
Division Head

MR:kms
Attachment
cc: O. Thompson, EH 31-2
C. Costantino
A. Philippacopoulos
M. Wane

REPORT ON TRIP TO
WASTE ISOLATION PILOT PLANT

August 8-12, 1988

Prepared by

C.J. Costantino, A.J. Philippacopoulos,

M. Wane and M. Reich

Structural Analysis Division
Brookhaven National Laboratory

August 24, 1988

Report on Trip to
Waste Isolation Pilot Plant

1.0 INTRODUCTION

During the week of August 8th through 12th, 1988 the above named personnel of BNL together with Dr. O. Thompson and Mr. F. Talbot of DOE-HQ (EH-33) visited the Albuquerque office of the Safety Program Division (DOE/AL-SPD) at Sandia National Laboratory (SNL), the Waste Isolation Pilot Plant (WIPP) facility near Carlsbad, New Mexico, and the Green Street Bank Building in Carlsbad, New Mexico, where WIPP archives are located.

The purpose of the trip was to obtain enough information to allow the Team to (a) evaluate the adequacy of the draft Final Safety Analysis Report (FSAR), (b) evaluate the adequacy of the independent review being conducted by DOE/AL-SPD for the design, construction and operation of the facility and (c) perform an audit of safety related analysis/ design evaluations as well as construction documents prepared for the WIPP facility.

In order to facilitate the discussion envisioned during the trip, questions pertaining to the draft FSAR, as well as descriptions of specific audit items of interest to BNL, were prepared. This information was transmitted by Dr. O. Thompson of DOE/EH to DOE/AL-SPD prior to the visit.

Meetings were held on Monday afternoon and Tuesday, August 8th and 9th respectively at SNL with members from DOE/AL-SPD, WIPP Project Office (DOE/WPO) and Westinghouse Electric Corporation (WEC). On Wednesday, August 10th, meetings were held at the WIPP site and at the Green Street Bank Building with various personnel involved with the WIPP Project. Throughout Wednesday, Mr. Howard Taylor of Bechtel Corporation, the facility Architect Engineer (A/E) was made available to assist the Team with regard to questions pertaining to the design of the facility. Mr. Taylor was indeed helpful and provided important information by describing the background details and approaches employed for the design of the WIPP facility. Closing meetings were held on Thursday, August 11 in Albuquerque with members of DOE/AL. Initial discussions between the Team and DOE/AL-SPD focused on resolution of the questions pertaining to the FSAR, which was then followed by a general exit meeting. Messers. D. Krenz and R. Miller of DOE/AL also attended this exit meeting.

2.0 COMMENTS

With respect to meetings and discussions held with DOE/AL-SPD, DOE/WPO, WEC and contractor personnel associated with the WIPP project during this visit, the following comments are presented. A list of specific documents which were made available to the Team during the visit is given in Attachments I and II.

- a. Members of DOE/AL, stated that since 1979, extensive overviews have been conducted by various management teams organized by DOE/AL-SPD to review criteria specification, facility design details, construction procedures as well as operational plans developed for the facility. We were told that designs were modified as the project directors opted for more conservatism in design criteria than originally thought to be required. However, detailed documentation of this process was, in general, difficult to resurrect, and to a great extent may not exist. From the discussions, it appears that DOE/AL-SPD selected "credible accident scenarios" on an ad hoc basis with no formal evaluation of any conventional fault tree analysis. It seems that the items that were investigated were those which were felt to be significant to DOE-AL-SPD personnel. No documentation of the process of elimination of potential accident scenarios was available.
- b. The team was told that WEC is in the process of preparing a Preoperational Appraisal Report (PAR) which will then be independently audited by DOE/AL-SPD. This report, which is expected to be completed in September/October of 1988, is intended to provide a detailed review of the as-built condition of the facility as well as its operational aspects. We were told that no further assessments are to be made in this PAR with respect to the design and construction phases of the facility.
- c. The facility design was carried out by Bechtel. This design was apparently evaluated by the Corps of Engineers (CE) Office at Fort Worth, Texas for DOE/WPO. The extent of this review and the documentation associated with the review is currently unknown. Similarly, the QA aspects of the construction phase of the project are also unknown. Moreover, the team was told that the CE review mentioned above only involved the Waste Handling Building. Documentation pertaining to the CE review was requested during the meeting.
- d. The team was told that the DOE/AL-SPD office is short handed in that it consists of only two people (N. Bailey and S. Thompson) who are supported by consultants and subcontractors on an as needed basis. DOE/AL-SPD indicated that since the WIPP project is only one of five of their ongoing projects they would require additional full-time staff to be able to perform a complete and independent assessment of the facility.
- e. A series of DOE/AL-SPD files (see Attachment I) were reviewed by various members of the Team, with some of documents reviewed dating back to 1976. From these documents, it appears that only those files dating from 1982 onward were maintained consistently, that is, responses to specific questions and evaluations raised by DOE/AL-SPD or by its predecessor, the Operational Safety Division (DOE/AL-OSD), were filed with the evaluation document. Moreover, no files were found that indicated that DOE/AL-SPD or OSD had a comprehensive plan for independent review of the facility design and/or construction. From our discussions at the meetings, it appears that DOE/AL-SPD is currently taking a more active role in assessing the operational aspects of the facility.

- ✓ f. At the initial meeting held at the WIPP site, it was found that no specific documents were available for review and evaluation that the Team could use to assess the independence and adequacy of the DOE/AL-SPD review, or the adequacy and completeness of the FSAR document. Mr. Howard Taylor of Bechtel attended this meeting and, in fact, was the only person at the meeting familiar with the design process conducted during various phases pertaining to the WIPP project (i.e. Title I-Preliminary Design, Title II-Detailed Design, and Title III-Construction/As built submittals). This was extremely upsetting to the Team since it was expected that all documentation requested prior to the visit would be made available. Moreover, Mr. T. Dillon of Dravo Engineers working for WEC, indicated that Bechtel had performed an internal review of the Design Validation Final Report. The results of this review were also not available. 17

With respect to the rock bolting program, Mr. Dillon indicated that the openings are essentially self-supporting. No calculations of the design of the underground openings were available, however, to validate the above statement. Finally, we were told that the Rock Bolt Certification Program was not site specific but rather was determined from similar evaluations at other local mines.

- g. During the meeting held at the WIPP site on Wednesday, August 10th, the Team was informed (by H. Taylor) that extensive microfiche and microfilm of project documents were available at the Green Street Bank Building in Carlsbad. Two of the team members returned to Carlsbad to review these documents together with Mr. Taylor, while other members remained at the site to discuss rock bolting issues with Mr. T. Dillon.

The entire Team subsequently returned to Carlsbad and spent the rest of the day going through the microfiche documents with Mr. Taylor, in order to select documents applicable to the facility design/construction. Many of the microfiche documents were found to be not applicable since they were of a preliminary design nature. Copies of about 100 microfiche documents were requested for detailed review and audit back at BNL (a list of these documents are given in Attachment II).

- h. We were told that the CE was retained by DOE to review the adequacy of the Bechtel design. The review team requested copies of 124 rolls of microfilm, where the details of the CE review are expected to be described. At this point, the contents of these documents are unknown.
- ✓ i. Mr. Taylor stated that the initial design of the underground facilities was based primarily on calculations performed by Shoshei Serata. These were rejected by a WIPP project panel and a design based on empirical analyses and local mining experience was adopted. No documentation of this process was found, nor was the listing of panel members made available to us. We were told that a basic rule followed for selecting the room sizes was to maintain extraction ratios below 25% and at the

same time allow for sufficient clearance for equipment to emplace and retrieve wastes. Mr. Taylor said that he would try to trace the documentation for the adopted design by searching through the Bechtel files.

- j. A significant amount of time was spent reviewing the details of about 62 comments presented by the DOE and BNL reviewers on the draft FSAR. These comments mostly dealt with areas of the FSAR which were felt to be incomplete or inadequately documented. These comments were associated with both operational safety aspects as well as the design adequacy of the facility. DOE/WPO indicated that they will attempt to incorporate resolution of comments into the revised FSAR. (In fact, it was indicated to the Team that parts of the revised FSAR already reflect resolutions to some of the comments).
- k. An item of major concern to the Team was the lack of a clear definition in the FSAR of the current program envisioned for the facility. It is our understanding that the facility is to be operated in an experimental mode for a maximum of five years, after which a period for complete retrieval of all emplaced waste must be guaranteed. There is no indication in the FSAR of how long the retrieval period will be, nor is there any clear statement made regarding thresholds which will trigger the onset of retrieval operations. It is felt that the FSAR must clearly state the objectives of the planned program, key measurement items which will be used to ensure that the operation will be conducted safely and no design criteria for the facility will be violated. In addition, retrieval procedures for all waste types emplaced in the facility should be clearly described.

3.0 SUMMARY AND CONCLUSIONS

As mentioned in the introduction, the purpose of the trip was to (a) evaluate the adequacy of the draft Final Safety Analysis Report (FSAR), (b) evaluate the adequacy of the independent review being conducted by DOE/AL-SPD and (c) perform an audit of safety related analysis/design evaluations and construction documents associated with the WIPP. It is the Team's opinion that the trip did provide information so that assessments pertaining to items (a) and (b) can be made. Regarding item (c), however, no conclusions can be drawn at this point. This is due to the lack of documentation available during the visit. The information regarding this item was requested prior to the visit and also discussed in a previous meeting with DOE/AL-SPD and DOE/WPO (June 4-11, 1988). During the current visit, the Team went thru the WIPP document archives in the Green Street Bank Building in Carlsbad, and requested microfiche/microfilm documents given in Attachment II. Once the requested documents are reviewed, comments pertaining to the adequacy of the analysis/design and construction will be made.

In addition to the above general comments the following conclusions are based on the visit:

- a. Concerning the adequacy of the FSAR, about 62 specific comments were presented and discussed in detail with DOE/AL-SPD and WPO. These comments are associated with both operational and design/construction safety aspects of the facility and are considered by the team to be important for a document that adequately addresses the relevant safety issues of the facility. DOE/WPO indicated that they will incorporate resolutions pertaining to the comments into a revised version of the FSAR. Furthermore, it is strongly recommended that the FSAR clearly define its applicability to the experimental phase of the facility as well as the guaranteed retrievability period.
- b. ✓ The independent review of DOE/AL-SPD is primarily addressing operational safety aspects of the facility only. They have not addressed issues associated with either adequacy of the design or the quality assurance of the construction phase. The Team uncovered extensive microfiche/microfilm documents, copies of which have been requested. Some of the microfiche documents were briefly reviewed at Carlsbad and were found to be associated with some of the Bechtel Title II design aspects. The microfilm, on the other hand could contain copies of CE documents associated with the design and QA aspects of the construction (i.e., Title III). BNL will begin the review of these documents when available.
- c. With respect to the design aspects associated with the development of the underground facility, it is not clear whether the design was generated by detailed stress analysis, as implied by the Design Validation Final Report and the FSAR, or by empirical judgement of a committee of mining experts. It is expected that this issue will be further evaluated in terms of safety aspects of the facility.
- d. Documentation associated with development of the design basis earthquake, tornado, wind, the design calculations for the facility shafts, the seismic evaluation of underground structures and the evaluation of subsidence was not readily available to the Team during the visit. It is expected, however, that sufficient information pertaining to these items will be found in the microfiche and microfilm documents that were requested (see Attachment II). Moreover, we were told that attempts will be made by Mr. Taylor to investigate the Bechtel files with regard to any information pertaining to the above items.

ATTACHMENT I

Items Reviewed During Meeting

1. DOE/AL-SPD Files Reviewed:
 - a. Response to DOE/AL - Comments on SAR
 - b. WIPP SAR Comments on Volume 4
 - c. Compliance with 40 CRF191 (Meeting Notes, May 4, 1988)
 - d. Review of FSAR for WIPP: Health Physics Comments
 - e. WIPP FSAR Review, Chapters 1 thru 7 and 9 (from SPD to WPO, July 8, 1988)
 - f. Responses to AL Comments on WIPP FSAR, Chapter 8, 9, 11, 13
 - g. WIPP Audit Report (May 3-5, 1988)
 - h. WIPP Design Criteria/Basis, File #1 (1975-1981)
 - i. WIPP Design Criteria/Basis, File #2 (1982 -)
 - j. WIPP - ES&H Systems Evaluation File #2
2. "Review of the Scientific and Technical Criteria for WIPP" National Academy of Sciences of NRC, 1984
3. "Design Criteria Waste Isolation Pilot Plant (WIPP), Revised Mission Concept - II A", WIPP-DOE-71, Revision 4, February 1984, DE-ACO4-78AL05346, Westinghouse Electric Corporation
4. Title III Design Document Register - Design Bases, Rev. 2, 3/31/87, 10 Pages; microfiches obtained of Structural (General), Structural (Seismic), Structural (Tornado), Piping (General), Waste Shaft, Waste Handling Building
5. "Horizontal Emplacement and Retrieval Equipment Detailed Design Report", E.M. Schmura, et al, Westinghouse Electric Corporation Report No. WTSD-TME-041, Rev. 0
6. Design Calculation for RH-TRU sleeve design, WARD, pages 77 to 104, SE: RM: 84:123
7. A Description of the Site and Preliminary Design Validation for the WIPP Site, Revision 1, TME 3063, Rev. 1
8. Rock Bolt Certification, TME 3135 (not thoroughly audited, requested)
9. Stability analysis of Shaft Station (Failure of Rock Bolts), EWP 37-0-0414 (not thoroughly audited, requested)

ATTACHMENT II

The following documents (calculation packages and review documents) were identified by BNL during the meetings held on August 8-11, 1988 audit. Copies of these items are to be sent to BNL by the DOE-AL office.

1.	CE&SH Shaft Lining	CS-36-R-01 Rev 1	BTL-1451
2.	CE&SH Shaft Key	CS-36-R-03 Rev 0	BTL-1419
3.	Storage Exhaust Shaft - General	CS-37-R-01 Rev 1	
4.	Storage Exhaust Shaft Concrete Key	CS-37-R-03 Rev 0	BTL-2472
5.	Storage Exhaust Shaft Lining Buckling Sinking & Grouting	CS-37-R-02 Rev 0	BTL-1419
6.	Storage Exhaust Shaft Lining	CS-37-R-02 Rev 1	
7.	Storage Exhaust Shaft Key Redesign	CS-37-R-03 Rev 0	
8.	Waste Shaft Key	CS-31-R-02 Rev 0	BTL-1419
9.	Waste Shaft Lining	CS-31-R-01 Rev 1	BTL-1451
10.	CALC	CS-31-D-011 Rev. 0	CCP 014
11.	CALC	CS-31-D-016 Rev 1	CCP 014
12.	CALC	CS-31-F-411 Rev 1	CCP 014
13.	CALC	CS-31-F-412 Rev 1	CCP 014
14.	CALC	CS-31-F-414 Rev 1	CCP 014
15.	CALC	CS-41-D-008 Rev 0 (Attachment A & B)	
16.	CALC	CS-41-D-008 Rev 0	CCP 014
17.	CALC	CS-41-D-009 Rev 0	CCP 014
18.	CALC	CS-41-D-026 Rev 0	CCP 014
19.	CALC	CS-41-D-058 Rev 0	CCP 014
20.	CALC	CS-41-D-496 Rev 0 (Attachments 1-5)	
21.	CALC	CS-41-D-496 Rev 0 (Attachments 6-8)	

- | | | |
|-----|--|--------|
| | 482 | Rev. 1 |
| | 483 | Rev. 1 |
| | 486 | Rev. 1 |
| | 487 | Rev. 1 |
| | 488 | Rev. 1 |
| | 489 | Rev. 1 |
| 53. | 490 | Rev. 1 |
| 54. | 491 | Rev. 1 |
| 55. | 492 | Rev. 1 |
| 56. | 495 | Rev. 1 |
| 57. | Report: EWP 3709-0414 (Failure of rock bolts at the shaft station) | |
| 58. | Report: TME 3135 (Rock bolt certification) | |
| 59. | Subsidence calculations by Bechtel (to be provided by H. Taylor) | |
| 60. | Documentation of the review performed by CE for the WIPP facility
(Microfilm) | |

United States General Accounting Office
Testimony

GAO

For Release
on Delivery
Expected at
10:00 a.m. EST
Tuesday
September 13, 1988

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

Statement of
Keith O. Fultz, Senior Associate Director
Resources, Community, and Economic
Development Division

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

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss the status of the Department of Energy's (DOE) Waste Isolation Pilot Plant, or WIPP, located southeast of Carlsbad, New Mexico. The ultimate objective of the facility is to serve as a repository for the permanent disposal of transuranic¹ (TRU) nuclear waste generated by DOE in its atomic energy defense activities. TRU waste exists in a variety of physical forms, ranging from unprocessed trash, such as absorbent papers and protective clothing, to decommissioned tools. Because of the long period that these wastes are radioactive, they require isolation in a deep geologic repository.

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

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

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

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

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

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

STATUS OF WIPP

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

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

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

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

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

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

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

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

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

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

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

WIPP PURPOSE NOW LIMITED
TO TRU WASTE DISPOSAL

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

The Congress did not agree with this combined defense and commercial role, however, and in December 1979 enacted legislation authorizing DOE to build and operate WIPP "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States."²

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

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

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

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

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

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

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

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

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

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

THE BRINE SEEPAGE ISSUE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

OBSERVATIONS AND CONCLUSIONS

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

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

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

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

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

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

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

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

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

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

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

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

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