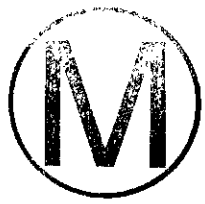


PEER 14 - Blue Ribbon Panel Review Report and Senate Hearing Testimony

REPORT TO THE SECRETARY OF ENERGY

Prepared by Dr. Thomas Bahr
Member, WIPP Blue Ribbon Panel

October 23, 1989

EXECUTIVE SUMMARY

In August 1989, the Secretary of Energy created a five-member Blue Ribbon Panel (BRP) to provide independent advice on three selected issues to the Waste Isolation Pilot Plant (WIPP). They include:

1. The concept and timing of DOE's proposed WIPP Operations Demonstration (OD) as part of the overall test plan.
2. Whether or not the OD should be conducted in parallel with the Performance Assessment (PA).
3. An evaluation of DOE's validation plan for certification of transuranic (TRU) waste to meet the WIPP Waste Acceptance Criteria (WAC).

Recommendations:

1. Full ramp up of the Operations Demonstration portion of the WIPP project should be delayed until results of Performance Assessment testing better clarifies the need for possible engineering modifications to drums and/or the repository environment. The OD is, without question, an important element of the WIPP test phase and some limited experience

will be gained through emplacement of waste for test purposes even if full ramp up is delayed. It is possible that an early full ramp up done in parallel with PA testing could later result in having to remove waste if certain engineering modifications are indicated. Removal of this amount of waste for purposes of doing engineering modifications does not represent a particularly difficult task nor should this activity result in any unusual health or safety risks. The primary risk and reason to delay the OD is one of almost certain loss of public confidence in DOE should waste have to be removed.

2. DOE should require full-time waste management inspectors on waste generation lines who report to superiors who are not employed by nor contractors of the waste generation facility. Audits should be more frequent and audit teams should include non-DOE employees should be more than simply observers but rather an integral part of the overall audit process.

3. DOE should immediately incorporate into its waste certification and validation program provisions to characterize the hazardous RCRA constituents of TRU mixed waste. The waste acceptance criteria should accordingly be modified to incorporate anticipated RCRA permit requirements. The DOE has a long history of dealing with radioactive materials and has developed comprehensive criteria for its safe handling, packaging and transport. In the present day regulatory environment it is absolutely essential for DOE to develop the same capability for the hazardous component of mixed TRU waste regardless of

how innocuous it may appear relative to the nuclear hazards of the waste.

4. DOE should incorporate at the WIPP site a capability similar to that at the Idaho National Engineering Laboratory for waste drum assays and expand the capability to enable hot cell inspection of drums, repackaging and waste retreatment, overpacking and the necessary facilities to examine and characterize the hazardous constituents in mixed TRU waste. DOE should also prepare to embark on a new program of new technology development directed at non-destructive qualitative and quantitative analysis of RCRA constituents. Planning for this effort should be done in close consultation and collaboration with those entities that will ultimately administer the RCRA Part B permit, most notably, the State of New Mexico.

5. DOE should immediately place a high program priority on the management of mixed TRU waste. There should be dual emphasis on characterizing existing mixed waste (see recommendations 3 and 4) and management of newly generated waste for the purpose of better characterizing, minimizing, segregating and perhaps even treating hazardous constituents. DOE should identify "in-house" personnel qualified to develop and implement this program and, if necessary, train, contract with or otherwise acquire the needed team. Administratively, they should be fully integrated into not only the waste management side of the agency but also into those production units that generate the waste.

6. The experimental portion of the Performance Assessment needs to be more closely integrated with those aspects of the WIPP that deal with the Waste Acceptance Criteria and transportation.

7. DOE needs to place additional emphasis on generating creative solutions to the long-term containment requirements of 40 CFR 191, particularly in reference to human intrusion scenarios. The reasonableness of assuming that no institutional controls can exist after 100 years should be seriously questioned and DOE should request the National Academy of Sciences or other independent scholarly body to evaluate this issue.

TEXT

Introduction:

The Secretary of Energy named a five member "Blue Ribbon Panel" (BRP) to provide advice on certain aspects of the Waste Isolation Pilot Plant (see Executive Summary). This report was developed over a two month period and it presents findings and conclusions of a general nature designed to provide broad guidance for DOE's WIPP project. The report does not represent a consensus of the BRP nor should it be construed to be a balanced treatment of opinions held by the many interest groups who have watched the evolution of this project over the years.

The author has been careful to be factually correct but it should be noted that this document has not been reviewed by anyone. Because of the short amount of time for analysis this report should be considered preliminary in nature and subject to further revision after consideration of new information should it become available.

General findings:

The DOE WIPP technical team, scientific and engineering contractors and outside evaluators have collectively undertaken what is perhaps the most complex and significant waste management project in this nation's history. Progress on this project over the paste decade has indeed been remarkable, especially in view of the fact that nuclear waste disposal

is such an emotionally charged issue across the nation. The project is nearing the time when WIPP will receive its first shipment of TRU waste for experimental purposes. This event is seen by many as perhaps the most significant milestone for the entire project. As this date nears, groups who have long opposed the project for various reasons can be expected to become increasingly vocal in their opposition and search for any reason to shut it down. The general public, long aware of this debate, will also give this project more and more scrutiny and opinions are already beginning to take shape. While scientific and regulatory agency review of the soundness of the project will certainly be a factor in public acceptance of WIPP, a more important factor will be the credibility of DOE in the eyes of the public.

Methodology:

The WIPP BRP first met as a group from September 11-14 to be briefed by DOE officials and to review operations on site at the WIPP, Idaho National Engineering Laboratory (INEL) and the Rocky Flats Plant (FRP). Later in the month on September 24-26 the BRP again met with DOE personnel in Denver to discuss questions submitted by the BRP to DOE. In terms of scope of our contact with DOE we had an opportunity to visit with nearly every decision-making manager that presently has WIPP responsibilities.

Findings:

Observation #1

The DOE will soon begin a series of tests both in the laboratory and in situ at the WIPP for the purpose of better understanding gas generation

and interactions with brine. Bin and alcove experiments, especially if they include performance assessments of different engineering fixes, will be valuable in deciding how final waste emplacement will be accomplished. Until certain test results are in it will be difficult to determine the need for additional waste treatment and other engineering enhancements required to meet the PA.

Recommendation #1

Full ramp up of the Operations Demonstration portion of the WIPP project should be delayed until results of Performance Assessment testing better clarifies the need for possible engineering modifications to drums and/or the repository environment.

Discussion #1

The OD is, without question, an important element of the WIPP test phase and some limited experience will be gained through emplacement of waste for test purposes even if full II ramp up is delayed. An early full ramp up done in parallel with the PA testing could result in having to remove waste if certain engineering modifications are indicated. Removal of this amount of waste for purposes of retrofitting engineering modifications does not represent a particularly difficult task nor should it result in unusual risk. The primary reason to delay the OD is that of possible loss of public confidence in the event that waste would have to be removed.

Observation #2

The production of nuclear materials by DOE is in large part driven by external factors, most notably the need to fulfill Defense Department needs. As would be expected, careful attention has been given to QA/QC programs on production lines because the quality and timely delivery of the final product is essential to this nation's defense. Not only does the Defense Department demand a quality product, but the nation as a whole demands it. In contrast to production of nuclear devices, DOE's management of nuclear waste generated by production is much less influenced by external factors such as meeting the needs of the Defense Department.

Recommendation #2

DOE should require full-time waste management inspectors on waste generation lines who report to superiors who are not employed by nor contractors of the waste generation facility. Audits should be more frequent and audit teams should include non-DOE employees, including state agency regulators, who would have the appropriate security clearances to witness any operation that generates waste. The non-DOE employees should be more than simply observers but rather an integral part of the overall audit process.

Discussion #2

The observation that QA/QC program related to waste management are less subject to external forcing influences than production management is not to say that DOE is insensitive to the need for safe management of its waste. Quite the contrary. It is clearly apparent that DOE has devoted

much time and effort and has made significant progress in recent years toward this end. This progress is a result of a highly conscientious and professionally administered program of self-regulation. The QA/QC programs for waste certification for the current WAC have been well thought out and with further modifications and fine tuning there is every reason to believe that from a technical standpoint the waste product should be acceptable for transport and ultimate emplacement in the WIPP repository. None-the-less, most of this program and its particular product are self-certified. Opponents to WIPP are well aware of the degree to which DOE self regulates its Waste Acceptance criteria and the associated QA/QC programs. Public confidence in DOE's ability to manage waste can significantly improve if DOE subjects more of its oversight to outside professionals and regulators, particularly on matters of waste certification and verification.

Observation #3

The present version of DOE's waste acceptance criteria seems to have evolved primarily out of concerns for radiological health and safety for workers and transporters and possible radiation exposure to the public. Until only recently, RCRA and its impact on management of TRU mixed waste has been recognized as being relevant to DOE operations. Characterization of the hazardous components of TRU mixed waste is needed for RCRA compliance however this is difficult to do. What knowledge that does exist is based on "process knowledge" and little if any direct verification has been done.

Recommendation #3

DOE should immediately incorporate into its waste certification and validation program provisions to characterize the hazardous RCRA constituents of TRU mixed waste. The waste acceptance criteria should accordingly be modified to incorporate anticipated RCRA permit requirements

Discussion #3

The DOE has a long history of dealing with radioactive materials and has developed comprehensive criteria for its safe handling, packaging and transport. In the present day regulatory environment it is absolutely essential for DOE to develop the same capability for the hazardous component of mixed TRU waste regardless of how innocuous it may appear relative to the nuclear hazards of the waste.

Observation #4

The present thinking of DOE is to implement a program of self certification at generating sites. This couples with an effective QA/QC program along with a statistically sound validation program is intended to produce acceptable waste drums ready for loading on TRUPACT's to be transported to and unloaded in the waste handling building at the WIPP. Present plans call for gas sampling from the TRUPACT's for archival purposes, several levels of swab checks for removable contamination, surface dosimetry, cross checks on labeling to verify that the correct drums are on a particular shipment and some other measurements. Not planned at this time are any spot checks using real time radiography (RTR), passive/active neutron assays, drum headspace gas sampling and

analysis or any other more rigorous examination to give a final verification of what is in a population of drums on receipt at the WIPP site.

Recommendation #4

DOE should incorporate at the WIPP site a capability similar to that at the Idaho National Engineering Laboratory for waste drum assays and expand that capability to enable hot cell inspection of drums, repackaging and waste retreatment, overpacking and the necessary facilities to examine and characterize the hazardous constituents in mixed TRU waste. DOE should also prepare to embark on a new program on a new program of new technology development directed at non-destructive qualitative and quantitative analysis of RCRA constituents. Planning for this effort should be done in close consultation and collaboration with those entities that will ultimately administer the RCRA Part B permit, most notably, the State of New Mexico.

Discussion #4

The final configuration of waste emplacement in the WIPP repository may well require room by room segregation of various waste forms. Tests during performance assessment, particularly those dealing with gas generation, may indicate an advantage in placing similar gas generating drums in the same room to optimize the use of gas "getters" in backfill material. Likewise, it may be found that certain waste forms need to be segregated because of chemical incompatibility, particularly with some of the hazardous components of mixed waste. Should some form of segregation as described above prove to be an important factor in

complying with regulatory standards, it would seem prudent to have some form of final verification of waste content before it is "sent down the hole".

The New Mexico EID will soon be the agency to administer the federal RCRA program and they indicate that as a requirement of the Part B Permit they will be required to do sampling for hazardous constituents in the mixed TRU waste at the WIPP site. Such sampling can be a hazardous undertaking and must be approached with great care. Specialized facilities and equipment will be needed and new assay technologies will have to be developed. This would be a significant undertaking yet considering the magnitude of the DOE weapons production program and the investment already made in the WIPP project, tooling up for such a final verification program at the final destination makes sense not only from a comparative economic standpoint but adds another element of safety that could only enhance public confidence in the operations of the DOE.

Observation #5

The DOE appears to have done little toward achieving effective administrative coordination between TRU mixed waste management and other elements of the WIPP program.

Recommendation #5

DOE should immediately place a high program priority on the management of mixed TRU waste. There should be dual emphasis on characterizing existing mixed waste (see recommendations 3 and 4) and management of

newly generated waste for the purpose of better characterizing, minimizing, segregating and perhaps even treating hazardous constituents. DOE should identify "in-house" personnel qualified to develop and implement this program and, if necessary, train, contract with or otherwise acquire the needed team. Administratively, they should be fully integrated into not only the waste management side of the agency but also into those production units that generate the waste.

Discussion #5

Organizational realignment is a matter of best left to policy officials in DOE headquarters and the above recommendation is self explanatory.

Observation #6

The long-term performance assessment will require the human mind to predict events 10,000 years into the future. To do so, scientists are put into a position of having to use todays knowledge and technology for developing in exact assumptions and then plug them into a model driven by the exact science of mathematics. To further add to the challenge, the same scientists must assume that all human knowledge of the WIPP site will somehow be lost after 100 years and there will be subsequent human intrusion into the repository.

Recommendation #6

DOE needs to place additional emphasis on generating creative solutions to the long-term containment requirements of 40 CFR 191, particularly in reference to human intrusion scenarios. The reasonableness of assuming that no institutional controls can exist after 100 years should be

seriously questioned and DOE should request the National Academy of Sciences or other independent scholarly body to evaluate this issue.

Discussion #6

Any creditable challenge to a federal rule by a regulatory agency should arise from outside any agency being regulated by the rule. In such an evaluation by the NAS or other scholarly body on this issue it would be important to include representatives from disciplines such as history, philosophy and political science in addition to the "hard" sciences.

WASTE ISOLATION PILOT PLANT
BLUE RIBBON PANEL

REPORT OF
ROBERT W. BISHOP, ESQ.

MEMBER,
WIPP BLUE RIBBON PANEL

OCTOBER 23, 1989

WASTE ISOLATION PILOT PLANT
BLUE RIBBON PANEL

REPORT OF ROBERT W. BISHOP, ESQ.
MEMBER
WIPP BLUE RIBBON PANEL

Executive Summary

The Waste Isolation Pilot Plant (WIPP) Blue Ribbon Panel was established by the Secretary of Energy to advise the Secretary on various aspects of the WIPP program for the disposal of transuranic (TRU) wastes. Specifically, the Blue Ribbon Panel was to advise the Secretary of the Panel members' independent views of the concept and timing of the proposed WIPP Performance Assessment and Operations Demonstration Test Phase and the proposed validation plan for the certification of TRU waste generated at the Department's Rocky Flats Plant.

My observations and recommendations are provided under each of the individual subject headings. My general conclusions appear at the end of each section, and are collected here for the reader's convenience.

A. WIPP Test Phase: Performance Assessment and Operations Demonstration

An Operations Demonstration is necessary to provide information and experience to enable a determination to be made of whether the WIPP facility, with its associated waste management system, is suitable for use as a permanent disposal facility. Upon satisfying applicable statutory and regulatory responsibilities, and verifiying the operational readiness of the WIPP facility, DOE should immediately commence the Operations Demonstration. TRU wastes must be shipped to support commencement of experiments, using actual waste emplaced in the WIPP facility, which are necessary to support the completion of the WIPP Performance Assessment and to develop practical experience in the operation of the TRU waste management system. The Operations Demonstration should continue after completion of waste emplacement for the experimental program until such time as a determination of the suitability of all aspects of the waste management system operation can be made in accordance with defined acceptance criteria.

B. Rocky Flats TRU Waste Certification Program Validation Plan

DOE should immediately implement a validation program of the Rocky Flats Plant wastes which have been certified to the WIPP Waste Acceptance Criteria. This should be accomplished by conducting an independent evaluation at the Idaho National Engineering Laboratory, through its Stored Waste Examination Pilot Plant, of a representative random sample of Rocky Flats Plant certified wastes currently in storage in Idaho to

verify the contents of those waste packages to the criteria under which those wastes were certified. Concurrently, an audit should be done of the Rocky Flats Plant certification process to evaluate the adequacy of the certification process and to recommend appropriate corrective actions, if any. Both of these programs should be accomplished by experienced operators and quality assurance personnel who have not been previously associated with the Rocky Flats Plant and with the participation, in an advisory role, of designated representatives of each of the states of Colorado, New Mexico and Idaho.

C. Systems Integration

DOE should establish an administrative mechanism to ensure the interaction of and coordination among the various DOE offices, contractors and subcontractors involved in all aspects of the WIPP program so that coordinated policy decisions can be made with the knowledge of the implications those decisions could have on various aspects of the program and so that those decisions can be implemented in a consistent and timely manner. The recently created DOE WIPP Task Force may be able to accomplish the systems and task integration necessary as long as it is appropriately staffed and given sufficient authority. In addition to DOE Headquarters personnel on the WIPP Task Force, a mechanism should be established, perhaps through topically-oriented Advisory Committees to the Task Force, to assure that the broad perspective of experienced operating personnel at each site and the principal contractors responsible for engineering and technical activities can be evaluated and considered in the decision-making process. The WIPP Task Force should also be responsible for considering and responding to the comments made by reputable groups involved in the WIPP evaluation process (e.g., National Research Council's WIPP Panel, Environmental Evaluation Group) and ensuring that the adoption of appropriate recommendations are implemented in an integrated manner.

D. Regulatory Requirements

A comprehensive review of all statutory and regulatory requirements applicable to the WIPP program should be conducted to ensure that all requirements are identified and integrated to ensure compliance or the timely preparation of requests for such regulatory exemptions as may be appropriate and technically justifiable because of the unique nature of the WIPP program. This analysis is necessary not only to evaluate the suitability of the WIPP program to begin operations but throughout the duration of the WIPP program as well. A high priority task should be to establish editorial and technical consistency on all substantive matters between the various regulatory submittals that have been prepared.

Fundamentally, both DOE and EPA are responsible for implementing national policy regarding the proper disposal of TRU waste. Neither agency can shirk its statutory responsibilities, but both must recognize that their responsibilities in this area are joint and not severable.

DOE and EPA must ensure, in the context of the WIPP project, that the responsibility for safe, permanent disposal of TRU wastes and the requirements of Parts 191 and 268 are reconciled. It is not in the nation's best interest for TRU waste, safe though it may be in temporary storage, to remain in that state ad infinitum because of a failure of government agencies to work together to develop a facility that can safely, permanently dispose of TRU wastes.

E. Waste Acceptance Criteria

The WIPP Waste Acceptance Criteria is but one of the criteria to which the waste generators must ensure that the TRU waste is packaged. These requirements should be integrated so that a single certification process that meets all criteria can be conducted and a single, comprehensive waste manifest completed. Ambiguous requirements should be clarified and all related documentation revised accordingly. The need to acknowledge that correct waste management is an important priority must be inculcated at all waste generating sites.

A monitoring system should be installed at WIPP to ensure that the containers as received meet the WAC and RCRA criteria that may be applicable. WIPP should also have the capability to repackage or otherwise disposition any drums received that do not meet the applicable criteria.

F. Project Documentation

DOE should establish, at a minimum, two Public Document Rooms, one in Albuquerque or Carlsbad, New Mexico, and one in Washington, D.C., in which all documents associated with the WIPP project would be located to facilitate review of those documents by the public, regulatory agencies (both state and federal), and the various DOE offices and their contractors and subcontractors. The WIPP project is an important national effort of great technical and political complexity; it is critical to informed decision-making that documentation of WIPP-related issues be made available for scrutiny.

G. Continuing Oversight

An independent advisory body, such as the WIPP Blue Ribbon Panel, should be charged with the responsibility of evaluating (1) the response to and implementation of recommendations made by the WIPP Blue Ribbon Panel members which are adopted by the Secretary, and (2) the Rocky Flats Plant waste certification validation plan, once it is developed, and the results of the validation program upon its completion.

Please refer to the associated report for the analysis upon which these conclusions are based.

REPORT OF ROBERT W. BISHOP, ESQ.
MEMBER
WASTE ISOLATION PILOT PLANT BLUE RIBBON PANEL

I. WASTE ISOLATION PILOT PLANT BLUE RIBBON PANEL

On August 11, 1989, Secretary of Energy James D. Watkins announced the establishment of a Blue Ribbon Panel to review the plans of the U. S. Department of Energy (DOE) for experiments and operational tests at the Waste Isolation Pilot Plant (WIPP) regarding the disposal of transuranic (TRU) wastes. Specifically, the Blue Ribbon Panel was to be responsible for providing an independent, technical review of WIPP operational issues relating to the concept and timing of the proposed WIPP Performance Assessment and Operations Demonstration Test Phase and the proposed validation of the certification of TRU wastes generated at the DOE Rocky Flats Plant for disposal at WIPP. The Panel consisted of five members: three members were nominated by the Governors of Colorado, Idaho and New Mexico, and two members were appointed by Admiral Watkins. The responsibility of the Panel members was to evaluate the information provided by DOE representatives, contractors and such other individuals and groups as each Panel member might determine appropriate and to each submit an independent report to DOE of our individual conclusions and recommendations, which would then be used as input to DOE's decisions concerning WIPP activities.

The Panel collectively met on September 11-14, 1989, with representatives of DOE and its major contractors and representatives of the National Research Council's WIPP Panel and the Environmental Evaluation Group (an independent advisory group located in Albuquerque, New Mexico). The Panel also toured the WIPP facility and TRU waste-related activities at the Idaho Nuclear Engineering Laboratory in Idaho Falls, Idaho and the Rocky Flats Plant in Jefferson County, Colorado. The Panel met with additional Department and contractor representatives at a meeting on September 25, 1989, that was called by the Panel to discuss questions that Panel members had identified as a result of the tour and associated presentations and the review of additional material that individual Panel members had requested.

Written material was provided to each Panel member, and Panel members were encouraged to request additional information that they thought might be helpful in their evaluation. In addition, Panel members were encouraged to address any questions they might have to representatives of DOE, contractors associated with the WIPP project, the National Research Council's WIPP Panel or the Environmental Evaluation Group. Changes in certain aspects of the project have apparently already occurred based on questions raised by Panel members during the Panel's investigation. Although this is a positive sign, it also means that a number of observations made by the Panel members in

their individual reports may no longer accurately reflect the status of that matter.

Attachment A is a listing of resource material that I reviewed, either completely or in part as pertinent to the Panel's Charter, to assist me in my understanding of the WIPP Project and to assist me in formulating the recommendations contained in this report. In addition to responding to the responsibilities delineated in the Panel's Charter, I have offered observations and recommendations on other aspects of the WIPP Project that I thought might be beneficial, based on my experience with nuclear matters over the last twenty-five years.

II. BACKGROUND

A. The Waste Isolation Pilot Plant

DOE is responsible for managing radioactive waste from defense activities and programs pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, and the Department of Energy Organization Act of 1977. One type of radioactive waste resulting from the production of nuclear weapons is transuranic (TRU) wastes. TRU wastes are materials contaminated with alpha-emitting radionuclides having atomic numbers greater than uranium (i.e., 92) with half-lives longer than 20 years and in concentrations greater than 100 nanocuries per gram. The TRU wastes result primarily from plutonium reprocessing and fabrication, as well as research and development activities at various DOE defense facilities. The wastes exist in a variety of forms, ranging from unprocessed laboratory trash (e.g., tools, glassware and gloves) to solidified sludges from treatment of waste water. Approximately 60% of the TRU wastes also contain hazardous chemical constituents; TRU wastes containing hazardous chemical constituents have physical and radiological characteristics similar to those of TRU wastes that do not contain these constituents. Since 1970, pursuant to a decision of the U. S. Atomic Energy Commission to store TRU waste by methods designed to keep it retrievable for at least 20 years rather than to continue the practice of shallow land burial, TRU wastes have been stored separately from other radioactive wastes produced at defense facilities for permanent emplacement in a geologic repository.

In 1957, a committee of the National Academy of Sciences suggested salt formations as a suitable geologic medium for the permanent disposal of radioactive wastes. Work started in 1975 on a conceptual design for a repository at a site in Eddy County, New Mexico, primarily to dispose of TRU wastes stored in retrievable form at the Idaho National Engineering Laboratory. The disposal facility, denoted the Waste Isolation Pilot Plant (WIPP), was first authorized, and designated as Project 77-13-f, by Public Law 95-183. The Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980 (Public Law 96-164), enacted on December 29, 1979, authorized the WIPP facility "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive waste resulting from the defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission."

The WIPP site, located in southeastern New Mexico approximately 26 miles southeast of Carlsbad, New Mexico, encompasses 18,960 acres of semi-arid land, all either federal or state land, of which nearly 17,000 acres would be used for buffer zones around the underground repository area.

In terms of geology, the site is in the north-central part of the Delaware Basin, a region in which evaporation in a shallow sea deposited about 3600 feet of evaporites during the Permian Period 280-225 million years ago. The repository would be excavated from a bed of nearly pure salt in the Salado Formation, which is approximately 2000 feet thick, with a mined disposal level 2150 feet below the surface. Although underground dissolution of salt in the region is still an active process, the rate of dissolution is so slow

that the zone of salt considered for the repository is expected to remain unaffected for two to three million years.

In accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA), an environmental analysis was done of the WIPP site and a Draft Environmental Impact Statement (DEIS) published in April 1979. The Final Environmental Impact Statement (FEIS) for the WIPP project, which included responses to comments received from the public and other government agencies, was published in October 1980. The preferred alternative delineated in the FEIS was to continue storing TRU wastes at the Idaho National Engineering Laboratory until a repository is available to receive it and to use the Los Medanos site in southeastern New Mexico for the construction and operation of a facility designed for the disposal of TRU wastes.

On January 28, 1981, DOE issued a Record of Decision on the WIPP project pursuant to the regulations of the Council on Environmental Quality (46 Fed. Reg. 9162). In that decision, DOE analyzed the environmental impacts of the authorized WIPP project and the alternatives thereto as identified in the FEIS. DOE determined that the long-term impact on the human environment resulting from taking no action was unacceptable: leaving the TRU wastes in surface storage could lead to very high radiation exposures both to individuals and the general population as a result of possible future volcanic action or human intrusion after governmental entities no longer controlled the site. DOE concluded that the environmental impacts predicted for the use of the Los Medanos site appeared acceptable for long-term disposal of TRU wastes "with minimal risk of any release of radioactivity to the environment. There was no indication that an alternate site for the demonstration would pose reduced risks." It was concluded that use of that site would solve the unacceptable long-term environmental problem of the surface storage of TRU wastes in the shortest amount of time and avoid the inflationary costs attributable to delay in constructing a facility. In conclusion, the Record of Decision stated that "DOE has weighed the benefits of proceeding with the authorized WIPP project against its potential environmental impacts and costs, and after consideration of the benefits, impacts and costs of reasonably available alternatives, has determined to proceed with the phased construction and operation of the authorized WIPP project." Consistent with NEPA requirements, DOE also stated that any significant new environmental information would be reviewed and the decision to proceed with the phased construction and operation reexamined as appropriate.

Construction of the WIPP project at the Los Medanos site commenced in April 1981. A decision to proceed with full facility construction was announced by DOE in June 1983, following conclusion of the Site and Preliminary Design Validation (SPDV) Program.

A draft Supplement to the Environmental Impact Statement (SEIS) was published in April 1989 to update the environmental record established in 1980 by evaluating the environmental impacts associated with new information, new circumstances, and proposed facility modifications from those originally envisioned. The SEIS documented a major modification to the WIPP schedule: WIPP would operate under a "Test Phase" for approximately five years during which time certain tests and operational demonstrations would be conducted.

The purpose of the Test Phase would be to reduce uncertainties associated with the prediction of natural processes that might affect long-term performance of the underground waste repository to assist in the determination of the ability of WIPP to meet applicable federal standards for the long-term protection of the public and the environment. The operational demonstrations would be conducted to evaluate the ability of the TRU waste management system to certify, package, transport and emplace TRU wastes in the WIPP safely and efficiently. Upon completion of the Test Phase, DOE would determine, based upon a performance assessment, whether WIPP would comply with the U. S. Environmental Protection Agency (EPA) standards for the long-term disposal of TRU wastes (i.e., 40 C.F.R. Part 191, Subpart B). If a determination of compliance is made, WIPP would enter a permanent disposal phase of approximately 20 years to demonstrate the safe disposal of TRU wastes. After completion of waste emplacement, the surface facilities would be decommissioned and the WIPP underground facilities would then serve as the permanent TRU waste repository.

B. Agreements with the State of New Mexico

In April 1981, the State of New Mexico filed suit against DOE concerning the acquisition of additional technical information and resolution of a number of controversial issues. The State of New Mexico's concerns included (1) that the final decision to commence construction and operation of WIPP should not be reached until the results of the SPDV tests were available, (2) that the State of New Mexico be provided with the opportunity to address and resolve off-site state government concerns prior to the decision to commence with construction, (3) that the State of New Mexico be entitled to enter into a binding and enforceable Consultation and Cooperation Agreement with DOE, and (4) that the withdrawal provisions of the Federal Land Policy and Management Act be complied with, including public hearings to be held before decisions were made to withdraw lands from the public domain for the WIPP project. In July, 1981, a Stipulated Agreement was executed by the State of New Mexico and DOE to address these issues. An Agreement for Consultation and Cooperation between the Department of Energy and the State of New Mexico on the Waste Isolation Pilot Plant was executed simultaneously and revised a number of times through April 1988. In December 1982, a Supplemental Stipulated Agreement was executed to address the state's off-site concerns regarding state liability, emergency response preparedness, independent monitoring of WIPP by the State, and upgrading and repair of state highways. A 1987 modification to the Agreement for Consultation and Cooperation limited TRU waste receipt to 15 percent prior to there being a demonstration of compliance with EPA disposal standards contained in 40 C.F.R. 191, Subpart B.

C. Environmental Evaluation Group

In 1978, the State of New Mexico established the Environmental Evaluation Group (EEG), with funds provided by DOE, to be responsible for conducting an independent technical evaluation of WIPP. The National Defense Authorization Act, Fiscal Year 1989, assigned EEG to the New Mexico Institute of Mining and Technology. Of particular pertinence to the Blue Ribbon Panel's investigation were reports EEG-40, 41 and 42 and EEG's Interim Evaluation of

Quantities of Transuranic Waste to be Brought to WIPP for Performance Assessment and Operational Demonstration, dated July 9, 1989 (Refs. 55-58).

D. National Research Council

The National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, was asked in March 1978 by DOE to "review the scientific and technical criteria and guidelines for designing, constructing and operating a waste isolation pilot plant for isolating radioactive wastes from the biosphere." An interim report was issued in 1983 and a final report, Review of the Scientific and Technical Criteria for the Waste Isolation Pilot Plant (WIPP), was issued by the National Research Council Commission on Physical Sciences, Mathematics, and Resources' Board on Radioactive Waste Management, Panel on the Waste Isolation Pilot Plant (hereinafter referred to as the "National Research Council's WIPP Panel"), in 1984.

Subsequently, the National Research Council's WIPP Panel was requested to review DOE's draft plan for conducting certain experimental and operational tests (Ref. 8). On July 19, 1989, the National Research Council's WIPP Panel issued its observations and recommendations on that plan.

E. WIPP Operational Prerequisites

Prior to initiation of the Test Phase, which necessarily involves the emplacement of TRU waste at the WIPP facility, the following actions must be accomplished: (1) land withdrawal, either administrative or legislative, completed; (2) a final Safety Analysis Report for the facility approved; (3) a Resource Conservation and Recovery Act (RCRA) No-Migration Variance Petition granted by EPA; (4) a Certificate of Compliance issued by the U. S. Nuclear Regulatory Commission (NRC) for TRUPACT II (the container in which the TRU waste will be shipped to the WIPP facility); (5) the Supplement to the Final Environment Impact Statement (SEIS) completed and DOE's Record of Decision issued; and (6) the Secretary must determine that the facility is ready to begin operations. Pursuant to the agreements with the State of New Mexico, the facility must also be in compliance with the requirements of 40 C.F.R. Part 191, Subpart A - Environmental Standards for Management and Storage.

Prior to commencement of operations following the Test Phase, the facility must be in compliance with 40 C.F.R. Part 191, Subpart B - Environmental Standards for Disposal, which includes the completion of a performance assessment and other demonstrations of the capability of the facility to meet certain radiological limits for 1,000 years after disposal and for 10,000 years after disposal.

At the time of this report, the following is the status of the required actions: both administrative and legislative land withdrawal proceedings are pending; the final Safety Analysis Report is expected to be issued in late October 1989 and approved in January 1990; the No-Migration Variance Petition was filed in February 1989, and EPA review is expected to be completed in January 1990 and action on the petition is expected in April 1990; the TRUPACT II Certificate of Compliance was issued on August 30, 1989; the final SEIS

is scheduled for issuance in mid-January 1990, and the Record of Decision is scheduled to be issued in February 1990. Completion on these activities on this schedule would support a Secretary's decision on WIPP readiness on or about June 1, 1990, and if that decision is to proceed, the facility could begin the Test Phase on or about July 1, 1990.

III. PROGRAM APPRAISAL

A. WIPP Test Phase: Performance Assessment and Operations Demonstration

Background

In April 1989, DOE issued its "Draft Plan for the Waste Isolation Pilot Plant Test Phase: Performance Assessment and Operations Demonstration" (DOE/WIPP 89-011) (hereinafter referred to as the "Draft Plan"). The Draft Plan, and a subsequent Addendum dated June 16, 1989, details the process whereby scientific and technical data will be collected that DOE has determined to be necessary for it to be able to make a decision on whether to designate the WIPP facility as a permanent repository for TRU waste. The Test Phase is described as having two objectives: (1) determination of compliance, through development of a performance assessment, with EPA regulations contained in 40 C.F.R. Part 191, Subpart B, and (2) completion of an operations demonstration to evaluate the safety and effectiveness of the TRU waste management system's ability to emplace TRU waste in the WIPP facility at the designed rate.

The Draft Plan describes a two-part program. Part One covers the first three years and concludes at a holdpoint where results will be evaluated and a determination made whether to proceed with Part Two, which would involve conducting any additional necessary tests. DOE has concluded that, consistent with its goal of minimizing the amount of waste emplaced while still being able to conduct a technically valid operations demonstration, it would limit the amount of waste emplaced in Part One to not exceed 3% of WIPP's capacity. As described in the Draft Plan, this would entail the emplacement of approximately 22,600 drums of contact-handled (CH) waste and three canisters of remote-handled (RH) waste. (CH wastes are those in which the dose rate at the surface of the waste package is not greater than 200 mR/hr; RH wastes are those with a dose rate at the surface of the waste package that is greater than 200 mR/hr, but not greater than 1000 R/hr).

In addition to being evaluated by the WIPP Blue Ribbon Panel, the Draft Plan has also been critically analyzed by the National Research Council's WIPP Panel and the Environmental Evaluation Group.

Observations and Recommendations

Performance Assessment

Fundamentally, there appears to be broad consensus that *in situ* testing with actual TRU wastes is necessary to validate design concepts and models to be used for the Performance Assessment and to complement past, current and future laboratory testing. I concur. The only way in which laboratory simulation and small-scale tests can be determined to provide a reasonable representation of real conditions is to validate them in the actual environment they are meant to simulate. When system performance over a 10,000 year period is to be examined, a critical factor in the analysis is the ability to

ascertain and minimize the degree of uncertainty in the calculations. A great deal is known about the geologic formation in which WIPP is located and the characteristics and effects of TRU wastes, but potentially significant uncertainties remain. A major uncertainty is the rate and volume of gases generated as a result of bacterial action, as byproducts of metal corrosion, and as the volatile products of radiolysis. The duration of the time period, and the complexity of chemical and radiological reactions that may occur, require the use of realistic rather than ostensibly conservative estimates because it may be that what were expected to be conservative assumptions are not, in fact, conservative. The planned experiments are not required to demonstrate regulatory compliance but rather to reduce uncertainties associated with the waste form and the response of the physical environment to the emplacement of those wastes.

As to the particulars of the planned laboratory tests, bin-scale tests and alcove tests, their timing, priority and detailed procedures, I have no opinion: the Draft Plan does not detail the purpose, protocol and evaluation process of these tests, but I do not believe it to be appropriate to attempt to definitively establish at a fixed point in time what must by necessity be an evolving, iterative process. For example, significant questions remain concerning the volume and rate of gas generated through decomposition of the wastes and the containers, and the effect of that gas generation on repository performance. It may even be that room-scale tests containing a sufficient volume of TRU waste to ensure homogeneity of the constituents will be necessary to perform an effective experiment.

Under the present schedule, data from some of the experiments (e.g., those associated with different types and configurations of backfill material) will not be available in time to support the Performance Assessment development. I do not believe that is a fundamental flaw in the Test Phase, because the regulatory criteria may be able to be satisfied without the need to adopt engineering enhancements which might otherwise be desirable. Those enhancements may be as simple as segregating the drums, based on their content codes, to separate nitrogen-generating wastes from those that will generate primarily hydrogen and carbon dioxide. Or, it may be that all of the wastes emplaced during the experimental program and the operations demonstration (which could be as much as 165,000 cubic feet), and all of that currently in storage (approximately 2,300,00 cubic feet), may have to be unpacked, treated in some way, and repacked with attendent costs and occupational exposures. These effects could be massive. The experimental program can provide valuable results regarding the potential benefit or detriment associated with various engineering enhancements or waste form modifications that may be determined to be necessary to meet facility criteria. If regulatory criteria cannot be satisfied without those enhancements, a decision must be made at that time regarding those modifications which should be instituted. Additional experiments may need to be conducted, based on those enhancements having been implemented, to be able to justify facility operation.

The experimental program appears to be well thought-out and should result in the achievement of two complementary goals: the validation, or modification as may be appropriate, of the understanding of the chemical, radiological, and geological phenomena of import to this project; and the reduction of

uncertainties in the evaluation of the project's ability to meet the required criteria. However, DOE should describe the uncertainties that each test is designed to address and when results are anticipated to be available. The key is to ensure that the tests are designed to reduce the uncertainties associated with the critical parameters. These experiments should begin as soon as possible to provide the maximum amount of useful data to support the conduct of the Performance Assessment and to evaluate what engineering enhancements or additional experiments, if any, may be necessary or desirable.

I fully expect the experimental program to generate data that will help to narrow the analytical uncertainties associated with the project, and it may well suggest the need for further experiments in an iterative fashion to provide data necessary to support a decision of whether the WIPP facility is suitable for operation. Although I appreciate the need to establish some reasonable parameters, I would strongly resist the imposition of definitive limits which would preclude the flexibility necessary to ensure that the experiments are properly conducted and result in the most meaningful data. At this point, it is impossible to know when enough will be known regarding waste and repository performance. I do not believe that the Nation has the luxury of waiting until we know all that we wish we knew about everything that could affect this project.

Operations Demonstration

The Operations Demonstration is characterized in the Draft Plan as that portion of the Test Phase which begins at the conclusion of the shipments necessary to support the experimental program and ends with a period of demonstrated capability to handle and emplace waste at the facility's design rate of 60 shipments per month.

In fact, the Operations Demonstration portion of the Test Phase really begins with the shipment and receipt of the first shipment of TRU waste for the experimental program. Shipments of waste for the experimental program will be made from both the Rocky Flats Plant and the Idaho National Engineering Laboratory and thus will provide the first practical experience of the operation of the TRU waste management system. Consequently, I do not consider the Test Phase to have a segregatable segment entitled the Operations Demonstration; rather, I would separate the Operations Demonstration into two phases. The first phase would consist of the management and emplacement of TRU wastes necessary to conduct the experiments to support the development of a viable Performance Assessment (including those wastes that may be necessary to support alcove or room-scale tests that may be determined to be necessary), with the second phase being such additional shipments as may be necessary to further evaluate the waste management system and facility operation.

Regarding the conduct of the Operations Demonstration, criteria should be established for each phase of the waste management system operation whereby it can be concluded, when the criteria is met, that no further experience in that phase is necessary. Although RH wastes comprise a small fraction of the total amount of TRU waste and shipments, I believe that a demonstrated

capability to safely handle RH waste should be a prerequisite to the Secretary's decision of operational readiness of the facility. It would be a mistake to wait too long to derive experience with the waste management system such that any modifications would end up being on the critical path for WIPP operation, but it would also be a mistake to completely staff and train personnel to be able to handle full system design through-put and be forced to have that trained cadre wait months or years from their time of training and operational experience until the repository begins full-scale operation.

After the initial campaign of shipments necessary to support the experimental phase, it should be determined what, if any, and when additional experience is necessary to accomplish the independent purpose of waste management system operational viability. Achieving the right balance should be the responsibility of operating personnel on an iterative basis, with the ramp-up rates of the number of shipments adjusted accordingly, as developments affecting the facility's schedule occur. Within the constraint of the 3 percent of the WIPP facility volume now specified in the Draft Plan, there is an ample margin for sufficient wastes to be transported to demonstrate the viability of the system. This would include such additional amounts as may be appropriate to validate the system after modifications to the system have been made as a result of lessons learned from earlier experience.

The relatively small volume associated with a maximum amount of waste that would be emplaced under the Draft Plan (i.e., 3 percent) is not likely to cause a significant perturbation in facility long-term performance if the results of the experiments lead to a determination that the wastes to be emplaced at WIPP (and perhaps only the 97 percent of the wastes that had not yet been emplaced in WIPP at that point) must be modified, segregated, repacked or in some other way managed to meet the applicable performance criteria. All of the wastes emplaced as part of the Operations Demonstration that are not associated with the experiments will not be backfilled -- thus, the wastes could be reconfigured for segregation purposes and/or backfill material added even once the waste was emplaced. This would further reduce the likelihood that those wastes would have to be retrieved.

Retrieval of the wastes emplaced, whether required for waste reconfiguration and/or the addition of engineering enhancements or because a determination is made that WIPP is not a suitable disposal facility, can be accomplished if necessary. This has been demonstrated by the performance of a very well-planned and executed mock retrieval exercise that validated the ability of the facility to retrieve emplaced wastes (Ref. 59). It has been estimated that the costs of retrieval for the full amount of the wastes emplaced in the Operations Demonstration (i.e., up to 3 percent) would be in the range of $1 million. Concurrent with the development of the criteria that will be used to determine what waste management experience beyond that associated with the experimental program is needed, DOE should develop a contingency plan on how and where it would deal with wastes that might have to be retrieved after having been emplaced as part of the Operations Demonstration, including those wastes associated with the experimental program.

The decision of how much experience in waste system management is necessary beyond that gained with the wastes emplaced for the experimental phase is, at heart, a risk/benefit equation. It is my conclusion that the risk, both in terms of cost and occupational radiation exposure for emplacing wastes up to the 3 percent maximum, are reasonably balanced against the benefit of ensuring that the system works in a timely fashion. Any necessary modifications can be made in time to support facility operation. I believe the 3 percent limit established in the Draft Plan is not unreasonable, but that the decision should be made, and periodically reconsidered, by operating personnel as to how much experience (in addition to that gathered in the experimental phase) is necessary and appropriate, up to the 3 percent limit. The fundamental decision should be how to gain the maximum experience, at the opportune time, with the minimum amount of waste. The waste volume utilized should be as small as possible so that the cost, both economic and in terms of human resources, of retrieval is as small as possible if it is subsequently determined that the wastes must be repackaged or that the WIPP project is not viable, but the waste volume must be large enough to validate system operability. It should not be arbitrarily set in advance but rather be the responsibility of the WIPP management staff to accomplish on a timely basis against the criteria established in advance. Evaluating performance against criteria of acceptability determined in advance is a good management practice.

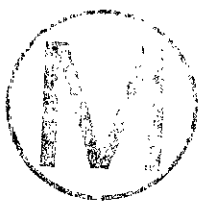
General Conclusion

An Operations Demonstration is necessary to provide information and experience to enable a determination to be made of whether the WIPP facility, with its associated waste management system, is suitable for use as a permanent disposal facility. Upon satisfying applicable statutory and regulatory responsibilities, and verifiying the operational readiness of the WIPP facility, DOE should immediately commence the Operations Demonstration. TRU wastes must be shipped to support commencement of experiments using actual waste emplaced in the WIPP facility which are necessary to support the completion of the WIPP Performance Assessment and to develop practical experience in the operation of the TRU waste management system. The Operations Demonstration should continue after completion of waste emplacement for the experimental program until such time as a determination of the suitability of all aspects of the waste management system operation can be made in accordance with defined acceptance criteria.

B. Rocky Flats Plant TRU Waste Certification Program Validation Plan

Background

Consistent with the WIPP Waste Acceptance Criteria (WAC), each DOE facility that generates TRU waste is required to establish its own waste certification program and associated quality assurance plan. Particular questions have been raised concerning the validity of the waste certification program conducted at the Rocky Flats Plant, and that concern was heightened by a Federal Bureau of Investigation (FBI) search of that facility begun on June 16, 1989, as part of a U. S. Department of Justice investigation.



Evaluation of a validation plan of the Rocky Flats Plant certification program was one of the primary responsibilities assigned to the WIPP Blue Ribbon Panel.

At the Panel's meeting with DOE and contractor representatives in Idaho on September 13, 1989, a proposed validation plan was discussed. At the Panel's subsequent meeting held on September 25, 1989, it became clear that the proposed validation plan was designed to evaluate the Rocky Flats Plant certified wastes to criteria other than those used in the certification process at Rocky Flats Plant and thus was preordained to conclude that the Rocky Flats certification program was inappropriately executed. Consequently, it would not satisfy the goal of determining whether the Rocky Flats Plant certification process had been correctly performed. An alternative validation plan was received on October 19, 1989, which was too late for the detailed evaluation and interaction with staff that such an important matter requires.

Observations and Recommendations

The primary purpose of the validation plan should be to determine whether the Rocky Flats Plant certification program was correctly administered and that the wastes evaluated in accordance with that program were correctly certified. Whatever validation program is adopted, it should have the following attributes: (1) it should be conducted by independent, technically qualified personnel in such a manner as to minimize occupational exposure, both to the radiological and the hazardous constituents contained within the waste drums; (2) it should be planned so as to minimize costs and system disturbance; (3) it should avoid additional transportation of the wastes if possible; (4) it should minimize the generation of additional wastes during the conduct of the validation program; (5) it should be conducted in a timely fashion to remove the cloud of suspicion associated with the Rocky Flats Plant certification program, or, if the program were flawed, to be able to identify discrepancies so that they can be corrected in a timely fashion; and (6) it should be conducted with comparable equipment calibrated to equivalent standards so as not to invalidate the Rocky Flats Plant certification program merely because of advances in technology that have occurred since the time those wastes were certified.

Separately, there may be value in reexamining, with currently available, more sensitive equipment, wastes previously certified by the Rocky Flats Plant and those wastes certified prior to the change in the concentration criteria of TRU wastes from 10 nanocuries per gram to 100 nanocuries per gram in accordance with DOE Order 5820.2A. It appears likely that a significant amount of the waste determined to be TRU waste could, in accordance with the revised criteria, be appropriately classified as either low-level radioactive waste, hazardous waste or mixed waste (rather than TRU or TRU-mixed waste). It may be possible to accomplish this reanalysis at the same time the validation program of the Rocky Flats Plant certification process is undertaken, but the purpose of the different evaluations should not be compromised. The purpose of the validation program is to determine whether the Rocky Flats Plant certification program was correctly administered, whereas the purpose of the second program is be to evaluate the waste with more sensitive equipment and to different criteria. The two programs may be able to be applied simultaneously, but the results should be separately evaluated.

Further, the implementation of either of these programs may provide a reasonable opportunity to evaluate the hazardous constituents within the TRU waste. That analysis can be very important to verify the process knowledge otherwise used in determining the presence and amount of hazardous constituents in the TRU waste and may provide empirical data that could be very important to the completion of the Performance Assessment and the No-Migration Variance Petition. I do not advocate the opening of a large number of containers merely to conduct this analysis, but an evaluation should be undertaken of an appropriate sample size and sampling technique that could provide additional, and probably very important, data while minimizing the exposure to these materials to the individuals conducting the evaluation. Use of available technology (e.g., head gas sampling evaluated by gas chromatography/ mass spectrometry) and techniques could significantly reduce personnel exposures while ensuring that the wastes are properly characterized.

General Conclusion

DOE should immediately implement a validation program of the Rocky Flats Plant wastes which have been certified to the WIPP Waste Acceptance Criteria. This should be accomplished by conducting an independent evaluation at the Idaho National Engineering Laboratory, through its Stored Waste Examination Pilot Plant, of a representative random sample of Rocky Flats Plant certified wastes currently in storage in Idaho to verify the contents of those waste packages to the criteria under which those wastes were certified. Concurrently, an audit should be done of the Rocky Flats Plant certification process to evaluate the adequacy of the certification process and to recommend appropriate corrective actions, if any. Both of these programs should be accomplished by experienced operators and QA personnel who have not been previously associated with the Rocky Flats Plant and with the participation, in an advisory role, of designated representatives of each of the states of Colorado, New Mexico and Idaho.

C. Systems Integration

Background

Early in the Panel's investigation, it became obvious that there was an institutional lack of communication among the various DOE offices involved in the WIPP project and the various contractors who were tasked with specific work product responsibilities by those offices. Examples abound and range from the inconsequential to the very consequential. For instance, operating personnel at the Rocky Flats Plant had not informed those individuals responsible for conducting the WIPP Performance Assessment about the nature of compaction to be accomplished at the Rocky Flats Plant; the compaction of the TRU wastes could directly affect criticality and gas generation calculations, both of which are critical parameters in evaluating WIPP facility performance.

Observations and Recommendations

At best, this results in an inefficient way to address significant problems, particularly when dealing with issues of a complex nature associated with a major project like the WIPP project. Frequently the result can be counterproductive activity. An additional deleterious result can be the lack of cross-fertilization between professionals and the resulting lack of different perspectives and insight which could hamper the development of innovative solutions to problems. In my judgment, the WIPP project and its associated waste management system cannot be managed correctly if engineering, technical and operating personnel are not responsible for interacting frequently with each other and with DOE staff. It is encouraging that DOE has recently established an interdisciplinary WIPP Task Force to oversee WIPP-related activities, and I advocate that it be provided with the responsibility, and sufficient authority, to ensure that the integration of these important activities occurs promptly.

In addition, there does not appear to be any on-going process to take advantage of the insight provided by independent groups evaluating aspects of the WIPP project or to respond to comments made at Congressional hearings (e.g., Ref. 10) and other types of relevant communications. This is not to imply that the observations and recommendations of the National Research Council's WIPP Panel, the Environmental Evaluation Group or even of the Blue Ribbon Panel itself should be blindly adopted, or categorically rejected either. There is evidence that at least some of these reports have been evaluated (e.g., Ref. 50). However, there does not seem to be an established policy that such a review and analysis should always be conducted. A mechanism should be established for those observations and recommendations to be carefully considered -- by technical, engineering and operating personnel, and staff who have policy perspective and responsibility -- for the value that such independent insights might provide. The results of those evaluations should be documented and a response provided to the issuing organization.

The WIPP project has completed its construction phase and now is poised to begin operations under the Test Phase. Therefore, a start-up team should be assembled, perhaps under the auspices of the WIPP Task Force, to ensure that the necessary transition is accomplished in a coordinated fashion (e.g., ensuring that all documents and plans reflect the as-built configuration). The team should be headed by an individual with major project start-up experience and include representatives of the Albuquerque Operations Office, the WIPP Project Office, the DOE Office of Environmental Safety & Health, the DOE Office of General Counsel, and operations personnel from the waste generating sites. This group must also have the authority commensurate with its responsibilities to ensure the safe and timely commencement of operations under the Test Phase.

General Conclusion

DOE should ensure that coordination takes place among the various DOE offices, contractors and subcontractors involved in all aspects of the WIPP program so that coordinated policy decisions can be made with the knowledge of the implications those decisions could have on various aspects of the

program and so that those decisions can be implemented in a consistent and timely manner. The recently created DOE WIPP Task Force may be able to accomplish the systems and task integration necessary, as long as it is appropriately staffed and given sufficient authority. In addition to DOE Headquarters personnel on the WIPP Task Force, a mechanism should be established, perhaps through topically-oriented Advisory Committees to the Task Force, to assure that the broad perspective of experienced operating personnel at each site and the principal contractors responsible for engineering and technical activities can be evaluated and considered in the decision-making process. The WIPP Task Force should also be responsible for considering and responding to the comments made by reputable groups involved in the WIPP evaluation process (e.g., National Research Council's WIPP Panel, Environmental Evaluation Group) and ensuring that the adoption of appropriate recommendations are implemented in an integrated manner.

D. Regulatory Requirements

Background

EPA regulations contained in 40 C.F.R. Part 191, Subpart A - Environmental Standards for Management and Storage, and Subpart B - Environmental Standards for Disposal, which were adopted in 1985, are the fundamental regulatory requirements that the WIPP facility must meet. The requirements of Subpart A are also mandated as a condition of the Stipulated Agreement between DOE and the State of New Mexico. Basically, Subpart A imposes a requirement that DOE operate the facility such as to provide reasonable assurance that the combined annual dose equivalent to any member of the public in the general environment resulting from discharges of radioactive material and direct radiation from such management and storage shall not exceed 25 mrem to the whole body and 75 mrem to any critical organ. Subpart B establishes individual protection requirements such that any member of the public in the accessible environment will not, for 1,000 years after disposal, receive a dose to exceed 25 mrem to the whole body or 75 mrem to any critical organ from the undisturbed performance of the disposal system and containment requirements for cumulative releases of radionuclides to the accessible environment for 10,000 years after disposal, with associated assurance requirements. Although disposal facilities are required to install permanent markers, records, and other passive institutional controls to indicate the danger of the wastes disposed of and their location, no contribution from active institutional controls for more than 100 years after disposal may be assumed in the analysis.

Subpart B requires that a performance assessment be conducted, which is an analysis that identifies the processes and events that might affect the disposal system, examines the effects of these processes and events on the performance of the system and estimates the cumulative releases of radionuclides caused by all significant processes and events, considering all associated uncertainties. Those estimates are then incorporated into an overall probability distribution of cumulative release that is measured against the EPA criteria. The EPA standards, both in the regulations, in the supplementary information associated with the final rule, and in the Draft Environmental Impact Statement associated with the final rule, are replete

with qualifications associated with the lack of specificity and technical justification because of the long time periods involved and the very nature of the events and processes that can take place during that time which create substantial uncertainties in projecting, and attempting to assure, system performance. In recognition of those uncertainties, both Subpart A and Subpart B contain provisions allowing for the issuance of alternate standards or substitute provisions, based upon appropriate analysis and explanations, as may be necessary to achieve the goals of the regulations. It is not clear whether legal analysis has been undertaken and advice provided regarding interpretation of the regulatory requirements and their application to the WIPP facility, as well as possible courses of action available.

Observations and Recommendations

It is possible, notwithstanding the best efforts of the most competent professionals available, that a demonstration of the ability of the facility to meet these criteria cannot be justified with the requisite level of certainty. EPA's own analyses demonstrate that a bedded salt formation is clearly a preferable geologic repository for radioactive waste, and the WIPP facility has attributes superior to those analyzed by EPA in reaching that conclusion.

It is also clear that the Part 191 requirements were based primarily on an analysis of the radiological constituents and waste forms associated with high-level radioactive waste. Because of the unique characteristics of TRU waste and because the WIPP facility is located in what EPA has determined to be a geologically superior type of formation, EPA should be closely involved in the experimental program and the development of the Performance Assessment to assure that the data collected and analyses performed satisfy EPA, both with respect to the established criteria and to the development of technical justification that may be required for seeking administrative modification of those requirements as may be appropriate for the WIPP facility. As the National Research Council's WIPP Panel observed, "[t]he primary goal of 40 CFR 191 is to ensure that a repository poses no significant health risk to the public; the standards set for compliance represent EPA's best estimate of what is required to achieve this goal. To date, however, these standards have never been applied to a specific repository." (Ref. 49, App. B). The National Research Committee's WIPP Panel further stated that "[t]he Panel believes that the above-mentioned primary goal can best be achieved by focusing performance assessment activities on demonstrating that the WIPP repository will be safe, i.e., pose no significant risk to the public health and safety, rather than by an uncritical, formal adherence to compliance with the current EPA standard" (emphasis in original). I agree.

Because approximately 60% of the TRU waste to be emplaced at WIPP contains hazardous wastes regulated under the Solid Waste Disposal Act, the Resource Conservation and Recovery Act of 1976, and the Hazardous and Solid Waste Amendments Act of 1984, the provisions of 40 C.F.R. Part 268 must be addressed. These regulations provide, inter alia, that a petition must be filed with EPA "demonstrating, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit . . . for as long as the wastes remain hazardous." Such a petition, commonly referred to as the

"No-Migration Variance Petition," was filed in February 1989. As was recommended for addressing Part 191 requirements, DOE should work closely with EPA to address Part 268 requirements and ensure that the application of those requirements to the WIPP facility is justifiable in terms of the unique nature of the TRU wastes being disposed of at WIPP and because of the fundamental purpose of the WIPP program.

The WIPP Final Safety Analysis Report (FSAR) and the Supplement to the Environmental Impact Statement (SEIS) also address environmental issues. Because of the evolutionary nature of the WIPP project, and particularly the developing understanding of the physical phenomena and geologic characteristics associated with the WIPP facility in the recent past, many of the documents that have been prepared and issued to address a variety of statutory and regulatory requirements (including the FSAR, SEIS and No-Migration Variance Petition) do not accurately reflect the current knowledge; they are being evaluated on the basis that they correctly represent the facts, yet they are different in significant respects (e.g., the assumptions associated with and the evaluation of consequences of hazardous chemical releases). Many of these documents were prepared by different individuals or groups to satisfy specific requirements and it appears that there was, and potentially still is, little interaction between those groups, which only exacerbates the problem.

General Conclusions

A comprehensive review of all statutory and regulatory requirements applicable to the WIPP program should be conducted to ensure that all requirements are identified and integrated to ensure compliance, or timely requests are prepared for such regulatory exemptions as may be appropriate and technically justifiable because of the unique nature of the WIPP program. This analysis is necessary not only to evaluate the suitability of the WIPP program to begin operations but throughout the duration of the WIPP program as well. A high priority task should be to establish editorial and technical consistency on all substantive matters between the various regulatory submittals that have been prepared.

Fundamentally, both DOE and EPA are responsible for implementing national policy regarding the proper disposal of TRU waste. Neither agency can shirk its statutory responsibilities, but both must recognize that their responsibilities in this area are joint and not severable. DOE and EPA must ensure, in the context of the WIPP project, that the responsibility for safe, permanent disposal of TRU wastes and the requirements of Parts 191 and 268 are reconciled. It is not in the Nation's best interest for TRU waste, safe though it may be in temporary storage, to remain in that state ad infinitum because of a failure of governmental agencies to work together to develop a facility that can safely, permanently dispose of TRU wastes.

E. Waste Acceptance Criteria

Background

The WIPP Waste Acceptance Criteria (WAC) establish limits for the physical, radiological, and chemical composition of the TRU waste that is to be emplaced at the WIPP facility. The primary objectives of the WAC are to ensure that all TRU wastes are packaged so that handling and subsequent disposal are performed safely and that the repository is able to isolate the waste from the environment in accordance with regulatory requirements. These criteria were developed so that TRU waste generators could design their waste processing systems such that the waste packages will be acceptable for geologic disposal in an embedded salt environment.

The WAC is established and administered by the Waste Acceptance Criteria Certification Committee (WACCC). In addition to establishing and modifying the WAC as it may deem appropriate, WACCC is responsible for reviewing and approving certification plans and associated quality assurance plans at all TRU waste generating and storage sites. WACCC is also responsible for conducting field audits to ensure that plans and programs associated with WAC are properly implemented. The WACCC is comprised currently of seven individuals, one of whom is required by the WACCC charter to have a formal QA background. All members of the WACCC are associated with the WIPP project: none of the waste generating facilities are directly involved in the formulation or modification of the WAC or the policies of the WACCC other than through applying to the WACCC for approval of their certification process and for supporting an annual audit conducted by the WACCC.

The WAC was developed from the perspective of disposal facility constraints. Different, and in some cases more stringent criteria, must be applied to the waste to meet the requirements of the TRUPACT II waste container, the U. S. Department of Transportation (DOT) and EPA regulations, and regulations of the State of New Mexico (e.g., no hydrogen generation limit vs. no more than 5 percent generated in a 60 day period; no criteria for flammable organics vs. 500 parts per million). For example, there apparently is a significant volume of TRU wastes that are certified to the WAC but do not meet the TRUPACT II criteria. Further, there is no evidence that the limitations imposed by the agreements with the State of New Mexico have been recognized in the WAC. (See Ref. 12, page 5).

Observations and Recommendations

I have a number of observations concerning the WAC and its implementation. First, the various criteria imposed (e.g., WAC, DOT and EPA regulations, TRUPACT II) should be integrated into a single set of criteria and a comprehensive data collection form developed that would satisfy all applicable requirements. Further, it does not appear that the need to determine the presence and amount of hazardous constituents has been evaluated from either a technical (i.e., to support the Performance Assessment development) or legal perspective. The WACCC should ensure that the appropriate data is collected during the certification process to support a determination that the criteria had been complied with (e.g., sampling the drum head space for

volatile organic compounds to ensure that the hazardous waste constituents are properly characterized to comply with EPA requirements). Second, there appears to be very little communication between waste generators, who might be able to learn from one another's experience, and those individuals who are involved in other aspects of the WIPP project (e.g., the scientists and engineers conducting the Performance Assessment); a result is that the interpretation given to the WAC by the WACCC may be dramatically different than that assumed by other individuals associated with the WIPP project. Third, whenever changes are made to the WAC or to the implementation of the WAC (e.g., the conclusion to allow, as a matter of course, free liquids up to 1 percent by volume), they must be immediately communicated to the individuals responsible for conducting the Performance Assessment and to those individuals who are responsible for assuring that the facility meets applicable regulatory requirements. Fourth, there are a number of instances where the criteria established in the WAC, and accompanying QA criteria, include phrases such as meeting "applicable" requirements without any guidance on how that determination should be made, by whom, and in reference to what. Fifth, various of the guidance documents appear to be internally inconsistent (e.g., Ref. 36 relies in its analysis on the use of a corrosive-resistent inner liner to satisfy the pertinent criteria, yet in Ref. 37 the use of corrosion-resistent liners is only recommended; Ref. 36 concludes that radioactive mixed wastes will be packaged, transported and disposed of in a manner "more stringent than regulations applying to other types of toxic substances," yet no technical justification is given for that conclusion: that issue is subject to considerable doubt, which is the focus of the petition filed with the EPA under Part 268). Sixth, there are a number of specific provisions that suggest additional consideration should be given to revising the WAC to include experience garnered to date (e.g., the requirement that labels be affixed to individual waste packages does not require that the labels be located in a manner that would aid in the quality assurance, transportation, receipt and emplacement operations -- for example, requiring labels to be located on the top and bottom and 120 degrees apart on the exterior sides of the drum). These are not critical issues, but they can have a dramatic effect on the ability of the program to function smoothly.

With respect to the operations of the WACCC, I have the following observations. First, once the WAC is established, the WACCC functions primarily in a quality assurance (QA) role, yet only one of its members is required to be experienced in QA activities and there is no requirement for any of the WACCC members to have operational experience. Second, it does not appear that the WACCC, in its QA role, is independent of line management, which experience suggests is a necessary attribute to ensure the independence of QA-related conclusions. Third, the audits of the generating facilities are conducted annually on an announced basis; experience suggests that more valuable audit insight could be achieved by conducting unannounced audits at a random frequency. Fourth, there apparently has not been any effort by the WACCC to evaluate trends that may be present in the individual site certification processes to be able to determine equipment degradation or any programmatic or personnel weaknesses; under the current system, a significant number of records are not required to be retained past a subsequent WACCC audit, nor is there any intent to retain package-specific records (e.g., routine assays and inspections, non-conformance reports) post-emplacement

that might facilitate problem resolution if one were to occur during facility operation.

In addition, I would make the following general observations. First, each site apparently develops its own three-digit "content code." It would seem to facilitate quality assurance activities, as well as waste emplacement and possible retrieval, for a uniform set of content codes to be developed for the general categories that are not likely to change and for each site to have the ability to use a defined block of numbers for any necessary additional site-specific content codes. Finally, DOE Order 5820.2A requires that radioactive and mixed wastes be managed in a manner that minimizes the generation of such wastes, yet it is apparent that little thought has been given at the Rocky Flats Plant, and presumably at other DOE production facilities, to conducting their operations in a manner that would minimize radioactive and mixed waste generation and would manage whatever wastes are generated in an integrated manner to minimize the handling of these materials; systems integration is clearly necessary if DOE's goal of effective waste management are to be achieved.

As currently envisioned, there would be no receipt inspection of TRU waste packages at WIPP other than a visual inspection for external package deterioration and both a radiation and surface contamination survey. Thus, once the wastes have been packaged and certified, there would be no further evaluation conducted (e.g., to determine if void spaces were created due to settling during transit; to determine if condensation during storage resulted in an increased amount of free liquid) even though conceivably these wastes could have been in surface storage for up to 20 years. This may not meet RCRA requirements. Further, the WIPP facility's only current capability to treat waste drums that are found to be not acceptable upon receipt is to overpack them.

General Conclusions

The WIPP Waste Acceptance Criteria is but one of the criteria to which the waste generators must ensure that the TRU waste is packaged. These requirements should be integrated so that a single certification process that meets all criteria can be conducted and a single, comprehensive waste manifest completed. Ambiguous requirements should be clarified and all related documentation revised accordingly. The need to acknowledge that correct waste management is an important priority must be inculcated at all waste generating sites.

A monitoring system should be installed at WIPP to ensure that the containers as received meet the WAC and RCRA criteria that may be applicable. WIPP should also have the capability to repackage or otherwise disposition any drums received that do not meet the applicable criteria.

F. Project Documentation

Observations and Recommendations

In the course of the investigation by the Blue Ribbon Panel, individual Panel members requested a number of documents that were referenced in other project-related documents or were otherwise pertinent to this investigation. In my experience, DOE and contractor personnel were, without exception, very willing to supply all documents requested. However, with the best of intentions, it frequently became a laborious process to locate where certain of the documents resided so that copies or excerpts could be made. The difficulty of that task strongly suggests that many of the documents that could be helpful to various DOE offices and contractors themselves in pursuing specific topics were not readily available to them and, in fact, they may not have known of their existence or how to obtain them if their existence was identified.

In a similar fashion, the need for individuals or groups not directly responsible for the WIPP project (e.g., National Resource Council's WIPP Panel, Environmental Evaluation Group) and regulatory agencies whose responsibilities affect the WIPP project (e.g., EPA, DOT, NRC), to say nothing of interested members of the media and general public, could be beneficially addressed by having all applicable documents collected in a central location. This would also be advantageous to DOE offices and contractors directly involved in WIPP and to DOE offices and contractors, as well as other regulatory agencies, involved in other projects (e.g. the high-level radioactive waste disposal facility to be developed in accordance with the provisions of the Nuclear Waste Policy Act of 1982) that might benefit from the knowledge of the lessons learned through the course of the development of the WIPP project.

General Conclusion

DOE should establish, at a minimum, two Public Document Rooms, one in Albuquerque or Carlsbad, New Mexico, and one in Washington, D.C., in which all documents associated with the WIPP project would be located to facilitate review of those documents by the public, regulatory agencies (both state and federal), and the various DOE offices and their contractors and subcontractors. The WIPP project is an important national effort of great technical and political complexity: it is critical to informed decision-making that documentation of WIPP-related issues be made available for scrutiny.

G. Continuing Oversight

Observations and Recommendations

The total time in which the WIPP Blue Ribbon Panel has been involved in conducting its investigation and evaluation has been very limited, primarily because of the necessity of DOE to have the ability to analyze the Panel members' insight in a timely fashion and to implement such modifications to the WIPP program as DOE may deem appropriate based upon that insight. Because

Panel members were, by the press of available time and resources, unable to have all of their inquiries pursued to resolution, it may be beneficial to provide the Panel with an additional opportunity to meet with DOE and contractor rerpresentatives at some time in the future to address the Panel members' observations and recommendations. It may also be beneficial for DOE to have an opportunity to interrogate individual Panel members to ensure that their views are understood. In addition, there may be benefit to DOE for the Panel members to consider their colleagues' analyses and reports and determine if, based on that further insight, additional or modified recommendations could be made that may be helpful to DOE.

As described in Section I of this report, one of the defined responsibilities of the Panel was to evaluate and comment upon a proposed validation plan of the Rocky Flats Plant certified waste program. In that a validation plan has not yet been developed, the Panel cannot at this time satisfy that responsibility. However, the Panel member's several observations and comments on the recent draft plan (Ref. 69) may assist DOE in developing an appropriate validation plan. Once a plan is developed and implemented, there may also be advantage to having an independent body, such as the Blue Ribbon Panel, evaluate the results of the validation program to assist DOE in determining what, if any, additional actions would be appropriate with respect to the Rocky Flats Plant certified waste or certification program.

General Conclusion

An independent advisory body, such as the WIPP Blue Ribbon Panel, should evaluate (1) the response to and implementation of recommendations made by the Panel members which are adopted by the Secretary, and (2) the Rocky Flat Plant waste certification validation plan, once it is developed, and the results of the validation program upon its completion.

IV. OVERALL OBSERVATIONS

The WIPP facility appears to have been well-planned and constructed, and the pride of the individuals responsible for those tasks was evident. It has the hallmarks of a professionally designed and staffed facility. It is well-maintained, organized to have a low ambient noise level and operated in a consistent manner, and is designed to provide sufficient space for planned operations with extra space to facilitate dealing with unexpected situations or subsequent system modifications that may be required.

Even in the short time in which the Panel has been active, it is clear that there are a great number of competent and motivated individuals, both professional and support staff, who are committed to doing their best to do this project correctly. That statement applies at each of the offices that we visited, to both staff and operating personnel, and to government employees and contractors alike. There may be relative strengths and weaknesses among the personnel, but there was no evidence of people being satisfied with doing less than a responsible job, whatever their responsibility might have been. They did not always agree with one another, nor I with them, but that does not diminish my respect for their willingness to tackle a very difficult task.

If WIPP is not determined to be a suitable facility as a geologic repository, it does not appear that it will be for the lack of many individuals doing their best to do the job right.

On February 12, 1980, the President of the United States established a comprehensive program for the management of radioactive waste. In a message to Congress on that date, President Carter observed that "[m]any citizens know and all must understand that this problem will be with us for many years. We must proceed steadily and with determination to resolve the remaining technical issues while ensuring full public participation and maintaining the full cooperation of all levels of government. We will act surely and without delay, but we will not compromise our technical or scientific standards out of haste. I look forward to working with the Congress and the states to implement this policy and build public confidence in the ability of the government to do what is required in this area to protect the health and safety of our citizens." A decade has expired since that call to action was made, and its principles remain apt today, as the recently issued DOE Environmental Restoration and Waste Management Five-Year Plan (Ref. 68) demonstrates. We must find the way to address and resolve these issues without delay.

Attachment A

WASTE ISOLATION PILOT PLANT

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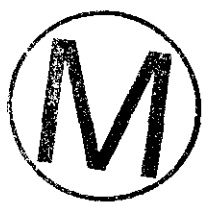

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WASTE ISOLATION PILOT PLANT

BLUE RIBBON PANEL

MEMBER REPORT

Dr. Arthur S. Kubo
October 23, 1989

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October 23, 1989

I. INTRODUCTION

The Waste Isolation (WIPP) Blue Ribbon Panel (BRP) was established by the Secretary of Energy on August 31, 1989. Each panel member is individually chartered to review, assess, and report on the following WIPP issues (Statement of Work):

> Independent validation of the certification of Rocky Flats Plant (RFP) waste at both Rocky Flats and at Idaho National Engineering Laboratory (INEL) for shipment to WIPP.
>
> Concept and timing for the WIPP Operations Demonstration Test Plan.
>
> Whether the WIPP Program can perform an operations demonstration in parallel with the conduct of performance assessment experiments.

II. ASSESSMENT METHODOLOGY

This assessment of WIPP issues is based on two WIPP BRP briefing sessions/meetings augmented by individual review of data and follow-up of specific questions. Various members attended separate briefings and meetings and made reports as appropriate to the panel.

On September 11 through 14, 1989, the BRP toured and attended briefings (Reference 80, Appendix A) at DOE's Albuquerque Operations Office, the WIPP Facility (Carlsbad, NM), the SWEPP and the TRU Waste Temporary Storage Facility (INEL, ID), and the Rocky Flats Plant (RFP, CO). The principal WIPP technical, management, and program personnel were introduced. EEG and NAS representatives made presentations in Albuquerque. The introductory tour was well organized, informative, and candid.

On September 25 and 26, 1989, a BRP-requested follow-up meeting in Denver occurred. Selected personnel from WIPP/INEL/RFP and supporting contractors (Westinghouse, Sandia, and IT) attended the meeting. The BRP requested answers to a list of questions (Appendix B) organized in nine subject areas: Organizational Relationships; The Legal Basis and Requirements for WIPP; The Methodology to Reduce Technical Uncertainty; The Interrelationships Between the Waste Acceptance Criteria (WAC), Performance Assessment (PA), and No Migration Petition (NMP); The WAC Certification (WACC), Quality Assurance/Quality Control (QA/QC), and Security; The RFP Waste Certification Validation Program; PA and Operations Demonstration (OD); Transportation; and Miscellaneous.

The BRP was provided with a substantial library of documents and, in turn, requested numerous other references. In addition to the documents, verbal information obtained outside of the formally-convened BRP meetings is referenced in Appendix A. This panel report is based on the review of information provided in Appendix A.

III. EXECUTIVE SUMMARY

The Executive Summary is presented in viewgraph format in Figures 1 through 3.

IV. ASSESSMENT

The major findings can be summarized into four statements:

(1) The various technical, plant, and operational groups supporting the WIPP Program demonstrate technical competence and excellent motivation;

(2) The WIPP Program embraces three important and entwined national issues -- development of a geologic disposal facility for nuclear wastes, implementation and rationalization of current conflicting mixed waste regulations, and management of TRU wastes as part of the production of defense nuclear materials;

(3) The TRU/Mixed TRU Waste and WIPP Program requirements have developed based on dynamic national defense, technical, public, and regulatory needs. The current unfocused program strategy and execution reflect this erratic process; and

(4) The TRU/Mixed TRU Waste and WIPP Program effectiveness, organizational charters, programmatic and technical integration, and conflict resolution lag behind the unfolding requirements.

These findings contribute greatly to the current WIPP dilemma and, in a significant way, have lead to the specific BRP assessment issues. In addition to the responses to the specific questions posted to the panel, these findings lead to the following major recommendations:

(1) DOE should develop a proactive DOE-wide Mixed Waste Management strategy; establish a program management structure aligned with the strategy; assign a full-time HQ-field program management organization and staff to execute the strategy in an integrated, coherent manner; and centralize authority at the HQ level; and

(2) DOE should adopt a formal systems engineering approach to the design, testing, and operation of the WIPP. This process should begin with the systematic identification of all requirements that must be meet to establish an operational WIPP facility and a Management Plan to achieve the desired program goals.

The remainder of this report provides the rational for the recommendations outlined in the Executive Summary.

V. OBSERVATIONS, RECOMMENDATIONS AND DISCUSSION:

A. Validation of RFP Waste Certifications

The circulated RFP Certified Waste Verification Program Plan, September 13, 1989, Reference 60, was withdrawn for further DOE staff coordination. The review of the WIPP WAC and the RFP WAC Certification Process suggests five issues that underlie the certification process.

1. Is the management of the standard appropriate to the WIPP and TRU/Mixed TRU Waste Program?

OBSERVATION A.1:

The WIPP WAC is the integrating configuration control document for DOE's TRU Waste Management Program, but it does not fully integrate the TRUPACT II, Performance Assessment, Consultation and Cooperation (C&C) Agreement, Stipulated Agreement, and RCRA requirements to establish a single standard for TRU/Mixed TRU waste acceptable for disposal at WIPP.

FIGURE 1: VALIDATION OF RFP WASTE CERTIFICATIONS

WIPP BLUE RIBBON PANEL CHARTER

INDEPENDENT VALIDATION OF THE CERTIFICATION OF ROCKY FLATS PLANT (RFP) WASTE AT BOTH ROCKY FLATS AND AT IDAHO NATIONAL ENGINEERING LABORATORY (INEL) FOR SHIPMENT TO WIPP

KEY QUESTIONS:

- *IS THE MANAGEMENT OF THE WAC STANDARD APPROPRIATE?*
- *IS THE WAC WASTE PACKAGE CERTIFICATION PROCESS ADEQUATE?*
- *IS THE WIPP WASTE INFORMATION SYSTEM DATA BASE ACCURATE?*
- *IS THE WIPP WAC QA PROGRAM EFFECTIVE?*
- *WHAT SHOULD THE RFP RECERTIFICATION PLAN BE BASED ON?*

IS THE MANAGEMENT OF THE WAC STANDARD APPROPRIATE?

RECOMMENDATION A.1:

- SEPARATE THE WAC APPROVAL AUTHORITY FROM THE CERTIFICATION AND AUDIT FUNCTIONS
- CHARTER A TRU/MIXED TRU WASTE ACCEPTANCE CRITERIA CONFIGURATION MANAGEMENT BOARD TO INTEGRATE, COORDINATE, AND APPROVE THE WIPP WAC
- RECHARTER THE WIPP WAC CERTIFICATION COMMITTEE TO CERTIFY AND AUDIT THE WAC CERTIFICATION PROCESS AT THE OPERATING SITES

IS THE TRU/MIXED TRU WASTE CERTIFICATION PROCESS ADEQUATE?

RECOMMENDATION A.2:

- SAMPLE WASTE PACKAGES AT RFP ROUTINELY
- DEVELOP AND USE HAZARDOUS WASTE ASSAY INSTRUMENTATION
- CROSS-CALIBRATE ASSAY INSTRUMENTATION AMONG OPERATING SITES
- OBTAIN RCRA HAZARDOUS MATERIALS DATA DURING ROUTINE PACKAGE SAMPLING
- ASSESS RTR TECHNICIAN PERFORMANCE ON A ROUTINE BASIS
- DOCUMENT RTR TECHNICIAN PREREQUISITE SKILLS AND WORK FUNCTIONS.

IS THE WIPP WASTE INFORMATION SYSTEM (WWIS) DATA BASE ACCURATE?

RECOMMENDATION A.3:

- ESTABLISH GLOBAL WWIS SECURITY AND QA STANDARDS
- AUTOMATE DATA TRANSFER AS MUCH AS POSSIBLE TO REDUCE HUMAN ERROR
- VERIFY ON ARRIVAL AT WIPP EACH PACKAGE DATA DESCRIPTION USING AN EASILY MEASURED PARAMETER (SUCH AS WEIGHT)

FIGURE 1: VALIDATION OF RFP WASTE CERTIFICATIONS (CONT)

IS THE WIPP WAC QA PROGRAM MANAGED AND EXECUTED EFFECTIVELY?

RECOMMENDATION A.4:

- CONDUCT AN INDEPENDENT REVIEW OF THE WIPP WAC QA PROGRAM

WHAT SHOULD THE RFP RECERTIFICATION PLAN BE BASED ON?

RECOMMENDATION A.5:

- INCORPORATE IN THE RECERTIFICATION PROCESS:
  - CERTIFIED AND PROPER TECHNICAL PROCEDURES WITH RANDOM PHYSICAL PACKAGE INSPECTION
  - RFP ON-SITE WASTE RECERTIFICATION BY OTHER THAN RFP EMPLOYEES
  - FULL-TIME WACCC AUDIT TEAM PRESENCE DURING CERTIFICATION PROCESS
  - 100 PERCENT COMPARISON OF ORIGINAL VS NEW RTR TAPES OF EACH ON-SITE RFP TRU WASTE PACKAGE AT SWEPP

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RECOMMENDATION A.5 (CONT):

- CONDUCT AN UNANNOUNCED AUDIT OF RFP RECORDS BASED ON A CONTROLLED AUDIT PLAN
  - PREBRIEF RECERTIFICATION GOALS AND PROCEDURES TO ALL AFFECTED STATE GOVERNMENTS
  - POST BRIEF ALL AFFECTED STATE GOVERNMENTS ON THE RESULTS OF THE AUDIT
- ANNOUNCE PROGRAM RESULTS PUBLICLY

FIGURE 2: THE RELATIONSHIP BETWEEN THE PERFORMANCE ASSESSMENT AND OPERATIONAL DEMONSTRATION

WIPP BLUE RIBBON PANEL CHARTER

CONCEPT AND TIMING FOR THE WIPP OPERATIONS DEMONSTRATION TEST PLAN

WHETHER THE WIPP PROGRAM CAN PERFORM AN OPERATIONS DEMONSTRATION IN PARALLEL WITH THE CONDUCT OF PERFORMANCE ASSESSMENT EXPERIMENTS

KEY QUESTIONS:

- WHAT IS THE TECHNICAL PURPOSE AND PHASING OF THE PA AND OD?
- WHAT SHOULD BE DONE TO ENSURE OPERATIONAL READINESS FOR THE OD?
- WHAT IS THE RELATIONSHIP OF WIPP TO THE DEFENSE NUCLEAR MATERIALS PROGRAM?

WHAT IS THE TECHNICAL PURPOSE AND PHASING OF THE PA AND OD?

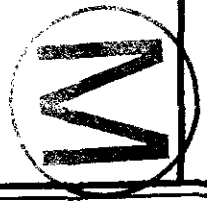
RECOMMENDATION B.1:

- SEPARATE THE WIPP TEST PLAN INTO THE TWO DISTINCT PARTS (PA AND OD) AND CLEARLY DEFINE THE GOALS FOR EACH
- START THE PA AT WIPP AS SOON AS THE LAW PERMITS
- START A LESS-THAN-FULL SYSTEM OD BEGINNING WITH THE EMPLACEMENT OF PA WASTE
- TECHNICALLY START A FULL-SYSTEM OD WITH THE FILLING OF THE BACKFILLED ALCOVE TESTS AND TIME FULL-CAPACITY TESTING TO BRIDGE WITH THE START OF WIPP DISPOSAL OPERATIONS
- SCOPE THE OD TO DEMONSTRATE TECHNICAL GOALS *OF FULL-SCALE TRU/MIXED TRU WASTE MANAGEMENT* TEST

WHAT SHOULD BE DONE TO ENSURE OPERATIONAL READINESS FOR THE OD?

RECOMMENDATION B.2:

- IDENTIFY ALL STATUTORY, REGULATORY, AND TECHNICAL REQUIREMENTS TO EXECUTE THE OD
- CONDUCT A READINESS REQUIREMENTS REVIEW USING A FORMALLY TASKED MULTIDISCIPLINARY REVIEW GROUP



WHAT IS THE RELATIONSHIP OF WIPP TO THE DEFENSE NUCLEAR MATERIALS PROGRAM?

RECOMMENDATION B.3:

- ISOLATE WIPP, AS MUCH AS POSSIBLE, FROM THE OPERATIONAL REQUIREMENTS OF THE DEFENSE NUCLEAR MATERIALS PRODUCTION PROGRAM
- DEVELOP A TRU/MIXED TRU WASTE STORAGE PLAN TO ADDRESS THE DEFENSE NUCLEAR MATERIALS PRODUCTION WASTE STORAGE ISSUE
- DEVELOP A PREAPPROVED RETRIEVAL AND STORAGE PLAN IF WIPP IS PROPOSED AS A TEMPORARY STORAGE FACILITY FOR CURRENT RFP PRODUCTION WASTE

FIGURE 3: THE MAJOR TRU/MIXED TRU WASTE MANAGEMENT PROGRAM ISSUES

IMPORTANT FINDINGS

THE FINDINGS OUTLINED ON THE FOLLOWING PANELS CONTRIBUTE IN A MAJOR WAY TO THE CURRENT WIPP DILEMMA AND THE SPECIFIC BLUE RIBBON PANEL ISSUES.

- *THE WIPP TEAM IS IMPORTANT TO THE PROPER AND SAFE EXECUTION OF THE TEST PLAN*
- *THE WIPP PROGRAM ADDRESSES THREE MAJOR NATIONAL ISSUES*
- *A MIXED WASTE MANAGEMENT POLICY AND STRATEGY ARE NEEDED*
- *THE MANAGEMENT OF THE MIXED WASTE PROGRAM SHOULD BE RESTRUCTURED*

THE WIPP TEAM IS IMPORTANT TO THE PROPER AND SAFE EXECUTION OF THE WIPP PROGRAM

RECOMMENDATION C.1:

- ASSESS THE IMPACT OF WIPP PROGRAM DELAYS ON TEAM EFFECTIVENESS AND PERSONNEL RETENTION

THE WIPP PROGRAM ADDRESSES THREE MAJOR NATIONAL ISSUES

RECOMMENDATION C.2:

- SEPARATE THE THREE ISSUES -- DEFENSE MATERIALS PRODUCTION, MIXED WASTE REGULATION, AND WIPP FACILTY DEVELOPMENT
- ADDRESS EACH ISSUE ON ITS OWN MERIT
- IDENTIFY EXPLICITLY THE COMMON ISSUES OF CONCERN AND THE TRADE-OFFS

A MIXED WASTE MANAGEMENT POLICY AND STRATEGY ARE NEEDED

RECOMMENDATION C.3

- DEVELOP A NATIONAL MIXED WASTE MANAGEMENT STRATEGY
- WORK COOPERATIVELY, AT AN ACCELERATED PACE, WITH EPA TO DEVELOP A COHERENT MIXED-WASTE REGULATORY FRAMEWORK (INDEPENDENT OF THE WIPP PROJECT)

FIGURE 3: THE MAJOR TRU/MIXED TRU WASTE MANAGEMENT PROGRAM ISSUES (CONT)

THE MANAGEMENT OF THE MIXED-WASTE PROGRAM SHOULD BE RESTRUCTURED

RECOMMENDATION C.4:

- **ESTABLISH A FULL-TIME TRU/MIXED TRU WASTE MANAGEMENT OFFICE AT HQ WITH THESE SUBFUNCTIONS:**
  - **STRATEGIC PLANNING AND REQUIREMENTS**
  - **WIPP PROGRAM**
  - **WIPP WAC CONFIGURATION MANAGEMENT**
  - **WIPP WAC AUDIT OFFICE**
  - **WIPP WASTE INFORMATION SYSTEM**

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RECOMMENDATION A.1:

DOE should separate the WAC approval authority from the WAC Certification and Audit functions. A TRU/Mixed TRU Waste Acceptance Criteria Configuration Management Board (WACCMB) should be established to review and approve the WAC and modifications to it. The WACCMB should report to the person responsible for DOE's TRU/Mixed TRU Waste Management Program in order to (af)fix? accountability. The WIPP WAC Certification Committee (WACCC) should be rechartered to certify and audit the WAC certification process employed at the generation and storage sites.

DISCUSSION A.1:

WIPP safety and the management and integrated control of DOE's TRU/Mixed TRU Waste Management Program is based on the WAC and the WIPP Waste Information System (WWIS). The WAC development, approval, and modification process should be independent from the certification and audit function, the WIPP Program, and the generation/storage sites. A separately chartered WACCMB reporting to a single individual responsible for managing the DOE TRU/Mixed TRU Waste Management Program would provide this independence.

The present WAC does not integrate TRUPACT II requirements, the PA parameters, agreements with the State of New Mexico, and RCRA requirements. The WAC and TRUPACT II requirements differ, and the current RCRA requirements are not incorporated in the WAC. Coordination with the New Mexico Environmental Improvement Division (EID) is necessary to ensure regulatory consistency between the WAC, the State EPA-equivalent licensing requirements, and the terms of agreements with the State of New Mexico. Presently, there is inadequate integration of the WAC and the definition of the physical characteristics of the waste source term used in PA analyses. Previous PA and Safety Analyses have treated hazardous materials separate from radioactive ones. For example, the current PA does not assume hazardous materials as contaminants (except for lead); it ignores the waste liquids as a potential carrier medium; and it does not consider various volatile organic compound (VOC) transport mechanisms.

The WAC is the integrating document that ultimately establishes the physical character of the WIPP source term and, hence, is an important factor in the long term safety of the facility.

2. **Is the TRU/Mixed TRU waste certification process adequate?**

OBSERVATION A.2:

The current waste certification process uses process knowledge to characterize hazardous waste streams. The process knowledge methodology tends to classify mixed wastes conservatively. Current hazardous waste data are based on a few samples of waste package analysis. The Real-Time-Radiography (RTR) operation is the most subjective aspect of the certification process and requires well-trained technicians.

RECOMMENDATION A.2:

RFP should, as part of its routine QA function, physically sample certified waste drums on a random basis to ensure compliance with the WAC and verify RTR certification. During the sampling, additional hazardous material data should be gathered. Hazardous waste assay instrumentation should be developed to better document the hazardous waste component. Assay instrumentation should be cross-calibrated among operating sites. RTR operator performance should be routinely

assessed. Furthermore, the current RTR operators should be evaluated to determine what individual skills are required to maintain a high level of performance. This study will provide a basis for future RTR training, selection, and certification of candidate technicians.

DISCUSSION A.2:

There is an inconsistency of technical effort, waste characterization, and data as it pertains to the radioactive and hazardous waste components of the TRU/Mixed TRU wastes.

The methodology for long-term radioactive waste disposal safety evaluation requires a performance assessment with potential human intrusion; whereas, RCRA requirements are being met based on a successful No Migration Petition (NMP) which does not model human intrusion. If the NMP is denied or substantively challenged, quantitative data are inadequate to support a detailed RCRA safety and health analysis. Except for sludges, current waste is RCRA type classified based on process knowledge using very conservative estimates for hazardous material content. Given the risks and technical difficulties in obtaining representative data, process characterization is a reasonable methodology, but nondestructive hazardous materials assay methodologies should be investigated to increase the available data.

Furthermore, if these conservatively estimated quantities of hazardous materials are present in the source term, detailed analyses of potential leakage from the disposal site do not consider the liquid components as adding to the total liquid volume nor as hazardous components in long-term safety studies. Current PA analyses do not consider the hazardous material, except lead, as potential contaminants for safety analysis.

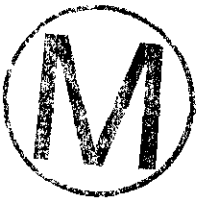
The data establishing hazardous material quantities are based on a few sampled drums (not including sludges). All waste drums are being vented, and this process may provide an opportunity to sample the volatile compounds in the drum head space. The gas data could provide the basis for estimating the VOC content.

At present, RFP does not routinely open drums to supplement the nonintrusive certification procedure. Additionally, at RFP (as at SWEPP), the certification process depends on the subjective judgement of the RTR technician. This and the process knowledge waste classification methodology are the most subjective aspects of TRU/Mixed TRU Waste certification. Over the past four years, RTR technicians have complied an outstanding record. QA checks of RTR tapes are made for one in three certified and for all uncertifiable drums. QA has yet to dispute the judgement of the on-line RTR technician. Notwithstanding this exemplary record, the prerequisite skills and work load/functions required of an RTR technician to maintain this quality standard should be documented.

3. Is the WIPP Waste Information System (WWIS) data base accurate?

OBSERVATION A.3:

The WWIS is central to effectively execute the TRU/Mixed TRU Waste Management Program. Local data management systems that feed WWIS were developed to meet individual operating needs and conditions. Substantial data are manually entered into the local data bases. No consistent security or QA standard is applied to the total (local and WWIS) system.



RECOMMENDATION A.3:

A security and QA review of the WAC Program, especially the WWIS and local waste management data bases, should be conducted to assess its vulnerability to deliberate malfeasance

and sabotage and to reduce the potential for human transcription error. Methods to automatically transfer WAC data during the certification process should be considered. Finally, waste package data should be verified upon receipt at WIPP. An easily measured parameter, such as weight, could be used.

DISCUSSION A.3:

The WWIS is central to the effective execution of the TRU/Mixed TRU Waste Management Program. The WWIS provides the data for all TRU/Mixed TRU waste, the coordinating link in transferring this waste between generation, storage, and transportation and ultimately to the WIPP. After the waste package is certified and labelled, there is no verification step to ensure that the package and the data base entry are consistent and that gross package content changes have not occurred.

The WWIS receives data from various local generating and storage site data bases. For example, the local data base at RFP evolved over many years to meet operational requirements without regard to consistency with WIPP requirements. The current RFP system user passwords are permanently assigned, a carry over from an earlier working procedure. Although a security standard has been implemented for the WWIS, there is no consistent security standard applied to the total system, comprised of this variety of data bases.

Currently, RFP waste certification technicians manually enter data developed during the waste package certification process. A waste certifier verifies each entry by comparing the process data sheets and the data file. Although independent checks are being accomplished (RFP is upgrading its system to automate data entry), manual data entry is a potentially large source of inadvertent or deliberate error.

4. **Is the WIPP WAC Quality Assurance Program managed and executed effectively?**

OBSERVATION A.4:

There was insufficient time for the panel to fully review the WIPP WAC Quality Assurance Program.

RECOMMENDATION B.4:

A review of the WIPP WAC Quality Assurance (QA) Program should be reviewed by an independent body. It could be a potential future BRP agenda item or could be accomplished by an outside Federal agency, e.g., the National Bureau of Standards.

DISCUSSION A.4:

The WIPP WAC QA serves as an important safeguard to ensure that the characteristics of the wastes repository source term remain consistent with the WAC criteria and with the parameters assumed for the PA analysis. Furthermore, Federal and state agencies will regulate the waste package contents.

5. **What should the major elements of the validation plan for the RFP-certified wastes be based on?**

OBSERVATION A.5:

Recertifying the RFP TRU/Mixed TRU wastes should accomplish two objectives: (1) proper technical certification of the RFP wastes based on

the WIPP WAC; and (2) assuring the public assurance that the certification process is properly conducted.

RECOMMENDATION A.5:

Recertification of the RFP TRU/Mixed TRU waste must be executed in a manner that is technically correct and which incorporates random physical inspection of the waste packages. Results should be made public. An unannounced audit of the RFP WAC certification process and waste records should be performed, and there should be a full-time presence of the WACCC audit team and a representative of the state regulatory agency during the recertification process. The actual recertification should be conducted by other than the RFP generating contractor and include a 100-percent QA check on all RTR tapes.

DISCUSSION A.5:

The RFP mixed-waste recertification dilemma has been caused, in part, by the change in the definition of TRU waste (lower limit changed upward from 10 nCi to 100 nCi per gram), the availability of more sensitive assay instrumentation, and the RFP practice of conservatively classifying the waste. The current estimate is that 10 percent or more of the RFP TRU/Mixed TRU waste at RFP, and a larger fraction of the RFP wastes at INEL, will be reclassified LLW/mixed LLW.

To improve the acceptability of the recertification results, the following are also proposed:

(1) An on-site WACCC Audit Team consisting of appropriate outside representation should monitor the total waste recertification process at RFP;

(2) Appropriate state regulatory and technical experts should be briefed and also observe recertification;

(3) An unannounced audit of RFP TRU/Mixed TRU waste records should be conducted specifically for technical accuracy and potential malfeasance;

(4) The RFP waste certification procedures and supporting waste information system should be reviewed to assess existing security measures;

(5) Calibration of all recertification systems, e.g., assay equipment, should be traceable to an appropriate standard and should be cross-calibrated between INEL SWEPP and RFP facilities;

(6) A 100-percent review of all RTR records of currently on-site RFP TRU/Mixed TRU waste should be conducted by INEL SWEPP or another qualified facility. The RTR tapes for each drum should be compared on an A-B basis--original certification versus recertification, with appropriate salting to ensure quality control. Furthermore, appropriate chain-of-custody rules must be established for all tapes;

(7) A predetermined number of all RFP waste containers should be opened to verify the waste classification;

(8) The RFP waste management system audit should be based on a limited-access audit plan;

(9) The objectives of the RFP waste recertification program should be made public and include proposed actions to improve the process; and

(10) The governors of Colorado, Idaho, and New Mexico should be briefed on the recertification plan, its objectives, and results.

B. The Performance Assessment and Operations Demonstration Sequence in the Overall WIPP Test Plan

The sequence of the OD vis-a-vis the PA in executing the WIPP Test Plan raises the four issues that are addressed below:

1. What is the technical purpose of the PA and OD Tests, and what should their execution phasing be?

OBSERVATION B.1:

As depicted by the briefings and documents, the PA experiments are designed to obtain the data for the final design of the WIPP and the supporting PA analysis for compliance with 40CFR191/286. Presently, the data are inadequate to accomplish final WIPP design. The full TRU Waste Management Systems OD test will assess the proper integration of the certification/packaging, transportation, and disposal subsystems, and operator training performance. The less-than-full system OD will begin with the insitu PA experiments. The full-system OD, an equivalent sub-scale WIPP demonstration, begins with the last two alcove tests that will be backfilled.

RECOMMENDATION B.1:

The WIPP Test Program should be divided into two distinct parts -- PA and OD -- with the objectives for each clearly identified. The insitu PA tests and experiments with actual waste should start as soon as the law permits. Based on technical reasons only, the planned start of the full-system OD should occur when the WIPP design is analytically finalized and the PA analysis based on this design meets the requirements of 40CFR191/286. The technical start of the full-system OD should begin with filling the backfilled alcoves. The scope of the system OD should be established to demonstrate that the TRU Waste Management System works as expected. The final ramp-up to full-scale operational rates should occur to blend naturally with the start of WIPP full operations. DOE should consider that a potential outcome of the PA might be that compliance with 40CFR191 cannot be reasonably achieved unless the waste is processed.

DISCUSSION B.1:

The WIPP facility is by far a safer concept for long term disposal than any of the current surface or near-surface storage facilities for TRU/Mixed TRU wastes. Furthermore, the technical and safety issues facing the WIPP Program are solvable with today's technology, but data are necessary to solve the technical issues.

The PA tests and experiments phase is intended to demonstrate the technical feasibility of the project and to establish the detailed WIPP disposal concept. Insufficient data are available today to specify the final design incorporating the five barriers that influence the release of waste materials from WIPP to the biosphere--the salt bed, the waste form, the aquifer, the prevention of inadvertent human intrusion, and the quantity of waste at risk if the salt barrier is breached. Until the design criteria and the credit allocable to each of these barriers are established and a safety analysis that meets 40CFR191

Part B (or its equivalent) is completed, the technical feasibility of the WIPP facility concept will not have been demonstrated. The PA goal is to establish the basis for the WIPP design that can be demonstrated in a subsystem OD.

The OD portion of the WIPP Test Program is a systems test of the TRU/Mixed TRU Waste Management System. The OD is very important to demonstrating that the waste management system is properly integrated, it can operate effectively, and it will operate safely. This system consists of three subsystems: waste packaging and classification; waste transportation; and WIPP operations. Each of these subsystems can be tested individually. In fact recertification of the RFP TRU/Mixed TRU waste is a limited scope OD of a generator and a storage site. Thus, two subsystems and a portion of the third subsystem will be operationally tested during the PA phase of the WIPP Test Program. Only the final room configuration, waste form, and anti-intrusion elements will not be tested. The technical start of the OD should coincide with the beginning of the last two alcove tests when the engineered modifications and backfill are incorporated with the waste package emplacement.

Until sufficient data are obtained during the PA portion of the WIPP Test Program and the final engineered modifications are completed, moving additional waste to the WIPP site incurs the risk of future retrieval, relocation, and processing and the associated loss of public credibility. There is a much smaller risk to public safety associated with transportation to the WIPP site. The degree of acceptable risk is a management decision. The real risk is public credibility. Moving the waste to a facility whose safety is not demonstrated analytically will be based largely on a "trust me" argument. Additionally, the acquisition of new knowledge and the ever-changing regulatory environment may require substantial modification of the WIPP disposal concept. This will result in further erosion of public confidence in the WIPP.

Even with the completion of the PA portion of the WIPP Test Program, there will be risks in beginning the movement of waste to WIPP. The slow processes that occur in the salt bed which enhance the long-term safety of the repository concept also require analysis and validation over a substantial time period: 100 to 200 years until the site achieves lithostatic equilibrium. Beginning with the PA, and continuing through the OD and full operations, there should be a test program to monitor filled rooms and provide early warning of potential problems. There will always be the concern for unexpected and unpredictable behavior of the repository even beyond the five-year test program (Consultation and Cooperation Agreement).

Finally, DOE should consider that a potential outcome of the test program might result in the conclusions that there is no reasonable way to demonstrate compliance with 40CFR191 without extensive modification. If the salt disposal concept is one of the safest geologic disposal options available (NRC-NAS 1957 and subsequently), what alternatives are available to remedy the current near-surface storage situation?

2. **<u>What should be done to ensure operational readiness before and during the OD?</u>**

<u>OBSERVATION B.2</u>:

The complex issues surrounding the WIPP Program necessitate a broad-based demonstration readiness program. It encompasses technical, systems, legal, regulatory, management, training, safety, and recovery planning.

RECOMMENDATION B.2:

A formal multidisciplinary review of the WIPP Program Operational Readiness requirements should be conducted.

DISCUSSION B.2:

No single individual can reasonably verify that all the OD readiness requirements have been identified and that the current plan has considered all the potential issues that could arise. A multidisciplined team of legal, regulatory, technical, safety, transportation, and Federal and state experts will be required to reasonably conduct such a review. The current status of the WIPP Program suggests a need for this review.

3. What is the relationship between WIPP and the Defense Nuclear Materials Production Program?

OBSERVATION B.3:

The WIPP development program is unnecessarily burdened by the perceived requirement to store operational TRU/Mixed TRU wastes in support of nuclear materials and weapons production.

RECOMMENDATION B.3:

DOE should separate WIPP from the operational defense nuclear material production program and develop a TRU/Mixed TRU Waste Storage Plan separate from the WIPP Test Plan.

DISCUSSION B.3:

Public Law 96-164 authorizes WIPP as "providing a research and development facility to demonstrate the safe disposal of radioactive wastes...." Further, the Consultation and Cooperation Agreement between DOE and the State of New Mexico establishes a five year test period during which the WIPP cannot be operated as a disposal facility. Prematurely incorporating WIPP into the defense nuclear materials production program jeopardizes the success of WIPP as a R&D demonstration project.

The TRU/Mixed TRU waste storage plan may include the WIPP facility. If WIPP is included, an agreed upon retrieval and temporary storage plan must be established among all involved parties to designate temporary storage facilities before implementation.

C. The Major TRU/Mixed TRU Waste Management Program Issues

1. The WIPP Team is important to the proper and safe execution of the WIPP Program.

OBSERVATION C.1:

A motivated and well trained WIPP Technical, Operations, and Management Team is essential to the success of the Program.

RECOMMENDATION C.1:

DOE should assess the personnel impacts of delays in the WIPP Program.

DISCUSSION C.1:

The WIPP Team has prepared itself technically and organizationally for a 1989-90 start to demonstrate an important national project. Circumstances beyond their control could delay this start, perhaps for many years. The retention of the highly trained and motivated team will be an important factor to the successful and safe execution of the test and evaluation phase of the WIPP Program. If a significant period of time lapses between the Test Phase and full operations, the OD results maybe rendered inappropriate.

2. **The WIPP Program is attempting to address three major national issues.**

OBSERVATION C.2:

The WIPP Program is faced with three major national issues: developing WIPP, establishing a workable set of mixed waste regulations, and supporting defense nuclear materials production.

RECOMMENDATION C.2:

DOE should separate the three issues and address each independently. The items common to two or more programs should be identified. Common issues can be solved for the common good; but the common items should be deliberately assessed, and the options specifically addressed to define the trade-offs that will occur.

DISCUSSION C.2:

The TRU/Mixed TRU Waste and WIPP Program is embroiled in three significant and conflicting requirements: developing a geologic disposal facility for nuclear waste, defining the mixed-waste regulatory requirements, and supporting a TRU/Mixed TRU waste management program to meet defense nuclear weapons production requirements. The Program does not have the management resources to adequately execute this complex, internally-conflicting program. Furthermore, a single solution to resolve these conflicting requirements is fraught with inconsistencies and jeopardizes the successful execution of the WIPP Program.

On the other hand, these three issues are intertwined and have intersections that are of common concern. An approach DOE might elect to pursue would be to identify all such items of common concern, then address each item explicitly and develop alternative solutions by identifying the trade-offs and impacts on each issue. A good start at systematically ordering these issues was provided to the BRP as a large graphic accompanying the Draft Decision Plan for WIPP, Revision 0, October 11, 1989.

3. **A Mixed Waste Management Policy and Strategy are urgently needed.**

OBSERVATION C.3:

The historic focus of the WIPP, WAC, PA, and DOE has been on the radiological hazards associated with TRU/Mixed TRU waste. The WIPP is establishing a regulatory precedent for managing mixed waste. This

precedent will affect the commercial power industry at the HLW repository project, current low-level mixed-waste storage and disposal sites and future options. Establishing mixed-waste regulations has a broader impact on national policy than just the WIPP Program.

RECOMMENDATION C.3:

DOE should establish an Office for Mixed-Waste Management and Policy and accelerate efforts to reconcile, with EPA, the differences between the RCRA and Radioactive Waste management regulations and develop a coherent DOE policy for managing and disposing of all US mixed-waste, commercial and defense. This office should be independent from the WIPP Program.

DISCUSSION C.3:

There is a fundamental conflict of interest in permitting the needs of the WIPP Program to drive the mixed-waste regulatory discussion. These regulations should be addressed from the national standpoint. Mixed-waste regulations will affect LLW disposal and storage and the HLW repository project. Future commercial nuclear power may use mixed fuels. Determining the future of this important regulatory arena based solely on a current program need is nearsighted.

4. **Management of the TRU/Mixed TRU Waste Program should be restructured.**

OBSERVATION C.4:

The management structure of DOE's TRU/Mixed TRU Waste Management Program is not clearly defined and is inadequately stated to provide dedicated, coherent top-level program direction. Indicators are that there is no coherent strategy or systems integration function for the TRU Waste Management Program to successfully transition WIPP from a research and development project to a waste disposal facility. As a result, there is an appearance of reactive rather than proactive program execution to achieve DOE TRU/Mixed TRU Waste Management goals.

RECOMMENDATION C.4:

DOE should establish a TRU/Mixed TRU Waste Program Office staffed, resourced, and chartered to manage this program. This office should be organized to establish a strategic planning and requirements function, the WIPP Development Program (i.e., the R&D, facility construction and operations, and safety analysis/EIS documentation), the WIPP WAC Configuration Management Board, the WIPP WAC Audit Office, and the Mixed Waste Information Systems Office.

DISCUSSION C.4:

The importance of WIPP to the national defense and the nuclear power industry cannot be overstated. Its success facilitates the execution of future defense programs, establishes an important milestone in the safe geologic disposal of nuclear waste, and indicates reconciliation of current conflicting environmental regulations governing mixed-waste.

During the past few years, the legal and operating requirements for WIPP have changed substantively, causing programmatic and technical redirection. The complexity of this management task has challenged DOE: there are indications that the program leadership has continually been placed in the position of responding rather than leading. Each of the program functional areas

demonstrates consistent and excellent technical knowledge, motivation, and dedication; however, more active management, integration, and planning would benefit the program. The following are examples of WIPP Program items where improvements can be made:

(1) A coherent, long-term schedule and detailed requirements statement for the TRU/WIPP Program;

(2) An active plan to work with the New Mexico Environmental Improvement Division (EID) to ensure that future regulations are consistent with the approved waste form (WAC);

(3) A formal risk assessment of the TRU/WIPP Program that identifies key issues with associated management action plans to resolve these issues;

(4) A clear definition of the PA and OD technical goals, separate from the nuclear materials production requirements;

(5) A Management Plan to take the TRU/WIPP Program through its various phases to eventual closure;

(6) A vigorous and proactive initiative to resolve the Mixed Waste Issue at the Inter-Agency Level;

(7) An integrated WAC process that formally incorporates input from the PA Analysis, the TRUPACT II requirements, the C&C Agreement, and the potential effect New Mexico RCRA regulations may have on the WIPP as a disposal facility;

(8) An aggressive effort to reconcile, with EPA, the mixed-waste regulations to meet national needs; and

(9) A coordinated WIPP retrieval and storage plan.

Appendix A

LIST OF REFERENCES

Appendix A

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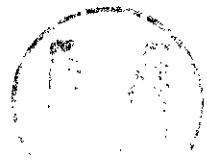

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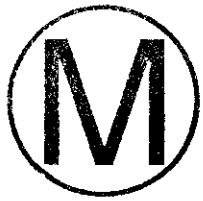
Appendix B

BLUE RIBBON PANEL QUESTIONS FOR SEPTEMBER 25-26, 1989 MEETING



Appendix B

BLUE RIBBON PANEL QUESTIONS FOR SEPTEMBER 25-26,1989 MEETING

1. ORGANIZATIONAL RELATIONSHIPS

a. Who is the single person at DOE HQs who is in charge of WIPP, and TRU and Mixed TRU waste management? (Kubo)

b. What is the line management organization beginning with the single person identified in 1.a. (DOE HQs) to the WIPP Principle contractors, e.g. Westinghouse, Sandia, Bechtel, etc? Clearly establish the TRU/Mixed TRU Waste Management Configuration Control Manager, the WIPP Engineering Change Proposal Approving Authority, and the Performance Assessment, QA/QC and the Waste Acceptance Criteria (WAC) Functions within the organization. (Kubo)

c. What is the line management relationship between the TRU waste generators and the WAC Certification Committee (WACCC)? Is there a DOE Order that requires TRU waste generators to comply with the WAC? What is the authority of the WACCC to conduct unannounced onsite audits of TRU/MIXED TRU WACC? (Kubo)

d. Who is the approving authority to modify process/production lines that generate TRU wastes? (Kubo)

e. What is the DOE practice to respond to comments made on the WIPP program (e.g., GAO and EEG testimony at 6/12/89 Synar Subcommittee hearing; the NAS 1984 report)? (Bishop)

f. Who has the authority to begin the Performance Assessment and Operations Demonstration (GAO at the 6/12/89 Subcommittee hearing stated that only Congress could approve; EEG stated that compliance with 40 CFR 191 Subpart A must be determined prior to commencement of the Operations Demonstration)? (Bishop)

g. If the Performance Assessment concludes that some type of waste segregation is important at the generating sites for overall system viability, does the WACCC have the authority to implement those requirements? If not, who does? (Bishop)

h. Has an evaluation of Rocky Flats Plant waste generation been undertaken on an integrated systems engineering basis (i.e., treating the waste as a product line)? Do waste activities compete with product activities for budget dollars? (Bishop)

i. Wouldn't membership on the WACCC of appropriate representatives from INEL and RFP better ensure the integration and coordination of activities and the implementation of a "no surprises" doctrine? (Bishop) As a follow-on, shouldn't the WACCC be chartered by DOE and have all generating sites represented? Clearly the WACCC is the configuration control group for TRU/Mixed TRU. (Kubo)

j. Why isn't waste treatment and disposal a component of DOE's determination at RFP and other manufacturing facilities of the Economic Discharge Limit (EDL)? (Bishop)

k. Are the DOE responses to the EPA questions regarding the No Migration Variance Petition being coordinated with the revision to the Supplemental Environmental Impact Statement and the Final Safety Analysis Report? (Bishop)

l. Please identify all the methods and locations currently used by DOE to store TRU and Mixed wastes? (Squyres)

m. What are the pros and cons (comparative costs and benefits) associated with continuing to store TRU and mixed wastes at the locations and with the methods set forth above, including regulatory, safety, national security and environmental issues? (Squyres)

n. What DOE organization is responsible for developing the WIPP waste retrieval plan? Is the approval of this plan on the critical path for the decision to ship waste to WIPP for experiments and the operations demonstration? (Slosky)

2. THE LEGAL BASIS AND REQUIREMENTS FOR WIPP

a. What is the legal basis to establish WIPP? What special or unusual authority was given DOE to design, construct, activate and operate/maintain WIPP? (Kubo)

b. What are the legal requirements for WIPP to begin the in-ground Performance Assessment (PA) experiments with actual wastes? (Kubo)

c. What are the RCRA and EPA requirements that WIPP must meet to begin the Operations Demonstration (OD)? Routine Operations and Maintenance? How does the No-Migration Petition fit into this? (Kubo)

d. How will the anticipated PA requirements differ from the remanded version of 40 CFR 191? (Kubo)

e. Has DOE evaluated the opportunity provided in 40 CFR Section 191.17 to advocate WIPP-specific criteria because of the unique characteristics of TRU waste and the WIPP facility? (Bishop)

f. Have any policy discussions been held with EPA to discuss the possibility that failure to meet the disposal standards of 40 CFR 191 (which may be without technical justification and thus arbitrary) will result in temporary storage for an indefinite period of time (which would provide a much greater hazard to the environment)? (Bishop)

g. Who at DOE is responsible for identifying statutory and regulatory requirements pertaining to WIPP and ensuring, on an integrated basis, that all WIPP related activities comport with those requirements? (Bishop)

h. Where and how is data on hazardous materials going to be collected and analyzed to satisfy RCRA requirements? (Bishop)

i. There appears to be a significant conflict between the EPA's regulation of (1) TRU waste; (2) hazardous waste; and (3) mixed wastes. How has DOE addressed this problem internally and with other members of the Executive Branch? (Squyres)

j. From a legal standpoint, can waste be put underground at WIPP before compliance with 40 CFR 191 Part B is demonstrated? (Slosky)

k. What type of RCRA Part B permit is required for WIPP? What other EPA permits (e.g., Safe Drinking Water Act) are required for WIPP? (Slosky)

l. Can land-banned wastes continue to be generated by DOE if the no migration petition is not approved? (Slosky)

3. THE METHODOLOGY TO REDUCE TECHNICAL UNCERTAINTY

a. What are the key technical issues that must be resolved to meet the PA and RCRA requirements for an operational WIPP? Which are known and what are uncertain? (Kubo)

b. What is the research plan to address the key technical issues identified above? (Kubo)

c. Explain the rationale for the room test if the waste drum positioning and the backfill composition will not resemble an operational configuration. Specifically, how do you assess the data obtained to extrapolate it to the actual waste disposal configurations and over time periods of 200 years. (Kubo)

d. Describe the areal extent of the mixing cell to assess the total release of hazardous and TRU materials to the environment. What portion of the repository is assumed to be the source term for the 10,000 year human intrusion scenario? (Kubo)

e. Has an analysis been made of the uncertainties identified in the data, models and analysis to date to ensure that the Performance Assessment Test Program is correctly focused at reducing those uncertainties to acceptable limits in support of the Performance Assessment? (Bishop)

f. Is DOE evaluating the technologies available to determine the hazardous material and organic components of each TRU Waste stream or package if either of those categories of materials become important in terms of the Performance Assessment or the facility's ability to comply with RCRA? (Bishop)

g. Is the WACCC requirement that generating sites estimate organic material to the nearest 10% sufficiently accurate for the site suitability analysis? Is the Performance Assessment evaluation using a probabilistic risk assessment for organic content? (Bishop)

h. Has the use of standard mixtures and weight percentages of radionuclides, as developed by INEL, been validated against actual waste being generated and has it been subjected to independent Quality Assurance assessment? Is the data consistent with the data being utilized in the SEIS, FSAR, No Migration Variance Petition, and Performance Assessment? (Bishop)

i. If the laboratory test described in DOE/WIPP 89-011, 2-84, will "bracket the times and conditions of interest for each important gas for 10,000 years," why does waste characterization, both as to radionuclides and non-radioactive materials, matter? (Bishop)

j. Has thought been given to using a supercompactor to simulate the salt creep and the resulting lithostatic pressure to which the waste will be subjected in WIPP? (Slosky)

k. What quantity of waste is needed for the bin-scale and the alcove-scale tests? What portion of the waste is scheduled to come from RFP and INEL? (Slosky)

l. Is RH waste needed for underground experiments at WIPP? If not, how will the performance of RH waste be assessed? (Slosky)

m. What technical information will the alcove-scale tests provide that the bin-scale tests will not? (Slosky)

n. Why can compliance (with 40 CFR 191 Part B) of the high-level waste repository be demonstrated without placing waste underground, when waste must be put underground to demonstrate WIPP's compliance? (Slosky)

o. What is the current thinking on the type of backfill to be used? What experiments (at WIPP or elsewhere) are planned to evaluate alternative backfill materials? (Slosky)

p. What is the current thinking on the types of room and shaft seals to be used? What experiments (at WIPP or elsewhere) are planned to evaluate alternative sealing approaches? (Slosky)

q. What is the current thinking on potential engineering enhancements? What experiments (at WIPP or elsewhere) are planned to evaluate alternative engineering enhancements? (Slosky)

r. What is the schedule for decisions on backfill, room and shaft seal and engineering enhancements? When will such decisions be incorporated into the PA? (Slosky)

s. What approaches are being used to determine the permeability of the collapsed waste rooms? (Slosky)

t. What is the sensitivity of the PA results to aqueous and organic liquids in the wastes? (Slosky)

u. Under the 3 or 5 year test plan, will the bin-scale and the alcove-scale test run long enough to produce sufficient data on gas generations? (Slosky)

4. <u>THE INTERRELATIONSHIPS BETWEEN THE WAC, PA AND NO MIGRATION PETITION (NMP)</u>

a. Define the legal and technical interrelationships between the WAC, PA and NMP? (Kubo)

b. What is the management plan to integrate the legal and technical compliance interrelationships between the WAC, PA and NMP? (Kubo)

c. What are the parameters assumed for the TRU/Mixed TRU source term for the PA calculations, e.g., initial and final conditions for density, initial hazardous and radioactive waste inventories, liquid content, etc? Additionally, what is the source for the data used to establish the source parameters? (Kubo)

d. How does DOE intend to address the inconsistencies between the No Migration Variance Petition and the Performance Assessment? (Bishop)

e. What mechanisms are in place to ensure the coordination of the Waste Acceptance Criteria with the facility operational analysis being undertaken to support the Performance Assessment (e.g., WAC allowance of 1% free liquid, compaction ratios to be achieved by RFP super compactor)? (Bishop)

f. What studies have been done to assess the long-term (200 year) performance of solidified waste forms? (Slosky)

g. What studies are currently underway and planned regarding waste treatment and the performance of treated waste forms in WIPP? How will the results of these studies be incorporated in the PA? (Slosky)

h. How will the fact that the WACCC can grant exemptions from the WAC be accounted for in the PA and the NMP? (Slosky)

i. What is the time schedule for the PA and the RCRA Part B application, and how do these relate to the various activities producing the data needed for the PA and the RCRA permit? (Slosky)

j. What is the difference between the PA and the consequence analysis? (Slosky)

k. How is criticality considered in assessing the performance of WIPP? (Slosky)

5. THE WAC CERTIFICATION (WACC), QA/QC AND SECURITY

a. Describe the WACC QA/QC procedures. Based on current WAC procedures, describe the range of uncertainties in percent of the nominal value for each measured WAC item, e.g. weight, fissile material content, hazardous material content, curie content, material species, etc. How are the range of uncertainties verified? (Kubo)

b. Describe the basis for each WAC item, the specific safety issue it addresses and why the limit was established. (Kubo)

c. Describe the procedures in place today that ensure the security of the WAC data base. For example, password control, administrative controls, etc. (Kubo)

d. Describe the experiments that validate the use of the carbon-carbon vent filters on the drums as it pertains to filter degradation with moisture and moisture entering the drum due to normal pressure differential aspiration. Once these vents are installed, how long can the drums be stored without a verification that the drum contents remain the same? (Kubo)

e. Are independent and routine reviews of the RTR tapes conducted to verify the quality of each operator? (Kubo)

f. The Waste Acceptance Criteria identifies 18 Quality Assurance program elements, yet it states that all 18 are not applicable to each Site Certification Plan. Why aren't they? (Bishop)

g. What evaluation was done to validate the Waste Acceptance Criteria against the requirements of 49 CFR 173 for Type A packages? (Bishop)

h. Does the WACCC intend to use its annual generating site audits to develop data that might be useful in trend identification and analysis of personnel and equipment performance? (Bishop)

i. Why aren't package specific records required to be retained post-emplacement to facilitate any problem resolution if it occurs (WIPP/DOE-120 P.13)? Similarly, why aren't certification records maintained beyond a subsequent audit so as to provide an ability for the WACCC to trend equipment degradation or programmatic weaknesses (WIPP/DOE-120, 12)? (Bishop)

j. If all generating site plans require the use of plastic liners, why doesn't the Waste Acceptance Criteria mandate their use (WIPP/DOE-114, Criterion 4.6)? (Bishop)

k. Why aren't specific requirements imposed by the WACCC regarding the number and location of labels to aid in potential package retrievability as well as to facilitate operations and associated quality assurance? (Bishop)

l. The Waste Acceptance Criteria specifies that no liquid waste form is acceptable, but allows minor liquid residue. This is apparently interpreted in practice to mean up to 1%; further conversations at INEL and RFP suggest that there was some correlation between the level allowed by the process and the detectability of liquids by RTR. Using ostensibly similar RTR equipment and trained operators, it was suggested that INEL uses a limit of .75 and RFP allows none (based on a discrimination threshold of "one teaspoon"). What is the real criteria, what is its basis, and what is the threshold of detection by the RTR? Why are adsorption materials not required to reduce free liquids to the minimum detectable? (Bishop)

m. What actions have been taken to identify the types and quantities of 40 CFR 261 Subpart C and D hazardous wastes that may be present in waste packages destined for WIPP? (Slosky)

n. How do the TRU waste generators and INEL determine compliance with the WAC for: corrosives, pyrophorics, explosives, and hazardous wastes (40 CFR 261 Subparts C and D)? (Slosky)

o. Does RFP and/or INEL have the laboratory equipment to determine the quantities of characteristic (40 CFR 261 Subpart C) and listed (40 CFR 261 Subpart C) hazardous wastes present in waste streams destined for WIPP? Does RFP or INEL participate in EPA's Contract Laboratory? (Slosky)

p. Have there ever been any TRU pyrophoric, explosive, or waste incompatibility problems at INEL or any of the TRU waste generating sites? (Slosky)

q. What methodology is being used at RFP for the Waste Characterization Study? (Slosky)

r. What methodology is used at RFP to "automatically designate" hazardous wastes? (Slosky)

s. Is it correct that the WAC do not require corrosives to be neutralized if a rigid liner is present? (Slosky)

t. Did the FY-83 through FY-85 TRU sampling program directly measure the radioactive and/or hazardous waste content of waste packages? Will the new sampling program make such measurements? (Slosky)

u. Are there radionuclides present in the TRU waste destined for WIPP that meet the RCRA definition of pyrophoric? (Slosky)

v. How has process knowledge been used to determine that explosive mixtures cannot occur in the TRU wastes? (Slosky)

w. Explain in more detail how the Passive-Active Neutron Assay system works. How does the system determine: fissile mass, total alpha, Pu-239 equivalent activity, and thermal power? (Slosky)

x. What are the capabilities and status of more accurate equipment to characterize the radioactive content of the TRU wastes? What modifications are being made to the SWEPP facility? (Slosky)

y. What activities are planned or underway to determine if some of the TRU waste in storage at INEL and RFP is actually LLW? Can these activities be accelerated? (Slosky)

z. What action is taken if a container is found to have more than 1000 curies of Pu-239 equivalent activity? (Slosky)

aa. Why are surface dose rate, surface contamination, and thermal power not rejection criteria? Is the PA based upon actual data on these parameters or the WAC for these parameters? (Slosky)

bb. Does WIPP/DOE-069 (page 42) correctly state that the surface contamination of the waste containers will result in the contamination of the WIPP waste handling building? (Slosky)

cc. What is the percentage contribution of the various processes (e.g., organic matter decay) to the total waste package gas generation? (Slosky)

dd. What is the status of the PREP facility? Can its operation be accelerated? Is the plan to grout the entirety of the drums processed through PREP or only the fine particles? (Slosky)

ee. What are the types and quantities of TRU waste that do not meet the WIPP WAC? (Slosky)

ff. What are the RECAP/PROP programs? (Slosky)

6. THE ROCKY FLATS PLANT (RFP) WASTE CERTIFICATION VALIDATION PROGRAM

a. How are hazardous waste identifiers and data entered into the waste data base? (Kubo)

b. What role should representative sampling of the waste barrels using the RTR methodology as an independent check of the physical opening of drums? (Kubo)

c. With respect to Rocky Flats Plant waste certification validation, has the proposed validation plan been evaluated against having INEL evaluate RFP wastes through the SWEPP process as an alternative to determine if the RFP certification process was properly conducted? What is the expected cost, both in terms of dollars and radiation exposure, of the proposed validation plan? What would the incremental costs be of evaluation of the same wastes through the SWEPP process? (Bishop)

d. If the proposed RFP certification validation program is approved wouldn't it be a wise use of resources to collect data on hazardous material and organic constituents to provide further insight in support of the No Migration Variance Petition and the Performance Assessment, as well as to provide data to substantiate potential modifications to the TRUPACT II Certificate of Compliance to handle the TRU waste which cannot presently be carried in TRUPACT II? (Bishop)

e. Has an assessment been made of the costs to locate a waste repackaging facility at WIPP sop that only wastes emplaced during the "Test Phase" that might have to be repackaged (instead of merely being overpacked) could be done on-site? (Bishop)

f. Does DOE have a plan for addressing the storage of TRU and mixed wastes that are WAC certified but not TRUPACT II certified? (Squyres)

g. In light of the FBI investigation, will a validation program conducted at the RFP or by RFP personnel have credibility? (Slosky)

h. Will the radiological and hazardous chemical contents of waste packages be directly measured in the validation program? (Slosky)

7. PERFORMANCE ASSESSMENT AND OPERATIONS DEMONSTRATION

a. What is the basis for the decision on the amount of waste to be used in the Performance Assessment and Operations Demonstration? Was a cost-benefit evaluation, including personnel exposure, conducted as part of the evaluation? (Bishop)

b. What are the estimated costs of conducting (1) the Performance Assessment Test Programs, (2) the Operations Demonstration, and (3) complete retrieval of wastes emplaced under both programs? (Bishop)

c. How was the airborne release set point in the WIPP exhaust shaft established? What time delay will occur from a release in an alcove or room at a locally hazardous level before that release exceeds the set point in the exhaust shaft to trigger the ventilation shaft, assuming appropriate ventilation dilution

factors? What local airborne monitoring system will be utilized when waste emplacement operations, either in the experimental rooms or as part of the Operations Demonstration, are underway? Will local alarms, both audible and visual, be provided and what personnel protective equipment will be provided to the site workers? (Bishop)

d. Please explain what DOE believes are the most severe adverse effects of the failure to begin the PA within the near term (3-5 months), the intermediate term (6-9 months) or the long term (beyond 9 months)? (Squyres)

e. The NAS review of the WI>PP Performance Assessment and Operations Demonstration draft plan (DOE/WIPP 89-011) states in the last paragraph of page 2 that it is unlikely that results of the experiments will be available for, or have any significant impact on the performance assessment. I'm told by EEG that results of the bin scale experiments will factor into the performance assessment but that alcove experiments may not. Is this the case? If so, what good will the alcove tests serve? Does DOE plan to delay the October 1992 decision data on performance assessment in order to factor in alcove test results that may come in after that date? (Bahr)

f. One concern about the operations demonstration program is if engineering modifications need to be made after emplacement of the waste, drums would have to be removed and perhaps be repackaged or in some other way modified. Should this be the case, where would the modifications be done? At the WIPP? At INEL? At generator sites? Who would make that decision? (Bahr)

g. Does DOE plan to enter into any agreements with New Mexico, Idaho, Colorado or any other state regarding the disposition of waste in the event it has to be retrieved from WIPP? (Bahr)

h. Who is responsible for the overall waste shipping plan, eg., which specific drums are shipped from where and when? Is there such a plan? How are the needs of performance assessment testing factored into this plan? The needs of the operations demonstration? (Bahr)

i. What information would be gained using "live" waste in the operations demonstration that cannot be gained by using "mock" waste for the operations demonstration? (Slosky)

8. TRANSPORTATION

a. Will a TRUPACK-II loaded with supercompacted CH drums (along with the tractor and trailer) exceed the 80,000 legal highway weight limit? (Slosky)

b. Will the total transportation unit for RH waste (cask, waste, tractor, and trailer) exceed the 80,000 legal highway weight limit? (Slosky)

c. Please provide a brief written comparison of the WIPP WAC to the NRC TRUPACT-II certification requirements. (Slosky)

d. What are the types and quantities of TRU and TRU-mixed wastes that cannot be shipped in TRUPACT-II? (Slosky)

9. MISCELLANEOUS

a. What is the capacity of WIPP with respect to: post-1970 TRU waste in storage at INEL and RFP, new TRU waste generation by the entire DOE complex, pre-1970 TRU waste buried at INEL, and anticipated TRU waste generation from DOE site cleanup actions? (Slosky)

REPORT

TO THE UNITED STATES SECRETARY OF ENERGY

ON THE

WASTE ISOLATION PILOT PLANT

BY

Leonard C. Slosky

Member

WASTE ISOLATION PILOT PLANT

BLUE RIBBON PANEL

October 23, 1989

WASTE ISOLATION PILOT PLANT

BLUE RIBBON PANEL

REPORT BY

LEONARD C. SLOSKY

October 23, 1989

I. BACKGROUND

The Waste Isolation Pilot Plant (WIPP), as established by Public Law 96-164, is being developed by the United States Department of Energy (DOE) to demonstrate the safe disposal of transuranic (TRU) waste from the nation's nuclear weapons program.

WIPP is a mined repository located 2,150 feet below the surface of southeastern New Mexico. The repository is within a 2,000 foot thick formation of 225 million year old bedded salt. WIPP is designed to dispose of nearly six million cubic feet of TRU wastes produced between 1970 and the year 2013. It is the only TRU waste disposal facility under development in the United States.

II. INTRODUCTION

The WIPP Blue Ribbon Panel (BRP) was established by the Secretary of the United States Department of Energy (DOE) on August 31, 1989. Each of the five Panel members was charged to independently report on the following issues related to WIPP:

- The concept and timing of the draft plan for the WIPP test phase: the performance assessment (including the waste experiments) and the operations demonstration.
- Whether the operations demonstration should be conducted at the same time as the waste experiments and the performance assessment.
- The adequacy of plans to ensure that the TRU wastes generated by the Rocky Flats Plant (RFP) meet the waste acceptance criteria (WAC) for the WIPP.

The short amount of time allotted to the BRP, together with the complexity and extensive history of WIPP project, presented the BRP with a formidable task. Because of this, this report should be considered preliminary in nature. It also should be noted that the BRP was not charged and has not attempted to review all of the important issues concerning WIPP. In particular, the Panel has not addressed the operational readiness of WIPP.

III. BLUE RIBBON PANEL ASSESSMENT METHODOLOGY

The following methodology has been used by the BRP:

- During September 11-14, 1989, the BRP toured the WIPP, portions of the Idaho National Engineering Laboratory (INEL), and portions of the RFP. During this period the BRP was briefed by numerous DOE officials and contractors; Dr. Peter B. Myers, Staff Director of the National Academy of Sciences/National Research Council Board on Radioactive Waste Management; Mr. Robert H. Neill, Director and Dr. Lokesh Chaturvedi, Deputy Director and Engineering Geologist of the Environmental Evaluation Group, New Mexico. Most of the people who briefed the Panel also provided written materials.

- On September 25-26, 1989, the BRP convened a follow-up meeting in Denver, Colorado. At this meeting, a select group of DOE officials, DOE contractors, and a representative of the United States Environmental Protection Agency (EPA) were requested to respond to ten pages of questions prepared by the BRP.

- The BRP has been provided an extensive number of DOE documents, including *Draft Plan For The Waste Isolation Pilot Plant Test Phase: Performance Assessment and Operations Demonstration*, April 1989 and June 1989 Addendum. DOE/WIPP 89-011; *TRU Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, January 1989. WIPP/DOE-069, Revision 3.

- The BRP and individual Panel members have requested and been provided additional documents from DOE. Individual Panel members have held discussions with a broad range of individuals knowledgeable about WIPP.

Throughout the process, officials from DOE have been quite informative, candid, and helpful to the BRP.

IV. EXECUTIVE SUMMARY

Following is a summary of the principal observations and recommendations.

1. The Waste Isolation Pilot Plant (WIPP) program is of major national importance even beyond the transuranic (TRU) waste management system. The success or failure of WIPP will have extensive impacts on the United States Department of Energy (DOE) as well as on civilian radioactive waste management programs.

2. DOE should implement an integrated management system for TRU waste and the WIPP program.

3. A considerable amount of work must be completed before WIPP can receive waste for the test phase. A number of potential legal challenges could impede the beginning of the test phase.

4. Rather than only including technical issues, the WIPP waste retrieval plan should address the regulatory and institutional actions required to store the waste if retrieval from WIPP becomes necessary.

5. Significant technical questions exist regarding the ability of WIPP to comply with the applicable regulatory requirements: the environmental radiation protection standards, the no migration exemption from the land disposal restrictions, and the hazardous waste facility standards. Despite the unresolved technical issues, bedded salt continues to offer outstanding qualities for the long-term isolation of TRU waste.

6. DOE should develop and publish within the next six months an integrated and coherent set of documents on the WIPP program:

   First, a systematic assessment of the current understanding of the long-term performance of the WIPP repository, as recommended by the National Research Council. This document should include a sensitivity analysis and should clearly indicate existing uncertainties and the data needed to determine if WIPP complies with regulatory requirements.

   Second, a generalized description of the laboratory, bin, and alcove experiments. This document should clearly indicate how the experiments address the data needs identified in the first document.

   Third, a detailed technical description of the laboratory, bin, and alcove experiments.

7. Essential data from the bin and alcove experiments (particularly concerning gas generation) may not be available as soon as DOE expects. It is also very possible that the results from the planned tests will raise new issues that necessitate additional experiments. Thus, it may take longer than the three to five years DOE projects to determine WIPP's regulatory compliance.

8. It is imperative that the test phase not only obtain data on important technical issues such as gas generation, but also test solutions to these problems. Therefore, the alcove and particularly the bin tests should be expanded to include a broad range of: nonmetallic containers, treated waste forms, and additives to prevent gas build up.

9. Increased attention should be directed to evaluating potential waste treatment technologies. In contrast to other parameters affecting the performance of the repository (e.g., hydrogeologic processes), the waste form is one of the most controllable variables. Since about 90 percent of the total waste volume to be emplaced at WIPP is yet to be generated or will likely require repackaging, the opportunity exists to develop a more stable waste form that would moot a number of the unresolved technical issues and would dramatically improve the ability of WIPP to meet regulatory standards.

10. The bin experiments should begin as soon as possible. If WIPP cannot receive waste for experimental purposes by (or shortly after) mid-1990, the bin tests should be promptly initiated at another location.

11. The alcove tests are an important part of the WIPP test phase because they integrate important repository conditions that laboratory and bin tests cannot fully represent. However, current scheduling calls for the "final" performance assessment to be conducted before the majority of the alcove test results are likely to be available.

12. In total, about 5,900 drum-equivalents of waste are justified for the currently planned test program. This is equal to about 0.8 percent of total WIPP capacity. With the recommended expansion of the test program, about 8,800 drum-equivalents of waste (equal to about 1.2 percent of WIPP capacity) may be needed.

13. An operations demonstration is an important element in ensuring the operational readiness of a "production" facility. However, given the current degree of uncertainty regarding the ability of WIPP to meet regulatory requirements, it is not prudent to transport large quantities of waste (i.e., 2.5 percent of total capacity) to WIPP. In addition, since WIPP design and operational configurations are uncertain, an operations demonstration in the near-term would not be representative of actual repository conditions. If DOE wants to obtain more experience in the operation of the WIPP system at full-capacity, drums and standard waste boxes containing nonradioactive materials could be used. The Operations Demonstration should be separated from the Test Plan in order to avoid confusion.

14. It is not clear that a comprehensive assessment has been made of the applicability of federal and state hazardous waste regulations to the WIPP program. Considerably more attention to hazardous waste compliance issues is needed to prevent potentially serious delays in WIPP. DOE should aggressively work to resolve the applicability of the Safe Drinking Water Act's underground injection control requirements to WIPP.

15. DOE should expeditiously prepare a comprehensive hazardous waste compliance strategy. DOE should work closely with the State of New Mexico on the promulgation of mixed waste regulations and in the preparation of permit applications.

16. DOE should develop a comprehensive plan to characterize the hazardous (nonradioactive) components of TRU-mixed wastes being generated and in storage. The characterization plan must include substantial laboratory waste analyses.

17. DOE should take advantage of the opportunity to obtain hazardous waste characterization information when wastes are being processed for other purposes. This includes laboratory analyses when waste packages are opened and physically inspected for compliance with the waste acceptance criteria (WAC); head space gas analysis when waste packages are vented; and analysis of liquids resulting from the supercompaction of wastes.

18. Waste packages in the TRU waste inventory that are actually low-level wastes should be removed from the TRU waste inventory.

19. DOE needs to ensure that the databases being used for the performance assessment and other regulatory purposes are consistent with the WAC. It is not clear how the performance assessment will take into consideration the authority of the Waste Acceptance Criteria Certification Committee (WACCC) to exempt wastes from the WAC in the future.

20. DOE should integrate the WAC, the TRUPACT-II shipping requirements, and future hazardous waste restrictions into comprehensive criteria for certifying wastes for WIPP. Waste containers that are aspirated in non-humidity controlled environments should be subject to real-time radiography immediately prior to shipment to ensure that the criterion for liquids is not exceeded.

21. DOE should actively encourage and facilitate observers from the New Mexico Environmental Improvement Division, the Colorado Department of Health, the State of Idaho, and the Environmental Evaluation Group to accompany the DOE waste certification auditors.

22. Unannounced audits at each TRU waste generator facility should be conducted at least annually. The audits should include radiological assaying and real-time radiographic examination of a sufficient number of waste packages to ensure at least a 95 percent confidence level that wastes are being properly certified.

23. State representatives should be encouraged to observe the Rocky Flats waste recertification audits and inspections. The Rocky Flats waste recertification program should include the selection of waste packages by the audit team/state observers for radiological assaying and real-time radiographic examination under the audit team's review.

V. OBSERVATIONS, RECOMMENDATIONS, AND DISCUSSION

A. MANAGEMENT OF THE WIPP PROGRAM

Observation A.1:

The WIPP program is of major national importance even beyond the defense TRU waste management system. The success or failure of the WIPP program will have extensive impacts on the entire defense program of DOE, as well as on civilian radioactive waste management programs, both inside and outside of DOE. WIPP is an important test case for how the "DOE Culture" can adapt to the new environment of outside regulation and public scrutiny.

Observation A.2:

The DOE TRU waste management system is sufficiently complex as to necessitate a sophisticated systems management approach. Currently it appears that an adequate systems management approach is lacking.

Discussion:

It is acknowledged that integrating ten TRU waste generators (producing many different waste streams) with the first deep geological repository in the United States, while the regulatory environment is in flux, is far from a trivial matter. However, much greater emphasis on systems integration is needed for the DOE TRU waste management system to function effectively. The problem is not that individual elements of the program are inadequately managed. Many of the managers who briefed the BRP appeared to be doing an outstanding job with respect to their particular area of responsibility. Rather, the shortcoming is in the effective integration of the many elements comprising the DOE TRU waste management system.

Following are a few examples illustrating TRU waste management elements that do not appear to be adequately integrated:

- There does not appear to be a direct linkage between TRU waste generators implementing new waste treatment technologies and the performance of the WIPP site. There does not appear to be a central management focus for assessing question such as: What impact does the supercompaction of waste from the RFP have on the performance of WIPP? Does supercompaction pose repository critacility concerns? How are plans for changes in waste forms communicated to the WIPP performance assessment team? Who has the authority and the responsibility to determine if a new waste form will be acceptable at WIPP?

- The Waste Acceptance Criteria Certification Committee (WACCC) has the authority to approve wastes for disposal at WIPP that do not meet the WAC. How is this accounted for in the WIPP performance assessment? How can it be accounted for in the performance

assessment when the WACCC can exempt waste from the WAC years after the performance assessment is completed?

Recommendation A.1:

DOE should implement a comprehensive, integrated management system for TRU waste generation, treatment, transportation, storage, and disposal. The management system should encompass all DOE TRU waste generators and should include planning, research, and operational aspects of TRU waste management.

B. "DOE CULTURE"

Observation B.1

A number of the DOE managers who briefed the BRP exhibited a frustrated attitude, implying that WIPP is obviously an exemplary facility; why don't people just let us use it?

Discussion:

At a time when the preliminary performance assessments conducted by DOE indicate that WIPP does not comply with the Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes 40 CFR Part 191, Subpart B (EPA Standard) for human intrusion scenarios, such an attitude can easily be perceived as arrogant, sloppy, and unconcerned about safety and the environment. Such perceptions do not facilitate rational issue resolution.

Recommendation B.1:

DOE managers should recognize and exhibit in their attitudes that WIPP is being developed in a new era of external regulation. The mission of DOE is to carefully, scientifically, and systematically assess whether or not WIPP complies with the EPA Standard and other regulatory requirements. This means that all of the facts (and uncertainties), whether favorable or unfavorable to WIPP, need to be clearly presented and publicly debated.

C. PREREQUISITES TO THE RECEIPT OF WASTE AT WIPP FOR EXPERIMENTAL PURPOSES

Observation C.1:

A number of actions must be completed before waste can be received at WIPP, even for experimental purposes. The important milestones include, but may not be limited to:

- Obtaining a Resource Conservation and Recovery Act (RCRA) Part A Interim Status Permit by filing a complete Part A application pursuant to 40 CFR Part 270. Before this can occur, the State of

New Mexico must receive authorization from EPA to regulate mixed wastes.

- o Receiving approval of the No Migration Petition from EPA to exempt WIPP from the Land Disposal Restrictions pursuant to 40 CFR Part 268.6.
- o Demonstrating compliance with the EPA regulations on Environmental Standards for Management and Storage of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Waste, 40 CFR Part 191, Subpart A.
- o Completing the Final Safety Analysis Report (FSAR).
- o Completing the Operational Readiness Review (ORR).
- o Complying with the Agreement for Consultation and Cooperation (C&C) between the United States Department of Energy and the State of New Mexico.
- o Obtaining Land Withdrawal approval.
- o Publishing the Final Supplement Environmental Impact Statement (FSEIS) on WIPP and issuing the Record of Decision (ROD).
- o Issuing the final WIPP waste retrieval plan. Successfully completing the bin and alcove retrieval tests.
- o Completing the Performance Assessment (PA) Plan.

Observation C.2:

Although the Secretary's Draft Decision Plan on WIPP (October 1989) identifies these actions, this list is provided to emphasize the considerable amount of work that must be completed for WIPP to receive waste for experiments, and to illustrate the numerous opportunities for legal challenges with which the WIPP program may have to contend.

Observation C.3:

DOE is currently developing a WIPP waste retrieval plan to address the technical aspects of waste retrieval, if WIPP is found unsuitable as a permanent repository.

Recommendation C.1:

The WIPP waste retrieval plan should address the regulatory and institutional requirements for implementing each waste retrieval alternative. Without consideration of such requirements, the institutional feasibility of the plan may be nil.

Observation C.4:

While many of the elements of the test program have been provided in various DOE documents, DOE has not adequately articulated the need for and design of the test program in an integrated manner.

Recommendation C.2:

DOE should develop and publish within the next six months a hierarchial, integrated, and coherent set of documents on the WIPP test phase. This set of documents should include:

- Preliminary WIPP Performance Assessment 1989--A systematic assessment of the current understanding of the long-term performance of the WIPP repository, as recommended by the National Research Council. This document should include analyses of a range of scenarios (including human intrusion) and a comprehensive sensitivity analysis. The report should elucidate the critical issues, uncertainties in data and models, and the parameters for which additional data are needed.

- Conceptual WIPP Test Phase Plan--A generalized description of the laboratory, bin-scale, and alcove-scale experiments already underway and planned for the test phase. This document should clearly indicate how the on-going and planned experiments address the data needs identified in the Preliminary Performance Assessment 1989, above. This document should replace the *Draft Plan For The Waste Isolation Pilot Plant Test Phase: Performance Assessment and Operations Demonstration.*

- WIPP Experimental Design--A detailed technical description of the laboratory, bin-scale, and alcove-scale experiments to be conducted during the test phase. This document should be a more detailed technical version of the Conceptual WIPP Test Phase Plan, above. As with the Conceptual Plan, this document should indicate how the experiments will provide the data needs identified in the Preliminary Performance Assessment 1989.

D. CONCEPT AND TIMING OF THE WIPP TEST PHASE AND OPERATIONS DEMONSTRATION

1. Test Phase

Observation I.D.1:

Significant technical questions regarding the ability of WIPP to meet the EPA Standard and other regulatory requirements remain to be resolved. A carefully planned, integrated, and implemented suite of tests--laboratory, bin-scale, and alcove-scale--is needed to provide additional data for the performance assessment (to determine compliance with the EPA Standard), the no migration

petition, and the RCRA Part B permit application. Despite the substantial unresolved technical issues, bedded salt continues to offer outstanding qualities for the long-term isolation of TRU waste.

Observation I.D.2:

DOE plans call for a hold point after the first three years of the test phase to analyze the results of the performance assessment up to that point. If this review concludes that there is reasonable confidence that WIPP will meet the EPA Standard, then a decision will be made on the need for and the design of the second portion of the test phase. This approach has great merit. Because of the issues discussed below, it is likely that the second portion of the test phase will be required.

Observation I.D.3:

Because of the complexity and interaction of the technical issues that must be resolved, it may take longer than five years for adequate test results to be available to determine compliance with the EPA Standard. It is also very possible that either the laboratory, bin-scale, or alcove-scale tests will raise new issues requiring additional experiments.

Observation I.D.4:

One of the key questions the test phase needs to resolve is the net rate of gas generation/diffusion which results from at least five processes: chemical corrosion of the waste containers and metal within the wastes; biological decomposition of the organic matter in the wastes; radiolytic decomposition of waste materials; inflow of naturally occurring gas in the salt; and the diffusion of gas into the salt formation.

Because of the incomplete understanding of these processes and potential interactions among the processes, both the bin-scale and the alcove-scale tests may need to be conducted for a longer period of time than is anticipated in the test plan in order to obtain adequate data. This in turn means that the data needed for the "final" performance assessment may not be available in time to conduct the performance assessment on the current schedule.

Recommendation I.D.1:

The bin-scale and the alcove-scale tests should be continued at least until the decision is made regarding the suitability of WIPP as a permanent disposal site, and probably as long as WIPP is operational (25 or more years).

Observation I.D.5:

It is very important for the test phase not only to gather data on important technical issues such as gas generation, but also to test solutions to the potential technical problems. This means that the scope of the test phase experiments may need to be expanded. For example, it may be advisable to

include in the bin-scale tests nonmetallic containers (e.g. high integrity containers) and several different treated waste forms to address the gas generation issue. This means that an increased number of bins and a corresponding larger quantity of waste may be needed for the test phase. If such an approach is not taken, it is possible that following completion of the currently planned test phase, a subsequent test phase will be needed.

Recommendation 1.D.2:

The test phase and the bin-scale experiments in particular should be expanded to include a broad range of potential solutions to the gas generation problem such as: gas getters, preventers, and recombiners; several treated waste forms; nonmetallic containers; etc.

Observation 1.D.6:

Current plans call for the TRU waste to be emplaced in the WIPP repository in an essentially untreated form. In contrast with the other parameters affecting the performance of the repository (e.g., hydrogeologic processes), the waste form is one of the most controllable variables. Since about 90 percent of the total volume of contact-handled waste to be emplaced at WIPP is yet to be generated or is expected to require repackaging, the opportunity exists to develop a more stable waste form that would moot a number of the existing technical issues and would dramatically improve the ability of WIPP to meet the EPA Standard.

Recommendation 1.D.3:

The test phase and the bin-scale experiments in particular should be expanded to include a broad range of potential treated waste forms, such as drum grouting, shredded waste, thermal treatments, etc.

Recommendation 1.D.4:

On a periodic basis, DOE should assess the trade-offs between continuing to attempt to demonstrate compliance with the EPA Standard and other regulatory requirements using existing TRU waste forms versus committing to waste treatment(s) that would simplify and resolve many of the regulatory compliance issues.

Observation 1.D.7:

The inclusion of the Operations Demonstration (which is perceived by some as a pretext to ship large quantities of waste to WIPP before compliance with the EPA Standard has been demonstrated) has confused the purpose of the test phase and has undermined its credibility.

Bin-Scale Tests

Description:

The bin-scale tests are divided into three phases as described below.

> Phase 1: Generally as-received waste, no backfill. Will utilize 40 bins containing about 210 drum-equivalents of uncompacted waste. In place 7/90.
>
> Phase 2: As-received and compacted waste, backfill in drums. Will utilize 76 bins containing about 390 drum-equivalents of uncompacted waste. In place 4/91.
>
> Phase 3: Largely undefined, but intended to incorporate contingencies and engineering modifications to waste and/or backfill. In place 12/91.

Phases 1 and 2 will require about 600 total drum-equivalents of waste. This is equal to about 0.08 percent of the total capacity of WIPP (for contact-handled waste).

Observation 1.D.8:

The bin-scale tests are an essential portion of the test program. The results of the bin-scale tests may be needed in order to obtain approval by EPA of the no migration petition. It is possible that regulatory or operational issues could delay the receipt of waste at WIPP for experimental purposes significantly beyond mid-1990.

Recommendation 1.D.8:

The bin-scale tests should begin as soon as possible. If WIPP cannot receive waste for experimental purposes by (or shortly after) mid-1990, the bin-scale tests should be promptly initiated at another location permitted for such purposes.

Observation 1.D.9:

Two important pieces of information are needed for the bin-scale tests that do not currently appear to be available: (1) chemical characterization of the Salado brine; and (2) characterization of the TRU waste inventory for hazardous waste components.

Discussion:

If the bin-scale tests are initiated and it is then determined that the Salado brine (which will interact with the waste in the repository) is significantly different in chemical composition than the brine used in the bin-scale tests, the bin-scale tests may not be representative of repository conditions and may need to be repeated. Likewise if the hazardous waste components of the waste

used for the bin-scale tests are not known or if they are found to be significantly different from the overall TRU waste inventory, the bin-scale tests will not have addressed important issues concerning repository performance and regulatory compliance.

Recommendation I.D.6:

The bin-scale tests should preferably use actual Salado brine or secondarily utilize simulated Salado brine developed after the Salado brine is adequately characterized. The wastes to be used for the bin-scale tests should be characterized for hazardous waste components. Further work is needed to determine how the hazardous waste characterization of TRU-mixed wastes can best be accomplished.

Alcove-Scale Tests

Description:

The alcove-scale tests consist of two phases as follows.

Phase 1: Intended to simulate the operational phase of WIPP; consists of two alcoves:

Alcove 1--empty (no waste) gas baseline-reference. Utilizes zero drums. In place 7/90.

Alcove 2--as received waste, no backfill. Utilizes 1,050 drum-equivalents. In place 7/90.

Phase 2: Intended to simulate the post-operational phase of WIPP; consists of four alcoves:

Alcove 3--specially prepared non-compacted waste with brine and backfill within drums. Will utilize 1,050 drum-equivalents. In place 5/91.

Alcove 4--specially prepared compacted waste with brine and backfill within drums. Will utilize 1,050 drum-equivalents. (Due to compaction, 350 drums will be shipped to WIPP.) In place 11/91.

Alcove 5--specially prepared, non-compacted waste with brine and backfill within drums. Also with external backfill in alcove. Will utilize 1,050 drum-equivalents. In place 11/91.

Alcove 6--specially prepared compacted waste with brine and backfill within drums. Also with external backfill in alcove. Will utilize 1,050 drum-equivalents. (Due to compaction, 350 drums will be shipped to WIPP.) In place 4/92.

In total, the alcove-scale test phases 1 and 2 will utilize about 5,250 drum-equivalents of waste. This is equal to about 0.7 percent of the total capacity of WIPP (for contact-handled waste).

Observation 1.D.10:

The alcove-scale tests are an important part of the WIPP test phase. The alcove-scale tests are needed to investigate important repository conditions that laboratory and bin-scale tests cannot fully represent. Alcove-scale tests have the advantage of being able to more realistically represent:

- o Potentially synergistic effects of the repository itself (i.e., gases and brines released from the host rock, mine biochemistry, etc.) on the rates and modes of waste degradation and gas generation.
- o The full-scale size of the repository.
- o The radiological and hazardous waste source terms included in the large number of TRU waste types intended for disposal at WIPP.

Observation 1.D.11:

While the experiments are planned to be conducted for a relatively short period of time (five years), the experiments are intended to provide information to allow prediction of repository behavior over the long-term (1,000 to 10,000 or even 100,000 years). The geohydrologic complexity of the WIPP repository makes the collection of meaningful and reliable experimental results extremely difficult. For example, will the disturbed rock zone interfere with measurements of the long-term salt permeability, as well as brine and gas inflow into the waste rooms? Will the disturbed rock zone have to be instrumented in order to determine its impact? Can the disturbed rock zone be instrumented without changing its properties.

Recommendation 1.D.7:

Since alcove 1 (gas baseline-reference) does not require any waste it should be initiated as soon as possible, preferably before 7/90.

M

Timing of the Test Phase

Following is a listing of key events in the WIPP test program and their scheduling, as presently understood or inferred from a number of DOE documents and presentations to the BRP. This timeline assumes that waste receipts at WIPP begin in July 1990. This listing is not intended to indicate all of the important (or even critical-path milestones); it has been prepared to illustrate apparent problems in the sequencing of test phase activities. Therefore, what is important are not the specific dates but the sequence of events. (The current DOE schedule for the test phase is unclear; written

materials presented to the BRP within the last several weeks have different dates for a number of these activities.)

Activity	Date
Phase 1 bin experiments initiated	7/90
Alcove 1 experiment initiated	7/90
Alcove 2 experiment initiated	7/90
Engineering enhancements report, preliminary	8/90
Backfill selection complete	10/90
Engineering enhancements report, final	12/90
Large-scale room seal experiments complete	1/91
Phase 2 bin experiments initiated	1/91
Alcove 3 experiment initiated	2/91
Phase 1 bin experiments initial results	3/91
Alcove 4 experiment initiated	7/91
Decision on engineering enhancements	9/91
Phase 2 bin experiments initial results	10/91
Phase 3 bin experiments (with engineering fixes) initiated	12/91
Alcove 5 experiment initiated	1/92
Alcove 1 reliable results available	6/92
Alcove 2 reliable results available	6/92
Alcove 6 experiment initiated	7/92
Phase 3 bin experiments initial results	9/92
Latest date that data from the experiments can be used in "final" performance assessment	9/92
Alcove 3 reliable results available	5/93
Hold point for review of performance assessment	7/93

Draft EPA compliance report released	9/93
Alcove 4 reliable results available	11/93
Alcove 5 reliable results available	1/94
Alcove 6 reliable results available	9/94
Final EPA compliance report released/ Decision on WIPP as a disposal facility	9/94

Observation 1.D.12:

The scheduling of the test phase assumes that useful data will be rapidly available from the experiments. It is not likely that obtaining adequate data on gas generation will require significantly longer time periods.

Observation 1.D.13:

The scheduling of the test phase assumes that enough is known about the performance of TRU waste in salt to concurrently conduct the three scales of testing: laboratory, bin, and alcove. Given the current range of uncertainties and the complexity of the interactions, this assumption has a significant probability of turning out to be incorrect.

Observation 1.D.14:

Results from the engineering enhancements study will not be available until relatively late in the test phase. By the time decisions are made on engineering enhancements (9/92), all of the phase 1 and phase 2 bin tests will already be underway, as will alcove tests 1, 2, 3, and 4. This means only alcoves 5 and 6, and a third phase of bin-scale tests will be able to incorporate engineering enhancements that may be necessary for WIPP to comply with the EPA Standard.

Observation 1.D.15:

According to the existing schedule, the latest date that data can be input to the "final" performance assessment is 9/92. As of this date, reliable results from alcove tests 3, 4, 5, and 6 are unlikely to be available. In addition, if a third phase of bin-scale tests are needed, data from such tests are also unlikely to be available by 9/92. Thus, a significant portion of the data to be produced in the test phase will not be available in time to be used in the "final" performance assessment.

Recommendation 1.D.8:

Aside from delaying the "final" performance assessment, which may turn out to be inevitable, the primary action to increase the utility of the test phase is to increase the range of experiments conducted at the alcove-scale and particularly at the bin-scale.

Observation 1.D.16:

Alcoves 1 and 2 are scheduled to be sealed five months before the large-scale room seal experiments are scheduled to be complete. This is of concern because maintaining an airtight seal (to maintain anoxic conditions as will exist in the repository) is essential to the alcove tests.

Observation 1.D.17:

The alcove 3 experiment is scheduled to begin before significant data from the bin-scale experiments is likely to be available. This means that the backfill to be used in the drums in alcove 3 will be chosen before it is known if that backfill was effective in the bin-scale tests.

2. Operations Demonstration

Description:

The Operations Demonstration plan calls for the shipment of a large quantity (approximately 18,900 drums, which is equal to about 2.5 percent of the capacity of WIPP for contact-handled waste) of waste to WIPP essentially concurrently with the conduct of the bin-scale and alcove-scale experiments. This activity is intended to demonstrate the operational capability of the entire WIPP-related TRU waste management system including: generators' waste certification and TRUPACT-II loading, the transportation system, and waste receipt and emplacement at WIPP. The operations demonstration will not provide data useful in determining compliance with the EPA Standard.

Observation 2.D.1:

An operations demonstration is an important element in ensuring the operational readiness of a "production" facility. However, given the current degree of uncertainty regarding the ability of WIPP to meet the EPA Standard, it is not prudent to transport large quantities of waste to WIPP in the next several years. If WIPP is determined not to comply with the EPA Standard, all waste emplaced at WIPP would have to be removed and shipped elsewhere for storage, treatment, and/or disposal.

Observation 2.D.2:

Until a detailed study of engineering enhancements has been completed and reviewed, at least interim results are available from the bin-scale and alcove-scale experiments, and compliance with the EPA Standard has been demonstrated through performance assessment, the specific design and operational configuration of the WIPP underground will not be known. Thus, an operations demonstration prior to this point cannot demonstrate actual operational conditions. Therefore, a near-term operations demonstration will have limited value.

Observation 2.D.3:

The preparation of TRUPACT-II shipments by the generators, shipments along the transport routes, and emplacement of waste for the bin-scale and the alcove-scale experiments will provide significant operational experience. Assuming that 4,450 drums will be shipped to WIPP for waste experiments, about 106 TRUPACT-II shipments will be needed. If DOE believes that it is necessary, during the next few years, to obtain more experience or to demonstrate the operation of the WIPP system at full-capacity, nonradioactive simulated drums and standard waste boxes should be used.

Observation 2.D.4

The results of the test phase may necessitate the redesign of the waste rooms (e.g., smaller rooms to reduce the source term available for human intrusion) or treatment of the waste. If an operations demonstration is conducted prior to the resolution of such issues, it is possible that all of the waste emplaced for demonstration purposes would have to be moved to smaller rooms, removed for treatment at WIPP, or shipped elsewhere for treatment. This would result in significant additional radiation exposures to personnel, expense, and work effort.

Observation 2.D.5:

Plans for the Operations Demonstration appear to have been driven more by the need for additional TRU waste management capacity to serve defense program operational requirements than by the need for technical information related to WIPP. Regardless of the technical safety of storing wastes in WIPP, if DOE stores more waste in WIPP than is needed for waste performance experiments, DOE will be perceived as moving too fast, or of putting operational needs ahead of environmental and safety concerns.

Recommendation 2.D.1:

An operations demonstration with radioactive waste should be delayed until WIPP has been determined to comply with the EPA Standard and until the design and operational configuration of WIPP is resolved.

Recommendation 2.D.2:

The Operations Demonstration Plan should be separated from the Test Plan in order to avoid confusion. While the Operations Demonstration Plan and the Test Plan should be separated, it is important to recognize and maintain the interrelationships between these two programs.

E. REPROMULGATION OF THE ENVIRONMENTAL RADIATION PROTECTION STANDARD

Observation E.1:

It is not clear that the repromulgated EPA Standard (Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes 40 CFR Part 191, Subpart B) will satisfy the objections contained in the 1987 decision by the United States Court of Appeals For the First Circuit, or that the repromulgated standard will be able to withstand legal challenges on other grounds.

Although DOE is following the development of the new standard by EPA, until the standard is actually promulgated and any legal challenges resolved, it is not known what performance standard WIPP will be required to meet as a permanent disposal facility. This "moving target" subjects WIPP to a considerable amount of regulatory uncertainty.

Observation E.2:

One of the reasons the Court remanded the Standard to EPA in 1987 was that the Court believed WIPP to be an underground injection well and that the EPA Standard was less stringent than, and therefore inconsistent with the standard under the Safe Drinking Water Act to which underground injection wells are regulated.

Recommendation E.1:

DOE should explore options for resolving this issue, including determining if an underground injection control permit is needed for WIPP and statutorily clarifying the applicability of the Safe Drinking Water Act to WIPP.

F. COMPLIANCE WITH FEDERAL AND STATE HAZARDOUS WASTE REGULATIONS

Observation F.1:

It is not clear that a comprehensive and systematic assessment of the applicability of federal and state hazardous waste regulations to the WIPP program has been conducted. Without such planning, hazardous waste requirements have the potential to stall the WIPP program at numerous points.

It is not clear that all of the plans for WIPP are in compliance with applicable hazardous waste regulations. For example, the operational procedures for WIPP clearly state that waste containers will not be opened at WIPP. However, the federal regulations specifying Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264) appear to require that waste analyses be conducted at the disposal facility.

Discussion:

Planning by DOE is needed to minimize the chance that federal or State of New Mexico hazardous waste regulations do not catch the WIPP program by surprise. For example, there could be significant uncertainty in the RCRA Part B permitting process for WIPP. It is not uncommon for the RCRA Part B permitting process for land disposal facilities to take three or more years. Nationally, very few permits have been issued under the "Miscellaneous Units" provision to which WIPP is subject (40 CFR 264.600). No RCRA permit has ever been issued for a deep geologic repository.

Recommendation F.1:

DOE should promptly conduct a comprehensive and systematic assessment of the WIPP program's compliance with federal and State of New Mexico hazardous waste regulations. The assessment should identify each of the specific provisions of federal and state regulations that apply to the WIPP program. Following this assessment, a compliance strategy should be developed for each applicable provision. DOE should work closely with the State of New Mexico on the promulgation of mixed waste regulations and the preparation of hazardous waste permit applications.

Observation F.2:

Inadequate analytic data are available on the types and quantities of hazardous wastes in the TRU wastes intended to be disposed in WIPP.

Discussion:

Almost all existing waste characterization information is based on process knowledge. Process knowledge may provide a reasonably accurate characterization of hazardous wastes for the newly generated TRU-mixed waste. However, process knowledge may not provide sufficiently accurate characterizations for wastes generated nearly 20 years ago. Hazardous waste characterization data are needed for a number of purposes including: the performance assessment, the no migration petition, and the RCRA Part B permit application. Hazardous waste characterization data are also needed to comply with federal or state hazardous waste regulations at every site at which TRU-mixed wastes are generated and/or stored. Without actual measurements of the hazardous components in both old and newly generated TRU-mixed wastes, the WIPP program will continue to suffer a credibility problem and is also likely to encounter regulatory challenges.

It is recognized that conducting hazardous waste characterizations on TRU-mixed wastes presents formidable technical and personnel exposure problems that need to be addressed.

Recommendation F.2:

DOE should promptly develop a comprehensive, Department-wide plan to

characterize the hazardous (nonradioactive) components of TRU-mixed waste being generated and in storage.

When TRU wastes are being examined for other purposes, DOE should take advantage of the opportunity to obtain information on the hazardous components in the wastes. Several such opportunities are:

- o When waste packages are opened and physically inspected for compliance with the WAC.
- o When waste packages are vented.
- o When wastes are supercompacted.

Discussion:

Since all waste packages are required to be vented prior to shipment to WIPP (in TRUPACT-II), the opportunity is readily available to sample the head space gas from essentially all of the WIPP wastes. Analysis of the head space gas from, for example, ten percent of the waste packages (preferably at an elevated temperature) has the potential of producing a highly reliable database of the volatile organic compounds present. Some methods development would probably be needed, and the approach should be validated by more invasive analysis techniques.

The RFP plans to begin compacting all of its TRU wastes in 1990. It is likely that in the supercompacting process liquids will be pressed out of some of the packages being supercompacted. These liquids need to be removed for solidification or other treatment. Prior to treatment, these liquids could be sampled and analyzed for hazardous components.

Observation F.3:

Documents prepared by the RFP indicate that several types of hazardous materials used at the RFP and several hazardous wastes that are produced at the RFP do not end up in the TRU waste inventory. Further work by the BRP is needed to confirm that this is the case.

G. MANAGEMENT OF THE TRU WASTE INVENTORY

Observation G.1:

A significant percentage of the waste packages currently in the TRU waste inventory at the RFP and at INEL (the only two generator/storage sites reviewed to date by the BRP) are believed to be low-level waste and not TRU waste. RFP and INEL estimate that eight to ten percent and around 50 percent, respectively, of their TRU waste inventory is expected to be low-level waste. This "misclassification" has resulted from a change in the TRU waste criterion from 10 nCi/g to 100 nCi/g of TRU radionuclides, and the use of less sophisticated assay equipment.

Recommendation G.1:

All waste packages in the TRU waste inventory at all DOE facilities that may contain less that 100 nCi/g of TRU radionuclides should be reassayed as soon as possible and removed from the TRU waste inventory, if the TRU radionuclide content is less than 100 nCi/g.

Discussion:

The retention of low-level waste in the TRU waste inventory has the potential to needlessly consume significant resources through "over management" of such waste. This misallocation of resources can occur in the consumption of valuable TRU waste storage space, certification of waste packages that need not go to WIPP, and the misuse of expensive disposal capacity at WIPP.

H. WASTE ACCEPTANCE CRITERIA FOR WIPP

To date there has been insufficient time to fully assess the WAC for WIPP. While further time is needed to complete this assessment, some initial and preliminary thoughts are provided below.

Observation H.1:

It is not clear that the WAC are consistent with the source term databases being used for the performance assessment, the no migration petition, and the RCRA Part B permit application.

Recommendation H.1:

DOE needs to ensure that the databases being used for the performance assessment, the no migration petition, and the RCRA Part B permit application are consistent with the WAC. The databases should not assume that the WAC are controlling elements of the source term that the WAC in reality are not.

Observation H.2:

It is not clear how the performance assessment, the no migration petition, and the RCRA Part B permit application will take into consideration the authority of the WACCC to exempt wastes from the WAC in the future.

Recommendation H.2:

The WACCC should not grant any exemptions from the WAC until after WIPP has been demonstrated to comply with the EPA Standard. Exemptions to the WAC should be granted only if a technical assessment indicates that the performance of the repository will not be materially affected.

Observation H.3:

It is not clear that adequate methods are being used to ensure that the WAC for corrosives, pyrophorics, explosives, and RCRA constituents are being met. The BRP should pursue this matter further.

Observation H.4:

It is possible that waste containers that are vented and then allowed to aspirate in a high humidity environment (such as out-of-doors) may accumulate a significant amount of liquid.

Recommendation H.3:

Waste containers that are aspirated in non-humidity controlled environments should be subject to real-time radiography immediately prior to shipment to ensure that the criterion for liquids is not exceeded.

Observation H.5:

In addition to the WAC, wastes to be shipped to WIPP in TRUPACT-II must also comply with the conditions specified in the United States Nuclear Regulatory Commission's Certificate of Compliance, some of which are more restrictive than the WAC. In the future, the RCRA Part B permit for WIPP may impose additional restrictions on the wastes that can be received at WIPP.

Recommendation H.4:

DOE should develop comprehensive, integrated criteria and a unified certification process for determining what wastes can be shipped to WIPP. The WACCC should audit waste generators for compliance with this integrated set of criteria.

I. AUDITING COMPLIANCE WITH THE WASTE ACCEPTANCE CRITERIA

Observation I.1:

The audit program conducted by the WACCC is a vital mechanism for ensuring that the TRU waste generators are properly certifying waste according to the WAC. While the existing audit approach has significant merit, additional steps would increase the effectiveness and credibility of the WAC and the auditing program.

Recommendation I.1:

DOE should actively encourage and facilitate observers from the New Mexico Environmental Improvement Division, the Colorado Department of Health, the State of Idaho, and the Environmental Evaluation Group to accompany the WACCC auditors.

Recommendation I.2:

The WACCC should conduct an unannounced audit at each TRU waste generator facility at least annually. In addition to reviewing the waste generators' certification records, the audit team should randomly select drums from the generators' inventory for radiological assaying and examination by real-time radiography under the audit team's observation. Audits of each generator should include enough waste packages to ensure at least a 95 percent confidence level that wastes are being properly certified.

J. ROCKY FLATS WASTE RECERTIFICATION PROGRAM

A revised draft of the Rocky Flats Waste Recertification Program Plan (DOE/WIPP 89-025) was not received for review by the BRP until October 18, 1989. This revised plan was prepared in response to questions raised by the BRP. While this responsiveness is appreciated, the recent receipt of this document has not permitted thorough review nor has it allowed opportunity for discussion with DOE officials. Therefore, the following comments are very preliminary.

Observation J.1:

The recertification plan appears to be generally headed in the correct direction.

Discussion:

An important change from prior plans is the exclusion of low-level waste (waste having less than 100 nCi/g of TRU radionuclides) prior to recertification. Inclusion of state observers on the audit teams will improve public confidence in the recertification program. For the plan to have credibility, the level of observation/inspection needs to be very nearly full-time. The plan calls for the audit team to review each of the drums to be reassayed at the RFP. Given the on-going criminal investigation, limiting the audit team reviews to only the drums to be reassayed does not seem adequate. The plan does not include unannounced audits of RFP waste being recertified at INEL. The plan includes the opening of a number of waste containers and the physical inspection of contents, both at the RFP and at INEL. This presents an opportunity to collect data on the hazardous components in the wastes that will be useful in the performance assessment, the no migration petition, the RCRA Part B application, and other hazardous waste compliance issues regarding WIPP.

Recommendation J.1:

DOE should actively encourage and facilitate observers from the New Mexico Environmental Improvement Division, the Colorado Department of Health, and the Environmental Evaluation Group in the recertification audits/inspections.

Recommendation J.2:

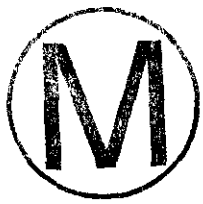
In addition to the recertification procedure to be conducted by RFP personnel, the audit team should, on an unannounced basis, randomly select drums from each of major waste types in the RFP inventory for radiological assaying and real-time radiographic examination under the audit team's observation

Recommendation J.3:

Because the RFP and INEL will have the same contractor during the recertification program (and because of the on-going criminal investigation), unannounced audits of the recertification activities at INEL should be conducted to increase public credibility.

Recommendation J.4:

Since the recertification plan involves the opening of waste containers and the inspection of their contents, serious consideration should be given to obtaining data on the hazardous constituents of the wastes.



WASTE ISOLATION PILOT PLANT (WIPP)

BLUE RIBBON REVIEW PANEL MEMBER REPORT

Newal Squyres
Boise, Idaho

October 23, 1989

EXECUTIVE SUMMARY

The Waste Isolation Pilot Plant (WIPP) Blue Ribbon Panel was established by the Secretary of Energy in late August of this year. The five members of the panel were each asked to provide an independent assessment of certain issues related to the recertification or validation of Rocky Flats Plant waste for shipment to WIPP and to the Draft Plan for the WIPP Test Phase: Performance Assessment and Operations Demonstration. Those issues and my recommendations are as follows:

1. The proposed plan to validate Rocky Flats Plant certification of waste for shipment to WIPP.

The latest draft of the Rocky Flats Waste Recertification Program Plan (DOE/WIPP 89-025) was received as this paper was being finalized. Although more detail needs to be provided, particularly concerning the audit of RFP's certification processes, it appears to contain most of the elements necessary to provide assurance that RFP generated waste has been properly certified. For waste at INEL, the plan should be developed in conjunction with the September 1989 draft RWMC/SWEPP Compliance Plan for TRUPACT-II Authorized Methods for Payload Control (TRAMPAC). Both plans should be circulated to EEG and/or other representatives of Colorado, New Mexico and Idaho for comment. No RFP waste should be shipped from INEL to WIPP unless it

complies with the TRAMPAC plan, which requires a re-evaluation and examination of the certification for each drum to be shipped; and post-1985 INEL stored waste, which was WIPP/WAC certified by RFP, should not be shipped until validation of RFP's waste certification program. A Colorado representative should have the opportunity to observe each step of the planned re-examination of certain RFP waste to see whether it is properly classifiable as LLW, rather than TRU. RFP stored waste not examined under this procedure should not be shipped to WIPP unless it conforms to TRAMPAC, and its previous certification has been validated. Newly generated RFP waste should be certified to WIPP/WAC under any new procedures or compliance requirements flowing from the recertification/validation process.

2. The concept and timing of the WIPP Demonstration Test Plan and the relationship between the performance assessment and operations demonstration.

a) <u>Operations Demonstration</u>: The operational capability of WIPP to safely and efficiently receive and place waste underground is a critical component in fulfilling WIPP's research and development mission of demonstrating the safe disposal of defense generated radioactive waste. An operations demonstration will begin with the receipt of the first waste for use in the performance assessment process. Included in the scope of the operations demonstration must be the capability to retrieve all waste placed underground during the PA; retrieval plans must be correlated to the nature of the PA experiments and be sufficient for the scientific and

technical community to believe they will work. The PA will be an evolving, iterative process. A full fledged operations demonstration should begin when sufficient data is received from the PA to establish with reasonable confidence the conditions (backfill and other engineering modifications) under which particular waste will be disposed of. Final decisions about the optimum design and use of the underground space, including such things as how the waste is stacked and whether some waste is segregated from other waste, will depend on information from the PA. Pending the satisfactory resolution of the institutional, technical and legal/regulatory considerations concerning WIPP's use as a permanent repository, serious consideration should be given to its use as an interim storage facility. In this capacity an operations demonstration would be conducted, which should provide useful information in the research and development process for WIPP.

b) Performance Assessment: The PA process involves TRU and mixed-TRU waste and different regulatory issues and approaches result from these distinctions in waste form. The regulatory requirements need to be clarified so the PA can provide the information necessary to satisfy the regulations or so that necessary changes and modifications can be made to the manner in which the waste is stored (including engineering modifications) or to the methods and procedures under which the waste is initially handled and packaged for shipment to WIPP. Lab scale experiments must begin as soon as possible. Bin-scale and room-scale (alcove) tests will begin as soon as operational readiness and regulatory authority are obtained. All of these tests are necessary to

achieve regulatory compliance and to determine the conditions under which permanent disposal can begin. Based on the unique nature of WIPP and its research and development mission, the performance assessment phase should begin in full as soon as operational readiness is obtained. DOE should explore with ways to allow the experiments to begin even if final regulatory approval has not been obtained by the time operational readiness is achieved. DOE should continue to integrate and expand the PA database, based on WIPP/WAC and TRAMPAC compliance as well as the updating and expansion of the Preliminary Nonradionuclide Inventory for CH-TRU Waste (IT Corporation, May 1989). Information concerning the character of the waste, gathered to satisfy various compliance requirements, needs to be reported uniformly by generator site and coordinated with the process of determining whether, or in what manner, WIPP can comply with applicable regulatory standards. Better knowledge can be gained in the PA by making full use of all available information about the wastes to be shipped to WIPP. The PA process should take into consideration the fact that waste destined for WIPP has not been generated and thus the results of the PA and the needs of the facility may affect the way waste is stored and handled at its inception. There should be a regular, formalized process of interaction and communication between the PA, WIPP/WAC personnel and the generator sites. The underlying assumptions about the character of the waste and the storage methodology used in the PA should be continually reexamined to insure that regulatory compliance and/or public confidence are not undermined by worst case scenarios or other assumptions which have no realistic basis in fact or which could be modified. The PA plan should not be

constricted by unrealistic or arbitrary time limits that do not consider the research and development mission of WIPP or that do not reasonably correspond with the gathering of data necessary to determine the long term acceptability of WIPP as a permanent disposal site. Performance assessment, broadly defined, should continue as long as data is generated which supports modifications/improvements in the use of WIPP to demonstrate the safe disposal of TRU/Mixed-TRU waste. Based on the knowledge gained from using the facility, the waste management disposal systems at WIPP will probably not remain static. Changes may occur because of alterations or modifications in the character of waste shipped to WIPP, considering the time period when the waste was generated, the effect of RFP's waste minimization plan, the effect of compaction or other unanticipated changes which might flow from the increase in knowledge about WIPP. The PA is the principal mechanism to implement the congressionally mandated goal of demonstrating that a geological repository such as WIPP is a viable solution to the need for a safe long term disposal site. Continuing consultation and interaction with the EPA, NAS and EEG is appropriate and necessary to achieve this goal.

DISCUSSION

I. INTRODUCTION

The primary statutory basis for WIPP is contained in section 213(a) of Public Law 96-164, the Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980. This section directed the Secretary of Energy to proceed with construction of the Waste Isolation Pilot Plant and further provided:

> Notwithstanding any other provision of law, the Waste Isolation Pilot Plant is authorized as a defense activity of the Department of Energy, administered by 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 waste resulting from the defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission.

Congress required the Secretary of Energy to consult and cooperate with officials of the state of New Mexico in carrying out WIPP's mission and further provided in section 213(c):

> No law enacted after the date of the enactment of this act shall be held, considered, or construed as amending, superseding, or otherwise modifying any provision of this section unless such law does so by specifically and explicitly amending, repealing or superseding this section.

It is now nine years since Congress established WIPP's mission, and numerous groups, including this panel, are involved in addressing issues associated with beginning to use WIPP as a site for the disposal of TRU and mixed-TRU waste resulting from defense activities and programs of the United States.

At the initial briefing held for the panel, the representative from the National Academy of Sciences stressed the need to move forward with the test phase for WIPP in order to obtain the information necessary to determine the conditions under which WIPP can serve as a permanent disposal site. At the present time, TRU and mixed-TRU waste are stored "temporarily" at various sites throughout the United States with the vast majority being stored at the Idaho National Engineering Laboratory. A relatively small amount of more recently generated waste is stored at the Rocky Flats Plant (RFP) in Colorado, but there are currently strict limitations on the amount this may increase. Similar waste is being generated on a regular basis due to national security requirements. There is thus a strong national interest in storing and permanently disposing of this waste safely. WIPP was established by Congress (and has been funded in the total amount of $780 million through fiscal year 1989) to determine whether such a geologic repository can demonstrate its capability to serve as a permanent disposal site. That final decision cannot be made yet, but it is now time to do what is necessary for the research and development process to go forward.

II. VALIDATION/RECERTIFICATION OF ROCKY FLATS PLANT WASTE FOR SHIPMENT TO WIPP

Because of recent events at the Rocky Flats Plant concerning, broadly speaking, its handling and disposal of waste from nuclear weapons production, DOE has perceived a need to validate or recertify waste previously certified by RFP to WIPP's Waste Acceptance Criteria standards. I am not aware of any allegations that directly relate to the WIPP/WAC certification program at RFP. No assertions have been made that any individuals associated with the certification process intentionally or negligently did something to raise any substantial concern about the original waste certification process. In addition, there have been periodic audits and inspections of the RFP WAC certification program conducted by WACCC, non-RFP personnel. My understanding is that an EEG representative has accompanied suc.. audit teams and that no substantial problems have been identified. These are relevant considerations in evaluating the scope and efficacy of a plan to recertify Rocky Flats waste.

There are at least three interrelated, yet distinct, categories of waste involved in the validation/recertification program. First, there is a portion of previously certified RFP waste that may be properly classifiable as low level waste, rather than TRU. Re-examination of this limited category of waste will be conducted by re-assaying the waste with more sophisticated equipment than was used initially. The object is

to determine whether a particular container has a sufficiently low amount of radioactive material to be characterized as low level radioactive waste, rather than TRU. Because this re-assay process may create an ability to continue storing this waste at RFP without contributing to the 1601 cubic yard limit agreed to by DOE and the state of Colorado, it is particularly important for an appropriate representative from Colorado to have the opportunity to be present during each step of the re-examination process. The Colorado representative should be fully briefed for a thorough understanding of how the waste was originally assayed; how the waste was identified for re-examination; and how the new equipment differs from the old, including the use of controls to assure that the new equipment is being operated and functions accurately to produce measurements that are not open to question. In summary, DOE should make the necessary arrangements with the Governor of Colorado to obtain the presence of a technically competent representative to sign off on this portion of the validation/recertification process.

The second category subject to the validation/recertification plan is waste now being stored at RFP, which was previously WIPP/WAC certified by RFP. Before this waste can be shipped to WIPP, it must also be certified for shipment under the TRUPACT-II authorized methods for payload control (TRAMPAC). The latest draft Rocky Flats Waste Recertification Program Plan (DOE/WIPP 89-025, October 1989) was received as this report was being prepared and has not been reviewed in detail. However, the plan for this category of waste contemplates an unannounced audit process administered by the WACCC. The audit will include quality assurance and record keeping activities but will focus on

activities associated with initially packaging and certifying the waste. This appears to be an acceptable audit process but more information is needed concerning the actual scope and duration of the audit.

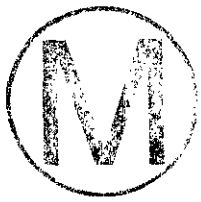
In addition, substantially more detail is needed concerning the plan to recertify that portion of the 1200 drums, less that determined to be low level in the re-assay process, to be shipped to WIPP. This portion of the plan should include a re-examination of each drum and its original certification by individuals not involved in the original certification. At least a significant number of randomly selected drums should be recertified by different people. Finally, the validation/recertification of this category of waste must be observed to the extent deemed appropriate by the states involved, and measures should continue to be taken to provide the opportunity for independent oversight in the development and implementation of the recertification program.

The third category of waste subject to this plan involves approximately 8800 drums of waste certified by RFP prior to shipment to INEL; this waste has been stored at INEL since 1985. The purpose of the draft RWMC/SWEPP Compliance Plan for TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) is to provide the methodology for examining each of these drums to make sure it can be shipped to WIPP in accordance with TRAMPAC criteria. Unfortunately, the TRAMPAC criteria were developed somewhat independently from the WIPP/WAC criteria, and it is possible that waste may be certifiable for acceptance at WIPP but not meet the criteria for TRUPACT-II shipment. As this plan is finalized, it could serve as a basis to integrate the WIPP/WAC with

the TRAMPAC requirements so that one certification process satisfies both. In any event, DOE should make certain that compliance with WIPP/WAC will also provide compliance with TRAMPAC.

Because each container now stored at INEL and intended for shipment to WIPP must be re-examined to insure compliance with TRAMPAC, and because that process will begin in the very near future, the plan for the validation/recertification of RFP certified waste at INEL should be developed in conjunction with the TRAMPAC compliance plan. It appears that the draft TRAMPAC compliance plan contemplates an examination of the data generated when the waste was originally certified by the RFP, a 100% real time radiography (RTR) examination of each container and a random sampling process, all conducted at the SWEPP site. There should be an integration between the TRAMPAC compliance plan and the RFP recertification plan. An opportunity should be provided for comment on the proposed plans by the EEG and/or other appropriate state representatives, and arrangements should be made for independent observation of the implementation of the plans, if requested. Before going forward with a plan to validate or recertify RFP waste, DOE should be satisfied that appropriate groups and state representatives are in essential agreement with the plan's scope and methodology. This, plus a thorough briefing concerning the basis for DOE's confidence in RFP's certification processes, are necessary to blunt public skepticism concerning RFP's waste certification processes.

III. CONCEPT AND TIMING OF THE WIPP DEMONSTRATION TEST PLAN; RELATIONSHIP BETWEEN THE PERFORMANCE ASSESSMENT AND OPERATIONS DEMONSTRATION



A. Operations Demonstration: An operations demonstration is necessary and will begin with the waste to be used in the test phase. The object of the performance assessment portion of the test plan is to develop the necessary information to determine the conditions under which the waste will be stored or disposed of to achieve regulatory compliance and the overall suitability of WIPP as a permanent repository for TRU/Mixed-TRU waste. Until the information from the PA becomes available to begin to make such decisions, an operations demonstration, conducted on the basis of assumptions about how the waste will be stored, seems premature. It has been continually stressed that the PA will involve an iterative, step by step learning process. The operational activities associated with receiving and placing the waste underground will be significantly influenced by what is learned in the PA concerning the behavior of the waste and the geologic repository. Because of uncertainties associated with the results of the PA and thus with any measures that may be necessary to counter unexpected or adverse conditions, flexibility needs to be maintained concerning the commencement of waste acceptance at capacity or near capacity rates. Essentially, I agree with NAS's observations and recommendation 6 of the Review Comments on DOE document DOE/WIPP 89-011: Draft Plan for the Waste Isolation Pilot Plant Test Phase: Performance Assessment and

Operations Demonstration, July 19, 1989. At this juncture, the operations demonstration process should obviously make every effort to maximize what can be learned from emplacement of the waste needed for the PA. A plan should be developed to determine how best to maximize from an operational standpoint the experience gained with the waste to be used in the PA.

Perhaps an unspoken concern, at least in the limited experience of this member, is the belief that the current operations demonstration plan may provide a method for the temporary storage of waste, until the PA process is far enough along to make some final decisions concerning the use of WIPP to solve obvious problems existing in the management of TRU/Mixed-TRU waste. Stated simply, there is too much waste and no readily acceptable place to put it. Until sufficient information is available to demonstrate regulatory compliance of WIPP and to demonstrate its safety as a long term disposal site, issues concerning the temporary or interim storage of waste will be present.

In this regard, the NAS representative that met with the panel at its first meeting said, perhaps unofficially, that although the question had not been asked he did not oppose placing waste underground so long as it was recognized that the waste was not necessarily put there on a permanent basis. Common sense virtually compels the conclusion that waste is better stored underground at WIPP than it is above the surface, and this appeared to be the position of the NAS representative. Although the subject has been covered in part in the supplemental environmental impact statement, a detailed and thorough analysis needs to be done of the costs and benefits of continuing to store TRU and mixed-

TRU waste at interim sites not developed to assure the safe handling of such waste. There would appear to be certain beneficial effects from the use of WIPP as an interim storage facility in terms of an operations demonstration. These benefits alone would not justify such use but could be achieved through a well considered, conservative plan for using a portion of the facility for interim storage. The subject should be addressed with the regulatory agencies, including appropriate participation by those groups (EEG and NAS) long involved in evaluating WIPP and its proposed use.

B. Performance Assessment. The plans associated with the performance assessment to demonstrate regulatory compliance do not appear to take into consideration the difference in the regulatory scheme for radioactive waste (40 CFR 191, Subpart B) and hazardous waste (40 CFR 268). These differences are illustrated, for example, by different definitions of "disposal". With respect to radioactive TRU waste, "disposal of waste in a mined geologic repository occurs when all of the shafts to the repository are backfilled and sealed." 40 CFR 191.02(l). On the other hand, for hazardous waste, "land disposal" means placement in the land and includes placement in a salt bed formation, underground mine or cave. 40 CFR 268.2(a). An estimated 50% to 60% of the defense generated waste to be emplaced at WIPP is mixed, containing both hazardous constituents and TRU radioactive waste. The regulatory process needs to address these facts about the waste WIPP must contend with to fulfill its mission.

The Environmental Protection Agency is currently considering DOE's no migration petition, filed pursuant to 40 CFR 268.6. Until the no migration petition is approved, mixed waste apparently will not be put underground at WIPP. If the no migration petition is not approved or is delayed, current plans for the PA will have to be modified. The term of a no migration petition may be only 10 years, and this could pose downstream problems for waste emplaced at WIPP in reliance on the no migration petition exemption. Even if the no migration petition is granted, what appears to be an inconsistent regulatory approach, or perhaps better termed a non-approach, to the regulation of TRU/Mixed-TRU waste creates potentially fertile ground for future problems. An effort should be made to reconcile or harmonize what appear to be conflicting regulatory approaches. DOE should probably not assume that the no migration petition will be granted in a timely fashion and should therefore begin to develop contingency plans for the PA, specifically including an early approach to EPA to develop a way to begin the presently planned experiments at WIPP as soon as operational readiness is achieved.

A combination of lab scale, bin-scale and alcove tests are clearly necessary to develop the information for a satisfactory performance assessment, and just as importantly, to gather data necessary to predict the net behavior of the rooms for long term disposal purposes. The performance assessment/experimental program must adequately address the concerns, and seek solutions, raised by the presence of hazardous constituents, particularly volatile organics, in the waste intended for disposal at WIPP. An increased effort should be made

to insure that as much pertinent and uniform data as possible is gathered for these purposes from all available sources, including the WIPP/WAC and TRAMPAC compliance process and an ongoing update of the Preliminary Nonradionuclide Inventory for CH-TRU waste.

DOE and its contractors appear to be making progress in responding to NAS recommendations concerning the performance assessment/experimental test program. Scientific and public confidence in this program is obviously enhanced by input received from NAS, EEG and EPA together with the recognition that the process is an iterative one, which requires constant flexibility and openness in recognizing potential problems and developing solutions, so that regulatory compliance can be achieved and decisions made about permanent disposal. A formal mechanism should be established so that the personnel involved with performance assessment/experimental test program work closely with the personnel, from WIPP and the generator sites, responsible for WIPP/WAC and TRAMPAC compliance. This will provide for early identification and implementation of measures intended to remedy known or anticipated problems.

There should be a direct relationship between the results, even preliminary, from the performance assessment and the conduct of an operations demonstration. Planning for the performance assessment and the first receipt of waste, including the timing and volume of waste received, should be conducted so as to maximize the opportunity to test, verify and modify, if appropriate, the operational plan for waste receipt and emplacement.

Short term goals, such as compliance with 40 CFR 191 and reaching an early decision concerning permanent disposal, cannot predominate over the long term goal of establishing the conditions for WIPP's use as a final repository for TRU and mixed-TRU waste. The solutions to the gas generation and brine inflow issues, for example, may evolve and may permit a portion of the facility to be used as a final repository but nevertheless warrant modifications or changes in both the waste form and repository usage for another portion of the site. Regulatory issues may be resolved differently at one point in time than another, because of the continuing learning process. In terms of complying with 40 CFR 191, PA personnel should continue to consider NAS's suggestion to supplement the numerical predictions of a performance assessment with qualitative judgments. It may be necessary to continue aspects of the performance assessment/experimental program even after a final decision is made that certain portions of the repository can be used for permanent disposal.

IV. ADDITIONAL CONSIDERATIONS AND CONCLUSION

Progress appears to have been made by the DOE in recognizing the need for better coordination and integration among various people and groups with responsibility for WIPP. In order to make the transition from the site selection/construction phase of WIPP to its actual use to fulfill the congressionally mandated goal of providing a research and development facility to demonstrate the safe disposal of defense weapons production generated waste, DOE and its contractors are now required to focus realistically on the so-called institutional concerns and decide what needs to be done to put WIPP in use. Resolution of these institutional concerns should be enhanced by the progress made in meeting the concerns expressed by the NAS and EEG concerning the performance assessment/experimental program phase.

From an operational and technical standpoint, WIPP is about ready to begin receiving waste as the project moves from the construction phase to the test phase. Significant institutional and regulatory issues remain to be resolved but these issues do not go to the merits of WIPP's functional ability to serve as a valuable national resource of providing a place to store defense generated nuclear waste. Once operational readiness is achieved, there is no reason not to go forward with the test phase, which should be conducted to the maximum extent possible on site at WIPP. So long as the ability to retrieve the emplaced waste is maintained, WIPP should be put to use. If funds need to be set aside in order for public confidence to exist with respect to

retrievability, then that should be done. WIPP is a unique facility, whose very existence and current status are the result of the hard work and dedication of numerous groups both inside and outside the government. There are an infinite number of variables associated with the way WIPP may ultimately be used as a disposal site, and there will no doubt be troublesome issues that must be resolved in the course of making the decisions about that use. But those decisions are not being made in a vacuum or without the opportunity for oversight by groups representing the public interest, particularly the states directly involved. It is reassuring that not once during my involvement in this project did anyone suggest that a particular course of action should be taken for national security reasons. Clearly, there are national security issues associated at stake when one considers the disposal of defense-generated waste. But the history of WIPP's development clearly illustrates that decisions about its use will not be made in secret or without significant involvement of groups outside of DOE and its contractors. To this point, decisions about WIPP appear to have been made based on the best available technical and scientific input from numerous sources. This should continue as decisions are made about its future use as a repository for actual waste, for only in this manner will the proper decisions be made, in the national interest, about WIPP's ultimate suitability as a permanent repository.

HEARING BEFORE
THE SENATE COMMITTEE
ON ENERGY AND NATURAL RESOURCES

APRIL 26, 1990, 2:00 P.M.

DIRKSEN SENATE OFFICE BUILDING

ROOM 366

STATEMENT AND ACCOMPANYING
DOCUMENTS OF

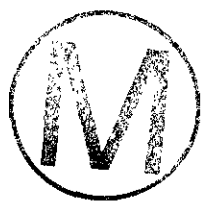
DR. TOM BAHR
MEMBER OF THE DEPARTMENT OF
ENERGY'S BLUE RIBBON PANEL ON WIPP

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

APRIL 26, 1990



My name is Dr. Tom Bahr and I am here today speaking as a member of the Waste Isolation Pilot Plant (WIPP) Blue Ribbon Panel. The Blue Ribbon Panel was established by the Secretary of Energy in August 1989 as an independent oversight group to provide advice on selected issues relating to WIPP.

I am presently an employee of New Mexico State University serving as Director of the New Mexico Water Resource Research Institute. Between 1987 and 1989, I spent 2 1/2 years on leave from the university serving in state government as Cabinet Secretary for the New Mexico Energy, Minerals and Natural Resources Department. As part of my responsibilities, I chaired the statutory Radioactive Waste Consultation Task Force, commonly called the WIPP Task Force. This Task Force serves as the primary liaison between the U. S. Department of Energy and the executive branch of state government in New Mexico. My work with the WIPP Task Force dealt largely with policy issues and to some extent technical matters within my personal area of expertise.

My views on WIPP have in part been shaped by that experience in state government, but to a lesser degree than the insights I have gained during the past 8 months as a member of the WIPP Blue Ribbon Panel. My remarks today are as an independent member of the Panel and they do not necessarily reflect the views of the State of New Mexico or New Mexico State University. I should stress that the Blue Ribbon Panel is not charged with arriving at consensus on any particular issue nor are we constituted as an official advisory body. We have no chairman and our written and verbal reports to the Secretary of Energy and his staff are done as individuals.

The original charge to members of the Blue Ribbon Panel was to analyze and report on three issues: 1) The concept and timing of DOE's proposed WIPP Operations Demonstration program; 2) Whether or not the Operations Demonstration program should be conducted in parallel with the Performance Assessment; and 3) An evaluation of DOE's validation plan for the certification of transuranic waste to meet the WIPP waste acceptance criteria.

During September and October of 1989, the Blue Ribbon Panel conducted site visits of the Waste Isolation Pilot Plant, Idaho National Engineering Laboratory and the Rocky Flats Plant. We were briefed by a host of DOE employees, contractors and others and we had the opportunity to question most decision-making managers having anything to do with the WIPP. We also reviewed thousands of pages of documents furnished by DOE and others. On October 23, 1989 we submitted individual reports to the Secretary of Energy. Mr. Chairman, I would like to request that my report be included for the record, if it is agreeable with the Committee.

Following the submission of our reports, the Blue Ribbon Panel was asked to continue its service to the DOE by providing our individual observations and recommendations to the Department in three areas: 1) continued review of DOE plans to characterize Rocky Flats Plant transuranic and mixed waste; 2) assist DOE in developing a strategy for achieving compliance with RCRA and other environmental regulations at WIPP; and 3) evaluate the Final Test Plan and ancillary documents. More recently, DOE expanded our charge to include a management review of the WIPP project, review of the rationale and plans to characterize waste for the test phase, review of plans for engineered alternatives relating to the waste form with the overall general focus being placed on an evaluation of DOE efforts on preparing for the test phase at the WIPP.

In addition to issues identified by the DOE, the Blue Ribbon Panel was also asked in late November 1989 to comment on questions submitted by members of the New Mexico Congressional Delegation. The questions were essentially two: 1) What is the rationale for conducting in-situ experiments at the WIPP rather than at existing waste generation and storage sites along with some discussion of how much waste would need to be emplaced at the WIPP for the experiments; and 2) Our recommendations regarding DOE's proposed)perational Demonstration experiments.

On December 28, 1989, I responded to these questions in writing to each member of the New Mexico Delegation. Two members of our Delegation who sit on this committee have seen my responses but for the benefit of others on this committee who may have not,

the following were my answers:

"1. Rationale and need for In Situ experiments at WIPP.

Experiments with actual transuranic waste being proposed by DOE to be conducted in situ at the WIPP range from small-scale bin tests to larger room-scale alcove tests. Bin experiments would be done in metal boxes containing assorted waste forms, brines and other additives, for the purpose of generating data on gas generation, biological and chemical reactions, etc. Alcove experiments would test the effects of actual room conditions on drums, backfill and seal performance, etc.

In my opinion, bin testing could be conducted elsewhere without significantly compromising test results so long as careful temperature control is maintained. To do so, however, would require facility construction and associated time delays. According to DOE, this could cost as much as $10 million. Alcove testing must be done in situ at WIPP to have any scientific credibility at all. The actual room conditions represent a complex set of interactions that simply cannot be duplicated elsewhere. Of particular significance are the interactions of gas pressure on brine inflow and the ultimate "wetness" of the room environment after closure. Alcove experiments over a 5-year period could generate valuable data on initial rates of these processes under real conditions and provide insight into physical, chemical and biological mechanisms that will affect long-term performance.

The DOE currently plans to emplace approximately 600 drum equivalents for bin tests and alcove testing would require close to 4,000 drums. The Blue Ribbon Panel has not been asked by DOE to make recommendations on the amount of waste needed for experimental purposes and we have not therefore evaluated that issue. I will say, however, that short-term health and safety concerns raised due to handling real transuranic waste during the experimental phase must be balanced against the knowledge gained by these experiments in making the facility safer in the long run. Put another way, DOE needs to find out as soon as possible whether there are design flaws

that could compromise the long-term integrity of the repository so they can be corrected before waste is no longer retrievable.

It would appear prudent to increase rather than decrease the amount of waste experiments if one is looking for flaws in the final repository configuration. The U.S. EPA has already recommended that DOE significantly increase the amount of waste emplaced for experimental purposes to include filling two full-scale rooms. My general recommendation about the amount of waste to be used for experimental purposes is to error on the high side with hopes of gaining new knowledge to improve long-term safety than to error on the low side and stand the chance of overlooking an important design flaw. So long as the waste is retrievable and agreement is reached on where waste would ultimately go after it is retrieved (should it need to be), the amount of waste used for experimental purposes should not represent a major issue so long as the experiments provide meaningful information. I think it is safe to say that there is general agreement among the scientific community that performance assessment modeling is now seriously constrained by the lack of real experimental data. Levels of uncertainty with respect to understanding the interaction of brine inflow, gas generation and rates of various chemical and biological processes span several orders of magnitude. Experiments need to begin as soon as possible to significantly reduce this uncertainty.

2. *My recommendations regarding Operations Demonstration.*

My recommendation is that the full "ramp up" of the operations demonstration portion of the project should be delayed until test results better clarify the need for engineering modifications to the waste form or repository environment (see page 5 of my report). It is my personal opinion that in order for WIPP to satisfy long-term containment criteria, it will be necessary to incorporate some engineering modifications to the waste and/or room environment. Knowledge gained from carefully planned experiments can be used to identify the most appropriate blend of engineering modifications. These modifications would be used to force the chemistry, biology and

physics of the repository to known conditions and thereby better assure long-term safety of the facility. In view of the fact that the final engineering configuration for the waste has yet to be determined, it does not seem reasonable to emplace waste drums in the WIPP for the purpose of gaining experience in drum handling when there is a significant chance the drums would have to be removed at a later date to be modified in one way or another.

My view of Operations Demonstration is that it is not a scientific experiment but rather a gradual phase in of drum emplacement for ultimate disposal. Operations Demonstration is an essential component to full-scale operation of any complex facility. The entire waste handling complex including generator sites, transportation systems, emergency response and tracking systems along WIPP routes, performance of safety testing and waste handling at the WIPP site to the final emplacement of drums in rooms, backfilling and sealing are all elements of a comprehensive Operations Demonstration program. Quantitative performance criteria need to be developed for each element of the system and then tested as the disposal program phases in.

In my opinion, valuable experience has already been gained and more will be gained during the experimental phase of WIPP. A full blown "ramp up" of an Operations Demonstration, however, must wait until such time as there is reasonable assurance that WIPP can comply with 40 CFR 191 Subpart B. That is not a scientific conclusion but rather a prudent management conclusion."

At this point Mr. Chairman, rather than going into my specific observations and recommendations and then having each of the panel members do the same, we decided in order to save time that I would very briefly summarize the general observations of the panel to date. The first and most significant observation in my opinion is that each member of the Blue Ribbon Panel has independently arrived at similar conclusions on each of the issues we were asked to evaluate. Also noteworthy is the high level of congruence of our findings with those of the Advisory Committee on Nuclear Facility Safety (Ahearne Committee). We have also participated in meetings with the WIPP Panel of the National

Academy of Sciences and I can report that we also generally share the same views on those issues we have both looked into. Let me now highlight those items upon which members of the Blue Ribbon Panel seem to agree.

1. The deep bedded salt repository at the WIPP appears to be a safe site for long term isolation of transuranic waste; certainly safer than where this waste is presently stored. Radioactive releases over the long term for an undisturbed WIPP site will probably meet EPA standards (40 CFR 191 Subpart B). Meeting this standard having to consider human intrusion scenarios will be more difficult. Treating the waste so as to change the waste form and thereby force the repository environment to known conditions will significantly reduce present uncertainties. The most controllable variable in the design of the repository environment is the waste form.

2. In situ testing is important and necessary and should begin as soon as possible. Results of bin and alcove testing should significantly increase the confidence of long range predictions undertaken in the performance assessment. Individual members of the Blue Ribbon Panel agree that the quantity of waste emplaced for experimental purposes should not be limited such as to preclude justifiable experiments. A limit of approximately 1% of the WIPP waste capacity is reasonable. A limit of 0.5% may be too restrictive by precluding the opportunity to undertake important Phase III bin testing of different waste forms resulting from different engineered modifications.

3. Members of the Blue Ribbon Panel agree conceptually that the EPA suggestion of adding two filled rooms for monitoring purposes is worthy of further consideration by DOE. This approach, however, should be evaluated in the context of verifying facility performance and not considered as part of the test phase itself. We have not, however, been asked to evaluate EPA's suggestion.

4. On the subject of Operations Demonstration, our panel agrees that such an undertaking will provide valuable information because of the practical experience gained in system-wide operations. We are in general agreement, however, that a full

"ramping up" of an Operations Demonstration should be postponed until such time as the final waste form and repository configuration are determined and that there is a high level of certainty that the Subpart B standard can be met.

5. We also have general agreement that DOE had underestimated the complexity and level of effort required to comply with RCRA in managing its transuranic-mixed wastes.

Mr. Chairman, I have touched the high points and obviously skipped over many details. Other panel members may wish to elaborate on these and other items. In closing, there is one last item of strong agreement expressed by all panel members. We are very impressed by the responsiveness of DOE to our suggestions. Some examples include 1) The significant improvements that have been made in the DOE organization toward overall systems integration, both vertically and horizontally among the varied elements of transuranic and mixed-transuranic waste management; 2) The significant increase in effort being placed on evaluation of engineered alternatives and waste treatment; 3) The accelerated activity and seriousness with which DOE is now placing on dealing with RCRA and in particular on waste characterization issues; and finally 4) The decision by the Secretary to postpone the start up of the Operations Demonstration program.

Mr. Chairman, thank you for the opportunity to present testimony on this important subject.

TESTIMONY OF
ROBERT W. BISHOP, ESQ.

MEMBER
U.S. DEPARTMENT OF ENERGY
WASTE ISOLATION PILOT PLANT BLUE RIBBON PANEL

BEFORE THE
COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

April 26, 1990

STATEMENT

Mr. Chairman and Members of the Committee, I welcome this opportunity to speak to you today. By way of background, I have been involved in various aspects of nuclear power for almost 26 years. That experience includes design, construction and operations of both naval nuclear propulsion plants and commercial nuclear power plants. I am here as a member of the U.S. Department of Energy's Waste Isolation Pilot Plant Blue Ribbon Panel.

The Blue Ribbon Panel is one of a number of oversight groups that have been created to assist the Department in identifying and resolving issues associated with the potential utilization of the WIPP facility as the Nation's research and development operation to validate the ability to dispose of radioactive wastes in a manner that would protect public health and safety as well as the environment. The Panel consists of five members: three members were nominated by the governors of Colorado, Idaho and New Mexico, and two members (including myself) were appointed by Admiral Watkins. The responsibility of the Panel members was to evaluate the information provided by DOE representatives, contractors and such other individuals and groups as each Panel member might determine appropriate, and to each submit an independent report to DOE of our individual conclusions and recommendations, which would then be used as input to DOE's decisions concerning WIPP activities.

The initial responsibility of the Panel was to evaluate the concept and timing of the WIPP Operations Demonstration Test Plan and to address the validation of the waste characterization at the Rocky Flats Plant.

Subsequently, the Blue Ribbon Panel was asked to continue in existence to complete its review of DOE plans to characterize transuranic wastes at the Rocky Flats Plant; to assist DOE in developing a strategy for achieving compliance with the Resource Conservation and Recovery Act ("RCRA") and other environmental regulations at WIPP, and to evaluate the final Test Plan and ancillary documents. Three weeks ago, we were also asked to provide continued management review of the WIPP Project (especially the revised Waste Acceptance Criteria), the plans for characterizing wastes for the Test Phase, and the engineered alternatives plan and associated activities. Fundamentally, our responsibility is to provide independent advice and counsel to DOE on various activities, including those that are necessary to satisfy the Department's Decision Plan requirements relating to the conduct of the Test Phase at WIPP.

My observations, conclusions and recommendations are contained in my report to Admiral Watkins dated October 23, 1989, and a supplemental report dated February 15, 1990, both of which I request be included in the record of this hearing. I would also ask that a copy of my responses to the questions posed by the members of the New Mexico Congressional Delegation at the end of last year also be included in the record.

My colleagues on the WIPP Blue Ribbon Panel have also documented their observations, concerns, and recommendations in our individual reports to the Department, as have the Advisory Committee on Nuclear Facility Safety and the National Research Council's WIPP Panel. I would commend those reports to the Committee's attention for the insight they might provide in more depth

relating to the Committee's consideration of legislative land withdrawal or any further matters concerning WIPP.

In the eight months that the Blue Ribbon Panel has been in existence, significant changes have occurred in the WIPP Project. The most significant changes have been made in the areas of systems and task integration and in planning, which is best evidenced by the creation of the Draft Decision Plan which documents the major tasks that are necessary to support the Secretary's decision of when the Test Phase at WIPP will be able to commence.

I should emphasize throughout this process the Department has been very forthright in its dealings with the Panel and in supplying any information that has been requested. This process may have made their job more difficult, but I think there is no question that it has made the result significantly better. They are certainly to be commended for that view of their responsibilities, and for thoroughly considering the Panel Member's recommendations and taking actions responsive to many of those recommendations.

It is important to remember that the National Security and Military Applications of Nuclear Energy Authorization Act of 1980 authorized the WIPP facility "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive waste resulting from the defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission." In my judgment, and I believe it is consistent with the views of my fellow Blue Ribbon Panel Members

and those of the Advisory Committee on Nuclear Facility Safety and the National Research Council's Management WIPP Panel, the Test Phase to be conducted at the WIPP facility, which involves in situ tests with actual transuranic ("TRU") wastes, is necessary and should begin promptly. The only way to determine if WIPP is a suitable research and development facility, consistent with the mission articulated by Congress in 1979, is to collect and evaluate data to reduce the uncertainties associated with assessing the facility's long-term performance. As Admiral Watkins and Mr. Duffy testified at the Committee's April 3, 1990 hearing, the only practical, reasonable and effective way to be able to assess whether WIPP is an appropriate disposal facility is to proceed with the Test Phase.

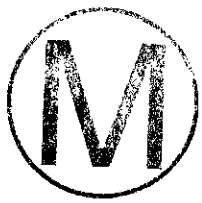
The Test Phase, to satisfy those objectives, must be flexible with respect to the number and type of experiments that will be conducted -- results of currently planned tests may indicate the need to conduct additional tests to resolve what may then be newly identified issues. The fundamental decision that DOE must make is how to gain the maximum experience, and therefore data, at the opportune time and with a minimum amount of waste. The waste volume to be used in the experiments should be as small as possible so that the cost, both economic and in terms of resources, of retrieval is as small as possible if it is subsequently determined that the waste must be repackaged, the waste form altered, or that the WIPP project is not viable. However, the waste volume must be large enough to ensure that appropriate data can be collected so that an informed decision can be made of whether WIPP is suitable to serve as an appropriate disposal facility.

The Admiral has stated that he intends to emplace no more waste during the Test Phase than is necessary, and my experience suggests that the Admiral honors his commitments. It is clear to me that DOE does not intend to use the Test Phase at WIPP as a subterfuge to alleviate the TRU mixed waste storage constraint imposed at the Rocky Flats Plant. To enact an arbitrary limit on the Test Phase that is too low, and thereby preclude the Test Phase from accomplishing its necessary objectives to provide data to enable informed judgments to be made about facility performance, would not be in the public interest.

It is also important to remember that DOE has committed to retrieving any waste emplaced in the Test Phase if the determination is made that WIPP is not suitable for service as a disposal facility. That retrievability plan was provided to the Blue Ribbon Panel for its review, and our comments and recommendations have been provided to DOE.

I do not believe that a numerical cap on the amount of waste to be emplaced in the Test Phase is necessary or desirable; setting an arbitrary limit may prove to be counterproductive to gathering data necessary to enable an informed decision to be made regarding the appropriate waste form and the facility and site suitability. However, if Congress determines that it should legislatively impose some numerical cap on the volume of waste that could be utilized to conduct the Test Phase, a reasonable level should be set (e.g., one percent) of total facility design volume to allow for the potential, and necessary, evolution of the tests and experiments to be conducted as part of

the Test Phase, which may include the need to evaluate waste forms different from those that currently exist.



At the Committee's hearing on April 3, 1990, a number of questions were raised regarding the purpose and scope of the two rooms that EPA recommended that DOE establish for monitoring and subsequent evaluation. At the present time, DOE is evaluating the feasibility and value of creating those rooms, but it should be emphasized that the purpose of that proposal was to provide data over a period of many years to evaluate actual facility performance against expected facility performance. The purpose of that program is fundamentally different from the purpose of the Test Phase, which is to gather data to support the evaluations to be contained in the Performance Assessment to ascertain whether WIPP is a suitable disposal facility. Although the Blue Ribbon Panel has not evaluated this matter, I believe that EPA's suggested program might be an appropriate adjunct to the WIPP facility operation, but it should not be undertaken unless and until there is reasonable confidence as to the appropriate waste form for the TRU waste to be emplaced at WIPP and reasonable confidence that WIPP is a suitable disposal facility.

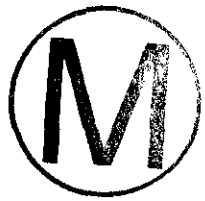
During the Blue Ribbon Panel's deliberations, and in fact during the Committee's hearing on April 3, 1990, questions continued to arise concerning the provisions and application of the EPA's "Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes" which is codified in 40 C.F.R. Part 191 Subparts A and B. Similar questions have also arisen concerning the applicability of provisions of the Resource Conservation and Recovery Act ("RCRA") and EPA's implementing

regulations contained in 40 C.F.R. Part 268. Of particular pertinence at this time is DOE's submittal of a No-Migration Variance Petition under those regulations and EPA's recent announcement of its proposed decision on that submittal.

Because of the importance of these requirements and their application to WIPP, I reviewed the pertinent parts of the Nuclear Waste Policy Act, 40 C.F.R. Part 191, and that rule's associated Regulatory Impact Analysis and Draft Environmental Impact Statement. I also reviewed the applicable provisions of RCRA and the implementing regulations codified in 40 C.F.R. Part 268, as well as EPA's Notice of Proposed Decision on DOE's No-Migration Variance Petition of April 6, 1990.

Fundamentally, I am deeply troubled by the realization that EPA, at least as detailed in the critical documents in the public record that support the adoption of the current Part 191, did not consider TRU waste or the WIPP facility in the development of Part 191. Thus, Part 191 does not provide a reasoned and responsible regulatory structure appropriate to the disposal of TRU wastes. In addition, as currently drafted, those standards establish release limits and are not based on an evaluation of the risk to public health and safety. EPA has announced its intent to issue revised Part 191 regulations, with a proposed rule scheduled to be issued for comment late in 1990 and a final rule promulgated in mid-1992. The NRC's Advisory Committee on Nuclear Waste has committed to the NRC that it would provide specific recommendations to the NRC regarding appropriate revisions to the EPA standards as they relate to spent fuel and high-level waste. DOE should do

nothing less with respect to TRU waste. I have recommended most strongly to DOE that it work with EPA, and the NRC as appropriate, and provide EPA with the technical justification that would support EPA's adoption of Part 191 standards appropriate to TRU waste and, as appropriate, the WIPP facility.



As a National Research Council's WIPP Panel observed in its 1989 report to DOE that Dr. Fairhurst referred to in this Committee's April 3, 1990 hearing, "[t]he primary goal of 40 C.F.R. 191 is to ensure that a repository poses no significant health risk to the public; standards set for compliance represent EPA's best estimate of what is required to achieve this goal. To date, however, these standards have never been applied to a specific repository." The Panel further stated that, "[t]he Panel believes that the above-mentioned primary goal can best be achieved by focusing performance assessment activities on demonstrating that the WIPP repository will be safe, i.e., pose no significant risk to public health and safety, rather than by an uncritical, formal adherence to compliance with the current EPA standard" (emphasis in original). I agree.

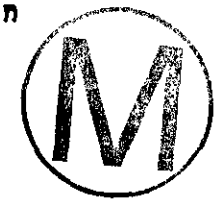
Dr. Rice testified at the Committee's hearing on April 3, 1990, regarding the concerns of the Advisory Committee on Nuclear Facility Safety about whether EPA has made proper judgments, based on justifiable assumptions, in its development of standards. The goal should not be to ascertain merely whether EPA standards are satisfied, but whether human health and the environment, consistent with the finding of Congress in RCRA, and the responsibilities delineated under the Atomic Energy Act, are being adequately protected both now and into the future. It appears self-evident that RCRA and

Part 191 were, by Congressional intent and EPA practice, based on concerns for materials and issues far different than TRU waste and TRU mixed waste.

I am also very concerned about the potential consequences of the regulatory duplication and conflict between EPA and NRC regulation of mixed wastes. I have provided for the record a copy of a letter from Congressman Udall to NRC Chairman Carr and EPA Administrator Reilly regarding the lack of resolution of the mixed waste issue and a copy of the responses of Messrs. Carr and Reilly. My specific concerns relate to the application of certain RCRA requirements to TRU mixed wastes, not only because of the current lack of regulatory resolution for the entire mixed waste issue, but also because of the very real occupational hazards that will likely result from slavish adherence to current RCRA requirements for hazardous material testing and identification that were developed for far different purposes and therefore are not appropriate in this situation. Workers should not be subjected to unnecessary occupational exposures to conduct waste testing if the test results will have no bearing on decisions related to facility performance and the experiments to be undertaken during the Test Phase to reduce the uncertaintites associated with assessing facility performance.

As I emphasized in my October 1989 report to Admiral Watkins, both DOE and EPA are responsible for implementing national policy regarding the proper disposal of TRU waste. Neither agency can shirk its statutory responsibilities, but both must recognize that their responsibilities in this area are joint and not severable. DOE and EPA must ensure, in the context of the WIPP project, that the responsibility for safe, permanent disposal of TRU

wastes and the requirements of Parts 191 and 268 are reconciled. It is not in the Nation's best interest for TRU waste, safe though it may be in temporary storage, to remain in that state ad infinitum because of a failure of governmental agencies to work together to develop a facility that can safely, permanently dispose of TRU wastes.



With respect to Congressional consideration of legislative land withdrawal, it should be emphasized that the experiments planned for the Test Phase are not required to demonstrate regulatory compliance, but rather to reduce uncertainties associated with the waste form and the response of the physical environment to the emplacement of those wastes. I strongly support the prompt passage of appropriate land withdrawal legislation so that the Test Phase, a necessary precondition to the determination of whether WIPP is a suitable disposal facility, can begin as soon as Admiral Watkins determines that it is appropriate to do so.

In conclusion, the WIPP facility appears to have been well-planned and constructed -- it has the hallmarks of a professionally designed and staffed facility. Even in the relatively short time in which the Blue Ribbon Panel has been active, it is clear that there are a great number of competent and motivated individuals, both professional and support staff, who are committed to doing their best to complete this project correctly. If WIPP is not determined to be a suitable facility as a geologic repository for transuranic waste, it does not appear that it will be for the lack of many individuals doing their best to do the job right.

In 1980, the President of the United States established a comprehensive program for the management of radioactive waste. In a message to Congress, President Carter observed that "[m]any citizens know and all must understand that this problem will be with us for many years. We must proceed steadily and with determination to resolve the remaining technical issues while ensuring full public participation and maintaining the full cooperation of all levels of government. We will act surely and without delay, but we will not compromise our technical or scientific standards out of haste. I look forward to working with the Congress and the states to implement this policy and build public confidence in the ability of the government to do what is required in this area to protect the health and safety of our citizens."

A decade has expired since that call to action was made, and its principles remain apt today. We must find the way to address and resolve these issues without delay, and continued Congressional support is required if those goals are to be able to be achieved.

STATEMENT OF

Dr. ARTHUR S. KUBO

PANEL MEMBER

THE SECRETARY OF ENERGY'S WASTE ISOLATION PILOT PLANT BLUE RIBBON PANEL

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

APRIL 26, 1990

I am Dr. Arthur S. Kubo and am pleased to appear before you today as a member of the Secretary of Energy's Waste Isolation Pilot Plant (WIPP) Blue Ribbon Panel to discuss the Department of Energy's (DOE) proposed legislation entitled the "Waste Isolation Pilot Plant Land Withdrawal Act."

I submit for the record copies of my Panel Report of October 23, 1989 and a letter provided to Senator Domenici addressing issues raised by the New Mexico Congressional Delegation. Similar letters were provided to Senator Bingaman, and Congressmen Skeen, Schiff and Richardson.

To begin with, I endorse Dr. Tom Bahr's introductory Remarks on behalf of the Blue Ribbon Panel and reiterate the importance of proceeding with the needed experimental program as part of the assessment of the long term safety of WIPP. My further remarks will emphasize two points:

1. The WIPP Test Program now focuses on demonstrating the technical feasibility of the WIPP concept and is separate from the operational management of TRU/Mixed TRU waste, and

2. A well understood and predictable waste form reduces the uncertainty in assessing the long-term safety performance of WIPP.

A. WIPP PROOF OF CONCEPT: In my report of October 23, I commented that the WIPP Program was attempting to address three major national issues: demonstrating the technical soundness of the WIPP concept, evolving a workable set of mixed waste regulations, and supporting the defense nuclear materials waste management program. I recommended, along with others, that the WIPP Test Program should focus on the technical feasibility of WIPP and be separated from the DOE's operational TRU waste management program. The Performance Assessment Experiments are designed to provide the technical data to reduce the uncertainty in assessing the long-term safety performance of the waste repository. This goal should not be intertwined with the need to manage TRU/Mixed TRU waste generated by the defense nuclear weapons production program.

The more realistic the Test Program the less likely we will be confronted with future surprises. Although the bin tests can be conducted off-site with further delay and additional cost, the most realistic test bed for the WIPP experiments is underground at WIPP. The research and development program must first demonstrate that WIPP is a safe Mixed TRU waste disposal facility. DOE is focusing the test program on obtaining the scientific data necessary to support a WIPP technical feasibility assessment in the near future and has separated it from the defense nuclear weapons production waste management program.

B. WASTE FORM: There are two factors that significantly affect the long-term performance of the WIPP as a deep geologic nuclear waste repository. These factors are (a) the geologic and hydraulic characteristics of the site and (b) the waste form characteristics. Obtaining and interpreting valid geologic and hydraulic data is difficult. The current and projected waste inventory is heterogeneous and subject to regulation as both radioactive and hazardous waste. A significant portion of the inventory is mixed waste, will generate gas, and has an unpredictable brine solubility and permeability. DOE may be unable to fully characterize, regardless of the extent of their experiments and tests at WIPP, the site geology and hydrology, and the TRU waste inventory. There will always remain a degree of uncertainty in assessing the long term repository performance. The waste form is one of the few variables we can control that significantly reduces the uncertainty of future WIPP performance.

This uncertainty can be reduced by better defining the waste forms that are proposed for burial. One method of better defining the waste forms is by accomplishing waste characterization studies. DOE currently is developing plans to accomplish this. DOE will be technically ready to begin the bin and alcove tests on-site when they have appropriately characterized the test waste and developed a plan to characterize the current and projected waste inventory.

Waste treatment is an alternative method to control the waste and packaging characteristics to fix the disposal site environment. Modifying the waste form would reduce the leachability of radionuclides on the off chance of repository disruption and preclude or reduce the gas generation phenomenon common to the current waste forms and packaging. This approach is technically more conservative and potentially more costly; however, this conservatism may be necessary to open WIPP as the first deep geologic repository of a National Program to safely dispose of all nuclear waste. DOE is currently conducting a study of Engineered Alternatives that addresses these issues.

In conclusion, the WIPP technical issues are all solvable, but the test and experimental program must go forward to obtain the data necessary to assess long term safety. WIPP was originally conceived as a test and demonstration facility. I can think of no better location to conduct realistic performance assessment testing than at WIPP.

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STATEMENT OF

LEONARD C. SLOSKY

MEMBER OF THE SECRETARY OF ENERGY'S

BLUE RIBBON PANEL ON THE

WASTE ISOLATION PILOT PLANT (WIPP)

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

APRIL 26, 1990

I am pleased to have this opportunity to share with the Senate Energy and Natural Resources Committee my views regarding the Decision Plan for the Waste Isolation Pilot Plant (WIPP).

My involvement with WIPP began in August 1989, when Governor Romer of Colorado and the Secretary of Energy asked me to serve on the WIPP Blue Ribbon Panel. After a very intense review, my initial report was presented to the Secretary on October 23, 1989. I have submitted a copy of that report for the record. Since that time I have provided the Secretary with several letter reports. The Blue Ribbon Panel is continuing to review and provide advice to the United States Department of Energy (DOE) on several aspects of WIPP. In addition to receiving many documents, the Blue Ribbon Panel generally meets and receives briefings every month or two.

Progress in the Transuranic Waste Management Program

Since the fall of 1989, DOE has made considerable progress in the transuranic (TRU) waste management program. I am also pleased to report that DOE has been responsive to many of the recommendations of the Blue Ribbon Panel members. As a result of recommendations from the members of the Blue Ribbon Panel (and in some cases other groups as well) DOE has:

- Initiated the development of a headquarters-directed integrated TRU waste management system.
- Removed WIPP from the pressures of managing waste from the defense program's production facilities (i.e., Rocky Flats).
- Decided to postpone the "Operations Demonstration."
- Increased attention to the technical and regulatory issues relating to the hazardous chemicals in TRU wastes (particularly those regulated by the Resource Conservation and Recovery Act (RCRA)).
- Committed to publish periodically the results of performance assessment calculations.

- Began revising and expanding the WIPP waste acceptance criteria (WAC) and the procedures used to audit compliance with the WAC.

DOE has also made considerable progress toward completing the many actions needed to begin waste experiments at WIPP.

WIPP Experimental Program

It is clear to me that further progress in determining whether or not WIPP is suitable for TRU waste disposal cannot be made without the bin and alcove experiments using real TRU wastes. The uncertainty in the predictions of how WIPP will perform cannot be substantially reduced without real world data. Therefore, the bin and alcove experiments should begin as soon as possible.

The bin experiments are to be conducted in enclosed metal containers isolated from the surrounding environment. Thus, the bin experiments can be conducted at WIPP or any suitable facility. Unless unexpected delays occur, the bin experiments could be initiated at WIPP as quickly or more quickly as another facility could be constructed and be in compliance with applicable legal requirements. However, if significant delays occur in initiating the experiments at WIPP, the bin experiments should be conducted elsewhere.

The alcove tests, on the other hand, can only be conducted at WIPP. Because the alcove experiments are needed to study the complex interactions between the wastes and the disposal environment (the Salado formation), they can only be conducted in the WIPP underground. While there has been much discussion of the quantity of gas that will be generated, there are other critical issues (i.e., the permeability of the Salado to gas) that the alcove experiments are designed to address. The alcove experiments also have the advantage of being close to the full-scale size of the disposal rooms. This means that the alcove tests will be more representative (than the bin tests) of the actual repository

conditions, including utilizing a large number of waste packages that will be more typical of the radiological and chemical constituents in the large number of TRU waste types intended for disposal at WIPP.

Waste Characterization

This hearing has addressed several issues that could delay the initiation of waste experiments at WIPP. A primary area that has been discussed (and which is largely beyond DOE's control) is the United States Environmental Protection Agency's (EPA) final decision of the No-Migration Petition. There is an additional area with which I am concerned that has received little public attention. This is the issue of waste characterization or composition. EPA's proposed Conditional No-Migration Variance requires DOE to submit results of detailed waste characterization and analysis of the wastes to be used in the bin and alcove experiments. In addition to this and other regulatory requirements for waste analysis (e.g., 40 CFR 264, the RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities), there are critical technical reasons why substantially more information is needed on waste composition.

Based upon a review of DOE's efforts to characterize the hazardous chemicals in the TRU wastes on the basis of "process knowledge," I have concluded that, at best, only semi-quantitative estimates are possible. Is it possible to develop reasonably reliable estimates of the quantities of hazardous chemicals in TRU wastes generated 15 years ago, based upon "process knowledge?" There are important reasons why reasonably accurate waste characterization data are needed.

The first is a fundamental scientific principle: If you do not know the initial conditions of an experiment (the hazardous chemicals that go into the bin and alcove tests), you may not be able to understand the results of the experiment. For example, certain organic chemicals that may be present in the TRU wastes (or may be produced by their decomposition) could greatly increase

the solubility of the plutonium in the wastes. This is important because an increase in the solubility of plutonium could increase the mobility of the wastes in the environment.

The second reason is that the wastes to be used in the bin and alcove experiments must be representative of the universe of wastes to be disposed in WIPP. If you do not use the same types of wastes in the experiments that you intend to dispose at WIPP, the experiments may not be relevant to how WIPP will actually perform. There have already been substantial technical surprises in the WIPP program. The rooms have been found to close two to three times faster (at least initially) than originally estimated. The permeability of the salt has been less than estimated (resulting in the need for more accurate data on gas generation). At the conclusion of the several hundred million dollar WIPP test phase, it would be disappointing to discover that more detailed waste characterization information is needed.

Thus, based on my present understanding, I do not think that the bin or alcove experiments should proceed without reasonably accurate quantitative data on the organic chemicals in the TRU wastes. Given the potential technical difficulties in obtaining such data, it is possible that waste characterization could delay the initiation of waste experiments into 1991. A waste characterization plan is expected from DOE in the next several months. Hopefully there will soon be a solution to this problem.

The waste form or the need for waste treatment is a second issue that has not received much public attention. Based upon the review by the Blue Ribbon Panel and particularly from discussions with the National Academy of Sciences, I have concluded that the technical uncertainties regarding the performance of WIPP are considerable and are much greater than generally understood. For example, in modeling the long-term performance of WIPP, it is not unusual for the range of an input parameter to be four or six orders of magnitude. This means that for important measures of the properties of the Salado, the current state of knowledge is such that the actual number is somewhere between 1 and 10,000 or

1,000,000. Given the complexity of waste decomposition processes and interactions with the reconsolidating Salado formation, it is likely that at the end of a five-plus year experimental program, substantial uncertainties regarding the performance of WIPP will remain.

So what can be done to reduce these uncertainties? The salt is fundamentally a given. The design of the repository (e.g., the size of the rooms) can be changed, but such alterations are unlikely to enhance the performance of WIPP dramatically. Greater use of engineered barriers is possible, but their performance over 1,000 to 10,000 years is highly questionable. The one variable in the WIPP equation that is clearly changeable (i.e., can be dramatically improved) is the waste form. For example, waste treatment technologies are currently available that will essentially eliminate gas generation.

I believe that it is important to assess the likelihood of success by continuing to use an essentially untreated waste form versus producing a more stable waste form through treatment. In making this assessment it is important to consider the cost, timing, regulatory/institutional, and personnel exposure issues involved. While recognizing that waste treatment may be a substantial undertaking (depending upon the degree of treatment needed), I believe that it may be necessary to dispose permanently of TRU wastes in the foreseeable future.

Because of the potential importance of waste treatment to the performance of WIPP, a broad range of potential treated waste forms should be included in the bin and alcove experiment at the earliest possible time. I concur with the position of the Environmental Evaluation Group (EEG) that the test phase, in addition to quantifying gas generation, should include potential solutions to this problem. The DOE study of engineering alternatives that is now in progress is expected to address this issue.

Quantity of Waste Needed for Experiments

I believe that DOE has justified the need for using waste volumes totaling about 0.5 percent of WIPP's capacity for the bin and alcove experiments. The Blue Ribbon Panel has not yet reviewed the EPA suggestion that DOE assess the technical feasibility of two large-scale instrumented rooms containing about 1.5 percent of WIPP's capacity. However, it seems advantageous to obtain the type of mid-term performance data intended to be provided by the EPA rooms. While such data are desirable, as EPA recognizes, obtaining these data may not be technically feasible. In any case, a decision on whether or not to include such rooms in the experimental program is at least several years away. It would not be prudent to begin such large-scale experiments until well into the test program when waste form and disposal configuration issues have been finally resolved. Otherwise, one risks having substantial quantities of waste in WIPP that have to be removed for treatment or disposal elsewhere.

Because of the importance of including treated waste forms (and other engineering alternatives) in the bin and alcove experiments, I would recommend that Congress authorize the use of waste volumes of up to 1.0 percent of WIPP's capacity for the bin and alcove experiments.

Land Withdrawal Legislation

In my view it is preferable that the land withdrawal be done legislatively rather than administratively. Legislative land withdrawal has the advantages of being able to address the concerns of a number of interested parties as well as bolstering public confidence in the WIPP program.

The timing of land withdrawal legislation is also an important issue. I am hesitant to comment on this because it may be a "chicken or egg" problem depending on one's perspective. While everyone acknowledges that additional actions need to be completed before waste experiments can begin at WIPP, would it be in the national interest for the experiments to be significantly delayed

while the current Congress is in recess or the 102nd Congress is in its start-up period? It would appear to me that Secretary Watkin's feet have been adequately singed by the fire. What substantive purpose would be served by holding the land withdrawal legislation "hostage?" DOE is now internally motivated to begin waste experiments at WIPP at the earliest possible time that they can be conducted safely and in compliance with all legal and institutional requirements. Is there any new information anticipated that would affect the provisions of the land withdrawal legislation? It would seem to me that Congress could now move to debate and resolve the remaining land withdrawal issues. The legislation could be passed through committee, and if deemed necessary, held for final passage until DOE satisfies Congress that it is ready to begin the experimental phase.

In conclusion, it is my observation that despite our focus on the problems of developing this nation's first permanent repository for TRU waste, bedded salt continues to be an outstanding medium for waste disposal and WIPP is a very good site. I know of nothing that indicates that WIPP has a "fatal flaw." While some type of waste treatment may be found to be necessary or expeditious, WIPP has a high probability of ultimately satisfying very stringent short-term and long-term health and environmental protection criteria. However, as a general matter, it should be recognized that there is inherent risk in any program that pursues a single approach without contingencies.

I will be pleased to respond to any questions.

STATEMENT OF

NEWAL SQUYRES

MEMBER

DEPARTMENT OF ENERGY'S

BLUE RIBBON PANEL ON WIPP

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES

UNITED STATES SENATE

April 26, 1990

STATEMENT

Mr. Chairman and Members of the Committee, I appreciate the opportunity to appear before you with the other members of the Secretary of Energy's Blue Ribbon Panel on the Waste Isolation Pilot Plant (WIPP). I practice law in Boise, Idaho, and became a member of this group as a result of Admiral Watkins' request of Governor Cecil Andrus to nominate someone from Idaho to serve on this Panel. My views on WIPP are my own and do not necessarily represent the views of Governor Andrus or the State of Idaho. Initially, the five members of the Panel were each asked to provide an independent assessment of certain issues related to WIPP, involving primarily the scope and direction of the test phase. My report to the Secretary of Energy was submitted on October 23, 1989, and will be submitted to the Committee for the record as an addendum to this prepared statement. That report, although somewhat dated by subsequent events and the Panel's continuing involvement on certain issues, continues to reflect my overall views on WIPP.

Congress established WIPP's mission in 1980, when it directed the Secretary of Energy to proceed with construction "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive waste resulting from the defense activities and programs of the United States . . . ." Pub. L. No. 96-164, § 213(a) (1980). To put this mission in perspective in terms of the test phase now at issue, it

is important to remember several things. WIPP's total capacity is 880,000 drum equivalents of TRU and/or mixed-TRU waste. The test phase as currently configured contemplates the use of approximately 4,500 drum equivalents. There are over 280,000 drum equivalents of this waste stored "temporarily" at sites throughout the United States in facilities not designed or intended for permanent disposal. There are approximately 180,000 drums in temporary storage in Idaho planned for shipment to WIPP.

DOE has made significant progress in the last eight months in moving WIPP from the construction phase to the experimental phase of its development. This test phase is necessary to aid in establishing regulatory compliance and, more importantly, to determine whether, or under what conditions, WIPP may serve as a permanent repository for the disposal of defense generated TRU and mixed-TRU waste.

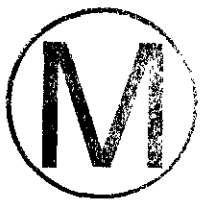
At the first meeting of the Blue Ribbon Panel in Albuquerque, New Mexico, on September 11, 1989, the representative from the National Academy of Sciences (NAS) said there were no significant safety issues associated with using WIPP for the test phase. At that time, however, there were institutional and regulatory matters that had to be resolved before the test phase could begin. Technical issues related to the scientific experiments for the test phase were also still being addressed.

Resolution of these outstanding issues has followed in a steady progression since the Secretary's draft decision plan for

WIPP was issued last October. My understanding is that WIPP is very close to being operationally ready to receive the limited amount of waste necessary to begin the test phase. The EPA's decision earlier this month on DOE's no migration petition provides the opportunity to satisfy critical regulatory requirements under RCRA. The proposed conditional variance would allow DOE to place untreated mixed waste into WIPP for the purpose of testing and experimentation. The public comment period is now underway, and EPA contemplates being in a position to finalize its proposed variance by September of this year. I believe the most significant remaining hurdle to beginning the test phase is the land withdrawal legislation now under consideration by this committee. I strongly support DOE's effort to obtain appropriate land withdrawal legislation during this term of Congress so that the test phase can begin as soon as possible.

There is another consideration which should not go unnoticed as decisions are made concerning WIPP's future. There are a number of independent oversight groups, not to mention federal and state regulatory agencies, involved in the decisionmaking process. The presence of these groups provides substantial assurance of adequate peer review for the scientific and technical issues and will prevent decisions from being hidden or being made in a vacuum. I have been continually impressed by DOE's willingness to accept and respond to suggestions and criticism from these independent groups.

As the closing speaker, I want to emphasize the opening remarks of Dr. Tom Bahr from New Mexico. Although there has been no effort by the members of this Panel to arrive at agreement on the subjects we have considered, agreement has naturally evolved from our independent evaluation of the issues. Moreover, our conclusions on the primary issues have been in accord with the other groups providing advice on various aspects of WIPP. This is significant when one considers the differences in background, training and experience of the individual members of these groups. In my judgment, those areas of agreement are as follows:



- It is in the national interest to safely manage the disposal of the waste (existing and future) generated by the production of nuclear weapons.
- WIPP is safe from the standpoint of being ready to proceed with the test phase.
- The operations demonstration should not begin until enough data is gathered from the test phase to indicate with some assurance what the final disposal methods will be.
- The test phase should be conducted at WIPP.
- DOE should continue to fully explore changes in waste form and other engineering modifications.
- The quantity of waste for the test phase should permit flexibility to expand the currently proposed experiments with additional waste, if scientifically justified.

I have not heard anyone suggest in the last eight months that there is a better place to store or dispose of the waste in question than WIPP. The taxpayers have spent over $800 million for WIPP, and there appears to be no sound reason not to put WIPP to its intended use as a research and development facility. It is a mistake not to recognize that WIPP is a unique place and that its potential to provide a meaningful solution to some of this nation's waste management problems is an outstanding accomplishment. It would be a sad day indeed if we do not seize the opportunity to go forward with WIPP's development.

Thank you for the opportunity of appearing before you today; I would be pleased to attempt to answer any questions you might have.