

REPORT TO THE SECRETARY OF ENERGY

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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 clarify 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, including state agency regulators, who would have 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.
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 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. 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 past 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 (RFP). 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 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 DOE 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 quality assurance/quality control (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 programs 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 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 coupled 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 an 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 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 today's knowledge and technology for developing

inexact 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 credible challenge to a federal rule by a regulatory agency should arise from outside the 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, because this issue is not strictly quantitative.