STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF THE FINAL PERMIT ISSUED TO THE UNITED STATES DEPARTMENT OF ENERGY AND WESTINGHOUSE ELECTRIC COMPANY WASTE ISOLATION DIVISION FOR A HAZARDOUS WASTE ACT PERMIT FOR THE WASTE ISOLATION PILOT PLANT, EPA No. NM4890139088	)	HRM 98-04(P)

NEW MEXICO ENVIRONMENT DEPARTMENT'S DIRECT TESTIMONY REGARDING REGULATORY PROCESS AND IMPOSED CONDITIONS

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INTRODUCTION

The New Mexico Environment Department (NMED) prepared this testimony in support of certain imposed conditions in the revised draft permit, and to respond to factual issues raised in public comments regarding the regulatory basis for the revised draft permit.[1] This testimony is divided into two sections: (A) *Statutory and Regulatory Background,* and (B) *Imposed Permit Conditions.* NMED addressed many of these issues in previously published fact sheets. See Hearing Docket Nos. 1 and 10 (fact sheets published November 13, 1998 and December 8, 1998).

The testimony regarding imposed conditions addresses the following issues:

(1) Tentatively Identified Compounds;

(2) Composite Sampling;

(3) Audit Requirement;

(4) Prohibition of Remote-Handled TRU Mixed Waste;

(5) Access To WWIS Database;

(6) Financial Assurance and Liability;

(7) Prohibition on Non-Mixed TRU Mixed Waste;

(8) VOC Room-Based Concentration Limits;

(9) Confirmatory VOC Monitoring Program;

(10) Mine Ventilation Rates;

(11) Detection Monitoring Program;

(12) Point of Compliance for Ground-Water Monitoring; and

(13) Corrective Action.

[1] This testimony is submitted as NMED Exhibit A.

NMED EXPERTS

The following individuals helped to prepare and/or review this testimony:

Steve Zappe. Mr. Zappe is currently a Geologist III in the Hazardous and Radioactive Materials Bureau (HRMB). Mr. Zappe has been the WIPP permit writer since 1994. Mr.Zappe holds a bachelor's degree in Physics from California State University-Fresno, and a master's degree in Geological Science from the University of California-Riverside.

Benito Garcia. Mr. Garcia is Bureau Chief for the Hazardous and Radioactive Materials Bureau. Mr. Garcia has held this position since 1991. As Bureau Chief, Mr. Garcia supervises several environmental programs, including RCRA permits, inspection and enforcement. Mr. Garcia has been involved with the WIPP permitting process since 1991, including the Test Phase and the Disposal Phase applications. Mr. Garcia holds a bachelor's and master's degrees from New Mexico Highlands University.

June Dreith. Ms. Dreith has more than twenty (21) years of experience in regulatory analyses, RCRA permit reviews and analyses, hazardous waste remediation, hazardous waste QA/QC, Subpart X units, and RCRA compliance and enforcement. Ms. Dreith has worked as NMED's consultant since 1993, including work on both the Test Phase and Disposal Phase permit applications. She has supported EPA ORIA on the WIPP Compliance Certification Application review. Ms. Dreith served as an Enforcement Officer and Permit Writer with the Colorado Department of Health. On behalf of EPA, she has managed and performed technical reviews on numerous Part B permit applications, including applications for land-based units, incinerators, boilers and industrial furnaces (BIFs), storage facilities, and prepared several RCRA Part B permits. She also has managed and performed closure/post-closure plan reviews, facility closure financial assessments, and RCRA Facility Assessments. She has taught training courses in permit writing, closure/post-closure plans, waste minimization, financial assurance, and Subpart CC regulations. Ms. Dreith holds a bachelor's degree in Environmental Health from Colorado State University.

Gregory Starkebaum. Mr. Starkebaum is a registered professional engineer with more than twenty (20) years of experience in landfill and impoundment design, and construction and permitting, including Subpart X units. He served as an Enforcement Officer and Permit Writer with the Colorado Department of Health. On behalf of EPA and other state hazardous waste agencies, he has managed and performed a wide variety of RCRA-related activities, including permit application reviews, RCRA Facility Investigations, and Corrective Measure Study reviews, site inspections, and regulatory development support. He supported EPA OSW on the WIPP Test and Disposal Phase No Migration Petitions, EPA ORIA on the WIPP Compliance Certification Application review, and NMED on the WIPP Test and Disposal Phase Part B permit applications. Mr. Starkebaum holds a bachelor's degree in Civil and Environmental Engineering from Colorado University-Boulder, and a master's degree in Civil Engineering from Colorado University-Denver.

David Walker. Mr. Walker is a registered professional engineer with more than fifteen (15) years of expertise in RCRA permitting, emphasizing facility engineering and corrective action.

He has conducted RCRA Part B permit review and analyses, RCRA Closure and Post-Closure Plan reviews, and RCRA Facility Investigation work plan and report reviews for numerous facilities, and has managed the implementation and oversight of all phases of field activities related to these reviews. In addition, he currently manages several large-scale RCRA Corrective Action projects. He has presented Corrective Action training to several EPA Regions. With respect to WIPP, he has supported EPA OSW on both the WIPP Test and Disposal Phase No Migration Variance Petitions, EPA ORIA on the WIPP Compliance Certification Application review, and the NMED on the WIPP Test Phase and Disposal Phase permits applications. Mr. Walker holds a bachelor's in Geological Engineering from the University of Missouri-Rolla

Constance Walker. Ms. Walker has more than seventeen (17) years of experience, including the performance and management of numerous RCRA permitting tasks, with an emphasis on groundwater monitoring, waste characterization, and corrective action. On behalf of EPA and other clients, she has reviewed/written RCRA Part B Permit applications, Subpart X permit applications, Closure/Post-Closure Plans, Corrective Measures Studies, Interim Measures Evaluations, RCRA Facility Investigation Work Plans and Reports, RCRA Facility Assessments, and RCRA Sampling Programs. She has conducted training programs for compliance monitoring and compliance evaluation, and developed Quality Assurance Project Plans. She has participated and managed WIPP-related projects for over ten years, including providing support to EPA OSW on both the WIPP Test and Disposal Phase No Migration Variance Petitions, EPA ORIA on the WIPP Compliance Certification Application review, and the NMED on the WIPP Test Phase and Disposal Phase permit applications. Ms. Walker holds a bachelor's degree in Geology from Colorado State University, and a master's degree in Geology, from Colorado School of Mines.

Robert Thielke. Mr. Thielke has more than fourteen (14) years of experience in hazardous waste/hazardous constituent chemical analysis and waste characterization, including establishing sampling statistical conditions, sampling and analytical methods, data reporting and validation, audit conditions and checklist requirements, and quality assurance plan requirements. Mr. Thielke holds a bachelor's degree in Chemical Engineering from the University of Colorado-Boulder and a master's degree in Environmental Policy and Management from the University of Denver.

Jonathan P. Cohen. Dr. Cohen received his Ph.D. in Statistics from Imperial College in London, with an emphasis in the areas of applied probability and the statistical aspects of extreme value theory. He also holds a bachelor's degree in Mathematics from the University of Oxford and a master's degree in Statistics from the University of Birmingham. Dr. Cohen manages a wide variety of projects pertaining to statistical theory and its applications to the analysis of environmental data.

Howard Finkel. Mr. Finkel is a registered professional engineer with extensive experience in RCRA regulatory analysis/support, with an emphasis on waste generation, characterization, and management. Mr. Finkel holds a bachelor's degree in Biology and Environmental Science from St. Lawrence University and a master's degree in Environmental Science and Engineering from Virginia Polytechnic Institute.

The resumes of NMED's experts are attached to the NMED's Notice of Intent, filed on February 1, 1999.

STATUTORY AND REGULATORY BACKGROUND

I. STATUTORY BACKGROUND

A. WIPP LAND WITHDRAWAL ACT

In 1980, Congress authorized withdrawal of the WIPP site "for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from defense activities and programs of the United States." Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1980, Public Law. 96-164, Section 213. In 1992, Congress authorized disposal at the WIPP facility of TRU waste. WIPP Land Withdrawal Act (LWA), Public Law 102-579. In 1996, Congress exempted DOE from treatment standards and land disposal restrictions under the Solid Waste Disposal Act, 42 U.S.C. §6901 et seq.. LWA Amendments, Public Law 104-201.

The LWA provides a comprehensive environmental regulatory scheme for the operational and disposal phase of WIPP. The LWA requires DOE to: (1) obtain a State RCRA permit prior to management, storage or disposal of radioactive mixed waste at WIPP; and (2) comply with the U.S. Environmental Protection Agency (EPA) compliance criteria for disposal of transuranic waste at WIPP.

B. THE NEW MEXICO HAZARDOUS WASTE ACT AND THE RESOURCE CONSERVATION AND RECOVERY ACT

The State of New Mexico is authorized by the New Mexico Hazardous Waste Act (HWA) and the Resource Conservation and Recovery Act (RCRA) to regulate the WIPP facility for protection of human health and the environment. Under RCRA, State programs are authorized to operate in lieu of EPA; EPA does not regulate radioactive mixed wastes in those States with an authorized program. EPA has authorized the State of New Mexico to issue and enforce RCRA hazardous waste facility permits. 50 FR 1515 (Jan. 11, 1985). The State of New Mexico implements this authority under the HWA, Sections 74-4-1 et seq (Repl. Pamp. 1992). On January 2, 1996, the State of New Mexico received final authorization to implement federal requirements under the Hazardous and Solid Waste Amendments of 1984 (HSWA). 61 FR 2450 (January 26, 1996). See also AR #960804 (EPA and State Memorandum of Agreement for State Primacy). The New Mexico legislature has designated the NMED as the state agency responsible for administering, implementing and enforcing all requirements under the HWA and regulations promulgated to carry out the HWA, including the issuance of the WIPP permit. NMSA 1978, Section 74-1-6 (Repl. Pamp. 1993).

RCRA Subtitle C provides a broad spectrum of external environmental regulation for the management, storage, and disposal of radioactive mixed waste at the WIPP facility. United States v. State of New Mexico, 1992 WL 437983 (D. N.M., Aug. 13, 1992), *aff'd*, 32 F.3d 494 (10th Cir. 1994). These requirements are applicable from the moment waste is received at WIPP through facility closure and a post-closure period. See 40 C.F.R. §§264 and 270. There are a wide range of general and specific environmental requirements applicable to the surface and the underground, during operation and closure at WIPP.

General standards applicable to the WIPP facility under the HWA and RCRA include: general waste analysis (40 C.F.R. §264.13); security and inspection (40 C.F.R. §§264.14 and .15); prohibitions on ignitable, reactive or incompatible wastes (40 C.F.R. §§264.17); standards for preparedness and prevention to ensure the facility is designed, constructed, maintained and operated to minimize the possibility of fire, explosion or unplanned sudden or non-sudden releases of hazardous wastes into the environment (40 C.F.R. §264.31), testing of equipment (40 C.F.R. §264.33); contingency and emergency procedures (40 C.F.R. §264.50); record-keeping and reporting (40 C.F.R. §§264.70 et seq); volatile organic concentrations (VOC) emission limitations to protect human health or the environment (40 C.F.R. §264.601); ground water monitoring to detect the presence and concentration of hazardous constituents (40 C.F.R. §264.97); compliance monitoring to detect statistically significant evidence of ground water contamination (40 C.F.R. §§264.98 - .99); corrective action (40 C.F.R. §§264.100 - .101); and financial assurance (40 C.F.R. §§264.143 - .147). These requirements are summarized in the May 15, 1998 and November 13, 1998 fact sheets.

C. EPA'S ROLE AT WIPP

Under the LWA, EPA serves two functions at WIPP. First, EPA's "primary responsibility is to determine whether the WIPP facility will comply with EPA's disposal regulations, located at Subparts B and C of 40 C.F.R. 191." See NMED Supplemental Fact Sheet Issued December 13, 1998, and EPA Fact Sheet, Proposed Certification Decision for WIPP's Compliance with EPA's Radioactive Waste Disposal Standards. EPA's disposal regulations and criteria provide comprehensive regulatory protection from the "time period beginning at disposal and ending 10,000 years after disposal." 40 C.F.R. §194.2 (defining the "regulatory time frame"). The term "disposal" is defined as "the permanent isolation of spent nuclear fuel or radioactive waste from accessible environment with no intent of recovery . . . For example, disposal of waste in a geologic repository occurs when all the shafts to the repository are backfilled and sealed." 40 C.F.R. §191.02.m.[1] Second, EPA may enforce RCRA if the State of New Mexico fails to adequately administer or enforce the law under the HWA. See 42 U.S.C. §6926(e). Under this regulatory scheme, EPA and NMED jointly provide comprehensive external environmental regulation to ensure that the storage and disposal of mixed radioactive waste at WIPP will be protective of human health and the environment.

[1] EPA's regulatory requirements for the WIPP operational phase are set forth in 40 C.F.R. 191, Subpart A. Subpart A limits radiation doses to members of the public from the management and storage of TRU waste at WIPP. Subpart A does not contain any other specific requirements, and therefore does not duplicate the HWA or RCRA.

II. REGULATORY BACKGROUND

The regulatory background of the WIPP Application was discussed in NMED's previously published fact sheets. Hearing Docket Nos. 1 and 10. This testimony briefly recaps that history, as well as the factual basis for issuance of a final permit.

A. GENERAL APPLICATION REQUIREMENTS

In processing the WIPP Application, NMED followed the same regulatory process it follows for other RCRA facilities. Attachment 1. An owner or operator of a proposed hazardous waste management facility must submit a comprehensive permit application covering all aspects of design, operation, maintenance, and closure of the facility. The application is divided into Parts A and B.

- Part A is a short, standard form that summarizes general information about a facility, including the name of the owner and operator, a list of the types of wastes managed at the facility, a facility layout diagram, and the activities requiring a permit.

- Part B is a more extensive document, submitted in a narrative, tabular, and schematic format, that describes the facility operations in detail. This information includes a general description of the facility, a waste analysis plan, information on the design and operation of all hazardous waste management units, procedures to prevent hazards, a contingency plan, and other relevant information, such as a groundwater monitoring program.

In addition to the general Part B information, there are unique information requirements for certain facilities. For example, WIPP is a geologic repository. Therefore, the Applicants must demonstrate compliance with the environmental performance standards for Subpart X facilities (also known as miscellaneous units) contained in 40 C.F.R. §§264.600 through 264.603. These standards require that the units be located, designed, constructed, operated, maintained, and closed in a manner that ensures protection of human health and the environment.

B. SIGNIFICANT PROCEDURAL MILESTONES

The first step in the regulatory process is the determination that an application is "administratively and technically complete." 20 NMAC 4.1.901.A.1. An applicant must provide NMED with all necessary information to review an application for compliance with the HWA and RCRA. NMED cannot begin, and is not required to begin, to draft a permit until it deems the application to be "complete". 20 NMAC 4.1.900 (incorporating 40 C.F.R. §270.10(c)); 20 NMAC 4.1.901.A.1; 20 NMAC 4.1.1103 (incorporating 40 C.F.R. §124.3)). If NMED deems an application to be incomplete, it issues a Notice of Deficiency (NOD) describing the additional information which must be provided for a complete application. NMED may issue a NOD at any time, and as often as necessary, during the permitting review. If an applicant fails to submit a complete application, NMED may deny the application. NMSA 1978, §74-4-4.2.D.

When the application contains all of the necessary information, NMED notifies the applicant that the application has been deemed to be complete. NMED then evaluates the application to determine if the facility complies with the applicable legal and technical requirements.

After determining that the facility complies with the applicable legal and technical requirements, NMED prepares a draft permit for public notice and comment, or if the facility will not comply with the applicable legal and technical requirements, NMED prepares a notice of intent to deny for public notice and comment. 20 NMAC 4.1.901.A.1.

C. THE WIPP FACILITY

1. TEST PHASE APPLICATION

On August 27, 1990, the NMED Secretary required the DOE to "submit . . . the Part B permit application for the management of hazardous waste as required by RCRA . . . 40 C.F.R. §270.1(b)." Attachment 2. The Applicants subsequently submitted a Part A application on January 22, 1991, and a Part B application on February 26, 1991. Attachments 3 and 4. The application for "Test Phase" activities sought to designate a hazardous waste container storage area within the Waste Handling Building (WHB) and to operate two miscellaneous hazardous waste management units within part of the subsurface repository. The Applicants did not propose to dispose waste in the Test Phase Application.

The Applicants twice revised the Test Phase Application before NMED deemed the Application to be complete. On August 30, 1993, NMED issued the draft permit for a sixty (60) day public notice and comment period. Attachment 5. At the Applicants' request, NMED twice extended the public comment period. Attachments 6 and 7. On January 14, 1994, the public comment period finally closed. Attachment 8.

2. WITHDRAWAL OF TEST PHASE APPLICATION AND SECRETARY'S ORDER

On October 21, 1993, the Applicants announced that they would not conduct tests involving radioactive wastes at WIPP. Attachment 9. On November 30, 1993, the Applicants further clarified that they no longer intended to conduct mixed waste testing during a Test Phase. See NMED Administrative Record #940904. As a result, the draft permit was moot. Moreover, the the Applicants had not submitted an application, nor had NMED prepared a draft permit for the Applicants' new proposal to dispose of mixed waste at WIPP.

On September 2, 1994, after considering the public comments, which ranged from allowing the Applicants to update their application to reflect the disposal of mixed waste, to requiring the Applicants to withdraw their application and cease all activities at WIPP, the NMED Secretary issued an order requiring the Applicants to (1) submit a revised application for future WIPP activities; and (2) hold a stakeholders' meeting to explain the expected revised application. AR #940904. The order also remanded the Test Phase draft permit to the Hazardous and Radioactive Materials Bureau.

On May 26, 1995, the Applicants submitted the revised application (entitled Revision 5.0), which proposed to store and dispose mixed waste at the WIPP facility. On June 15, 1995, NMED issued a public notice disclosing receipt of the revised application. AR #950608. The public notice, which fulfilled the requirements of 20 NMAC 4.1.1103 (incorporating 40 C.F.R. §124.32), contained a brief description of the application and identified locations where copies were available for public review.

On June 20, 1995, the NMED Secretary closed the September 2, 1994 order, finding that all requirements of the order had been met. AR #950611.

3. DISPOSAL PHASE APPLICATION

The Applicants' submittal of the revised application restarted the regulatory process.

a. Revision 5.0

NMED determined that Revision 5.0 of the Application contained technical deficiencies, and issued numerous requests to the Applicants to remedy those deficiencies, as specified below:

- Request for Information regarding Chapters A, B, and C (Revision 5) - November 2, 1995 (AR #951101)
- Request for Information regarding Chapters D,E, and I (Revision 5) - November 16, 1995 (AR #951110)
- Request for Information regarding Chapters F,G,H,K,L, and M (Revision 5) - November 30, 1995 (AR #951121).

These requests, comprising nearly one hundred fifty (150) pages, stated that the Application "lack[ed] necessary and important detailed information required for the development of the draft permit." In particular, the requests emphasized that the waste analysis chapter was seriously deficient, identifying "specific concerns regarding waste sampling/analysis, acceptable knowledge, RH waste characterization, and verification procedures." The requests also identified a serious lack of detail regarding the design and operation of the WHB Hazardous Waste Management Unit (HWMU), the design and operation of the Underground HWMUs, the design and operation of the ground control and geomechanical monitoring programs for the Underground HWMUs, the assumptions and risk assessment calculations used to demonstrate compliance with miscellaneous unit environmental performance standards, the design and construction of the repository panel seals and repository shaft seals, the HWMU closure requirements, as well as numerous inconsistencies within and between the tables, chapters, and appendices.

The Applicants responded to these requests, including Revision 5.2 of the Application, as specified below:

- Submittal of response to Request for Information regarding Chapters A & B - December 4, 1995 (AR #951202)

- Submittal of response to Request for Information regarding Chapters I & L - December 8, 1995 (AR #951207)

- Submittal of response to Request for Information regarding Chapters D & E - December 14, 1995 (AR #951214)

- Submittal of response to Request for Information regarding Chapters F & H - December 20, 1995 (AR #951224)

- Submittal of response to Request for Information regarding Chapters C & G - December 21, 1995 (AR #951225)

- Final Response to all previous Requests for Information, submittal of Revision 5.2 of Permit Application - January 17, 1996 (AR #960106).

b. Revision 5.2

NMED determined that Revision 5.2 of the Application contained numerous technical deficiencies, and issued a NOD on March 14, 1996. AR #960308. The NOD, comprising nearly eighty (80) pages, contained numerous requests for specific information regarding most chapters of the Application. General areas of deficiency included:

- Waste characterization. NMED requested clarification regarding contact-handled waste characterization procedures, and detailed information regarding remote-handled waste characterization procedures.

- Risk assessment. NMED requested the reevaluatation of the point of compliance based on maximally exposed individuals or populations at risk, an assessment of the impacts of a major RCRA constituent release at the point of compliance, and more specific information describing ground control and geomechanical monitoring programs.

- Monitoring plans. NMED requested programs for monitoring potential air releases of RCRA constituents during disposal operations and potential groundwater releases of RCRA constituents during post-closure, and demonstrations that these programs contained provisions to establish background levels of RCRA constituents in the waste destined for WIPP.

- Closure plans. NMED requested clarification of some aspects of the closure plan, such as contingency closure, and the submittal of final shaft seal designs.

The Applicants responded to the NOD, including Revision 6.0 of the Application, as specified below:

- Submittal of Revision 6 of Permit Application - April 12, 1996 (AR #960413)
- Submittal of Final Shaft Seal Report - September 30, 1996 (AR #960914)

NMED identified several deficiencies in Revision 6.0 which the Applicants had failed to address despite prior requests for information and NODs (e.g., remote-handled waste characterization procedures). However, NMED determined that further requests for information and NODS were unlikely to obtain additional information, and proceeded to develop the draft permit based upon the available information, except as noted below.

c. Post-Revision 6 Submittals

Despite NMED's decision not to issue additional requests for information and NODs, the Applicants continued to submit information which supplemented, and in some cases, modified the Application. Attachment 10 and 11. The volume of this information was substantial. NMED conservatively estimates that the Applicants submitted an additional eleven thousand four hundred (11,400) pages between April 12, 1996, and November 20, 1997. Attachment 12. By comparison, Revision 6.0 contained approximately eleven thousand (11,000) pages -- a total of thirteen (13) three inch (3") binders. For instance, after the Applicants notified NMED that the ground water monitoring program was inadequate for their purposes, NMED was compelled to request a revised ground water monitoring plan. AR #970213. Similarly, NMED was compelled to request additional information as a result of significant changes in federal laws governing WIPP. AR #970425. Specifically, on September 23, 1996, Congress amended the LWA to exempt all WIPP-destined TRU mixed waste from RCRA treatment standards and land disposal prohibitions. However, the Application relied heavily on the WIPP No-Migration Variance Petition, which presumably demonstrated compliance with these standards and prohibitions. But in light of the LWA amendments, the EPA had not reviewed the Petition. As a result, the Application failed to include the required information in sufficient detail for NMED to prepare the draft permit. The Applicants' response to this deficiency consisted of nearly seven thousand three hundred (7300) pages -- seven (7) three inch (3") binders. Finally, the Applicants voluntarily submitted large quantities of information after the Applicants discovered, and attempted to correct their use incorrect analytical methods to characterize contaminated sites at the WIPP facility. AR #961006.

d. Revision 6.3

On May 16, 1997, and again on June 16, 1997, the Applicants voluntarily submitted Revision 6.3 of the Application. Revision 6.3 was intended to clarify, modify, and supplement the previous application. AR #970514, 970607, 970713. Unfortunately, NMED identified numerous inconsistencies between the Applicants' redline/strikeout pages (which purported to indicate changes from Revisions 6.0 to 6.3), the "clean" replacement pages, and the corresponding WordPerfect electronic files. AR #970620. While the only official submittal was the paper version of the Application, NMED relied heavily on the WordPerfect electronic files to

prepare the draft permit. It took the Applicants three (3) attempts to submit accurate information regarding the changes in Revision 6.3. AR #970620.

d. Completeness Determination

On July 25, 1995, following a checklist review of Revision 5.0 of the Application, NMED issued an administrative completeness determination. AR #950710. NMED then began its technical review of the Application. As described above, after numerous requests for information and NODs, the Applicants submitted Revision 6.0 of the Application, and on June 27, 1996, NMED issued a final completeness determination. AR #960413, 960616. On September 26, 1997, after it became evident that WID had failed to provide statutorily-required disclosure and financial assurance information, and in light of the voluminous submittals of new information, NMED rescinded the completeness determination. AR #970939. After the Applicants submitted the necessary information as Revision 6.5 of the Application, on January 5, 1998, NMED issued a new completeness determination. AR #971114, 980102.

e. Draft Permit - May 13, 1998

On May 15, 1998, NMED published a notice announcing the availability of a draft permit and fact sheet, and establishing a ninety (90) day public comment period. AR #980542. NMED also mailed the public notice and fact sheet to the Applicants, EPA, governmental agencies, and all persons who requested such notice, including approximately eleven hundred (1100) persons on NMED's WIPP mailing list. NMED's public notice was published in the Albuquerque Journal, a newspaper of general state-wide circulation, as well as newspapers in Santa Fe, Carlsbad, Hobbs, Las Cruces, and Roswell, as required by 20 NMAC 4.1.901.C. NMED also posted the draft permit, technical support document, citizen letter, public notice, and fact sheet on the NMED WIPP Information Page at <*http://www.nmenv.state.nm.us/wipp/*>. Finally, NMED placed copies of the draft permit and technical support document in a Santa Fe print shop (The Paper Tiger, 120 E. Marcy Street) to enable interested persons to make copies at their own expense.

During the ninety (90) day public comment period, which extended until August 14, 1998, NMED received comments from thirty (30) persons comprising approximately three thousand three hundred (3300) pages. Attachment 13. Nine (9) commentors requested an extension of the public comment period. Six (6) persons requested a public hearing on the draft permit. On August 20, 1998, NMED denied the requests to extend the public comment period, noting that these persons would have another opportunity for public comment upon revision of the WIPP draft permit. AR #980842, et seq. On August 26, 1998, NMED announced its decision to hold a public hearing on a revised draft permit. NMED explained that it would provide public notice of the hearing, including the date, time, location, contact person and the process for public involvement, when NMED had prepared the revised draft permit. AR #980869, et seq.

f. Revised Draft Permit - November 13, 1998

On November 13, 1998, NMED published a public notice announcing the availability of a revised draft permit, fact sheet, and the decision to hold a public hearing in Santa Fe on February 22, 1999, continuing in Carlsbad on March 8, 1999, and reconvening, if necessary, in Santa Fe on

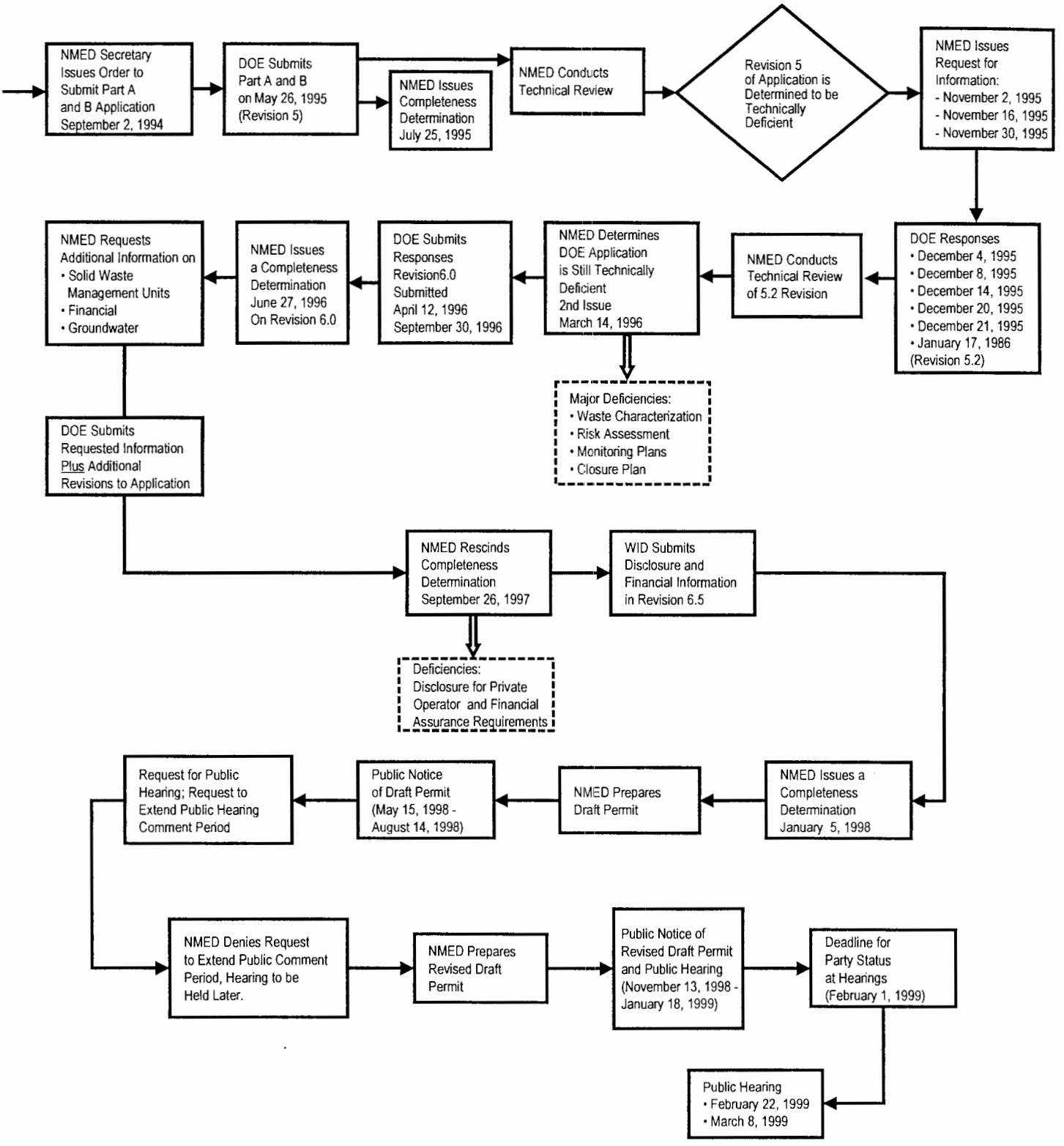
March 15, 1999. AR #981134. The public notice also established two critical deadlines: (1) a deadline of January 18, 1999, for submittal of written public comments; and (2) a deadline of February 1, 1999, for filing of Notices of Intent to Present Technical Testimony or/and Entries of Appearance. NMED mailed the public notice and fact sheet to the Applicants, EPA, governmental agencies, and all persons who requested notice, including approximately one thousand two hundred fifty (1250) persons on NMED's WIPP mailing list. NMED's public notice was published in the Albuquerque Journal, a newspaper of general state-wide circulation, as well as newspapers in Santa Fe, Carlsbad, Hobbs, Las Cruces, and Roswell, as required by 20 NMAC 4.1.901.C.

On December 9, 1998, NMED published a second public notice announcing the availability of a supplemental fact sheet. The second public notice also identified two (2) errors in the printed version of the revised draft permit, and provided replacement pages. NMED mailed the second public notice and supplemental fact sheet to the Applicants, EPA, governmental agencies, and approximately four hundred twenty (420) persons on NMED's WIPP mailing list. NMED's public notice was published in the Albuquerque Journal, a newspaper of general state-wide circulation, as well as newspapers in Santa Fe, Carlsbad, Hobbs, Las Cruces, and Roswell, as required by 20 NMAC 4.1.901.C.

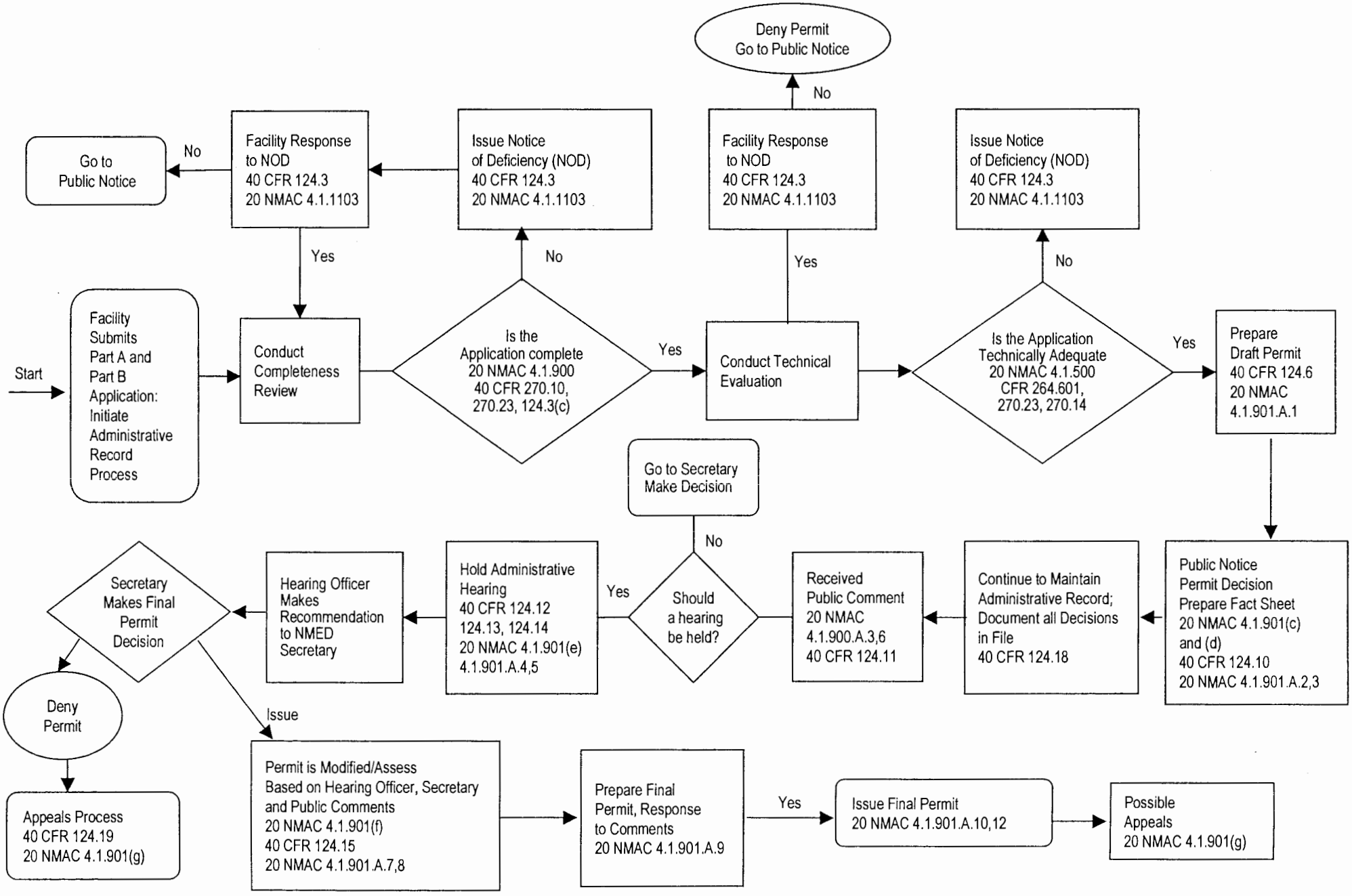
Sixteen (16) persons submitted comments. Eleven (11) persons filed Notices of Intent To Present Technical Testimony at the public hearing. Nine (9) persons filed Entries Of Appearance in the proceeding. The purpose of the public hearing is to receive oral public comment. The Department will respond to all written and oral public comments after the close of the public comment period in accordance with 20 NMAC 4.1.901.A.9.

ATTACHMENT !

WIPP SPECIFIC
FLOW DIAGRAM OF PERMITTING PROCESS
Submitted through Public Notice



GENERAL FLOW DIAGRAM
FOR NMED PERMITTING PROCESS



Attachment 2

New Mexico Health and Environment Department

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

August 27, 1990

Mr. Arlen E. Hunt
Project Manager
U.S. Department of Energy
WIPP Project Office
P.O. Box 3090
Carlsbad, NM 88221

Dear Mr. Hunt:

As you know, the State of New Mexico received, on July 25, 1990, final authorization from the U.S. Environmental Protection Agency for the radioactive mixed waste requirements as published in the Federal Register on July 3, 1986.

This letter is to notify you that, as Director of the New Mexico Environmental Improvement Division, I am requiring the Department of Energy, Waste Isolation Pilot Plant (WIPP) Project Office, to submit by Wednesday, February 28, 1991, the Part B permit application for the management of hazardous waste as required by the Resource Conservation and Recovery Act (RCRA) (New Mexico Hazardous Waste Management Regulations, Part IX, 40 CFR section 270.1(b)).

You are reminded of the following requirements for the WIPP facility to qualify for interim status during the review period of its Part B permit application: the Part A application must be received by Monday, January 22, 1991 and groundwater monitoring certification must accompany the Part B permit application.

If you have any questions, please contact me at (505) 827-2850 or Dr. Kirkland Jones at 827-2835.

Yours truly,

Richard Mitzelfelt
Director

cc: J. Mewhinney

RM/AEG/aeg

Waste Isolation Pilot Plant
RCRA Part A Permit Application

Received 11/22/91

HAND-SIGNED ORIGINAL

United States Department of Energy

Waste Isolation Pilot Plant
Carlsbad, New Mexico

December 28, 1990

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APPLICATION FOR A HAZARDOUS WASTE PERMIT

PART A

Please print or type with ELITE ty 2 characters per inch) in the unshaded areas only

Form Approved. OMB No. 2050-0034 Expires 12-31-91
GSA No. 0246-EPA-DT

For EPA Regional Use Only		For State Use Only

Date Received
Month Day Year

EPA

United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

I. ID Number(s)

A. EPA ID Number	B. Secondary ID Number *(if applicable)*
NM4890139088	

II. Name of Facility

WASTE ISOLATION PILOT PLANT

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street

JAL HWY 30 MILES EAST

Street (continued)

City or Town	State	ZIP Code
CARLSBAD	NM	88221-

County Code (If known)	County Name
03	EDDY

B. Land Type	C. Geographic Location		D. Facility Existence Date
(enter code)	*LATITUDE (degrees, minutes, & seconds)*	*LONGITUDE (degrees, minutes, & seconds)*	Month Day Year
F	32 22 30 N	103 47 30 W	05 18 1981

IV. Facility Mailing Address

Street or P.O. Box

PO BOX 3090

City or Town	State	ZIP Code
CARLSBAD	NM	88221-

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(last)*	*(first)*
HUNT	ARLEN

Job Title	Phone Number *(area code and number)*
MANAGER	505-887-8101

VI. Facility Contact Address *(See instructions)*

A. Contact Address Location	A. Contact Address Mailing	B. Street or P.O. Box
	X	

City or Town	State	ZIP Code
		-

EPA I.D. Number *(enter from page 1)*: N M 4 8 9 0 1 3 9 0 8 8

Secondary ID Number *(enter from page 1)*:

VII. Operator Information *(see instructions)*

Name of Operator: U S DEPARTMENT OF ENERGY

Street or P.O. Box: P O BOX 3090

City or Town: CARLSBAD

State: NM

ZIP Code: 88221-

Phone Number *(area code and number)*: 505-887-8101

B. Operator Type: F

C. Change of Operator Indicator: Yes ☐ No ☐

Date Changed Month Day Year:

VIII. Facility Owner *(see instructions)*

A. Name of Facility's Legal Owner: U S DEPARTMENT OF ENERGY

Street or P.O. Box: P O BOX 3090

City or Town: CARLSBAD

State: NM

ZIP Code: 88221-

Phone Number *(area code and number)*: 505-887-8101

B. Owner Type: F

C. Change of Owner Indicator: Yes ☐ No ☐

Date Changed Month Day Year:

IX. SIC Codes *(4-digit, in order of significance)*

Primary	Secondary
4953 (description) REFUSE SYSTEMS	(description)
Secondary	**Secondary**
(description)	(description)

X. Other Environmental Permits *(see instructions)*

A. Permit Type *(enter code)*	B. Permit Number	C. Description
E		Other: See Appendix A

EPA I.D. Number (enter from page 1)

N	M	4	8	9	0	1	3	9	0	8	8

(enter from page 1)

XI. Nature of Business (provide a brief description)

The Waste Isolation Pilot Plant (WIPP) is a U.S. Department of Energy facility intended to demonstrate the technical and operational principles involved in the permanent isolation and disposal of defense-generated transuranic waste. WIPP operations entail receiving, unloading, and transferring radioactive-mixed waste from the surface of the site to the underground storage rooms. Waste will be emplaced in an underground storage horizon located in a deep-bedded salt formation approximately 2,150 feet beneath the surface.

XII. Process - Codes and Design Capacities

A. **PROCESS CODE** - *Enter the code from the list of process codes below that best describes each process to be used at the facility. Twelve lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided in item XIII.*

B. **PROCESS DESIGN CAPACITY** - *For each code entered in column A, enter the capacity of the process.*

1. **AMOUNT** - *Enter the amount. In a case where design capacity is not applicable (such as for a closure/post-closure or enforcement action) enter the total amount of waste for that process unit.*
2. **UNIT OF MEASURE** - *For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.*

C. **PROCESS TOTAL NUMBER OF UNITS** - *Enter the total number of units used with the corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	DISPOSAL:	
D79	INJECTION WELL	GALLONS; LITERS; GALLONS PER DAY; OR LITERS PER DAY
D80	LANDFILL	ACRE-FEET OR HECTARE-METER
D81	LAND APPLICATION	ACRES OR HECTARES
D82	OCEAN DISPOSAL	GALLONS PER DAY OR LITERS PER DAY
D83	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	STORAGE:	
S01	CONTAINER (barrel, drum, etc.)	GALLONS OR LITERS
S02	TANK	GALLONS OR LITERS
S03	WASTE PILE	CUBIC YARDS OR CUBIC METERS
S04	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	TREATMENT:	
T01	TANK	GALLONS PER DAY OR LITERS PER DAY
T02	SURFACE IMPOUNDMENT	GALLONS PER DAY OR LITERS PER DAY
T03	INCINERATOR	SHORT TONS PER HOUR; METRIC TONS PER HOUR; GALLONS PER HOUR; LITERS PER HOUR; OR BTU'S PER HOUR
T04	OTHER TREATMENT (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundment or incinerators. Describe the processes in the space provided in item XIII.)	GALLONS PER DAY; LITERS PER DAY; POUNDS PER HOUR; SHORT TONS PER HOUR; KILOGRAMS PER HOUR; METRIC TONS PER DAY; METRIC TONS PER HOUR; OR SHORT TONS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
GALLONS PER HOUR	E
GALLONS PER DAY	U
LITERS	L
LITERS PER HOUR	H
LITERS PER DAY	V
SHORT TONS PER HOUR	D
METRIC TONS PER HOUR	W
SHORT TONS PER DAY	N
METRIC TONS PER DAY	S
POUNDS PER HOUR	J
KILOGRAMS PER HOUR	R
CUBIC YARDS	Y
CUBIC METERS	C
ACRES	B
ACRE-FEET	A
HECTARES	Q
HECTARE-METER	F
BTU's PER HOUR	K

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
N	M	4	8	9	0	1	3	9	0	8	8												

XII. Process - Codes and Design Capacities (continued)

EXAMPLE FOR COMPLETING ITEM XII (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line Number		A. PROCESS CODE (from list above)			B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS			FOR OFFICIAL USE ONLY				
X	1	S	0	2	600	G	0	0	2					
X	2	T	0	3	20	E	0	0	1					
	1				178,290	C	0	0	1					
	2				*See page 5 (this									
	3				form) for process									
	4				description -									
	5				miscellaneous unit									
	6													
	7													
	8													
	9													
1	0													
1	1													
1	2													

NOTE: If you need to list more than 12 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for additional treatment processes in Item XIII.

XIII. Additional Treatment Processes (follow instructions from Item XII)

Line Number (enter numbers in sequence with Item XII)	A. PROCESS CODE	B. TREATMENT PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. 2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS	D. DESCRIPTION OF PROCESS
	T 0 4				
	T 0 4				
	T 0 4				
	T 0 4				

XII. PROCESS - CODES AND DESIGN CAPACITIES (continued)

The Waste Isolation Pilot Plant (WIPP) is defined as a "miscellaneous unit" under 40 CFR Part 260.10. "Miscellaneous unit" means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of, and that is not a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, or underground injection well with appropriate technical standards under 40 CFR Part 146. WIPP is a geologic repository designed for the disposal of defense-generated transuranic waste. Some of the transuranic wastes disposed of at the WIPP contain hazardous wastes as co-contaminants. WIPP will be permitted as a "miscellaneous unit" under 40 CFR Part 264, Subpart X. This permit application does not include a code for "miscellaneous unit" and therefore, no code has been included in Sections XII A. and XIV D. of the form.

The process design capacity shown in this Section XII B. and the estimated annual waste quantities shown in Section XIV B. are for the expected life of the facility (25 years). During the initial Test Phase of the facility, which is expected to be less than 10 years, the total amount of waste received will be limited to 8,500 drums (about 1800 cubic meters). This limitation has been stipulated in the Conditional No-Migration Determination for the Waste Isolation Pilot Plant (WIPP) issued under 40 CFR 268.6 by the US EPA on November 14, 1990 (55 FR 47700).

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)											
N	M	4	8	9	0	1	3	9	0	8	8												

XIV. Description of Hazardous Wastes

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C. UNIT OF MEASURE - *For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that processes that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES - IF MORE ARE NEEDED:

1. *Enter the first two as described above.*
2. *Enter "000" in the extreme right box of Item XIV-D(1).*
3. *Enter in the space provided on page 7, Item XIV-E, the line number and the additional code(s).*

2. PROCESS DESCRIPTION: *If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(2)).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. *Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.*
3. *Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.*

EXAMPLE FOR COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA HAZARD WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESS (1) PROCESS CODES (enter)									D. PROCESS (2) PROCESS DESCRIPTION (if a code is not entered in D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

EPA I.D. Number (enter from page 1): N M 4 8 9 0 1 3 9 0 8 8

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	F001	1273	M		Miscellaneous unit; see Section XII
2	F002	1176	M		
	F003	544	M		
	F004	21	M		
	F005	42	M		
	D002	2	M		
	D003	2	M		
	D004	84	M		
	D005	50	M		
	D006	698	M		
	D007	252	M		
	D008	1133	M		
	D009	160	M		
	D010	13	M		
	D011	13	M		
	P015	67	M		
	D012	*			
	D013	*			
	D014	*			
	D015	*			
	D016	*			
	D017	*			
	D018	*			
	D019	*			
	D020	*			
	D021	*			
	D022	*			
	D023	*			
	D024	*			
	D025	*			
	D026	*			
	D027	*			

EPA I.D. Number (enter from page 1): N M 4 8 9 0 1 3 9 0 8 8

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D028	*			Miscellaneous unit; see Section XII
2	D029	*			
3	D030	*			
4	D031	*			
5	D032	*			
6	D033	*			
7	D034	*			
8	D035	*			
9	D036	*			
10	D037	*			
11	D038	*			
12	D039	*			
13	D040	*			
14	D041	*			
15	D042	*			
16	D043	*			
17					
18					
19					
20					
21					
22					
23					
24					

* Complete analytical data obtained by the Toxic Characteristic Leaching Procedure is currently not available from mixed waste generator sites. Therefore, waste codes D0012-D0043 have been listed with (*) in the quantity column. The amount of waste received annually for each waste code indicated by (*) is not expected to exceed 900 metric tons.

Please print or type with elite type (12 characters per inch) in the unshaded areas only

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)																	
N	M	4	8	9	0	1	3	9	0	8	8																		

XIV. Description of Hazardous Waste (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 6.

Line Number		Additional Process Codes (enter)																											

XV. Map

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

XVIII. Certification(s)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner Signature	Date Signed

Name and Official Title *(type or print)*
ARLEN HUNT, PROJECT MANAGER

Operator Signature	Date Signed
SEE ATTACHED PAGE FOR	

Name and Official Title *(type or print)* OPERATOR CERTIFICATION

XIX. Comments

Note: Mail completed form to the appropriate EPA Regional or State Office. (refer to instructions for more information)

RCRA PART A APPLICATION CERTIFICATION

The U.S. Department of Energy (DOE), through its Albuquerque Operations Office and WIPP Project Office, has signed as "owner and operator," and Westinghouse Electric Corporation, acting through its Waste Isolation Division (WID), has signed as "co-operator," this application for the permitted facility. The DOE has determined that dual signatures best reflect the actual apportionment of responsibility under which the DOE's RCRA responsibilities are for policy, programmatic, funding and scheduling decisions, WIPP requirements of DOE generator sites, the Waste Acceptance Criteria Certification Committee (WACCC), all other parties engaged in work at the WIPP facility pursuant to a direct contractual relationship with the DOE, as well as general oversight; the WID's RCRA responsibilities are for certain day-to-day operations (in accordance with general directions given by the DOE and in the M&O Contract as part of its general oversight responsibility), including but not limited to, the following responsibilities: certain waste handling, monitoring, record keeping, certain data collection, reporting,, technical advice, and contingency planning. For purposes of the certification required by 40 CFR 270.11(d), the DOE's and the WID's representatives certify, to the best of their knowledge and belief, the truth, accuracy and completeness of the application for their respective areas of responsibility.

Owner and Operator Signature: Arlen Hunt
Title: Project Manager, WIPP Project Office
for: Department of Energy
Date: January 18, 1991

Co-Operator Signature: A. LaMar Trego
Title: General Manager
for: Westinghouse Electric Corporation
Date: January 18, 1991

Attachment 4

WIPP
03/14/91

Department of Energy
Albuquerque Operations Office
Waste Isolation Pilot Plant Project Office
P. O. Box 3090
Carlsbad, New Mexico 88221

FEB 26 1991

Dr. Kirkland Jones, Deputy Director
Environmental Improvement Division
State of New Mexico
P.O. Box 968
Santa Fe, NM 87504

Dear Dr. Jones:

Enclosed please find one original and three copies of the Resource Conservation and Recovery Act (RCRA) Part B permit application for the Waste Isolation Pilot Plant near Carlsbad, NM. This submittal is in response to the letter of August 27, 1990, from Richard Mitzelfelt to Arlen Hunt. This application has been prepared to satisfy the requirements of New Mexico Hazardous Waste Management Regulations-5, Part IX, entitled, "The Hazardous Waste Permit Program." A copy of this permit application is also being delivered to the U.S. Environmental Protection Agency Region VI office in Dallas, TX.

DOE has prepared a Groundwater Monitoring Waiver under New Mexico HWMR Part VI, 40 CFR 265.90 (c). Based on this waiver and the low potential for migration of hazardous constituents, DOE certifies that it is in compliance with the Groundwater Monitoring Requirements of HWMR Part VI.

Note that behind the first tab in Volume I is a cross-reference list tying the various sections of the permit application to specific requirements in NMHWMR-5. This cross-reference is provided to facilitate your review. If during your review of the application, you find that you need additional reference material, please contact H. M. Greenwood at (505) 887-8107. If you have any other questions regarding the application, they should be directed to Dr. James A. Mewhinney at (505) 887-8143.

Sincerely,

Arlen Hunt
Project Manager

4 Enclosures

cc w/enclosure:
C&C File

cc w/o enclosure:
L. Trego, WID
J. Mewhinney, WPO
J. Carr, WPO
R. Kehrman, WID
R. Farrell, WID

WIPP:JEC I91-0010

Notice of Receipt

Please be advised that Part B of the Department of Energy Waste Isolation Pilot Plant's RCRA Permit Application was delivered to the New Mexico Environmental Improvement Division on the date indicated below.

Dr. C. Elizabeth Gordon
Signature

02/26/91
Date

Attachment 5

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

BRUCE KING
GOVERNOR

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

LEGAL NOTICE

NEW MEXICO ENVIRONMENT DEPARTMENT
HAZARDOUS AND RADIOACTIVE MATERIALS BUREAU

Public Notice No. 51 August 30, 1993

NOTICE OF INTENT TO GRANT A PERMIT FOR THE OPERATION OF A HAZARDOUS WASTE STORAGE FACILITY

U.S. DEPARTMENT OF ENERGY and
WESTINGHOUSE ELECTRIC CORPORATION
WASTE ISOLATION DIVISION
WASTE ISOLATION PILOT PLANT
EDDY COUNTY

The State of New Mexico is authorized to operate a hazardous waste management program in lieu of the Federal program for those portions of the Resource Conservation and Recovery Act (RCRA) in effect prior to the Hazardous and Solid Waste Amendments of 1984 (HSWA). HSWA imposes additional requirements on hazardous waste management facilities, and these requirements will be administered and enforced by the U.S. Environmental Protection Agency (EPA) until the State of New Mexico receives authorization for those requirements.

Under the authority of the State Hazardous Waste Act and the federally delegated authority under RCRA, and the HSWA, the New Mexico Environment Department (NMED) and EPA, Region 6 propose to issue Permits to the U.S. Department of Energy (DOE), P.O. Box 3090, Carlsbad, New Mexico 88220, and the Westinghouse Electric Corporation, Waste Isolation Division (WID), Waste Isolation Pilot Plant (WIPP), P.O. Box 2078, Carlsbad, New Mexico 88220, for storage of mixed hazardous waste in a container storage unit (Waste Handling Building) and two Subpart X miscellaneous below ground storage units (Bin-Scale Test Rooms 1 and 3), and for implementation of the HSWA provisions. The final decision on the State Permit is issued under the authority of the New Mexico Hazardous Waste Act (Section 74-4-1 et seq. NMSA 1978, as amended 1989), and the Permit issued by EPA is under the authority of HSWA. WIPP has been assigned the EPA identification number NM4890139088.

The proposed State Permit contains conditions regulating the storage of transuranic-mixed hazardous waste in a specially constructed above ground Waste Handling Building (WHB) and in two

LEGAL NOTICE

NEW MEXICO ENVIRONMENT DEPARTMENT
HAZARDOUS AND RADIOACTIVE MATERIALS BUREAU

Public Notice No. 51 August 30, 1993

NOTICE OF INTENT TO GRANT A PERMIT FOR THE OPERATION OF A HAZARDOUS WASTE STORAGE FACILITY

U.S. DEPARTMENT OF ENERGY and
WESTINGHOUSE ELECTRIC CORPORATION
WASTE ISOLATION DIVISION
WASTE ISOLATION PILOT PLANT
EDDY COUNTY

The State of New Mexico is authorized to operate a hazardous waste management program in lieu of the Federal program for those portions of the Resource Conservation and Recovery Act (RCRA) in effect prior to the Hazardous and Solid Waste Amendments of 1984 (HSWA). HSWA imposes additional requirements on hazardous waste management facilities, and these requirements will be administered and enforced by the U.S. Environmental Protection Agency (EPA) until the State of New Mexico receives authorization for those requirements.

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U.S. EPA (6H-P)
1445 Ross Avenue
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Written comments on the draft Permits must be received by November 1, 1993, in order to be considered. The NMED Secretary has decided that public hearings will be held on the Draft Permits. Public notice on the schedule for the hearings will be given at a later date. EPA may participate in the public hearings. All written comments submitted on the proposed Permits received by the above date will be considered in formulating a decision. NMED or the EPA may modify the draft Permits based on comments received. NMED will notify the DOE and WID and each person who submitted written comments during the public comment period and at the public hearings of the Permit decision.

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LEGAL NOTICE

NEW MEXICO ENVIRONMENT DEPARTMENT
HAZARDOUS AND RADIOACTIVE MATERIALS BUREAU

Public Notice No. 54 October 22, 1993

NOTICE OF EXTENSION OF THE PUBLIC COMMENT PERIOD ON A PERMIT FOR THE OPERATION
OF A HAZARDOUS WASTE STORAGE FACILITY

U.S. DEPARTMENT OF ENERGY and
WESTINGHOUSE ELECTRIC CORPORATION
WASTE ISOLATION DIVISION
WASTE ISOLATION PILOT PLANT
EDDY COUNTY

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The proposed State Permit contains conditions regulating the storage of transuranic-mixed hazardous waste in a specially

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U.S. EPA (6H-P)
1445 Ross Avenue
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(214) 665-6770 or 665-7442

The Secretary of the New Mexico Environment Department has been requested to extend the comment period from The original deadline of November 1, 1993 to December 1, 1993. Therefore, all written comments on the draft Permits submitted on or before December 1, 1993, will be considered. The NMED Secretary has decided that public hearings will be held on the Draft Permits. Public notice on the schedule for the hearings will be given at a later date. EPA may participate in the public hearings. All written comments submitted on the proposed Permits received by the above date will be considered in formulating a decision. NMED or the EPA may modify the draft Permits based on comments received. NMED will notify the DOE and WID and each person who submitted written comments during the public comment period and at the public hearings of the Permit decision.

This Notice satisfies the requirements of RCRA, as amended, 42 U.S.C. 6910 et seq., and 40 Code of Federal Regulations (CFR) 124.10 and the New Mexico Hazardous Waste Management Regulations (HWMR-7). The EPA final Permit, if issued, will implement the requirements of the Hazardous and Solid Waste Amendments of 1984 (HSWA) to the Federal Solid Waste Disposal Act, as amended. The State of New Mexico and the EPA have entered into a joint Permitting agreement whereby RCRA Permits may be issued and enforced by the State in accordance with the New Mexico Hazardous Waste Management Regulations until the State receives authorization under RCRA to administer the requirements of HSWA. Until that time, the HSWA requirements will be issued and enforced by EPA. In order for the applicant to have a fully effective RCRA Permit, both NMED and EPA must issue Permits.

Attachment 7

STATE OF NEW MEXICO
BEFORE THE SECRETARY OF ENVIRONMENT

IN THE MATTER OF NEW MEXICO
DRAFT HAZARDOUS WASTE PERMIT
AT THE WASTE ISOLATION PILOT PLANT:

ORDER ON EXTENDING THE COMMENT PERIOD

This matter having come before the Secretary of Environment on the Department of Energy's ("DOE") request for an additional sixty days in which to submit comments on the New Mexico Draft Hazardous Waste Permit at the Waste Isolation Pilot Plant ("WIPP").

THE SECRETARY FINDS:

1. On October 21, 1993, DOE requested that further activities regarding the permit be delayed and that the "test involving radioactive waste will not be conducted at WIPP".

2. I granted a thirty day extension until December 1, 1993 in which to submit comments on the draft permit.

3. DOE, in a letter dated November 30, 1993, requested an additional sixty days in which to submit comments.

4. As reasons, DOE stated again that it no longer intended to conduct mixed-waste testing during a test phase at WIPP and that it will finalize its compliance strategy for reaching a disposal decision over the next sixty days.

5. DOE has not withdrawn its Hazardous Waste Permit application or stated its intent to conduct the testing at WIPP under the permit.

6. Several parties commented that the permit should be denied, because of DOE's stated intent not to conduct testing at WIPP.

A8

7. An extension of the comment period would not affect a future permit denial if DOE does not conduct testing at WIPP.

8. All comments received will be considered in my final decision.

THE SECRETARY ORDERS the comment period be extended an additional forty-four (44) days until January 14, 1994.

JUDITH M. ESPINOSA
Secretary

Date: 12-15-93

LEGAL NOTICE

NEW MEXICO ENVIRONMENT DEPARTMENT
HAZARDOUS AND RADIOACTIVE MATERIALS BUREAU

Public Notice No. 60 December 16, 1993

NOTICE OF SECOND EXTENSION OF THE PUBLIC COMMENT PERIOD ON A PERMIT FOR THE OPERATION OF A HAZARDOUS WASTE STORAGE FACILITY

U.S. DEPARTMENT OF ENERGY and
WESTINGHOUSE ELECTRIC CORPORATION
WASTE ISOLATION DIVISION
WASTE ISOLATION PILOT PLANT
EDDY COUNTY

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The Secretary of the New Mexico Environment Department has been requested by the Department of Energy (DOE) to extend the comment period. Ms. Judith M. Espinosa, the Secretary of the New Mexico Environment Department, has granted DOE and extension until January 14, 1994. Therefore, all written comments on the draft Permits submitted on or before January 14, 1993, will be considered. The NMED Secretary may decide that public hearings will be held on the Draft Permits. Public notice on the schedule for the hearings will be given at a later date. EPA may participate in the public hearings. All written comments submitted on the proposed Permits received by the above date will be considered in formulating a decision. NMED or the EPA may modify the draft Permits based on comments received. NMED will notify the DOE and WID and each person who submitted written comments during the public comment period and at the public hearings of the Permit decision.

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Attachment 9

file WIPP

DOE NEWS

NEWS MEDIA CONTACTS:
Bernie Pleau, 202/586-5806
Tracy Loughead, 505/845-5977

FOR IMMEDIATE RELEASE
October 21, 1993

DOE ANNOUNCES REVISED TEST STRATEGY FOR WASTE ISOLATION PILOT PLANT

In response to concerns raised by the scientific community and others, the U.S. Department of Energy (DOE) announced today that tests using radioactive wastes will be conducted in laboratories rather than underground at the Waste Isolation Pilot Plant (WIPP) in New Mexico . These tests are needed for determining the suitability of the WIPP facility for defense waste disposal and compliance with Environmental Protection Agency (EPA) requirements.

"This is a major break with the last administration's approach, which frankly did not give full consideration to the concerns of the scientific community, EPA and the public," said Secretary Hazel R. O'Leary.

"By doing these tests in laboratories we will be able to collect the right technical data more quickly and at a lower cost", said Thomas P. Grumbly, DOE Assistant Secretary for Environmental Management. "This new plan will help build a more solid scientific foundation for the WIPP facility than conducting waste tests at the site because DOE and EPA can now focus on the real certification issues, rather than on tests with inherent technical limitations."

Grumbly estimated the cost savings of the revised strategy at more than $100 million over the course of the test program.

(MORE)

AP 931005

The new strategy includes conducting additional laboratory-based tests with both simulated and real transuranic (TRU) waste instead of the "bin-scale" and "alcove" tests that were planned to be conducted in the WIPP facility. The decision to change the test plan addresses criticisms of the National Academy of Sciences and other independent reviewers and stakeholders about the on-site tests.

"The support of the scientific community will be crucial to our long-term disposal strategy, and we are confident that, by demonstrating that we are taking their input seriously, we will foster cooperation during the test program and later phases," Grumbly said. "Ultimately by 'following the science' we will put the EPA in a far better position to determine whether the facility meets environmental requirements and will be available to meet the pressing challenge of defense waste disposal."

A plan summarizing the revised test strategy will be given to EPA later this year. DOE plans to submit a draft compliance application to EPA for review by spring 1995.

No Test Phase Plan or Waste Retrieval Plan will be submitted to EPA because the department was not convinced that the previously proposed bin and alcove transuranic waste tests would have provided information directly relevant to a certification of compliance with applicable requirements. The department is working with the community around Carlsbad, New Mexico, where WIPP is located, to strengthen the local DOE organization and to ease the potential economic impact of the decision not to conduct radioactive waste tests at the facility.

WIPP is a research and development facility constructed 2,150 feet underground in bedded salt deposits to demonstrate the feasibility of safe, long-term disposal of TRU waste generated by the U.S. nuclear weapons production.

- DOE -

R-93-215

ATTACHMENT 10

REQUESTS FOR INFORMATION

- Request for Information regarding Solid Waste Management Units (**SWMUs**) - April 23, 1996 (AR #960419)
- Request for revised ground water monitoring plan - February 25, 1997 (AR #970213)
- Request for Additional Information regarding SWMUs - April 11, 1997 (AR #970409)
- Request for Information regarding disclosure and financial assurance - April 28, 1997 (AR #970421)
- Request for Information regarding modeling and parameter selection, and other changes - April 29, 1997 (AR #970425)
- Request for Additional Information regarding ground water monitoring plan - June 18, 1997 (AR #970612)
- Request for Information regarding financial assurance for WID - September 24, 1997; October 15, 1997 (AR #970930, 971021)

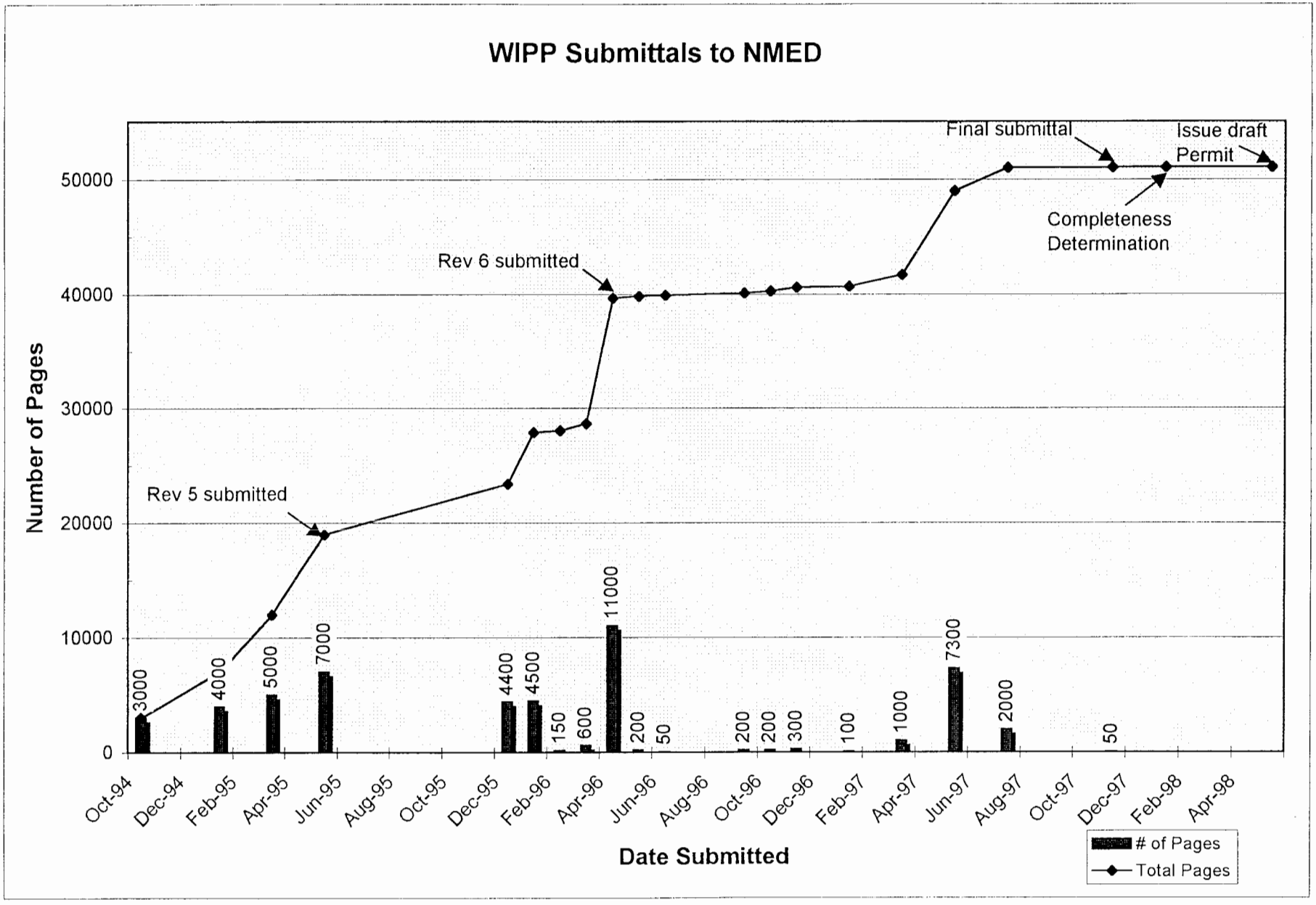
ATTACHMENT 11

APPLICANTS' SUBMITTALS

- Submittal of revised Part A (Revision 7) and minor page changes to Part B (Revision 6.1) - May 31, 1996; June 4, 1996 (AR #960522, 960602)
- Submittal of validated analytical data packages for six SWMUs - September 30, 1996 (AR #960915)
- Submittal of validated analytical data packages for eight SWMUs - October 8, 1996 (AR #961004)
- Submittal of SWMU sample location maps and comparison of total metals analytical results - October 22, 1996 (AR #961006)
- Submittal of data package ("final report") for sixteen SWMUs - November 25, 1996 (AR #961113)
- Submittal of Final SWMU Assessment Report - January 30, 1997 (AR #970115)
- Submittal of Groundwater Monitoring Program Plan (Appendix D18, Revision 6.2) - March 21, 1997 (AR #970310)
- Submittal of Supplemental Information for SWMUS at WIPP - May 2, 1997 (AR #970503)
- Submittal of response to four specific comments - May 9 & 13, 1997 (AR #970509, 970510)
- Submittal of changes to Permit Application (Rev 6.3, first attempt) - May 16, 1997 (AR #970514)
- Submittal of 7 volumes of information related to modeling and parameter data from the No-Migration Variance Petition and Compliance Certification Application - May 27, 1997 (AR #970522)
- Submittal of changes to Permit Application (Rev 6.3, second attempt) - June 16, 1997 (AR #970607)
- Submittal of environmental compliance and disclosure information for DOE - July 14, 1997 (AR #970711)
- Submittal of changes to Permit Application (Rev 6.3, third attempt) - July 21, 1997 (AR #970713)
- Submittal of Groundwater Monitoring Program Plan (Appendix D18, Revision 6.4) - July 21 & 28, 1997 (AR #970714, 970715)
- Submittal of contract laboratory Standard Operating Procedures for analysis of groundwater samples - August 6, 1997 (AR #970802)
- Submittal of financial assurance information for WID (Revision 6.5) - November 20, 1997 (AR #971114)

WIPP Submittals to NMED

Date	# of Pages	Total Pages	Item
October-94	3000	3000	Rev 4
January-95	4000	7000	Rev 4
March-95	5000	12000	Rev 4
May-95	7000	19000	Rev 5
December-95	4400	23400	Rev 5.1
January-96	4500	27900	Rev 5.2
February-96	150	28050	DSR 1
March-96	600	28650	DSR 2 & 3
April-96	11000	39650	Rev 6
May-96	200	39850	DSR 4
June-96	50	39900	Rev 6.1
September-96	200	40100	Validate 6 SWMUs
October-96	200	40300	Validate 8 SWMUs
November-96	300	40600	Final VRA
January-97	100	40700	Final SWMU
March-97	1000	41700	Rev 6.2
May-97	7300	49000	Suppl Info
July-97	2000	51000	Rev 6.3, 6.4
November-97	50	51050	Rev 6.5
January-98		51050	Completeness Determination
May-98		51050	Issue draft Permit


WIPP Submittals to NMED
Number of Pages
Date Submitted
Rev 5 submitted
Rev 6 submitted
Final submittal
Issue draft Permit
Completeness Determination
# of Pages
Total Pages
0
10000
20000
30000
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Comments Received by NMED on WIPP Draft Permit
August 14, 1998

	Receipt Date	Author	Organization/Citizen	# Pages [1]	Hearing?	Extension?
1	20-May-98	Annette Adams	Citizen	3		
2	27-May-98	Lee Cartwright	Citizen	1	yes	
3	28-May-98	Virginia Hallock	Citizen	2		
4	01-Jun-98	Deirdre Lennihan	Citizen	1		
5	03-Jun-98	Dials/ Epstein	DOE/CAO	250		
	14-Aug-98	McFadden/Epstein	DOE/CAO	2200	yes	
6	14-Jul-98	Tom Haney	Citizen	12		
7	04-Aug-98	Mark Castagneri	NFT Incorporated	4		
8	10-Aug-98	David Neleigh	EPA Region 6	2		
9	10-Aug-98	Deborah Reade	Citizen	1		yes
10	12-Aug-98	Michael Overbay	Citizen	3		
11	12-Aug-98	John E. Tanner, Jr.	Citizen	1		
12	12-Aug-98	Richard T. Bernardi	Waste Inspection Technology Co	70		
13	12-Aug-98	Cristopher Moore	Citizen	3		
14	13-Aug-98	Geoffrey H. Fettus	New Mexico Attorney General	90	yes	yes
	14-Aug-98	Geoffrey H. Fettus	New Mexico Attorney General	16		
15	13-Aug-98	Kathleen E. Trever	Idaho INEEL Oversight Program	2		
16	14-Aug-98	Charles Rice	INEEL Citizen Advisory Board	4		
17	14-Aug-98	Jim Harrison	Carlsbad Dept of Development	4		
18	14-Aug-98	Gary Perkowski	City of Carlsbad	4		
19	14-Aug-98	Don Hancock	Southwest Research & Info Center	80	yes	yes
20	14-Aug-98	Sue Chavez	Citizen	1		yes
21	14-Aug-98	Joseph A. Legare	Rocky Flats Environmental Tech Site	19		
22	14-Aug-98	Elizabeth Dunham	Citizen	1		yes
23	14-Aug-98	Lori Fritz	DOE/Idaho Operations Office	75		
24	14-Aug-98	Hargis/LeBrun	Los Alamos National Laboratory	4		
25	14-Aug-98	Nomi Green	Citizen	1		yes
26	14-Aug-98	Ray Schmidt	Citizen	1		yes
27	14-Aug-98	Robert H. Neill	Environmental Evaluation Group	200		
28	14-Aug-98	Abraham/Greenwald	Citizens for Altern to Rad Dumping	260	yes	
29	14-Aug-98	Margaret Anne Hesch	Citizen	1		yes
30	14-Aug-98	Carde/Arends	Concerned Citizens for Nucl Safety	7	yes	yes
		30 commentors	Total Pages =	3323	6	9

[1] Page numbers greater than 25 are estimates

TENTATIVELY IDENTIFIED COMPOUNDS

I. INTRODUCTION

The New Mexico Environment Department (NMED) imposed a permit condition in the proposed Waste Analysis Plan (WAP) regarding tentatively identified compounds (TICs). A TIC is a compound identified through the Volatile Organic Compound (VOC) or Semi-Volatile Compound (SVOC) analytical process that is not included in the target list of compounds for the specific analytical method. A TIC is considered tentatively identified because the compound is not included as part of the method calibration, and therefore cannot be quantified with any degree of certainty. Under the revised draft permit, a TIC is any compound not on the list of hazardous waste codes or target analytes provided in the Application.

The WAP establishes procedures for the characterization of hazardous waste disposed at WIPP. One waste characterization method required in the WAP is headspace gas analysis. Headspace gas analysis utilizes procedures, discussed below, to identify volatile organic compounds (VOCs) which may exist in a waste container. In addition, samples from homogenous solid and soil/gravel waste containers will be collected for VOC and SVOC analyses. NMED's proposed condition is reasonable and necessary to comply with the HWA and RCRA. 20 NMAC 4.1.200 (incorporating 40 CFR §§261.20(b) and 261.30(c)) requires an owner or operator to identify all applicable hazardous waste codes for a waste stream. NMAC 4.1.500 (incorporating 40 CFR §264.13) requires an owner or operator to analyze a representative sample of the waste to obtain all information necessary for treatment, storage, or disposal. 20 NMAC 4.1.500 (incorporating 40 CFR §264.601(c)) requires the permit to contain such terms as necessary to protect human health and the environment, including the prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air. EPA's SW-846 Test Methods provide the applicable methods for analyzing and identifying TICs. Finally, the use of the Appendix VIII list is appropriate and necessary.

II. TIC PERMIT CONDITION

The TIC permit condition requires the use of specifications for identifying and quantifying TICs contained in SW-846 Method 8260, Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (GC/MS). The method is used for identifying and quantifying compounds detected by GC/MS that are not on the method target analyte list. GC/MS is a waste characterization technique used to analyze headspace gas and homogenous solid and soil/gravel samples taken from hazardous waste containers. GC/MS analysis is performed for a target analyte list. The target analyte list, which consists of expected hazardous constituents in the hazardous waste codes provided in the Application, are compounds found in the calibration standards which are used to calibrate the GC/MS instrument. The target analyte list for each method subject to TIC evaluation is found in Permit Attachment B3, Tables B3-2, B3-4, and B3-6. NMED may modify the permit to add additional compounds to a target analyte list for a specific waste stream based upon these TIC analyses.

Analytes create peaks which are eluted on the GC section of the GC/MS. Each calibrated compound will elute at a specific time known as the retention time. If a peak retention time in a sample does not match one of the peak retention time in the calibration standard, the peak may be a suspected TIC.

Every compound is associated with a mass spectral characteristic to that compound. The mass spectra indicate the intensities of characteristic ions with specific molecular weights. Reference spectra are readily available and are used to identify target compounds, as well as TICs. The criteria for determining whether a TIC mass spectra can be matched to the reference spectra of a compound are specified in Attachment B3 of the revised draft permit (Section B3-1). If these criteria are satisfied, the Applicants must report the TIC for that sample.

The TIC will be added to the method target analyte list if it is found in twenty (25) percent or more of the samples, and the TIC is listed in 20 NMAC 4.1.200 (incorporating CFR § 261, Appendix VIII). The revised draft permit indicates that if the TIC is attributable to waste packaging or radiolytic degradation, it need not be added to the target list. NMED recommends that the permit be modified to indicate that while a listed hazardous waste code cannot be added based on the presence of constituents derived from radiolysis or waste packaging, TICs identified and meeting the criteria specified in the permit should be added to the target analyte list. This requirement is necessary to ensure that potentially hazardous constituents are not overlooked with respect to possible air monitoring, which is required to meet the environmental performance standards in 20 NMAC 4.1.500 (incorporating 40 CFR 264 Subpart X)**.** The permit condition requires the Applicants to compare TICs detected in twenty-five (25) percent of samples from a specific waste stream, and which are listed in 20 NMAC 4.1.200 (incorporating CFR § 261, Appendix VIII), to acceptable knowledge data for the waste stream to determine if the TIC is a constituent of the waste. The Applicants may exclude a TIC from a hazardous waste code assignment for a specific waste stream if the TIC is a constituent in a listed waste[1] whose presence is attributable to waste packaging materials, radiolytic decomposition, or other in-container processes. Waste packaging materials, radiolytic decomposition, and other in-container processes that generate a constituent in a listed waste do not constitute specific or non-specific process sources as defined in 20 NMAC 4.1.200 (incorporating CFR §§261.30, 261.31, 261.32, and 262.33). In addition, a waste attributable to waste packaging materials, radiolytic decomposition, or other in-container processes are not discarded commercial chemical products, off-specification species, container residues, or spill residues as specified in 20 NMAC 4.1.200 (incorporating CFR §261.33). Although a constituent may appear in one or more hazardous waste lists, the waste is not considered hazardous for that constituent unless it is attributable to a

[1] Listed wastes are all wastes attributable to non-specific processes identified in 20 NMAC 4.1.200 (incorporating CFR §261.31) or wastes attributable to specific processes identified in 20 NMAC 4.1.20 (incorporating CFR § 261.32).

listed process or a discarded or spilled product, or the constituent exceeds the maximum toxicity characteristic concentration.[2]

TICs whose presence and quantity render the waste toxic must be added to the target analyte list regardless of origin, because the hazardous waste designation is based on concentration, not source. However, the presence of toxicity characteristic and non-toxic F003 constituents, does not require assigning new hazardous waste codes, because the generator/storage sites may consider the concentration when assigning hazardous waste codes. If TICs are added to a target analyte list for specific waste stream, all samples from that waste stream must be analyzed for constituents on the expanded list.

III. REGULATORY ANALYSIS

The permit condition is reasonable and necessary to comply with the requirements discussed below.

A. IDENTIFICATION OF HAZARDOUS WASTE CODES

20 NMAC 4.1.200 (incorporating 40 CFR §§261.20(b) and 261.30(c)) requires the identification of all applicable hazardous waste codes for a waste stream. Hazardous waste codes are assigned to hazardous wastes which are listed or exhibit the toxicity characteristic. The TIC permit condition is essential to verify the correct identification of applicable hazardous waste codes for specific waste streams. TICs are indicators that a hazardous waste is present which was not identified in the Applicants' list of hazardous waste codes for a specific waste stream. If a TIC is present above certain levels, the target analyte list for a specific waste stream may be revised, and hazardous waste codes may be added. The permit condition ensures that the Applicants do not dispose a waste stream without identifying all applicable hazardous waste codes.

B. WASTE ANALYSIS PLAN

20 NMAC 4.1.500 (incorporating 40 CFR §264.13) requires owners or operators to obtain a detailed analysis of a representative sample of waste to obtain all information necessary for treatment, storage, or dispossal. In addition, the Applicants must ensure that waste destined for WIPP has been properly identified and characterized, and that WIPP is operated and maintained in accordance with the Treatment, Storage, and Disposal Facility standards found in 20 NMAC 4.1.500 (incorporating 40 CFR 264 Subpart B). The Applicants satisfy these requirements through the use of acceptable knowledge, RTR, VE, headspace gas analysis, and homogenous solid and soil/gravel sampling. In this context, the TIC permit condition ensures that the Applicants properly characterize wastes pursuant to the WAP, because TICs detected during headspace gas analysis and homogenous solid or soil/gravel sampling could indicate the presence

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[2] Toxicity characteristic wastes are constituents that exceed the maximum concentration specified in 20 NMAC 4.1.200 (incorporating CFR §261.24) when tested pursuant to Method 1311, Toxicity Characteristic Leaching Procedure.

of waste not previously identified by acceptable knowledge. NMED believes that in the absence of the TIC permit condition, the Applicants could dispose improperly characterized waste at WIPP.

C. SUBPART X ENVIRONMENTAL PERFORMANCE STANDARD

The Subpart X environmental performance standards require the imposition of permit conditions to protect human health and the environment, including the prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air or ground water. 20 NMAC 4.1.500 (incorporating 40 CFR §§264.601). In addition, the Subpart X environmental performance standards require the Applicants to conduct monitoring, testing, and analysis to protect human health and the environment. 20 NMAC 4.1.500 (incorporating 40 CFR §264.602).

TIC analysis provides analytical data necessary to protect human health and the environment by identifying headspace gas components, VOCs and SVOCs, that could be emitted during the WIPP disposal period. The Applicants must monitor VOC emissions in the underground under Module IV. However, the VOC limits in Module IV are based on available information regarding the hazardous waste codes authorized for disposal at WIPP. Therefore, TIC analysis, and subsequent revision of target analyte lists, is necessary to ensure that WIPP does not emit air contaminants not addressed in Module IV. In sum, TIC analysis is necessary to protect human health and the environment, to demonstrate proper characterization of waste, to prevent exposures to hazardous waste, and to provide information in the event of a release of hazardous waste.

D. SW-846 METHODS

The TIC permit condition criteria are consistent the SW-846 Methods criteria, as they require the Applicants to report clearly identifiable TICs for addition to the target analyte list for specific methods. The SW-846 Methods, which were specifically written for the analysis of RCRA-regulated hazardous waste, do not limit the number of TICs that must be reported and identified.

In their public comments, the Applicants suggested the use of CERCLA Contract Laboratory Program (CLP) criteria which specify a limit of ten (10) TICs for volatile analyses and twenty (20) TICs for semi-volatile analyses, and do not require reporting for TICs with a peak height or area less than ten (10) percent of the nearest internal standard peak height or area. See Comment 27. NMED rejected this suggestion because the CLP criteria might fail to identify a hazardous constituent in a waste stream if the waste stream contains more than the specified number of TICs. For example, a generator/storage site performing a homogeneous solid or soil/gravel analysis of a waste stream that contains more than ten (10) volatile fraction TICs would be required to report only the ten (10) most abundant TICs from each waste sample. As a result, the site would fail to report TICs in the waste stream. The impact of limited TIC reporting are significant. Because the site would not add a TIC to the target analyte list if it were found in less than twenty five (25) percent of the samples from a waste stream, the exclusion of the eleventh most abundant TIC -- which affects the percentage of samples containing the TIC -- constrains

TIC reporting. This impact is magnified because the number of samples collected for most waste streams generally is small. By limiting TIC reporting on the basis of an arbitrary CLP cutoff limit, the site may improperly exclude the TIC from the target analyte list.

NMED agrees that TIC identification and reporting should be limited to clearly identifiable TICs, and that the generator/ storage sites should not report sample carryover or other laboratory artifacts as TICs. However, the SW-846 criteria address these concerns. First, the generator/storage sites are not required to report TICs that cannot be clearly identified to match the ions and ion intensities of a reference spectrum. Simply, the generator/ storage sites have no obligation to report unknown compounds or classes of compounds that do not have a clear reference spectrum match. As a result, the Applicants' concern that generator/storage sites would be required to report the equivalent of instrument noise lacks merit. Second, the generator/storage sites are not required to report TICs found at extremely low concentrations, because ions near the ten (10) percent relative abundance threshold are below the ion resolution capability of the GC/MS instrument and the spectra or relative intensities of spectra cannot be distinguished. Third, the generator/storage sites are not required to report TICs attributable to GC/MS instrument background or peak coelution. Rather, the generator/storage sites must report TICs which are clearly different than GC/MS instrument background and cannot be attributed to laboratory conditions. Conversely, under the CLP criteria, the generator/storage sites would be required to report unknown compounds or classes of compounds. In fact, the CLP criteria impose an arbitrary TIC limit as a direct result of this broad reporting requirement. Such a broad reporting requirement would not be consistent with the intent of the TIC condition: while the TIC permit condition is intended to identify hazardous constituents for potential addition to target analyte lists and assessment of hazardous waste codes, the CLP criteria would identify unknown compounds or classes of compounds which cannot be added to target analyte lists, and therefore are not relevant to waste characterization.

In sum, the SW-846 criteria ensures that potentially problematic TICs are reported, while the CLP criteria both overreport and underreport TICs on an arbitary basis. TIC detection does not automatically result in revision of the target analyte lists. To be added to the target analyte lists, the TIC must be found in twenty (25) percent of samples from the waste stream, and must be on the Appendix VIII list.

E. APPENDIX VIII LIST

The Appendix VIII list is necessary and appropriate to the TIC permit condition. Appendix VIII contains all of the constituents that the EPA Administrator has determined to be hazardous constituents. NMED regulations at 20 NMAC 4.1.200 (incorporating 40 CFR §261.11) state that constituents will be listed in Appendix VIII if scientific studies have shown teratogenic, mutagenic, carcinogenic, or toxic effects on humans or other life forms, and they pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or managed.

The Application proposed to add TICs to the target analyte list if the TIC was found in twenty (25) percent of all samples from a waste stream, and if the TIC was identified as a constituent in

40 CFR 264 Subpart F, Appendix IX. However, Appendix IX applies to ground water monitoring, not waste characterization. Moreover, the Appendix IX list does not include the full suite of hazardous constituents contained in Appendix VIII.

III. PUBLIC COMMENTS

NMED revised the draft permit in response to public comments requesting assurances that the target analyte lists would contain all hazardous constituents found in waste streams, and the Applicants' public comments requesting clarification of the TIC reporting requirements.

NMED's original TIC permit condition was developed in response to inadequacies in the Application. Revision 6.3 of the Application stated that the generator/storage sites would identify TICs in accordance with criteria specified in the TRU QAPP, and add TICs to the target analyte lists if they were detected in twenty five (25) percent or more of the samples and were included on the Appendix IX list. See Attachment C, Section C-3. This proposal was inconsistent with the SW-846 TIC reporting criteria, posed a risk that significant TICs would not be reported or added to target analyte lists, and failed to require reporting for significant TICs not included in the Appendix IX list. In addition, the Applicants failed to provide a mechanism for ensuring that TICs found in twenty five (25) percent of a waste stream would be added to the target analyte lists.

Because of these inadequacies in the Application, NMED proposed a TIC permit condition which required (1) the identification of TICs in accordance with EPA protocol; and (2) the revision of target analyte lists to add TICs which appeared in Appendices IX or Appendix VIII. However, the permit condition did not contain the requirement regarding detection in twenty five (25) percent of samples nor a limitation on reporting the number of TICs per sample.

Public comments on the revised TIC permit condition stated that TICs should be reported only if they satisfy the minimum identification requirements specified in the SW-846 Methods and, consistent with the CLP criteria, to a maximum of twenty (20) GC/MS semi-volatile compounds, ten (10) volatile GC/MS compounds, and five (5) Fourier Transform Infrared Spectroscopy compounds (applicable to headspace gas VOC analyses only). These commentors indicated that the number of TICs to be reported should be limited to minimize the cost of reviewing spectra data for each TIC. These commentors also disputed the requirement to add a TIC to the target analyte list for a method if the TIC were detected in the original and confirmatory samples. Instead, these commentors suggested a TIC should only be added if found in more than twenty five (25) percent of the samples, although they did not indicate when or how the twenty five (25) percent limitation would be applied. In addition, these commentors contended that TICs not be added if not found on the Appendix VIII list, because many compounds on the Appendix VIII list did not have corresponding SW-846 Methods. These commentors argued that the Appendix VIII list should not be used, because many of the listed compounds are U and P code wastes, which are not hazardous or not present in TRU waste destined for WIPP. Finally, one comment suggested that all identified TICs should be listed, and that acceptable knowledge should not be used to exclude a constituent from listing.

In response to public comments, NMED modified the TIC permit condition by defining the TIC identification criteria by reference to the SW-846 Methods, adding the twenty (25) percent listing criterion, and indicating that TICs must appear on the Appendix VIII list. The twenty five (25) percent listing criteria was added because the regulations do not specify when TICs must be added to the target analyte lists. While this criterion may result in TIC identification and hazardous waste code revisions based on compounds found in a small percentage of samples, the methodology is relatively easy to implement from a programmatic standpoint.

The CERCLA CLP Statement of Work (EPA, OLMO 3.2 revision) limits the number of compounds that must be identified to ten (10) volatile organic compounds and twenty (20) semi-volatile organic compounds of greatest concentration which are not system monitoring compounds and are not listed on the Target Compound List. These limitations normalize the impact of the CLP provision requiring reporting of unknown mass spectra data as unknown compounds or classes of compounds (e.g., unknown aromatics). Specifically, these limitations prevent the reporting of excessive numbers of unknown compounds and normalize the analysis costs for contract laboratories participating in the Contract Laboratory Program. On the other hand, the SW-846 Methods only require reporting of identifiable TICs. As a result, the CLP limitations are not warranted. Moreover, the arbitrary nature of the CLP limitations might exclude significant TICs from target analyte lists. In addition, the CLP criteria were prepared for a completely different regulatory scheme -- CERCLA, not RCRA. SW-846 Methods are the only chemical analysis test methods specified for use under RCRA. 20 NMAC 4.1.200 (incorporating CFR § 261 Appendix III).

Finally, NMED identified the Appendix VII list as the relevant list for TIC identification. Because the ground water monitoring list in 20 NMAC 4.1.500 (incorporating CFR § 264 Appendix IX) is a sublist of Appendix VIII, it does not include all possible constituents. Accordingly, NMED identified the Appendix VIII list as the most appropriate list for evaluating TICs for inclusion on target analyte lists.

IV. CONCLUSION

In summary, headspace gas compounds, including TICs, contained in the hazardous waste disposed at WIPP must be identified and quantified to ensure that (1) the accuracy of hazardous waste codes assigned to a waste stream; (2) the proper characterization of waste; and (3) the protection of human health and the environment from releases of hazardous waste. To this end, the TIC permit condition, based on SW-846 Methods and the Appendix VIII list, is both reasonable and necessary.

COMPOSITE SAMPLING

I. INTRODUCTION

The New Mexico Environment Department (NMED) has imposed a permit condition requiring the collection of cores from soil/gravel and solid TRU-mixed waste for sample preparation and analysis. For the analysis of Volatile Organic Compounds (VOCs), the Applicants must collect either: (1) three (3) sub-samples from the vertical axis of the sample core, place the sub-samples in a single sample container, and prepare and analyze that sample; or (2) collect a representative core subsection, provided the appropriate SW-846 sample preparation methods and containers are used. This condition provides a reasonable VOC sampling approach which is consistent with EPA guidance regarding soil/gravel and solid matrix sampling for VOCs, and which maximizes the representativeness of the sampling process while minimizing worker exposure and the loss of VOCs from the sample.

II. DISCUSSION

A. RELATIONSHIP TO PERMIT APPLICATION

Revision 6.3 of the Application (Appendix C4, Section C4-2a) proposed to collect VOC samples from a single randomly selected sampling location along the long axis of the core. Revision 6.3 also stated that semi-volatile, polychlorinated biphenyl, and metals samples could be collected in the same manner as VOC samples, or by splitting or compositing a representative subsection of the core.

The draft permit included a condition requiring the collection of three (3) VOC samples from three (3) randomly selected locations along the vertical axis of the core. The Applicants and some generator/storage sites expressed concern this sampling approach had been imposed to characterize the vertical variability within a container. The concern was misplaced. NMED imposed this condition to maximize the representativeness of the sampling process.

For this reason, in the revised draft permit, NMED retained the option of using the three-sample approach. NMED also specified that the three (3) sub-samples must be collected from three (3) separate and randomly selected sampling locations along the vertical axis of the core. However, rather than requiring individual analysis of each sub-sample, NMED modified the condition to allow the Applicants to composite the sub-samples in a single VOC container for analysis. NMED authorized the Applicants to collect samples for semi-volatile, polychlorinated biphenyl, and metals analyses using the same methodology, or by compositing a representative subsection of the core. NMED did not specify the length of the representative subsection, because this determination should be left to the discretion of the generator/storage site based upon the nature

of the waste stream, potential ALARA[1] concerns associated with the waste, and the condition and characteristics of the extracted core.

B. PUBLIC COMMENTS

In public comments on the draft permit, the Applicants objected to the three-sample approach for VOCs, contending that:

1) The variability of concentration within a container is not relevant;

2) Taking three (3) samples along the core length contradicts the principle of random location of the vertical coordinate, because true core sampling is based on random location in all dimensions;

3) VOC sample compositing violates EPA rules, because compositing tends to aerate the matrix, releasing VOCs and biasing the sample results.

See Comment 168.

C. REGULATORY STANDARD

NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.13(a)(1)) requires analysis of a representative waste sample in accordance with 20 NMAC 4.1.200 (incorporating 40 CFR Part 261, Appendix I).

D. ANALYSIS

The objective of the permit condition requiring the collection of three (3) sub-samples for VOC analysis is to increase the representativeness of the sampling process, eliminate inconsistencies in the Applicants' proposed sampling approach for non-VOC analyses, and create equivalency in the sampling design between VOC and other core sample analyses. In achieving this objective, the permit condition establishes a sampling procedure that is only marginally more difficult and expensive than the Applicants' proposed approach.

Composite sampling is a commonly used sampling technique in which multiple random sub-samples of a targeted media are combined to form a single sample of manageable size for analysis. Sample compositing often is desirable because the resulting composite sample is more representative of the chemical characteristics of the entire core than a single, small sample collected somewhere along the core. NMED's VOC sample collection process is similar to "classic" composite sampling, because a number of samples are collected to form a single sample. The only distinction is that NMED's VOC sample process does not require physical

[1] ALARA, the acronym for "As Low As Reasonable Achievable", concerns the minimization of worker exposure to radioactivity.

mixing in the field. NMED considers this type of compositing sampling to be "incremental sampling".

Incremental sampling is a useful and effective method to obtain a more representative sample of the contents of a waste container, while avoiding the logistical, financial, and safety concerns associated with collecting multiple samples. The Applicants implicitly acknowledge that compositing samples is reasonable, because the Application originally proposed compositing samples for the analysis of semi-volatiles, PCBs, and metals. Moreover, the EPA endorses the composite sample concept. See EPA Observational Economy Series Vol. 1: Composite Sampling (EPA 230-R-95-005).

The revised draft permit requires the use of consistent procedures for sample collection. In contrast, the Applicants' proposed methodology would allow generator/storage sites to collect a semi-volatile, PCB, or metals sample by either compositing a representative core subsection or by selecting a random sample from a single core location. NMED was concerned with the potential variations in methodology between generator/storage sites and the small sample sizes. Moreover, under the Applicants' proposal, the Applicants would have no obligation to ensure that generator/storage sites collected these samples using a consistent procedure for all waste streams, or even for all containers within a single waste stream. Finally, the Applicants' proposal would compromise their ability to demonstrate compliance with the Comparability Quality Assurance Objective in the revised draft permit (Attachment B3).[2]

Representativeness is the degree to which data represent a population. While the samples cannot be wholly representative of the waste stream, they should be collected in a similar manner to impart a similar degree of representativeness. Because the Applicants proposed dissimilar sample methodologies for VOC and non-VOC samples, these samples would have different degrees of representativeness. While the Applicants may not be able to achieve identical degrees of representativeness between methods for these different samples, the level of representativeness between different sample methods should be normalized to the extent practicable. For this reason, the revised draft permit ensures the best approximation of sample representativeness between different sample methods by requiring generator/storage sites to collect core samples in a similar manner, and establishing sample collection requirements that provide an acceptable level of sample representativeness.

NMED has considered public comment regarding sample collection, and believes that the revised draft permit should be modified to allow the Applicants to use any sample container that conforms to the specifications for SW-846 Test Methods for VOC soil samples. Several applicable SW-846 Test Methods do not preclude the collection of a representative core subsection, provided the appropriate SW-846 sample preparation methods and containers are used. Therefore, NMED recommends that the revised draft permit be modified to allow the use

[2] Comparability - the degree to which data sets can be compared - is achieved through the use of standardized testing, sampling, and analytical methods.

of containers other than forty (40) milliliter vials, provided that these containers do not prevent the application of the SW-846 Test Methods.

On the other hand, the Applicants' public comments opposing incremental sampling for VOC analysis lack merit:

1) The Applicants erroneously assert that the permit condition is an attempt to characterize variability within each waste container. NMED does not expect the Applicants to characterize the variability within each waste container. If NMED had intended to require the Applicants to characterize variability, the revised draft permit would have (1) required the separate collection and reporting of multiple samples for all analyses; (2) eliminated the compositing of a representative core section for non-VOC analyses; and (3) established provisions for the evaluation and assessment of data variability within each waste container. The revised draft permit does not contain any of these conditions. In fact, the act of compositing a sample eliminates the ability to evaluate variability within a waste container.

2) The Applicants incorrectly assert that collecting core sub-samples contradicts the concept of random sample selection. EPA guidance indicates that compositing grab samples from a core is both possible and acceptable. See Description and Sampling of Contaminated Soils: A Field Pocket Guide, (EPA/625/12-91/002). Although the EPA guidance discusses the composite sampling in the context of semi-volatile and metals analyses, the EPA's rationale applies equally to incremental sampling for VOCs analysis. The random sample selection strategy in the revised draft permit require random selection of the core in the x and y directions. While NMED agrees that completely random collection also would involve random selection in the z direction, such a condition would require collection of three (3) separate cores. In light of the Applicants' concerns regarding ALARA requirements, NMED has determined that such a condition would not be prudent or necessary. The Joint NRC/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste (Federal Register No. 97-130, p. 62085) encourages flexibility in the design of sampling programs to accommodate radiation exposure concerns. NMED has followed the Joint NRC/EPA recommendation, and proposed a sampling methodology that retains the concept of random sample collection, while accommodating the Applicants' ALARA concerns.

3) The Applicants incorrectly assert that the EPA does not allow compositing of VOC soil samples. The EPA guidance document "Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies" (EPA/600/SR-92/128) states that VOC soil samples can be collected through incremental sampling, which is defined as "the extraction of one or more distinct increments of material for inclusion in the final sample." NMED has adopted this EPA-endorsed methodology for VOC sampling in the revised draft permit.

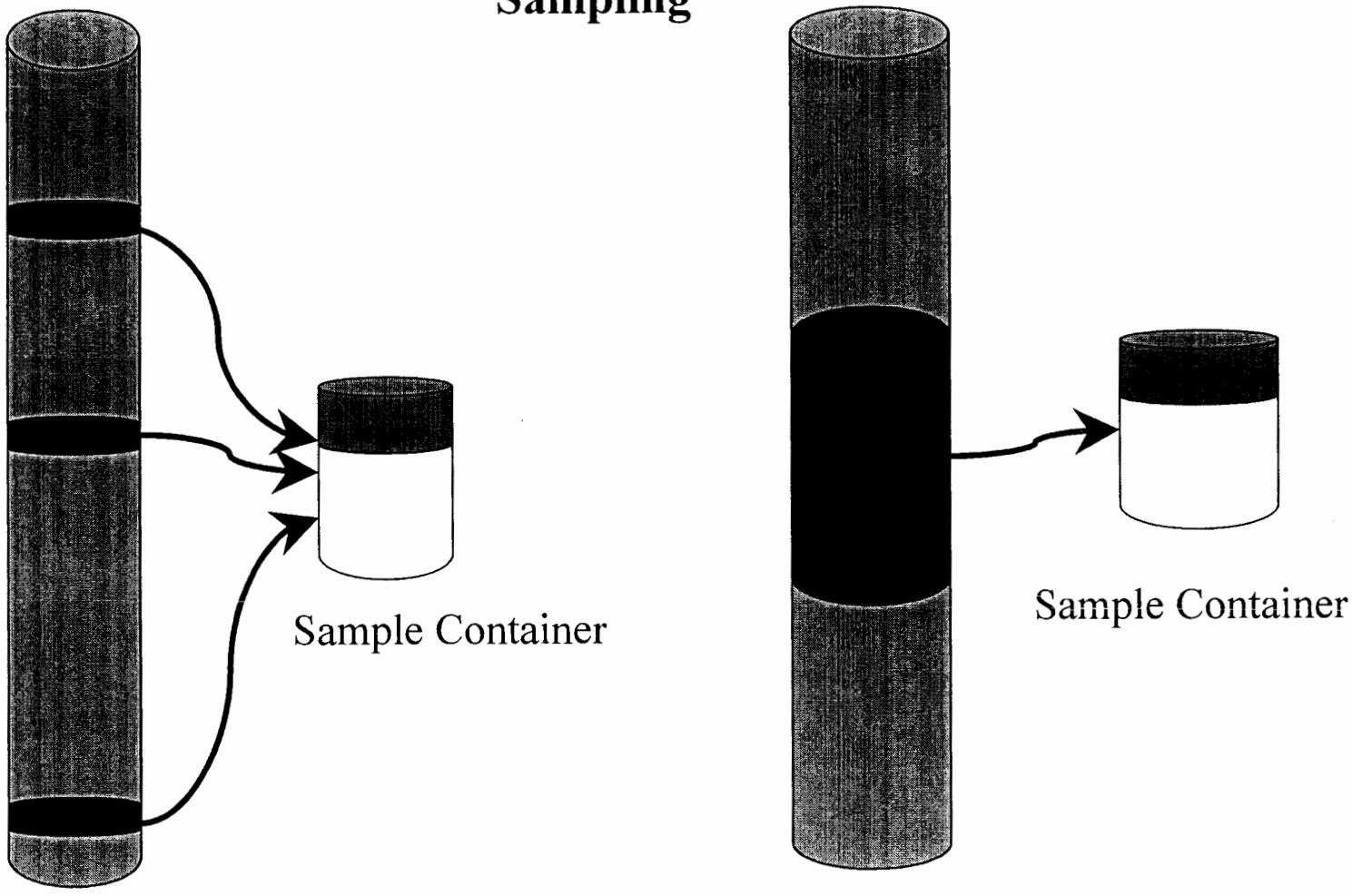
NMED believes that careful collection and preparation of composited samples will not bias the VOC analyses. First, any volatile loss during sample collection would be offset by the use of heated purge-and-traps methods that minimize VOC loss during the analytical process. Second, the sampling methodology in the revised draft permit - the collection and placement of three (3) sub-samples in one container without physical mixing - will not cause significant VOC loss.

Many methods can be used to collect and prepare composite soil samples without physical mixing, such as the EPA SW-846 Test Methods.[3] As a result, it is not necessary to obtain a physically homogeneous sample in the field. Rather, the sample is composited using EPA SW-846 Test Methods, such as Methods 5021, 5032, and 5035, which composite the sub-samples under controlled conditions which significantly minimize volatile loss.

Finally, NMED does not believe that the composite VOC soil sampling requirement will impose significant additional costs or sampling delays. The time required to collect three (3) sub-samples, rather than a single sample, is minimal compared to the other tasks associated with core sampling. For instance, the following tasks would tend to take significantly longer than collecting three (3) sub-samples from a waste container: (1) placing the drum in the radiation containment area; (2) performing safety checks and inspections; (3) decontaminating the sampling equipment; (4) extruding the core; (5) completing the sample documentation (e.g., custody records, sample labels and tags); (6) repackaging the core; (7) replacing the drum lid; and (8) performing personal decontamination. Additional composite sample collection time includes only the time to randomly select and document two (2) additional sample locations along the core, physically collect two (2) additional sub-samples, and add two (2) additional sub-samples to the sample container. Because the three (3) sub-samples are placed in a single container for analysis, the analytical costs should not differ from the analytical cost proposed by the Applicants, except that a slightly greater quantity of derived waste may be generated. All other tasks and costs associated with the sampling process would not be affected. Finally, there would not be any additional shipping costs, because the same number of samples would be sent to the laboratory.

[3] Method 5021 involves a heated purge to free volatile constituents for introduction into the GC/MS instrument. Method 5032 is a closed system vacuum distillation technique. Method 5035 is a closed purge-and-trap system in which the soil sample is hermetically sealed throughout process. None of these methods require physical mixing of the soil sample in the field.

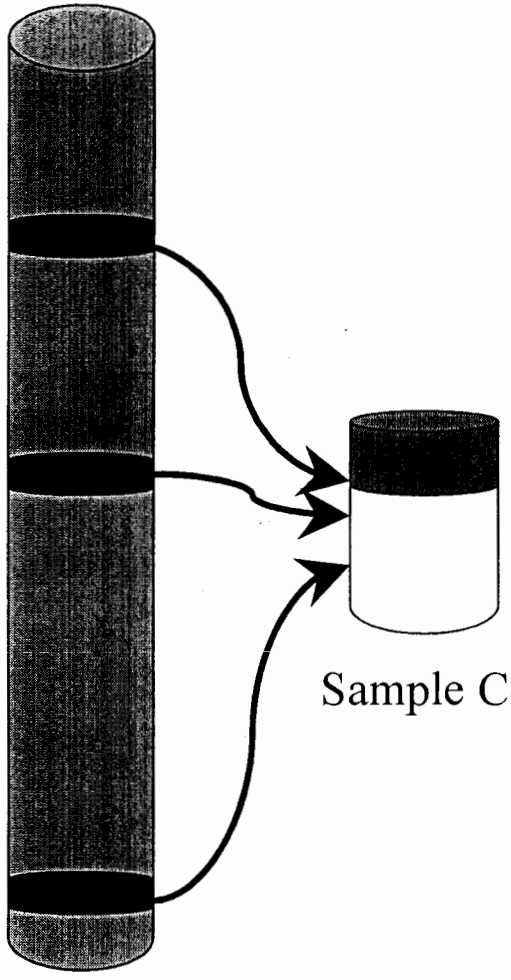
Comparison of Incremental Compositing and Representative Core Section Sampling



Incremental Compositing

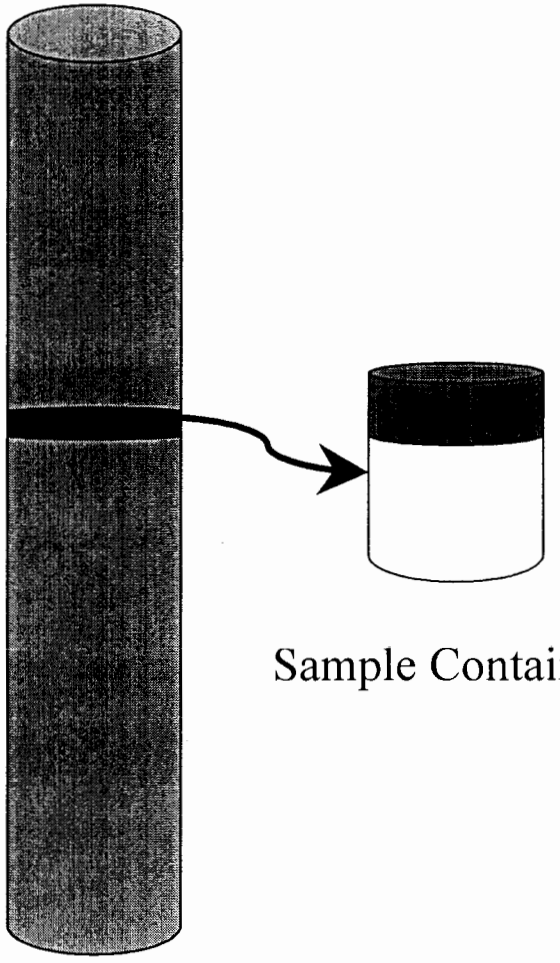
Representative Core Section

Comparison of NMED and Applicant VOC Core Sampling



Sample Container

NMED Imposed Incremental Compositing

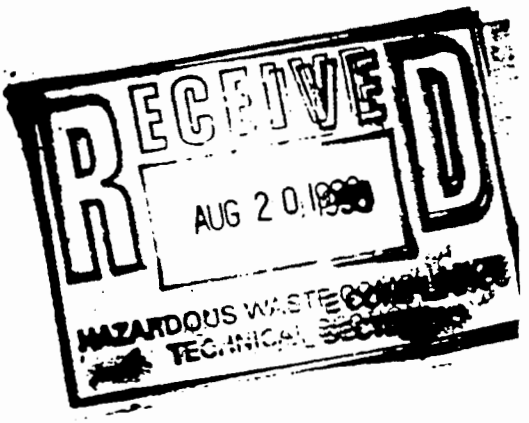


Sample Container

Applicants Random Core Section

Attachment 1

EPA Observational Economy Series
Vol. 1: Composite Sampling



United States
EnvironmentalProtection
Agency

Policy, Planning,
And Evaluation
(2163)

EPA 230-R-95-005
August 1995

2. What is Composite Sampling?

2.1. Method

First, let's clarify that a "sample" in this document refers to a physical object to be measured, whether an individual or a composite, and not a collection of observations in the statistical sense. Individual sample units are what is obtained in the field, such as soil cores or fish fillets; or obtained from subjects, such as blood samples. Meanwhile, a composite sample may be a physical mix of individual sample units or a batch of unblended individual sample units that are tested as a group. Most compositing for environmental assessment and monitoring consists of physically mixing individual units to make a composite sample that is as homogeneous as possible.

With classical sampling, no distinction is made between the process of sampling (i.e., selection or inclusion) and that of observation or measurement. We assume, with classical sampling, that any unit selected for inclusion in a statistical sample is measured and hence its value becomes known. In composite sampling, however, there is a clear distinction between the sampling and measurement stages. Compositing takes place between these two stages, and therefore achieves two otherwise conflicting goals. While a large number of samples can be selected to satisfy sample size requirements, the number of analytical measurements is kept affordable.

If a variable of concern is a measurement that is continuous in nature such as a chemical concentration, the mean (arithmetic average) of composite samples provides an unbiased estimate of the true but unknown "population" mean. Also, if measurement error is known, the population variance based on the scale of the individual samples can be estimated by a simple weighting of the measured composite sample variance.

With selective retesting of individual sample units, based on initial composite sample results, we can classify all of the individual sample units according to the presence or absence of a trait, or exceedance (vs. compliance) of a numerical standard. We can subsequently estimate the prevalence of

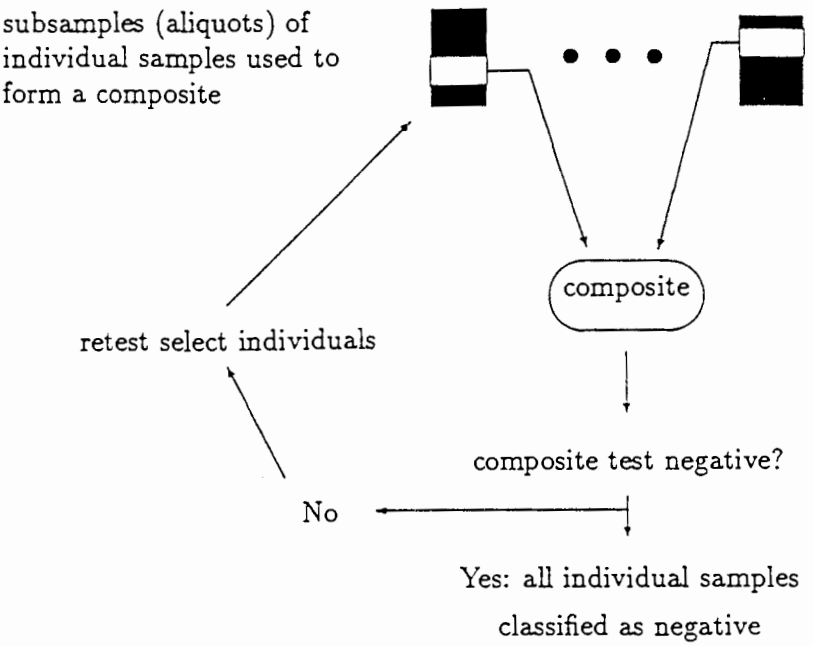


Figure 2: Composite sampling with retesting

a trait or proportion of non-compliance. Basically, if a composite measurement does not reveal a trait in question or is in compliance, then all individual samples comprising that composite are classified as "negative". When a composite tests positive, then retesting is performed on the individual samples or subsamples (aliquots) in order to locate the source of "contamination".

Retesting, as visualized in a general sense in Figure 2, may simply be exhaustive retesting of all individuals comprising a composite or may entail more specialized protocols. Generally, as the retesting protocol becomes more sophisticated, the expected number of analyses decreases. Therefore, one must consider any increased logistical costs along with the expected decrease in analytical cost when evaluating the overall cost of a compositing/retesting protocol.

Due to recent research (Patil, Gore and Sinha, 1994), the individual samples with the highest value, along with those individual samples comprising an upper percentile, can be identified with minimal retesting. This ability is extremely important when "hot spots" need to be identified such as with soil monitoring at a hazardous waste site.

Whether we are dealing with data from binary (presence/absence) measurements or data from measurements on a continuum, composite sampling

can result in classifying each individual sample without having to separately analyze each one. While composite sampling may not be feasible when the prevalence of contamination is high, the analytical costs can be drastically reduced as the number of contaminated samples decreases.

2.2. Limitations of Composite Sampling

Both physical and logistical constraints exist that may restrict the application of composite sampling. The limitations which more commonly arise are discussed here along with some simple recommendations for how compositing still may help.

Physical:

If the integrity of the individual sample values changes because of compositing, then composite sampling may not be the desired approach. For example, volatile chemicals can evaporate upon mixing of samples (Cline and Severin, 1989) or interaction can occur among sample constituents. In the first case, compositing of individual sample extracts may be a reasonable alternative to mixing individual samples as they are collected.

Another limitation is imposed by potential dilution, where an individual sample with a high value is combined with low values resulting in a composite sample that falsely tests negative. When classifying samples according to exceedance or compliance with some standard value, c, the problem of dilution is overcome by comparing the composite sample result to c divided by the composite sample size, k, (c/k). Furthermore, when an analytical detection limit, d, is known, the maximum composite sample size is established according to the inequality $k < c/d$. One may lower this upper bound on the composite sample size to reduce effects of measurement error. As can be seen here, when reporting limits (Rajagopal, 1990) or action levels (Williams, 1990) of some hazardous chemical concentrations are legally required to be near the detection limit, the possibility of composite sampling may be eliminated.

Sample homogeneity is another consideration. A homogeneous sample is one where the variable of interest, such as a chemical concentration, is evenly distributed throughout the sample. In contrast, a heterogeneous sample can have substantially different values for the variable of interest, depending on what part of the sample is actually analyzed. If the whole sample unit is analyzed, then heterogeneity is not a problem; however, most laboratory analyses are performed on a small subsample of the original sample unit. For example, one gram of soil may be taken from a one kilogram soil core for

actual extraction and analysis. If a subsample is to represent a larger sample unit, then the larger unit must be fairly homogeneous with respect to the variable of interest.

Therefore, an individual sample unit should be homogenized as much as possible prior to obtaining an aliquot for inclusion in a composite. Furthermore, formation of a composite must include homogenization if the composite is going to be represented by measurement on a smaller subsample.

Often, measurements on multiple attributes are desired. However, if retesting is performed in order to classify individual samples, it is unclear how to optimize the retesting relative to the different attributes (Schaeffer et al., 1982). For example, should chemicals be tested independently, or does there exist dependence in the multivariate information that can be used to improve cost efficiency? Classifying for multiple attributes remains an open problem in composite sampling.

Logistical:

When retesting of certain individual samples may be required based on composite sample results, then subsamples (aliquots) of the original individual samples must be preserved and stored until all testing is done. This may lead to extra expense that must be considered in the overall cost comparison between compositing and other strategies. For most environmental and public health studies, the analytical savings from compositing will far outweigh the extra cost of sample preservation and storage.

Another consideration is that events out of control of the scientists may dictate the feasibility of composite sampling. For example, people whose wells are being tested may demand that their wells be treated as equitably as the wells of their neighbors. Measuring some well samples individually and some well samples solely as part of a composite may give an appearance of inequitability and result in a political decree to measure each well individually (Rajagopal, 1990).

Circumstances that may presently disqualify composite sampling from being applied may change upon advances in technology. Long turn-around time for laboratory results and large labor costs may currently eliminate optimal retesting designs from consideration. However, retesting designs in the future may be automated and guided by an expert system (Rajagopal, 1990). Also, advances in statistical methodology may further extend the utility of composite sampling.

For other reviews of composite sampling, see Rohde (1976, 1979), Elder (1977), Elder, Thompson, and Myers (1980), Boswell and Patil (1987) and Garner, Stapanian, and Williams (1988). For an overview, see Patil, Gore, and Taillie (1994).

United States
Environmental Protection
Agency

Environmental Monitoring
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Las Vegas, NV 89193-3478

Research and Development

EPA/600/SR-92/128 September 1992

EPA

Project Summary

Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies

Benjamin J. Mason

This document is designed to serve as a companion to the *Soil Sampling Quality Assurance User's Guide, Second Edition.* In order to make it current with the state-of-the-art, the predecessor document, published in 1983, has been thoroughly reviewed and revised. The two documents together provide methods, techniques, and procedures for designing a variety of soil measurement programs and associated quality assurance project or program plans, implementing those programs, and then analyzing, interpreting, and presenting the resultant data.

This Project Summary was developed by EPA's Environmental Monitoring Systems Laboratory, Las Vegas, NV, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

During the initiation of any project in which the conceptual model of the site indicates that soil is one of the key factors, proper planning and selection of the techniques and strategies for collecting the samples is essential. Proper planning in the early stages of a project can ensure that the final data received will be of sufficient quality and adequately represent the site to allow for the correct decision to be made concerning the "fate" of the site. In contrast, the lack of proper planning often leads to data being generated that do not sufficiently meet the initial project goals, even if laboratory analyses are perfect. If this situation occurs, the time and expense of sampling and analysis are lost and resampling of the site may be necessary to allow for a competent decision to be made.

During the preliminary phase of planning a soil sampling project, several general characteristics of the site and/or problem must be considered. These characteristics include:

- the type and distribution of the contaminant (or other constituent of interest),
- the natural soil characteristics that can influence the distribution of the contaminant of concern, and
- the nature of the media to be sampled (i.e., soil vs. non-soil materials, or a combination of the two distinctly different media).

These general components provide the project planner with the necessary information required for the development of a proper soil sampling protocol.

Once the basic characteristics of the site and problem have been clearly identified, the strategy and techniques to collect the samples must be developed. During this phase in the development of soil sampling protocols, the investigator should consider the following issues:

- the size or area of contamination,
- particulate sampling theory to address proper sample and subsample collection,
- statistical aspects pertaining to soil sampling,

- the use of relevant historical data,
- sampling designs and their appropriate use,
- proper sample collection procedures,
- other types of sampling of soil materials, and
- interpretation of the final results.

When each of these issues is properly considered and addressed, a solid basis for the development of a soil sampling protocol will have been established.

The Size or Area of Contamination

The concept of a "support" as it applies to soil sampling and the determination of the size of the site (or subunits within a site) has been presented. The specific size, shape, orientation, and spatial arrangement of the samples to be collected constitute the "support". Risk and exposure assessment data can often be used to assist in defining an "action support" or can be used in the application of an action level over a particular support.

Particulate Sampling Theory

The minimum amount of soil required to make up the "support" can be determined using the concepts developed in particulate sampling theory. Gy's theory (developed by Dr. Pierre Gy of the Paris School of Mines) is based upon the relationship between the variability of the material, particle sizes in the material, distribution of the component of interest, and size of the sample taken. The variability found in particulate material, such as soil, is based upon the number of individual particles in the sample. Therefore, the controlling factor in the collection of a correct soil sample is the size of the largest particle. Thus, samples that have been screened prior to analysis with the coarser fractions being discarded, can produce greatly biased results. Fortunately, most soils have particle-size ranges in which the "typical" sample size collected is adequate to address this concern. In cases where a fine-textured soil has an abundance of cobbles and gravels or where wastes such as rubble, construction debris, or battery cases are present in the soil, the validity of the contaminant concentration data may be questionable if appropriate steps are not taken to account for the occurrence of these large "particles".

Additionally, particulate sampling theory directly addresses the process of obtaining of a correct sample by providing the basis for extracting the sample from the site and for aliquoting a subsample in the laboratory. Seven sources of sampling error have been clearly delineated, thereby allowing the study planner to properly take steps to reduce these errors. Techniques and suggestions are presented to extract an unbiased soil sample and thus control or at least allow for the estimation of the size of these errors.

Statistical Aspects Pertaining to Soil Sampling

Several of the sample handling techniques that are often used to reduce sample variability (or sampling error) include:

- subsampling and sample size reduction,
- composite sampling, and
- sample homogenization.

Since these processes are incorporated in the initial sampling program and can affect the final data, the investigator must weigh the value of the information gained versus information lost by performing the various sample handling operations to more accurately assess which techniques can be used to meet the project goals.

When a sample of any population, such as soil, is collected, it is usually necessary to reduce its original size to some smaller quantity of material for chemical analysis (i.e., a subsample). The guiding principle for the subsample selection is that the probability of collection of all fractions of the soil must be equal. If any fraction is excluded or favored, sampling is not correct and the results will be biased.

One of the key elements of Gy's particulate sampling theory is the identification of the size or weight of sample that must be taken in order to insure a predetermined level of reliability. If proper techniques are used and if an appropriate sample weight is collected for the given particle-size range in the sample, then subsampling techniques can be a means for reducing the bias and error within the sample. If an inadequate subsample size is collected or improper techniques are used, then an unknown level of bias exists and consequently may affect the final decision to be made concerning the site.

Several techniques, including the use of riffle splitters, alternate shoveling, or incremental sampling, can be used to reduce the volume of sampled material to an appropriate subsample. Riffle splitters are an effective means to reduce sample size but only work with freely flowing materials. The alternate shoveling method can be used in the field or laboratory if the material is not cohesive. Incremental sampling involves extraction of one or more distinct increments of material for inclusion in the final sample. With the exception of incremental sampling, these methods will not work with samples being tested for volatile organic compounds.

The standard deviation around a mean estimate obtained from a series of soil samples is often quite large. One technique to reduce the variability is to composite samples. Composite samples can be created from a well homogenized sample made up of a number of increments or from several samples collected from the support. The use of composite samples is often recommended as a means of reducing the cost of sampling at a particular site. When properly used, compositing can provide a means of quickly assessing the average pollutant concentration and if an area needs further sampling. One problem with compositing samples is the loss of individual sample information and concentration sensitivity due to the dilution of the samples (i.e., a "hot spot" may be unidentifiable due to the inclusion of one increment from the "hot spot" into the composite sample with multiple increments from the "clean" background soil).

Homogenization is not a statistical concept; however, it is used to control the variance within a sample. The mixing of the sample reduces the distribution and segregation errors, as defined in Gy's particulate sampling theory, and thereby increases the probability of obtaining a more representative sample or subsample than if homogenization is not performed. It should be noted that complete homogeneity in a soil sample is impossible to attain even though a sample may appear to be homogeneous visually on the macroscale.

The Use of Relevant Historical Data

Too little time is usually spent in preliminary data collection, evaluation, and planning. It is difficult, if not impossible, to undertake a reliable soils study without reviewing existing data and developing a conceptual model of the pollutant behavior at the site. Any information on the pollutants, potential routes of migration, and potential effects of migration is extremely useful during the development of soil sampling protocols. Any historical site information that includes:

- geologic character (e.g., parent material, bedrock type)

Attachment 3

Technology Transfer EPA/625/12-91/002

EPA

Description and Sampling of Contaminated Soils:

A Field Pocket Guide

Center for Environmental Research Information
U.S. Environmental Protection Agency
26 West Martin Luther King Drive
Cincinnati, OH 45268

Printed on Recycled Paper

Notice

should be recorded when describing cores below the weathering horizon:

1. Type of sample (split spoon, shelby tube, etc.)
2. Thickness driven/thickness recovered
3. Blow count (per 6 in.), if driven
4. Depth interval

Descriptions of depth intervals tend to be more abbreviated than near-surface soil profile descriptions and apply to regular depth intervals rather than transitions between horizons (although such transitions should be noted and described). Features should be described in a consistent sequence. The following features, when present, should be described:

1. Texture (USDA and Unified estimated textures, coarse fragments)
2. Sorting and roundness
3. Moisture condition (moist, wet, dry, presence of water table)
4. Color and mottling
5. Consistency (rupture resistance, cementation)
6. Secondary porosity features
7. Sedimentary structures
8. Presence of organic matter
9. Effervescence in dilute, 10 percent cold HCl (calcareous parent material)
10. Visible presence of synthetic chemicals (oil, gasoline, solvents)
11. Reading from field instrumentation (photoionization or flame ionization detector)

Appendix A.2

General Protocol for Soil Sample Handling and Preparation

If questions arise in the field concerning sample handling and preparation procedures as specified in the Soil Sampling Plan for the site, this general protocol can be used. Any departures from procedures contained in the site Soil Sampling Plan should be documented and justified (see Form 4-1). The procedures described here generally apply to any type of soil sampling. They have been compiled primarily from procedures described in Brown et al. (1991). Specific procedures for different types of sampling tools are described in Appendices A.3 and A.4.

A.2.1 Soil Sample Collection Procedures for Volatiles

1. Tube samplers are preferred when collecting for volatiles. Augers should be used only if soil conditions make collection of undisturbed cores impossible. Soil recovery probes and augers, with dedicated or reusable liners (see Table 4-1), will minimize contact of the sample with the atmosphere.
2. Place the first adequate grab sample, maintaining and handling the sample in as undisturbed a state as possible, in 40-mL septum vials or in a 1-L glass wide mouth bottle with a Teflon®-lined cap. *Do not mix or sieve soil samples.*
3. Ensure the 40-mL containers are filled to the top to minimize volatile loss. Secure the cap tightly.
4. Examine the hole from which the sample was taken with an organic vapor instrument after each

sample increment. Record any instrument readings.

5. Label and tag sample containers, and record appropriate data on soil sample data sheets (depth, location, etc.).
6. Place glass sample containers in sealable plastic bags, if required, and place containers in iced shipping container. Samples should be cooled to 4°C as soon as possible.
7. Complete chain-of-custody forms and ship as soon as possible to minimize sample holding time (see Table A.1 for maximum holding times for various constituents).
8. Follow required decontamination and disposal procedures (see A.2.3).

A.2.2 Soil Sample Collection and Mixing Procedures for Semivolatiles and Metals

1. Collect samples.
2. If required, composite the grab samples, or use discrete grab samples.
3. If possible, screen the soils in the field through a precleaned O-mesh (No. 10, 2 mm) stainless steel screen for semivolatiles, or Teflon®-lined screen for metals (some metals in stainless steel could contaminate the sample).
4. Mix the sample in a stainless steel, aluminum (not suitable when testing for Al), or glass mixing container using the appropriate tool (stainless steel spoon, trowel, or pestle).
5. After thorough mixing, place the sample in the middle of a relatively inexpensive 1-m square piece of suitable plastic, canvas, or rubber sheeting.
6. Roll the sample backward and forward on the sheet while alternately lifting and releasing opposite sides or corners of the sheet.
7. After thorough mixing, spread the soil out evenly on the sheet with a stainless steel spoon, trowel, spatula, or large knife.

8. Take sample container and check that a Teflon® liner is present in the cap, if required (see Table A-1 for recommended sample containers for different contaminants).
9. Divide the sample into quarters, and take samples from each quarter in a consecutive manner until appropriate sampling volume is collected for each required container. Separate sample containers would be required for semivolatiles, metals, duplicate samples, triplicate samples (split), and spiked samples.
10. Secure the cap tightly. The chemical preservation of solids is generally not recommended.
11. Label and tag sample containers, and record appropriate data on soil sample data sheets (depth, location, other observations).
12. Place glass sample containers in sealable plastic bags, if required, and place containers in an iced shipping container. Samples should be cooled to 4°C as soon as possible.
13. Complete chain-of-custody forms and ship as soon as possible to minimize sample holding time (see Table A-1 for maximum holding times for various constituents). Scheduled arrival time at the analytical laboratory should give as much holding time as possible for scheduling of sample analyses.
14. Follow required decontamination and disposal procedures (see A.2.3).

A.2.3 Equipment Decontamination/Disposal

Decontamination procedures may vary from state to state and site to site. Detailed procedures should be specified in the Soil Sampling Plan. A very general procedure is outlined here:

1. Any disposable solid contaminated equipment (plastic sheets, screens, etc.) should be placed in plastic bags for temporary storage and sealed in metal barrels for final transport/disposal.
2. Reusable equipment should be washed and rinsed using decontamination procedures specified in the Soil Sampling Plan.

AUDIT REQUIREMENT

I. INTRODUCTION

In the revised draft permit, the New Mexico Environment Department (NMED) imposed a condition requiring the Applicants to audit generator/storage sites (Sites). The audits are required in order to demonstrate that the Sites have implemented and complied with the applicable portions of the Waste Analysis Plan (WAP) during waste characterization for waste destined for disposal at WIPP. NMED may observe the audits to ensure that the Applicants have properly implemented the WAP and audited compliance with the WAP at the Sites. Further, the Applicants must obtain NMED's approval of the final audit report for a Site before the Applicants can manage, store, or dispose of waste at WIPP from that Site.

Because the Applicants do not intend to conduct waste characterization at WIPP, NMED must implement an oversight process, such as audits, to ensure that the Permittees comply with the applicable portions of the WAP. The detailed audit-related permit conditions are necessary because the Applicants' proposed audit program, while recognizing the need for Site audits, was technically inadequate, and did not provide for NMED participation, review, and approval. For instance, the Applicants proposed to share information with NMED, but did not allow NMED to observe the audits. Critically, the Applicants did not propose for NMED to approve the audit, even though the Applicants relied on the audit process to provide information which should have been contained in the Application.

II. REGULATORY ANALYSIS

NMED regulations at 20 NMAC 4.1.900 (incorporating 40 CFR §270.14(b)(2)) requires a permit application to contain:

> Chemical and physical analyses of the hazardous waste and hazardous debris to be handled at the facility. At a minimum, these analyses shall contain all the information which must be known to treat, store, or dispose of the wastes properly in accordance with Part 264 of this chapter.

In addition, 20 NMAC 4.1.900 (incorporating 40 CFR §270.14(b)(3)) requires a permit application to contain "[a] copy of the waste analysis plan required by §264.13(b) and, if applicable §264.13(c)."

Revision 6.4 of the Application did not contain a detailed and representative chemical and physical analysis of waste streams to be disposed at WIPP. Typically, proposed Subpart X facilities, such as WIPP, submit applications containing detailed chemical and physical analyses provided by generator sites, as well as detailed waste analysis plans for implementation by the facilities to ensure that the generator sites properly characterized the wastes. In addition, the

permit applications typically contain provisions for periodic waste analyses by the facilities to confirm the waste characterization by generator sites. These analyses, called on-site confirmatory or fingerprint analyses, are required to determine the accuracy of hazardous waste manifests. See 40 CFR 264.13(a)(4). However, the Applicants proposed no such analyses, arguing that multiple sampling of waste containers raised radiological health concerns. In the place of fingerprint analyses, the Applicants proposed to "review" waste characterization information prepared by the generator sites.

While the regulations indicate that permit applications must include chemical and physical analyses, they also state that the disposal facility must obtain these analyses prior to waste disposal. See 40 CFR 264.13(a). In recognition of the unique features of WIPP and the inclusion of general waste information in the permit application (Table C-2, Revision 6.0 of the permit application), NMED concluded that the provision of detailed and representative chemical and physical analyses could be obtained through implementation of the WAP at generator Sites, as confirmed by audits conducted by the Applicants with NMED oversight. As a result, the only method to ensure compliance with the WAP is to audit the generator Sites. Similarly, NMED must be able to approve the audits, because such approval is the only way for NMED to ensure that WIPP is enforcing the WAP at the generator Sites.

Disposal facilities are required to obtain all waste characterization information which must be known to treat, store or dispose hazardous waste. See 40 CFR 264.13. According to EPA guidance, this requirement includes verification of the integrity of the waste characterization information provided by generator Sites through Site visits and/or confirmatory analysis of split samples. Because the Applicants do not intend to analyze split samples, the only way for WIPP to verify the integrity of waste characterization information (e.g., acceptable knowledge) is through Site audits. EPA guidance also states that disposal facilities which rely on acceptable knowledge must become "thoroughly familiar with the generator's processes to ensure integrity of the acceptable knowledge data". By requiring acceptable knowledge audits in the context of the overall audit program, NMED ensures that the Applicants examine Site procedures for acquiring acceptable knowledge information and determine that the Sites have correctly used acceptable knowledge to characterize waste.

The EPA intended the WAP to include requirements specifying "the level of analysis to be performed on the waste managed at facilities, the minimum frequency with which these analyses were to be repeated, and the properties of the waste which were to be determined to verify the identity of each truckload, shipment, or batch of hazardous waste managed at facilities". 45 FR 33179. For off-site facilities, the WAP also was intended to present "procedures used to determine the identity of incoming waste," including sampling methodologies, test methods, and analysis parameters. Id. at 33180.

NMED reviewed the Applicants' proposed WAP in light of the EPA requirements, as well as the unique, site-specific factors relating to the management of mixed waste, which contains radioactive material imposing special health concerns at WIPP. Although the Applicants did not

submit a detailed, representative waste analysis or propose on-site verification of waste analysis, they did submit a detailed WAP which required the Sites to conduct the necessary waste analyses and subsequent "checks" to verify compliance, and required the Applicants to audit the Sites.

NMED regulations at 20 NMAC §4.1.900 (incorporating 40 CFR §270.32(b)(1)) explicitly authorizes NMED to impose permit conditions "necessary to achieve compliance with parts 264 and 266 . . . of this chapter." Permit conditions requiring audits and audit checklists are clearly within the scope of this regulation, because they ensure compliance with the WAP. A permit condition requiring NMED's approval of the final audit report also is clearly within the scope of this regulation, because the Applicants failed to submit a detailed waste analysis for NMED's approval. Simply, the permit conditions regarding audit reporting and oversight is critical to the WIPP permit because they ensure compliance with the WAP. NMED cannot regulate the Sites, but it can regulate the Applicants to ensure that they enforce the WAP diligently at the Sites.

III. RELATIONSHIP TO PERMIT APPLICATION

The Applicants submitted Rev. 5.0 of the Application in 1995. After review of this Application, NMED requested additional information, including information regarding the proposed WAP. NMED stated that "In general, the [WAP] presented in Chapter C of the [Application] lacks important and necessary detail", specifically identifying deficiencies regarding waste sampling and analysis, acceptable knowledge, RH waste characterization, and verification procedures:

> Chapter C of the permit application does not provide sufficient discussion of sampling and analyses intended to characterize waste at the generator site and how this information will be verified and checked by the generator. It also does not include waste analyses data that are currently available, and does not include volumetric data regarding how much waste from each waste summary category is anticipated for disposal at WIPP. For example, the permit application pays only cursory attention to sampling and analyses procedures for Waste Summary Categories S3000 and S4000, and does not discuss how many drums of waste from these categories will be sampled, analyzed, and statistically evaluated prior to shipment, as detailed in the 1995 QAPP, Section 5.0. [The QAPP (1995) indicates that all drums will undergo headspace gas analyses and RTR, with limited visual examination of all waste categories and limited confirmatory sampling of Waste Summary Categories S3000 and S4000.] Revise Chapter C of the permit application to include more detailed information regarding sampling and analyses performed at the generator site, verification and checking of this information, and to include available waste analyses data. For example, refer to Specific Comment Nos. 8, 11, and 21-63. . .
>
> NMED is concerned about how potential breakdowns in the waste characterization process at the generator sites would be identified and at what level of severity NMED would be notified. 20 NMAC 4.1, Subpart V,

264.13(a)(4) requires inspection and, if necessary, analysis of waste received by the owner/operator of an off-site facility. Since DOE will not be conducting analysis of wastes received at WIPP, NMED needs assurances that the process of waste characterization at the generator sites is adequately monitored and audited, and that any significant failures are disclosed to NMED in a timely fashion. Revise the applicable sections of the chapter to address these concerns more clearly.

In response, the Applicants submitted Revision 5.2 of the Application. Revision 5.2 contained additional information regarding waste characterization, including sampling/analysis procedures, and indicated that the Sites would be required to provide waste characterization information in accordance with the proposed WAP. After review of the Application, NMED issued a Notice of Deficiency (NOD), which included numerous comments regarding waste characterization and audits. The Applicants provided subsequent revision to the permit application in response to the March, 1996 NOD. Because of the Applicants' failure to address issues related to waste characterization at Sites in their responses to NMED NODs, however, NMED concluded that permit conditions for the proposed audit were necessary in order to meet the regulatory requirements of 40 CFR Subparts 264 and 270, as discussed above.

IV. PUBLIC COMMENTS

A. DRAFT PERMIT

The Applicants expressed concern regarding the requirement to obtain a permit modification for each Site intending to ship waste to WIPP. The Applicants also objected to the proposed audit checklist on the ground that the checklist would be "an ineffective tool to use to perform any kind of QA audit because many of its questions are redundant and many would not be important or relevant to evaluating a generator's compliance with the permit." See Comment 62. They suggested that NMED's participation in Site audits be limited to observation. See Comment 63. The Applicants also requested changes in the permit conditions regarding manager close-out of deficiencies, deficiency tracking, and CAR implementation. See Comment 64-66.

In light of numerous public comments, including the Applicants' comments, NMED reevaluated this permit condition. After careful consideration, NMED concluded that the condition was not appropriate, and replaced it with the audit program requirement as described below.

B. REVISED DRAFT PERMIT

The revised draft permit contained a permit condition requiring the Applicants to conduct Site audits and obtain NMED's approval of final audit reports. The permit condition also authorized NMED to observe the audits. NMED must approve the final audit report before a Site may ship a waste stream to WIPP.

The Applicants submitted public comments regarding the proposed audit program. The Applicants argued that NMED should rely on "facility inspection and enforcement", rather than an audit program, to ensure compliance with the WAP. See Resubmitted Comment 63, Comment 151. However, the Applicants suggested that if NMED retained the audit program, it should include conditions specifying audit time frames, conflict resolution, review criteria, acceptance of existing certifications, the role of public comment, and NMED notification prior to Site audits. The Applicants resubmitted earlier public comments regarding audit checklists, audits relating to waste stream profile forms, deficiency tracking, NMED participation, and trend reports, even though the revised draft permit had addressed these issues. See Comments 202-206). Finally, in the Executive Summary, §1.1.2, January 19, 1999, the Applicants stated, "...the Permittees do not object to NMED participation in and the review and appoval of WAP Audits provided that the review process is clearly memorialized and structured to provide timely review and approval" (modifying Comment 151).

C. NMED RESPONSE

1. COMMENT 151

With respect to clearly memorializing and structuring the audit process the Applicants requested that the audit should specify audit time frames, conflict resolution, review criteria, acceptance of existing certifications, the role of public comment, and NMED notification prior to Site audits:

- **Delete the condition requiring NMED approval of final audit reports.**

For the reasons stated above, NMED declines to delete this condition. NMED notes that in subsequent public comments, the Applicants withdrew this request, provided that NMED structure the process to ensure timely review and approval of final audit reports. See Additional Comments, Executive Summary §1.1.2 at p.3 (January 19, 1999).

- **NMED should approve the final audit report within thirty (30) days of receiving all relevant information.**

NMED is currently considering comments on the audit approval time-frame. NMED notes, however,the Applicants have not demonstrated that thirty (30) days would be a sufficient period of time to review and approve final audit reports. Whether thirty (30) days is a sufficient period of time depends on factors which the Applicants have not fully described.

- **NMED should participate in and resolve all conflicts during the audits.**

NMED agrees that it should be authorized to participate in any Site audit. NMED is currently considering comments on whether its participation in audits should be discretionary or obligatory. With respect to resolving all conflicts raised during an audit, NMED does not believe that this request is prudent or necessary. Moreover, issues raised during review of the final audit

report would be directly related to the Permittees' audit process, and it would not be possible to limit NMED commentary to "review of the final report"; limitations in the report might mean limitations in the audit process, and NMED must be able to question whether, for example, the audit addressed all necessary elements and whether the audit was thorough enough based upon report content and results. Therefore, this aspect of the comment cannot be incorporated into the final permit.

- **Audit review criteria should not include actual waste characterization data.**

NMED expects to examine whether waste characterization methods have functioned as designed, rather than examining actual waste characterization data. However, the audit review criteria must include the review of examples of actual characterization results in order to determine whether a Site is complying with the WAP.

- **NMED should accept EPA ORIA Site certifications.**

NMED cannot accept EPA's certification decisions because the EPA Office of Radiation and Indoor Air (ORIA) neither examines nor certifies RCRA-related waste characterization elements comprising the core of the WAP. EPA ORIA expects the Applicants to provide "information on how process knowledge will be used for waste characterization of the waste stream(s) proposed for disposal at the WIPP [and to implement a] system of controls at the Site, in accordance with 40 CFR §194.24(c)(4), to confirm that the total amount of each waste component that will be emplaced in the disposal system will not exceed the upper limiting value or fall below the lower limiting value described in the introductory text of paragraph (c) of §194.24." The cited regulation, 40 CFR §194.24(c), states that "[f]or each waste component identified and assessed pursuant to paragraph (b) of this section, the [Applicants] shall specify the limiting value (expressed as an upper or lower limit of mass, volume, curies, concentration, etc.), and the associated uncertainty (i.e., margin of error) for each limiting value, of the total inventory of such waste proposed for disposal in the disposal system." The only parameters with waste limits are cellulosics, plastics, rubber, and ferrous/nonferrous metals, and water. Of these, only water is common to the waste acceptance criteria (WAC) specified in the revised draft permit. As a result, EPA's examination and certification excludes RCRA components. EPA will not examine any waste characterization information related to hazardous waste, including acceptable knowledge, headspace gas analysis, and solids sampling. EPA ORIA also apparently accepted the QAPP specification limiting solids sampling and analysis to RCRA constituents; as a result, EPA ORIA will not examine solids sampling and analysis procedures. Finally, EPA ORIA will not examine waste management programs as they relate to RCRA characterization, including data validation and verification and Quality Assurance Objectives (QAOs).

Even for acceptable knowledge and radiography, EPA ORIA will not examine significant areas in the WAP regarding hazardous waste and identification of prohibited items. For example, headspace gas and solids sampling is critical to verifying acceptable knowledge under the WAP. However, EPA ORIA does not evaluate volatile radionuclides and does not examine the

analytical results of headspace gas or solids sampling. In short, because EPA ORIA does not examine critical elements of the WAP relating to verification of acceptable knowledge for hazardous waste characterization, NMED cannot rely on EPA ORIA's acceptable knowledge examination and certification.

Finally, EPA ORIA's examinations may be based on the Applicants' Quality Assurance Program Plan (QAPP), which differs from the proposed WAP in many critical aspects. For example, the WAP requires the selection of containers for visual examination based upon a stratified sampling approach; the QAPP does not. If NMED "piggybacked" on EPA ORIA's certification of a Site based on the QAPP, it would be accepting an audit result that violated the WAP and the permit. Moreover, it will be difficult to identify all potential differences between the WAP and QAPP because NMED will not finalize the WAP until permit issuance.

To summarize, NMED cannot accept EPA ORIA's certification as a demonstration of Site compliance with the WAP because (1) EPA ORIA does not audit most technical RCRA-related elements in the WAP; (2) EPA ORIA examines different technical elements in overlapping systems, such as acceptable knowledge, in the WAP and QAPP ; and (3) because NMED has not finalized the WAP, the scope of differences between the WAP and QAPP cannot even be fully identified at this time.

NMED notes that the Applicants withdrew this comment in their public comments submitted on January 15, 1999.

- **Public review of final audit reports is duplicative and unnecessary.**

New Mexico law mandates access to public records. Audit reports produced in response to permit conditions are public records. A member of the public is entitled to review the audit reports and submit written or oral comments to NMED.

The Applicants also misconstrue the public's role in the EPA ORIA certification process. Specifically, EPA ORIA does not provide for public review and comment on the generator Site certification process. In 40 CFR §194.8(b)(2), EPA ORIA stated that "[t]he Agency will announce a scheduled inspection or audit by the Agency with a notice in the Federal Register. In that or another notice, the Agency will also solicit public comment on the relevant waste characterization program plans and Department documentation, which will be placed in the dockets described in §194.67. A public comment period of at least 30 days will be allowed." In other words, the public may comment is on the Applicants' documentation (i.e. QAPjPs), not on EPA ORIA's audit results or approval process. After inspecting a Site, EPA ORIA will place a copy of its compliance determination letter in the public docket. The EPA ORIA process will not provide information "equivalent" to NMED's final audit reports, because the public will not have access to the Applicants' audit reports unless the Applicants submit them to EPA ORIA for inclusion in the public docket. In fact, none of the documents included in the public docket from

the three (3) EPA ORIA inspections to date[1] have included RCRA-related audit results..

Finally, NMED notes that the Applicants withdrew "those portions of the paragraph entitled 'Role of Public Comment' which can be interpreted as suggesting that the EPA Site certification should replace audit review." See Additional Comments, Section 1.1.2 at pp. 2-3 (January 15, 1999).

- **Requiring forty five (45) day notification is not feasible.**

NMED believes that a forty-five (45) notification period is feasible. The Applicants already have target dates for Site inspections well into the next century. At a minimum, the Applicants should be able to provide 30 days notice and a tentative inspection schedule for each fiscal year.

2. COMMENTS 202-206

NMED will provide a written response to these comments after the public hearing. However, NMED has provided a partial written response to Comment 202 in this testimony.

V. AUDIT CHECKLISTS

NMED revised the Applicants' proposed audit checklists to address the specific elements of the WAP. As revised, these checklists include requirements to demonstrate compliance with the WAP, using definitions and quotations from the WAP itself. By requiring the Applicants to use uniform, comprehensive checklists, NMED will be able to consistently evaluate the Applicants' compliance with the WAP. In addition, the revised checklists enhance the ability of audit personnel to consistently evaluate the performance of their Sites, because the relevant WAP requirements are clearly specified in the checklists, rather than referring the personnel to the WAP or some other documents, such as the Transuranic Waste Characterization Quality Assurance Program Plan (QAPP), which is not enforceable under RCRA. Finally, the increased detail and information in the revised checklists decrease the potential for misinterpretation during audits and between Sites.

The revised checklists establish the basis for a more comprehensive and RCRA compliant audit. For example, the revised checklists includes a section regarding waste stream identification, which did not appear in the Applicants' proposed checklists. The revised checklists now includes questions such as, "Does the generator/storage Site define waste stream as waste material generated from a single process or activity that is similar in material, physical form, and hazardous constituents?" This type of question is important because the proper identification of a waste stream is fundamental to the waste characterization process. The revised checklists also

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[1] The three (3) inspections were (1) LANL retrievably stored contact handled debris waste; (2) Rocky Flats retrievably stored contact handled debris waste; and (3) INEEL retrievably stored contact handled waste.

clarify vague statements in the Applicants' proposed checklists. For instance, the Applicants' proposed checklists for acceptable knowledge procedures ask such questions as, "Are the required documents included in the acceptable knowledge record?" The reference to "required documents" is so vague that NMED would be compelled to ask numerous additional questions to ensure that the Site examined the correct documents. Instead, the revised checklists identify specific requirements that must be documented, such as the site map, facility mission description, description of the operations that generate TRU waste, waste identification or categorization schemes, types or quantities of TRU mixed waste generated, including historical generation through future projections, correlation of waste streams generated from the same building, and waste certification procedures for retrievably stored and newly generated wastes. Such clarification focuses the audit process and simplifies NMED's review.

NMED also revised the checklists to ensure that they reflected provisions of the Application incorporated into the revised draft permit. For example, the revised checklists include the following sections that were omitted from the Applicants' proposed checklists: (1) waste summary categories; (2) unacceptable waste; (3) waste acceptance control; (4) laboratory selection; (5) shipment; (6) shipment exclusions; and (7) headspace gas sampling specifications regarding manifold and canister sampling, and sampling through drum lids and carbon filters. The revised checklists must contain these provisions to ensure compliance with the WAP.

The following tables highlight the differences between Applicants' proposed audit program and the audit program required in the revised draft permit. As demonstrated below, the revised draft permit provides a more comprehensive and effective audit program.

Table 1. Attachment B6 Comparison of Differences Between Application and WAP

	DOE Application, Appendix C11	Revised Draft Permit, Attachment B6 or Module II.C -NMED Condition (language modification or addition)	Justification for change
1	NMED is not authorized to approve audit results.	The Applicants must audit the Sites, allow NMED to observe the audits, and obtain NMED approval of the final audit report.	See text, above.
2	NMED is not authorized to participate in audits.	NMED personnel may observe the audits to verify Site implementation of the WAP.	NMED oversight of audits ensures compliance with the WAP.
3	Site audit checklists are based on site-specific QAPjPs, which implement the Transuranic Waste Characterization Quality Assurance Program Plan (QAPP).	Site audit checklists must include, at a minimum, the appropriate checklists found in Tables B6-1 through B6-6 for the audited summary waste category groups. In addition, references to the QAPP are eliminated.	The use of a standard audit checklist at all Sites simplifies and streamlines NMED's review of final audit reports by ensuring that all Sites address compliance with applicable portions of the WAP. References to the QAPP are not appropriate because NMED cannot enforce the QAPP.

	DOE Application, Appendix C11	Revised Draft Permit, Attachment B6 or Module II.C -NMED Condition (language modification or addition)	Justification for change
4	Audit procedures incorporate certain requirements of 10 CFR §830.120 (Quality Assurance), American Society of Mechanical Engineers NQA-1, Part 2.7 of NQA-2, NQA-3, and DOE Order 5700.6C (Quality Assurance).	These references have been deleted.	These references are not RCRA requirements. To the extent applicable, NMED has incorporated similar requirements in the revised draft permit.
5	The audit program manager performs several duties (see text for complete listing).	The audit program manager ensures performance of these duties.	The change streamlines the audit process while providing oversight by the audit program manager.
6	Audit checklists are tailored to evaluate specific activities at a Site.	A single audit checklist is required for all Sites, but Site audits may not include all waste summary category groups. Accordingly, the Sites may indicate the nonapplicability of a portion or portions of the audit checklist and justify the nonapplicability in the "Comment" column. In the event of discrepancies between the permit and the audit checklist, the permit controls.	NMED analysis of final audit reports would be difficult and time-consuming if each Site developed its own audit checklist. In addition, site-specific audit checklists would promote inconsistencies between Sites and conflicts with the permit, requiring oversight by NMED and the Applicants.

	DOE Application, Appendix C11	Revised Draft Permit, Attachment B6 or Module II.C -NMED Condition (language modification or addition)	Justification for change
7	Deficiencies, observations, and CARs are tracked to completion according to established procedures(s).	RCRA-related items will be uniquely identified within the CAR tracking system so that they can be readily tracked. RCRA-related CARs identified by the Sites during self-audits will be evaluated during the Applicants' audit and surveillance program and tracked in the Applicants' tracking systems.	RCRA-related items are uniquely identified so that those items important to WAP compliance are readily identifiable during an audit.
8	NMED not authorized to observe follow-up audits to determine completion of corrective actions.	After a Site completes corrective actions, the Applicants, observed by NMED, will conduct a follow-up audit.	NMED must have oversight of follow-up audits to ensure the completion of corrective actions and compliance with the WAP.

	DOE Application, Appendix C11	Revised Draft Permit, Attachment B6 or Module II.C -NMED Condition (language modification or addition)	Justification for change
9	The Applicants will prepare and issue the final audit report to the Site within 30 days of the completion of the audit.	The Applicants will prepare and issue the final audit report to the Site and NMED within 30 days of the completion of the audit. In addition, the Applicants will provide all WAP-related CAR resolution results to NMED, including a description of audited procedures, completed audit checklists, and narrative descriptions of the scope, purpose, and summary of observations and deficiencies, as well as other documents demonstrating implementation of the WAP. NMED will make the final audit report available for public review and comment. The Applicants will maintain the final audit report and related audit records in the WIPP Operating Record.	As discussed in the text of this testimony, NMED approval of the final audit report is required to ensure that the Applicants are properly implementing and verifying compliance with the WAP.

RH WASTE PROHIBITION

In the revised draft permit, NMED determined to impose a permit condition prohibiting the disposal of remote handled (RH) waste at WIPP (Permit Condition No. II.C.3.h.). The Applicants failed to submit an approvable waste analysis plan describing the procedures for obtaining a detailed chemical and physical analysis of RH waste destined for disposal at WIPP. Moreover, there are substantial questions regarding the applicability of CH waste characterization techniques and the Applicants' capability to characterize RH waste. Even the Applicants acknowledge that they cannot provide technical procedures for RCRA-related RH waste characterization. Finally, although the Applicants have requested construction modifications to the RH waste bay area, such a request raises questions regarding the completeness of the permit application. In any event, NMED declines the request because the Applicants failed to provide the technical information required by RCRA.

I. REGULATORY STANDARD

20 NMAC 4.1.500 (incorporating 40 CFR §264.13) establishes the requirement for an approvable waste analysis plan:

> (a)(1) Before an owner treats, stores, or disposes of any hazardous wastes, or nonhazardous wastes if applicable under §264.113(d), he must obtain a detailed chemical and physical analysis of a representative sample of the wastes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with this Part and Part 268 of this chapter . . .
>
> (b) The owner and operator must develop and follow a written waste analysis plan which describes the procedures which he will carry out to comply with paragraph (a) of this section. . . .

II. THE APPLICANTS FAILED TO SUBMIT AN APPROVABLE WASTE ANALYSIS PLAN FOR RH WASTE

A. THE APPLICATION DOES NOT CONTAIN A WASTE ANALYSIS PLAN FOR RH WASTE

The WIPP RCRA Part B Permit Application (Application), Revision 5.0, submitted on May 26, 1995, proposed to store, manage, and dispose RH waste at WIPP. However, the Application failed to include an approvable waste analysis plan for RH waste as required by 20 NMAC 4.1.500 (incorporating 20 NMAC §264.13).

Revision 5.0 of the Application (p. C-4) stated that the proposed WAP applied to CH waste, but acknowledged that it did not contain any characterization procedures for RH waste, and in fact,

that none had been developed:

> Waste characterization methods [for RH waste] may differ from those currently implemented by the QAPP [and included in the WAP] for CH TRU waste due to the more radioactive nature of the waste. Specific RH-waste analysis methods will be included in the Methods Manual as they are approved by WIPP facility personnel.

In addition, the Applicants have made conflicting statements regarding the applicability of WAP waste characterization methodology to RH waste. The WAP (Rev. 5.0) was based on Revision 0 of the DOE's Transuranic Waste Characterization Program Plan (QAPP)(DOE 1995a), and the QAPP is DOE's document which implements the WAP. This QAPP explicitly acknowledged that it applied only to CH-TRU waste. The most recent QAPP (1998) repeats this admission (Section 1.0 at 1): "This QAPP discusses the characterization of contact-handled transuranic (CH-TRU) waste streams only. Remote-handled transuranic (RH-TRU) waste streams will be addressed in a later revision". This statement directly conflicts with Revision 6.0 of the Application, which states: "Since the DOE has determined that the waste analysis parameters . . . are the same for CH and RH TRU mixed waste, RH will be characterized using the same techniques as are used for CH TRU waste". See C-4, lines 1-4. For the same reason, the Transuranic Waste Characterization Sampling and Analysis Methods Manual (DOE, 1995b), which was devised to support the QAPP, has no relevance to RH waste.

In this light, NMED concluded that the Applicants must submit additional information regarding the chemical and physical analysis of RH waste. Accordingly, in November 1995, NMED issued a Notice of Deficiency. In December 1995, the Applicants responded to the Notice of Deficiency, stating "[a]t this time, detailed information on RH TRU waste characterization methods is not available."

Subsequently, the Applicants submitted Revision 6.0 to the Application. Revision 6.0 asserted that CH waste methods applied to RH waste. However, the Applicants again failed to include any detailed waste characterization procedures for RH waste.

Finally, in their public comments submitted on December 19, 1998, the Applicants concede that the WAP procedures cannot be applied to RH waste. See Comment 167 (headspace gas sampling procedures designed for CH waste cannot be performed in a glovebox, which is required for handling RH waste); Comment 177 (a permit modification must be obtained to add RH TRU-mixed waste characterization methods).

B. THERE ARE SUBSTANTIAL QUESTIONS WHETHER CH WASTE CHARACTERIZATION TECHNIQUES CAN BE APPLIED TO RH WASTE

There are substantial questions whether CH waste characterization techniques can be applied to RH waste. For instance,

- The Applicants failed to present evidence supporting their assertion that CH waste characterization techniques are applicable to RH waste;
- The Applicants failed to explain the application of radiographic analysis to lead-shielded RH waste containers;
- The Applicants failed to describe the application of core technology to RH waste;
- The Applicants failed to adequately address whether modifications to CH techniques would be required for use in radiological containment areas;
- The Applicants failed to address the need for additional equipment, the likelihood of longer periods of time and increased analytical costs, and radiological safety and secondary waste generation issues associated with RH waste characterization;
- The Applicants failed to address potential problems with RCRA analytical methods for RH waste, such as interference, gas generation, and other method limitations;
- The Applicants failed to describe the procedures for acquiring representative samples of RH waste, given the applicable radiation protection requirements for personnel; and
- The Applicants failed to describe the QA/QC requirements for sampling and analysis of RH waste (e.g., the accuracy and precision associated with samples collected in compliance with ALARA principles; the QC criteria applicable to data collected by methods subject to sampling and analytical limitations);

In sum, the Applicants failed to provide any technical information supporting their assertion that CH waste characterization methodologies apply to RH waste. Nor have the Applicants addressed numerous critical technical questions regarding RH waste characterization.

NMED's conclusion regarding RH waste characterization is supported by several commentors, including the New Mexico Attorney General and the Environmental Evaluation Group (EEG). For instance, EEG concurs that the Application failed to "provide detailed discussion of the RH-TRU waste characterization efforts by the generators and/or storage sites." EEG further notes

that DOE contractors (Bild, 1994) have long recognized the need for new facilities for RH waste characterization, but that the Applicant do not expect to construct such facilities for years in the future.

C. DOE CURRENTLY DOES NOT HAVE THE CAPABILITY TO CHARACTERIZE RH WASTE

The Applicants have failed to provide any information regarding procedures to characterize RH waste. In fact, the DOE's own publicly available documents raise substantial questions regarding DOE's capability to characterize RH waste. For instance, DOE's Remote-Handled Transuranic System Assessment (DOE/CAO-95-1143), Appendix C, acknowledges DOE's lack of capability to characterize RH waste:

- Table 1 questions the applicability of DOE's Waste Acceptance Criteria (e.g., identification of liquids, sampling and analysis of sludges) to RH waste. Notably, the table differentiates between two "levels" of RH waste that were never identified in the Application;

- Page C-11 states that for RH waste with certain surface radiation doses, "the existing CH-TRU [RTR] instrumentation becomes unsuitable for characterization of RH-TRU waste";

- Page C-12 acknowledges that DOE currently does not have technology to radiographically examine RH waste containers: "There exists in the DOE RH-TRU system a need to modify existing technology or to develop new technology to replace the RTR system for examination of waste containers with internal lead shielding and/or the occurrence of "high surface dose rate" radiation";

- Table 3 purports to describe DOE facilities with the technology to characterize RH waste, but a footnote explains that this technology "requires modification for use on RH-TRU waste and containers";

- Table 4 indicates that the DOE facilities slated to ship RH waste to WIPP have no plans to develop the capability to conduct radiographic analyses or visual examinations of RH waste, and that most of the DOE facilities have no intent to conduct gas sampling or chemical analyses;

- Pages C-26 and C-27 question DOE's capability to characterize RH waste, stating "there appears to be limited characterization capabilities specifically designed for 'High Surface Dose Rate' RH-TRU waste at the sites identified. In fact, it is unlikely that the current infrastructure for RH-TRU waste characterization would support certification to the WIPP WAC . . . Current capabilities for RTR of RH-TRU waste are essentially nonexistent . . . Only the ANL-W system [for

> headspace gas], which is located in the Waste Characterization Area of the HFEF, is . . . capable of accepting RH-TRU waste . . . DOE will need to develop additional capabilities to support the necessary characterization activities to enable [RH waste] shipment to WIPP."

NMED recognizes that the Applicants may have conducted more research regarding RH waste characterization since the publication of the above-cited document. However, the Applicants failed to provide such information in response to NMED's Notice of Deficiency. Accordingly, NMED must conclude that the Applicants do not have the capability to characterize RH TRU-mixed waste in accordance with the WAP (particularly for waste with high surface dose rates).

III. THE RH WASTE PROHIBITION COMPORTS WITH APPLICABLE LAW

In their public comments, the Applicants contended that the RH waste prohibition was improper and undermined WIPP's mission. Specifically, the Applicants alleged that the prohibition (1) conflicted with the WIPP Land Withdrawal Act (LWA), which authorized the disposal of RH waste; (2) was based on radionuclide content, which NMED cannot regulate under RCRA and HWA; (3) was based on the lack of data in the Methods Manual, which the application no longer incorporated by reference; and (4) created logistical problems, which threatened WIPP's mission.
NMED addresses each argument in turn.

A. THE RH WASTE PROHIBITION DOES NOT VIOLATE THE LWA

The RH Waste prohibition does not violate the LWA. While the LWA Section 7(a) may authorize RH waste disposal, Section 9(a)(1) clearly requires the DOE to comply with all federal laws pertaining to public health and safety or the environment. These federal laws include RCRA. The only exemption is from the RCRA treatments standards and land disposal restrictions. Therefore, the Applicants must obtain a RCRA permit that complies with all applicable requirements of 20 NMAC 4.1.500 (incorporating 40 CFR 264.13), including the submittal of an adequate waste analysis plan. In this case, the Applicants have failed to provide any information demonstrating their ability to characterize RH waste. Accordingly, NMED must prohibit RH waste, and this prohibition does not violate the LWA.

B. THE RH WASTE PROHIBITION DOES NOT VIOLATE THE AEA

The RH waste prohibition does not violate the Atomic Energy Act (AEA). The Applicants assert that the RH waste prohibition is based on the radiation surface dose rate of RH waste, thereby regulating radioactive materials in violation of the AEA. However, NMED based the RH waste prohibition on the Applicants' failure to demonstrate their ability to characterize RH waste, not its radionuclide content. CH waste characterization methods may not be applicable to RH waste because of radionuclide content, but NMED would be forced to prohibit any hazardous waste for which the Applicants could not demonstrate the ability to characterize hazardous constituents.

C. THE RH WASTE PROHIBITION DOES NOT RELY ON THE METHODS MANUAL

The RH waste prohibition does not rely on the Methods Manual. While NMED may have considered the Methods Manual when evaluating the Application, it was the Application, not the Methods Manual, which conceded the lack of ability to characterize RH waste. In fact, it was the Revision 5.0 of the Application, not the Methods Manual, which stated: "Waste characterization methods [for RH waste] may differ from those currently implemented by the QAPP [and included in the WAP] for CH TRU waste due to the more radioactive nature of the waste. Specific RH-waste analysis methods will be included in the Methods Manual as they are approved by WIPP facility personnel." The Applicants never included such methods in the Application, the Methods Manual, or any other publicly-available document. Perforce, NMED must conclude that the Applicants had no such methods. This conclusion does not depend specifically on the Methods Manual, but generally on the utter lack of information in the record.

D. THE RH WASTE PROHIBITION DOES NOT UNDERMINE WIPP'S MISSION

The RH waste prohibition does not undermine WIPP's mission. First, the prohibition is not permanent; the Applicants may, at any time, seek to modify the permit to dispose RH waste, provided they submit detailed RH waste characterization methods. Second, a vital part of WIPP's mission is to protect public health and the environment. Prohibiting hazardous waste which the Applicants cannot characterize fulfills this mission. Finally, WIPP's mission includes compliance with applicable law. In this case, the applicable law is RCRA and HWA, and in particular, 20 NMAC 4.1.500 and 900 (incorporating 40 CFR 264 and 270). These regulations require applicants to provide "all information which must be known to treat store and dispose of the waste." See 40 CFR 264.13(a)(1). The Applicants have not provided this information for RH waste. As a result, NMED cannot authorize the disposal of RH waste. The Applicants should not be offended by the correct application of law.

IV. NMED DECLINES TO REVISE THE RH WASTE PROHIBITION AS REQUESTED BY THE APPLICANTS

For the reasons stated above, the revised draft permit contained the RH waste prohibition. In response, the Applicants resubmitted their objections, but suggested that their "concerns ... would be adequately addressed" if NMED took the following steps:

(1) included the RH Bay as an area in the Waste Handling Building Unit;

(2) authorized modification of the RH Bay;

(3) deleted the RH waste prohibition from the Treatment, Storage and Disposal

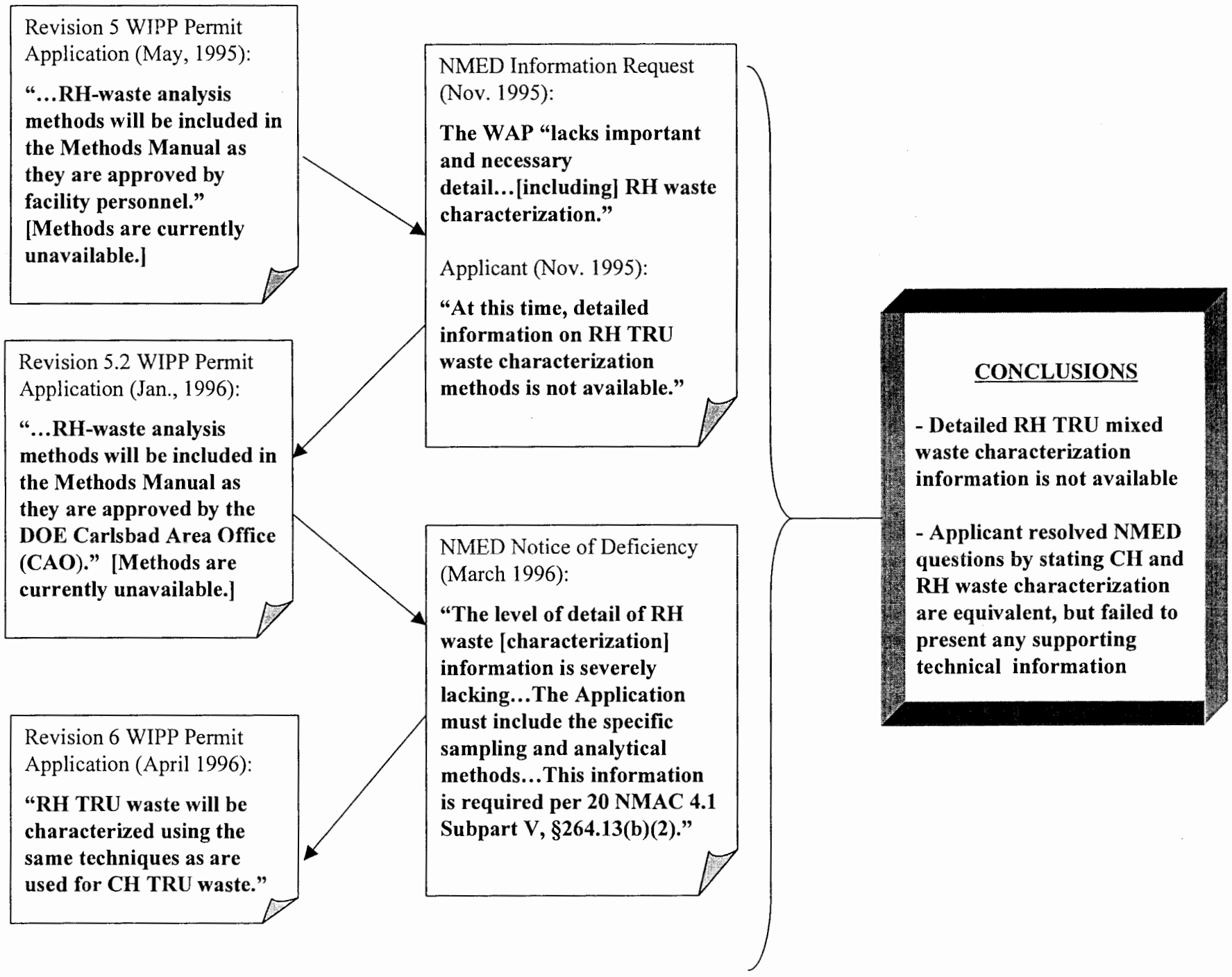
Facility Waste Acceptance Criteria, the WAP, and Permit Attachments B1-B6 and M-M2; and

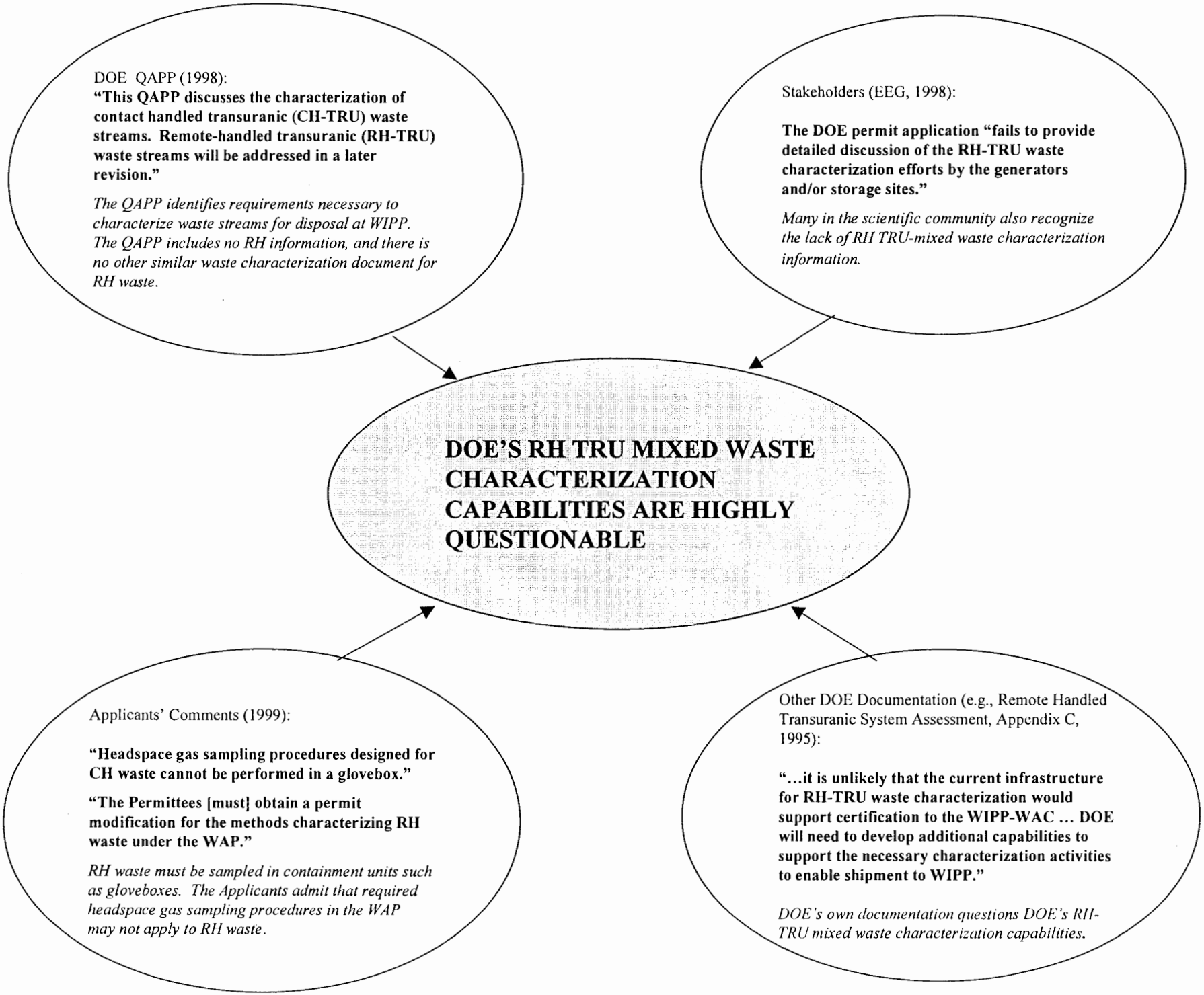
(4) authorized the Applicants to store, manage, and dispose TRU waste if the Applicants obtained a permit modification for RH waste characterization methods, and the storage and management of RH waste in the RH Bay.

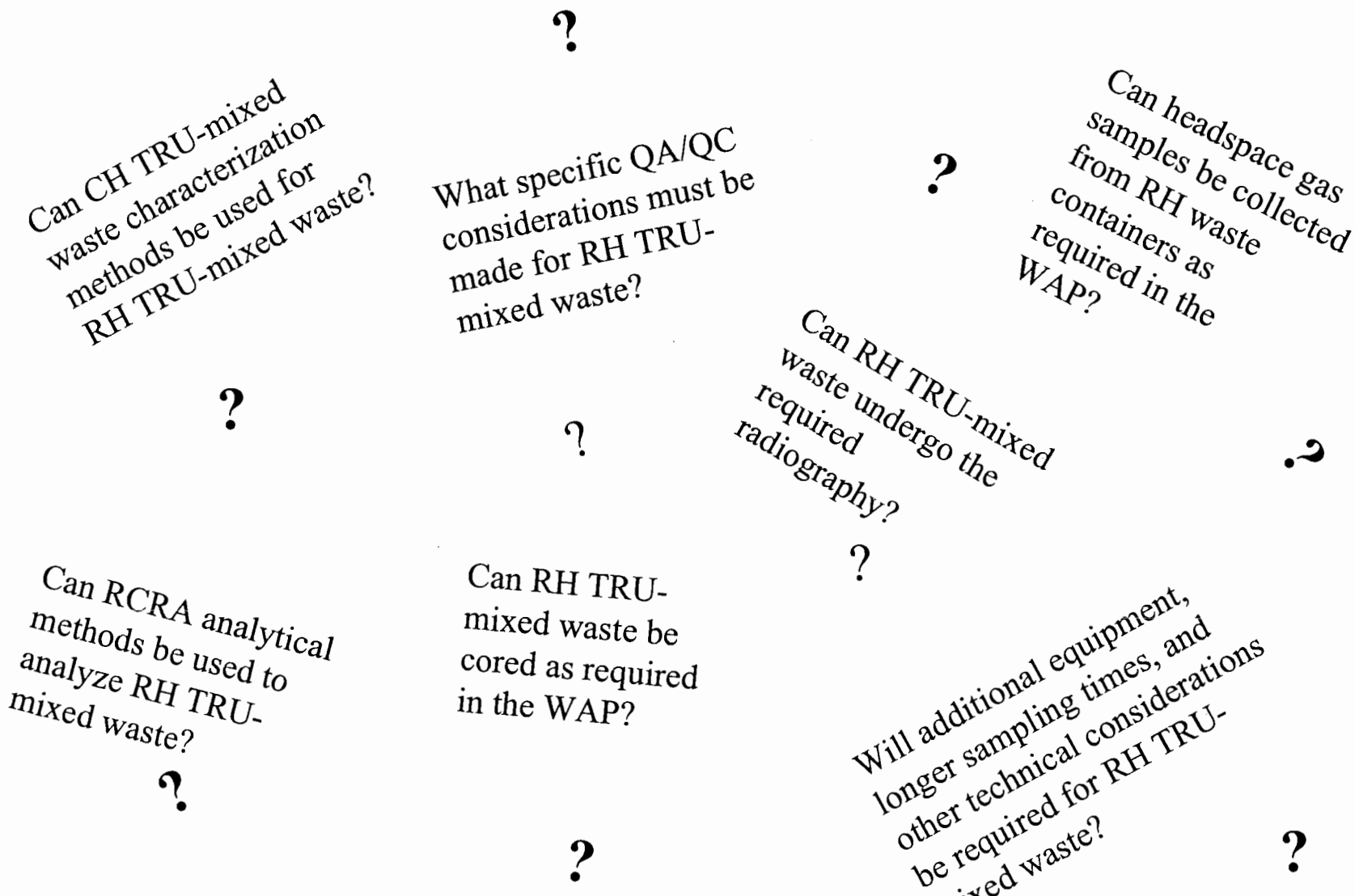
See Comment 177.

NMED believes that the Applicants should have modified their Application to obtain the substantial changes requested in their public comments. Typically, an applicant must amend its permit application to include specific information in support of such substantial changes to the facility and operation. Specifically, 20 NMAC 4.1.900 (incorporating 40 CFR §270.23(a)(2)) requires the permit application to provide "[d]etailed plans . . . describing how the unit will be . . . constructed, operated, maintained, monitored . . . to comply with the requirements of §264.601 and §264.602." For NMED to consider the proposed changes, the Applicants should have modified the Application to submit detailed engineering design drawings, design standards, construction and material specifications, structural calculations, and quality assurance/quality control procedures. Further, the Applicants' late disclosure of the proposed changes precluded NMED from thoroughly reviewing the information, requesting additional information, as necessary, and making a completeness determination. See 20 NMAC 4.1.900 (incorporating 40 CFR §270.10(c)). Even if NMED developed permit conditions authorizing these changes, the public would be precluded from commenting meaningfully on such conditions in violation of RCRA public participation requirements. See 20 NMAC 4.1.900 (incorporating 40 CFR §270); 20 NMAC 4.1.901. Of course, such a process would require additional time, resulting in a delay in the permitting process. Perhaps for this reason, the Applicants declined an invitation to modify the Application in precisely this manner. AR #970425 (April 29, 1997, Letter from Benito Garcia, NMED, to George Dials, DOE, and Joe Epstein, WID). Finally, even if NMED treated the Applicants' public comments as a modification of the Application, the comments do not contain sufficient information, as outlined above, to determine compliance with RCRA.

NMED's determination does not preclude the Applicants from implementing the proposed changes in the future. RCRA establishes a process for modifying a final permit. 20 NMAC 4.1.900 (incorporating 40 CFR §§270.14(a) and 270.42).


Revision 5 WIPP Permit Application (May, 1995):
"...RH-waste analysis methods will be included in the Methods Manual as they are approved by facility personnel." [Methods are currently unavailable.]
Revision 5.2 WIPP Permit Application (Jan., 1996):
"...RH-waste analysis methods will be included in the Methods Manual as they are approved by the DOE Carlsbad Area Office (CAO)." [Methods are currently unavailable.]
Revision 6 WIPP Permit Application (April 1996):
"RH TRU waste will be characterized using the same techniques as are used for CH TRU waste."
NMED Information Request (Nov. 1995):
The WAP "lacks important and necessary detail...[including] RH waste characterization."
Applicant (Nov. 1995):
"At this time, detailed information on RH TRU waste characterization methods is not available."
NMED Notice of Deficiency (March 1996):
"The level of detail of RH waste [characterization] information is severely lacking...The Application must include the specific sampling and analytical methods...This information is required per 20 NMAC 4.1 Subpart V, §264.13(b)(2)."
CONCLUSIONS
- Detailed RH TRU mixed waste characterization information is not available
- Applicant resolved NMED questions by stating CH and RH waste characterization are equivalent, but failed to present any supporting technical information


DOE QAPP (1998):
"This QAPP discusses the characterization of contact handled transuranic (CH-TRU) waste streams. Remote-handled transuranic (RH-TRU) waste streams will be addressed in a later revision."
The QAPP identifies requirements necessary to characterize waste streams for disposal at WIPP. The QAPP includes no RH information, and there is no other similar waste characterization document for RH waste.
Stakeholders (EEG, 1998):
The DOE permit application "fails to provide detailed discussion of the RH-TRU waste characterization efforts by the generators and/or storage sites."
Many in the scientific community also recognize the lack of RH TRU-mixed waste characterization information.
DOE'S RH TRU MIXED WASTE CHARACTERIZATION CAPABILITIES ARE HIGHLY QUESTIONABLE
Applicants' Comments (1999):
"Headspace gas sampling procedures designed for CH waste cannot be performed in a glovebox."
"The Permittees [must] obtain a permit modification for the methods characterizing RH waste under the WAP."
RH waste must be sampled in containment units such as gloveboxes. The Applicants admit that required headspace gas sampling procedures in the WAP may not apply to RH waste.
Other DOE Documentation (e.g., Remote Handled Transuranic System Assessment, Appendix C, 1995):
"...it is unlikely that the current infrastructure for RH-TRU waste characterization would support certification to the WIPP-WAC ... DOE will need to develop additional capabilities to support the necessary characterization activities to enable shipment to WIPP."
DOE's own documentation questions DOE's RH-TRU mixed waste characterization capabilities.



TOO MANY QUESTIONS REMAIN UNANSWERED

WIPP WASTE INFORMATION SYSTEM

I. INTRODUCTION

In the revised draft permit, NMED determined to impose Permit Condition II.C.1.g:

> WIPP Waste Information System (WWIS) database - the Permittees shall provide the Secretary access to the WWIS database as necessary to determine compliance with the WAP. The WWIS shall meet all requirements presented in Section B-4b(1)(i) of the WAP, Permit Attachment B, prior to acceptance of TRU mixed waste. The Secretary's access to the WWIS shall be direct, read-only (via modem or Internet) to all query and reporting functions of the Characterization, Certification, Shipping, and Inventory modules of the WWIS database.

II. DISCUSSION

A. RELATIONSHIP TO PERMIT APPLICATION

The NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.13(a)(1)) require the Applicants to "obtain a detailed chemical and physical analysis of a representative sample of the wastes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste . . . ."

Revision 6.5 of the Application contained a proposed WAP, which described the procedure for transmitting this analytical data:

> Data will be transmitted by hard copy or electronically (provided a hard copy is available on demand) from the data generation level to the generator site TRU mixed waste characterization project level... These data will also be input electronically into the WWIS... Summarized characterization information will be reported on a waste stream basis and transmitted by hard copy or electronically to the WIPP Waste Operations when requested. (Chapter C, page C-35)

Although other records (such as the Waste Stream Profile Form) may be used to "summarize waste characterization" results, and original waste characterization records may be difficult to access for enforcement purposes, the WWIS database was intended to be a principal mechanism to comply with NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.73(b).

B. APPLICANTS' PUBLIC COMMENTS

The Applicants objected to this permit condition on the ground that it imposed an "unnecessary permit condition concerning NMED access to WWIS." See Comment No. 266. Instead, the

Applicants proposed to create NMED Remote Site Query access to WWIS. The Applicants argued that, as an initial matter, NMED access to WWIS was not necessary to determine compliance with the WAP. However, they ultimately agreed to provide NMED with read only access. See Comment No. 223.

C. REGULATORY ANALYSIS

1. The WWIS Is A Type Of "Record" Which Contains The Results of Waste Analysis And Waste Determinations Under State Regulations.

NMED imposed this permit condition for several reasons. First, NMED regards the WWIS database as one type of required "record and results of waste analyses and waste determinations" required to be performed under the permit as specified in 20 NMAC 4.1.500 (incorporating 40 CFR §264.73(b)(3)). This regulation requires the "owner or operator to keep a written operating record which contains specific information until closure of the facility" and requires, among other items, information of "records and results of waste analysis and waste determinations performed as specified in Sections 264.13....." Unlike other TSD facilities, the Applicants have not proposed to perform confirmatory (i.e., "fingerprint") analysis of incoming waste shipments at WIPP as specified in NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.13(a)(4)):

> (4) The owner or operator of an off-site facility must inspect and, if necessary, analyze each hazardous waste movement received at the facility to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper.

Instead, in the Application the Applicants proposed that "testing, sampling, and analytical data will be reported for each waste container" from the data generation level to the generator site TRU mixed waste characterization project level, and that "these data will also be input electronically into the WWIS." However, only "summarized characterization information will be reported on a waste stream basis... to the WIPP Waste Operations when requested." (Chapter C, page C-35, emphasis added). The Applicants further proposed that "records related to waste characterization sampling and analysis activities at the generator sites will be maintained in the testing, sampling, or analytical facility files or site project files for those facilities located on sites." (Chapter C, page C-36, line 13+) This means that all results of waste analysis and waste determinations required under §264.73(b)(3) will be performed, and the original paper copies will remain, at the generator/storage sites, most of which are outside the State of New Mexico.

It is clear that the WWIS is an indispensable part of the facility operating record required by 20 NMAC 4.1.500 (incorporating 40 CFR §264.73). As presented in the Application, the only container-specific data readily available to the Applicants will be the information input electronically into the WWIS. In addition, the Application clearly established the WWIS as an

integral mechanism for transmitting basic characterization data from the generator/storage sites to the WIPP facility, and as such, there is no question that the WWIS contains records and results of waste analysis and determinations. NMED would therefore need access to the WWIS as a type of "record" to verify compliance with the permit.

2. NMED's Access To The WWIS Is Reasonable

NMED's permit condition requiring access to the WWIS is not only supported under the regulations, but is also reasonable. Unlike many other facilities, the Application provides that nearly all waste characterization activities will be performed at out-of-state locations, where the original data exists and will be electronically input into the WWIS. If NMED had no access to the WWIS, they would be required to travel out-of-state to review original data of waste analysis results to ensure compliance with the WAP. This would not only create a substantial hardship upon the agency, but almost certainly result in unnecessary delay for NMED review of final audit reports.

III. CONCLUSION

NMED needs access to the WWIS to verify implementation of the WAP and to determine compliance with numerous permit conditions. As presented in the Application, the WWIS database is an indispensable part of the facility operating record, providing "records and results of waste analyses and waste determinations." As a result, NMED requires access to the WWIS database as specified in Permit Condition II.C.1.g. The Applicants did not propose to furnish NMED with written records of all waste characterization activities, including waste analyses and determinations, even though these original records are also required to be available under the permit. Moreover, NMED's permit condition to access the WWIS is reasonable given the fact that, unlike other facilities, the WIPP permit application provides that all waste data and information will be performed (with the exception of LANL) by out-of-state generators. Therefore, there is a substantial hardship on NMED if it must review original data and waste analysis results at out-of-state generator sites to complete reviews of final audit reports.

FINANCIAL ASSURANCE AND LIABILITY COVERAGE

I. INTRODUCTION

The revised draft permit requires that WIPP's private operator, the Waste Isolation Division (WID), provide financial assurance and liability coverage for closure and post-closure costs. See Modules II(N),(O), (P) and (Q). The condition is based on NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.140(c)).

The Applicants oppose this requirement. See Comments at Executive Summary, p. 5; Comment 14, p. 36; Comment 179, p.77. Their opposition is based entirely upon a legal argument. Specifically, the Applicants argue that (1) WID is exempted from providing financial assurance and liability coverage under 20 NMAC 4.1.500 (incorporating 40 CFR §264.140(c)); (2) requiring WID to provide financial assurance and liability coverage is more stringent than the requirements of the HWA in violation of NMSA 1978 §74-4-4(D); (3) requiring a DOE facility contractor to provide financial assurance and liability coverage lacks precedent; and (4) pursuant to the terms of the operating contract, the cost of financial assurance and liability coverage ultimately would be borne by DOE.

II. NMED MAY REQUIRE FINANCIAL ASSURANCE AND LIABILITY COVERAGE

A. NMED'S IMPOSITION OF FINANCIAL ASSURANCE AND LIABILITY COVERAGE REQUIREMENTS IS BASED ON A REASONABLE INTERPRETATION OF THE NEW MEXICO HAZARDOUS WASTE REGULATIONS

The New Mexico Hazardous Waste Regulations provide that "the requirements of [financial assurance and liability coverage] apply to owners and operators of all hazardous waste facilities except as provided in 40 CFR Section 264.1." 20 NMAC 4.1.500 (incorporating 40 CFR §264.140(a))(emphasis added). 40 CFR §264.140(c) further states that "states and Federal government are exempt from the requirements of this subpart." Id. (emphasis added). The Applicants contend that the exemption for the Federal government extends to private operators of federally-owned facilities. See Comment 179, p.77. They base this interpretation on an EPA opinion to this effect. Fed. Reg. 33198-33199 (May 19, 1980).

NMED previously informed the Applicants that the clear language of §140(c) only exempts "states and the federal government." A private operator of a hazardous waste facility, like Westinghouse Inc., is clearly neither a state nor the federal government; the fact that the facility is owned by the federal government does not change this conclusion. See NMED Letter to Applicants, AR # 970930.

B. NMED'S IMPOSITION OF FINANCIAL ASSURANCE AND LIABILITY COVERAGE IS SUPPORTED BY POLICY CONSIDERATIONS

There are strong policy reasons for imposing financial assurance requirements on WID:

First, financial assurance and liability coverage requirements provide a direct incentive to WID, as the WIPP operator, to properly manage, store, and dispose TRU wastes in a manner calculated to minimize the costs of closure and post-closure. A primary objective of the HWA is to prevent and minimize hazards while the facility is active to eliminate environment risk when the facility closes. Closure and post-closure mark the last point when a hazardous waste disposal facility like WIPP must comply with environmental standards under the HWA. Accordingly, financial assurance and liability coverage requirements ensure that a hazardous waste disposal facility like WIPP will have sufficient funding to properly close the facility is indispensable to compliance with the HWA.

Second, financial assurance and liability coverage requirements force the operator to count the costs of closure and post-closure in the cost of operating the facility. As a result, the operator has a greater incentive to improve operating procedures, to reduce the risk of accidents, and to minimize the quantity of waste released into the environment.

Third, financial assurance and liability coverage requirements ensure the equitable result that WID (the entity directly benefitting from the storage and disposal of TRU waste at WIPP) will bear the costs of closure and post-closure care, rather than the taxpaying citizens of New Mexico.

Fourth, financial assurance and liability coverage requirements are appropriate because WID has an extensive history of non-compliance of environmental laws (approximately 400 violations since 1990). See Disclosure Statement, AR # 970711(7/11/97). The fact that a private operator of a proposed hazardous waste facility has significant environmental violations is, in and of itself, a strong reason for NMED to require financial assurance and liability coverage. Financial assurance and liability coverage requirements may deter the operator from operating the facility in a manner which violates environmental laws, and ensure that clean-up obligations resulting from any violation will be fully funded.

C. NMED HAS LITTLE CONFIDENCE THAT DOE WILL ADEQUATELY FUND CLEAN-UP OBLIGATIONS FOR PROPER CLOSURE OF WIPP

NMED's determination to require financial assurance and liability coverage from WID is buttressed by the fact that DOE has refused to provide any assurance that federal funds will be available for future clean-up obligations and closure. Under the HWA, it is imperative that closure be fully funded. DOE has taken the position in the State of New Mexico, and in other States, that insufficient federal funding is a defense to clean-up obligations. Specifically, in response to numerous compliance orders issued by NMED to DOE's Los Alamos National Laboratories, DOE has argued that under the Anti-Deficiency Act, 31 U.S.C §1341, insufficient funding is an absolute defense to clean-up obligations under state environmental laws. At the DOE Hanford Reservation, DOE has raised this defense to avoid complying with clean-up obligations related to millions of gallons of contaminated water stored in corroded and leaking tanks. In fact, DOE's intransigence has forced the State of Washington to file a notice of intent to sue under RCRA.

Attachment 1. In sum, NMED must assume that DOE will raise the insufficient funding defense in the event of future clean-up obligations at the WIPP facility.

D. AN EPA POLICY OPINION CANNOT BIND THE STATE OF NEW MEXICO'S DECISION TO IMPOSE FINANCIAL ASSURANCE AND LIABILITY COVERAGE UNDER THE HAZARDOUS WASTE ACT

The State of New Mexico is not bound by an EPA opinion regarding financial assurance and liability coverage. Fed. Reg. 33198-33199 (May 19, 1980). This outdated opinion, issued nearly twenty (20) years ago, is based on the discredited assumption that federal agencies would have sufficient funds to cover future clean-up obligations. Since that time, of course, Congress has been forced to enact the Federal Facility Compliance Act to encourage DOE to comply with state environmental laws; DOE has responded by raising the sufficient funding defense under the Anti-Deficiency Act. Obviously, EPA's optimism regarding the willingness and ability of federal agencies to fulfill their state-imposed clean-up obligations has no currency in 1999.

The Applicants also fail to acknowledge that EPA Region 6 concurs in the imposition of financial assurance and liability coverage requirements on WID. First, in correspondence with DOE, EPA acknowledged NMED's authority to impose financial assurance requirements on WID, explicitly stating that "the State may impose financial assurance requirements under State regulations", and that "New Mexico is fully delegated to implement RCRA and their letter of September 24, 1997 clearly indicates that they believe financial assurance is appropriate at this facility." EPA Region 6 Memo to DOE Carlsbad Area Office, 10/14/97, AR # 971013. Second, in public comments on the revised draft permit, EPA stated that the permit should be revised to reflect the imposition of financial assurance on WID, rather than the "permittees."

E. THE IMPOSITION OF FINANCIAL ASSURANCE AND LIABILITY COVERAGE REQUIREMENTS AT A FEDERALLY-OWNED FACILITY IS BASED ON SOUND PRECEDENT

The Applicants assert that the "imposition of financial assurance requirement(s) on a contractor at a major DOE facility is unprecedented." See Comment 179, p.77, ¶ 3. The Applicants rely to heavily on precedent. WIPP presents a case of first impression. It is the first new DOE facility to apply for a RCRA permit since the passage of the Federal Facilities Compliance Act. 42 U.S.C. §6939. As a new facility, there is no question that WIPP must comply with state law. To NMED's knowledge, DOE has not permitted any other privately-operated mixed waste disposal facilities since the passage of RCRA.

Even if precedent were relevant, other States have required financial assurance and liability coverage for private operators of federally-owned facilities. For example, the State of Oregon required the Raytheon Demilitarization Company to provide liability assurances at the U.S. Army's Umatilla Chemical Depot, even though Section 140(c) exempts the federal government from liability coverage requirements. Letter from EPA to DOE, AR # 971013.

III. CONCLUSION

NMED's decision to require financial assurance and liability coverage from WID is reasonable and based upon strong policy considerations. The Section 140(c) exemption clearly applies only to states and the federal government. Further, the financial assurance and liability coverage requirements comports with the intent of the HWA to ensure that properly closure of hazardous waste disposal facilities. Finally, the financial assurance and liability coverage requirements provide a direct incentive for WID to properly manage TRU waste at WIPP in a manner which will minimize future closure costs.

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PROHIBITION ON NON-MIXED TRU WASTE

I. INTRODUCTION

In the revised draft permit, NMED determined to impose Permit Condition IV.B.2.b:

> Specific prohibition - the Permittees shall not dispose non-mixed TRU waste in any unit specified in this Module unless such waste is characterized in a manner identical to the requirements of the WAP specified in Permit Condition II.C.1.

After reviewing public comment, and to clarify the intent of this condition, NMED has determined to revise the permit condition as follows:

> Specific prohibition - the Permittees shall not dispose non-mixed TRU waste in any ~~unit specified in this Module~~ Underground HWDU unless such waste is characterized in ~~a manner identical to~~ accordance with the requirements of the WAP specified in Permit Condition II.C.1. The Permittees shall not dispose TRU mixed waste in any Underground HWDU if the Underground HWDU contains non-mixed TRU waste not characterized in accordance with the requirements of the WAP.

This permit condition protects human health and the environment by ensuring that the waste managed at WIPP are properly characterized. Proper characterization is essential to achieving compliance with the environmental performance standards set forth in 20 NMAC 4.1.500 (incorporating 40 C.F.R §264.601), and to ensuring NMED's ability to enforce the permit.

In addition, NMED clarifies that the condition applies to "any Underground HWDU" at WIPP, not just "any unit." Further, NMED clarifies that the waste must be characterized "in accordance" with the WAP, not merely in a manner "identical to" the WAP.

Finally, NMED adds the last sentence to clarify that the Applicants shall not dispose unpermitted waste in any unit permitted unit under the New Mexico Hazardous Waste Act (HWA).

II. DISCUSSION

A. RELATIONSHIP TO PERMIT APPLICATION

The Applicants have repeated stated their commitment to characterize "all TRU waste" destined for disposal at WIPP "as though it were mixed." This commitment is repeated throughout the Application, related references, and other WIPP documents. In correspondence dated February 14, 1994, George Dials, DOE's Carlsbad Area Office Manager, informed NMED Secretary Judith Espinosa that the Applicants had "no plans or intentions of disposing of any wastes (neither hazardous, radioactive nor mixed) in the WIPP prior to the receipt of a RCRA Part B Disposal Phase permit." Attachment 1. The Application repeated this policy. For example, Revision 6.0

of the Application stated: "Once the WIPP facility has obtained a hazardous waste permit, the facility will be used for the permanent disposal of TRU Waste, including TRU mixed waste containing hazardous constituents regulated under the HWA." See Section B-2, ll.24-26. Table 1 contains a non-exhaustive list of specific examples. Attachment 2.

Further, the Applicants consistently referred to WIPP as a RCRA facility designed for the disposal of RCRA-regulated hazardous waste. The Application expressly defined the WIPP repository as a RCRA "miscellaneous unit. See D-16, l. 3 ("The WIPP facility is a geologic repository mined within a bedded salt formation, which is defined in 20 NMAC 4.1, Subpart I, §260.10 as a miscellaneous unit.") The Application stated that waste would be disposed in "underground hazardous waste management units" (HWMUs) pursuant to 20 NMAC 4.1.500 (incorporating 40 C.F.R. §264). HWMUs are RCRA-regulated units. 20 NMAC 4.1.100 (incorporating 40 C.F.R. §260.10). Table 2 contains a non-exhaustive list of examples from the Application which reflect the Applicants' intent to treat WIPP as a RCRA facility. Attachment 3.

B. APPLICANTS' POLICY CHANGE

Given this commitment, NMED reviewed the Application on the explicit understanding that the Applicants would characterize all TRU waste as if it were "mixed waste" subject to the terms of the permit and the WAP. Consequently, NMED was shocked by DOE's announcement that it intended to dispose waste at WIPP before permit issuance.

After NMED issued the draft permit on May 13, 1998, DOE Deputy General Counsel Mary Anne Sullivan informed NMED Secretary Mark Weidler in a letter dated May 18, 1998, that the Applicants intended to dispose allegedly non-mixed waste at WIPP prior to permit issuance. See Attachment 4. At the same time, in their public comments submitted on August 14, 1998, the Applicants asserted that NMED had no authority under RCRA to regulate non-mixed waste, nor even authority to require the Applicants to characterize non-mixed waste. See Applicants' Comments #2, 15, 42, 43, 50. The Applicants requested that NMED revise the draft permit to reflect its purported lack of authority to regulate non-mixed waste. Id. The Applicants repeated this position in their first public comments on the revised draft permit, particularly in response to Permit Condition IV.B.2.b. See Applicants' Comment Executive Summary 1.1.1 and Comment #155 (December 24, 1998).

In their second public comments on the revised draft permit (January 19, 1999), the Applicants modified their position regarding the disposal of non-mixed waste prior to permit issuance. Specifically, the Applicants withdrew their opposition to the non-mixed waste prohibition, provided NMED slightly modify the prohibition and adopt an exception for pre-permit issuance of non-mixed waste:

> Permit Condition IV.B.2.b: Specific Prohibitions - the Permittees shall not dispose of non-mixed TRU waste in any unit specified in this Module once this Permit becomes effective unless such waste is characterized in a manner that substantially complies with the requirements of the WAP as specified in Permit Module II.C.1.

Exception: The Applicants are allowed to dispose of non-mixed TRU waste during the period before the permit becomes final under the following conditions:

a. The non-mixed waste shall be characterized in a manner that substantially complies with the requirements and/or principles of the WAP and associated provisions set forth in Attachments B1-B6 contained in the Draft Permit;

b. The LANL TA-55 waste stream shall not require further characterization; and

c. The Applicants shall give the NMED at least fifteen (15) days notice of their intent to dispose of non-mixed waste during this period before the Permit becomes final.

See Comment No. 1.1.4, p. 4.

NMED reasonably construes the Applicants' second public comments as an acknowledgment that previous public comments are superseded if NMED adopts the Applicants' proposal outlined above. However, as explained below, NMED continues to assert that it has clear authority under RCRA to prohibit the disposal of non-mixed waste at WIPP to impose this permit condition.

C. REGULATORY ANALYSIS

This section sets forth the specific regulatory and technical bases for imposing revised Permit Condition IV.B.2.b.

As discussed above, NMED reviewed the Application based on the Applicants' explicit and repeated representations that "all TRU waste" destined for disposal at WIPP would be characterized and managed as "mixed waste" in accordance with the permit, and that no waste would be emplaced prior to permit issuance. As a result, NMED imposed a prohibition on the disposal of non-mixed waste which has not been characterized in accordance with the permit. The Applicants now have withdrawn their objection to this prohibition (with the exception of changing the characterization standard from "identical manner" to "substantial compliance").

Nonetheless, NMED believes that it is important to clarify its regulatory authority to impose the non-mixed waste prohibition. Specifically, NMED believes that the Applicants' initial opposition to the non-mixed waste prohibition was not justified for three (3) reasons:

1) The non-mixed waste prohibition is necessary to ensure compliance with the HWA and RCRA;

2) The non-mixed waste prohibition is necessary to protect human health and the environment; and

3) The non-mixed waste prohibition reflects a critical commitment by the Applicants in the Application which, if changed, raises serious questions regarding the accuracy and completeness of the Application.

In sum, the non-mixed waste prohibition is essential to ensure that the Applicants do not dispose unpermitted waste in a RCRA-regulated unit at any time.

1. The Condition Ensures Compliance with the HWA and RCRA

Permit Condition IV.B.2.b prohibits the disposal of non-mixed waste in any "unit" (e.g., HWDU) unless the Applicants have characterized the waste in accordance with the permit. NMED's revised language clarifies the intent of this condition by prohibiting the disposal of mixed waste in any HWDU if the HWDU already contains non-mixed waste that the Applicants have not characterized in accordance with the permit. Simply, the disposal of waste that has not been characterized waste in accordance with the permit poses a direct threat to human health and the environment. It also undermines NMED's ability to enforce the permit and ensure compliance with environmental performance standards.

a. Characterization Issues

The non-mixed waste prohibition ensures that the Applicants characterize all waste in accordance with the permit before disposal in a HWDU. This requirement is essential to protect human health and the environment for the following reasons:

1) Headspace Gas and VOC Information

Permit Condition IV.B.2.b requires characterization of all waste to quantify VOCs in headspace gas to ensure that VOC concentrations in a HWDU room do not threaten human health and the environment. See Permit Condition IV.D. Without this headspace gas information, NMED cannot ensure protection of human health and the environment.

NMED is authorized to impose requirements to prevent "any release that may have adverse effects on human health and the environment due to the migration of hazardous waste constituents in the air." 20 NMAC 4.1.500 (incorporating 40 C.F.R §§264.600 - .601). In addition, NMED is authorized to impose requirements for the collection of "monitoring, testing, analytical data . . . as well as any additional requirements" to achieve this standard. 20 NMAC 4.1.500 (incorporating 40 C.F.R. §264.602). Notably, no other statutory and regulatory regime authorizes the regulation of air releases from WIPP.

NMED believes there is a high likelihood that the headspace gas in non-mixed TRU waste containers may contain VOCs. The release of any VOCs from these containers would constitute a "release" of "hazardous constituents" in the air. See Permit Module VII.A (Definitions). These VOCs might originate from radiolysis, degassing of tape adhesive materials, or other processes that do not otherwise render the waste hazardous. For example, one generator/storage site (Los Alamos National Laboratory) already has justified the presence of VOCs in the headspace of non-mixed TRU waste containers as the product of radiolysis of plastics. See LANL's Confirmatory Sampling and Analysis Plan of Acceptable Knowledge for TA-55-43, Lot. No. 1,

Section XI, Radiolytic Origin of VOCs, p. 30, and Attachment B, pp. 57-63 (Attached to SRIC Notice of Intent filed February 1, 1999).

Moreover, DOE has acknowledged that the radiolysis of plastics in non-mixed waste will generate VOCs. Reed, D.T. and Molecke, M.L.,"Generation of Volatile Organic Compounds by Alpha Particle Degradation of WIPP Plastic and Rubber Material", Materials Research Society Symposium Proceedings, Vol. 333 (1994), cited in Public Comments of New Mexico Attorney General Office (August 14, 1998)(Attachment 6). In fact, Reed and Molecke explicitly state that the VOCs generated by radiolysis are "of interest to the WIPP for quantifying and meeting regulatory compliance issues [under RCRA], since a number of the VOCs we have detected are RCRA-listed compounds. These compounds include halogenated hydrocarbons (chlorine-containing organics), ketones, aldehydes, benzene, and some nitro compounds." Id. at p. 240.

The release of these VOCs "may have adverse effects on human health and the environment due to the migration of waste constituents in the air." 20 NMAC 4.1.500 (incorporating 40 C.F.R. §§264.600 - .601). Several VOCs known to be present in the waste streams, and potentially present in non-mixed waste, destined for disposal at WIPP, are classified as known or potential carcinogens.[1]

Concentration limits for these VOCs are necessary to prevent "any release that may have adverse effects on human health or the environment due to migration of waste constituents in air." 20 NMAC 4.1.500 (incorporating 40 C.F.R. §264.601(c)). Both NMED's and the Applicants' own analyses demonstrate that the average concentration of VOCs in the headspace gas of waste containers in a HWDU room must be limited to protect human health and the environment. To comply with these concentration limits, it is critical that the Applicants quantify VOCs in all waste destined for disposal at WIPP -- both mixed and non-mixed.

The New Mexico Hazardous Waste Regulations provide that "[p]ermits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of waste or hazardous constituents from the unit." 20 NMAC 4.1.500 (incorporating 40 C.F.R. §264.601). The quantification of VOCs in non-mixed waste is critical to fulfilling this mandate.

2) Acceptable Knowledge

The revised draft permit requires acceptable knowledge characterization of TRU mixed waste intended for WIPP, as confirmed by radiographic or visual examination, and headspace gas and solids analysis. NMED has determined that this process will characterize WIPP waste in accordance with 20 NMAC 4.1.500 (incorporating 40 C.F.R. §264.13). If waste is not characterized in this manner, NMED has no confidence in the accuracy of a non-mixed waste determination by a generator/storage site. Based on an inaccurate non-mixed waste determination, the Applicants might accept hazardous waste, or even prohibited waste, in

1 Known or potential carcinogenic VOCs identified in the Application include carbon tetrachloride, chloroform, 1,1-dichloroethylene, 1,2-dichloroethane, methylene chloride, and 1,1,2,2-tetrachloroethane.

violation of the permit. Nor can the Applicants rely on the EPA CCA characterization requirements to characterize non-mixed waste; these requirements, which do not comply with the HWA or RCRA, do not provide adequate assurance that waste will be characterized in accordance with the permit.

3) Radiography and Visual Examination.

The revised draft permit requires radiographic or visual examination of all containers to detect prohibited items, such as liquids and pressurized containers. See Permit Condition II.C.3.j. The Applicants have committed to perform radiographic and visual examination of all containers. If the Applicants fail to conduct such examination, NMED has no confidence that prohibited items would be excluded from WIPP. Moreover, as with acceptable knowledge, the Applicants cannot rely on the EPA CCA radiographic or visual examination requirements.

4) Solids Sampling

The Applicants have committed to perform solids sampling and analysis for Summary Waste Category Groups S3000 and S4000. See Permit Application, Rev 6 (Chapter C, Section C-3, page C-22, line 14+). This sampling and analysis, which would be performed on a statistically selected portion of each mixed waste stream, will be used to confirm the characterization based on acceptable knowledge. As noted above, the Applicants intended to characterize all waste in the same manner, including the coring of non-mixed waste to confirm characterization based on acceptable knowledge. If the Applicants do not perform this sampling and analysis as specified in the permit, NMED has no confidence in the characterizations based on incomplete sampling.

5) Data Management and Quality Assurance

The revised draft permit requires the Applicants to manage information regarding waste characterization, including reporting and quality assurance. See Permit Condition II.C.1.d. These requirements ensure that the Applicants generate and manage information to demonstrate the proper characterization of waste destined for disposal at WIPP. However, if the Applicants fail to comply with these requirements for alleged non-mixed waste, NMED has no confidence that the Applicants will properly evaluate characterization data, and in turn, properly characterize non-mixed waste. Finally, as noted above, the Applicants cannot rely on the EPA requirements, because EPA did not review elements regarding characterization of hazardous waste.

b. Permit Enforcement Issues

The non-mixed waste prohibition ensures the enforceability of other permit conditions.

1) Permit Condition IV.D.1

The non-mixed waste prohibition ensures the enforceability of Permit Condition IV.D.1, which establishes Room-Based VOC Concentration Limits. The VOC limits protect WIPP workers and the public from exposure to harmful VOC concentrations. As previously explained, non-mixed waste may include (or generate) VOCs. See LANL's Confirmatory Sampling and Analysis Plan of Acceptable Knowledge for TA-55-43, Lot. No. 1, Section XI, Radiolytic Origin of VOCs.

The disposal of improperly characterized non-mixed waste makes it extremely difficult to determine the source of VOCs and to take remedial action to abate harmful VOC concentrations.

2) Permit Condition IV.D.2.b

The non-mixed waste prohibition ensures the enforceability of Permit Condition IV.D.2.b, which requires the WWIS to be capable of generating a report identifying the average VOC concentrations on a room and panel basis, based on the actual waste containers disposed and the VOC headspace gas sampling data from those containers. Without data from properly characterized non-mixed waste, NMED could not implement this condition.

3) Permit Condition IV.F.2

The non-mixed waste prohibition ensures the enforceability of Permit Condition IV.F.2, which requires the Applicants to conduct compliance monitoring for VOCs. Without data from properly characterized non-mixed waste, there would no mechanism for allocating the relative contributions from mixed and non-mixed waste, or more generally, for allocating the relative contributions from RCRA-regulated and non-RCRA-regulated units. Further, there would be no mechanism for requiring Applicants to take remedial action (i.e., to close a room or panel), because NMED could not determine the source of the VOC limit violation (i.e., a RCRA-regulated or non-RCRA-regulated unit).

4) General Issues

The non-mixed waste prohibition ensures the enforceability of numerous other permit conditions. For example, NMED's ability to inspect WIPP depends upon access and review of all records, including waste characterization data, required to be kept under the permit. However, if NMED cannot access and review all records, including waste characterization data regarding non-mixed waste, it cannot enforce many permit conditions, particularly since the Applicants have proposed to dispose all waste in the same unit.

2. The Condition Protects Human Health and the Environment

The non-mixed waste prohibition is critical to protecting human health and the environment. 20 NMAC 4.1.900 (incorporating 40 C.F.R. §270.32(b)(2)) requires that:

> Each permit issued . . . shall contain terms and conditions as the Administrator or State Director determines necessary to protect human health and the environment.

If the Applicants do not properly characterize non-mixed waste, prohibited, incompatible, and non-permitted wastes may be disposed which could threaten human health and the environment. Equally important, VOCs in non-mixed waste may result in unregulated emissions in direct violation of the environmental performance standard. Finally, the management of improperly characterized waste could threaten the safe operations of WIPP. The Applicants must characterize non-mixed waste in accordance with the permit to comply with the environmental performance standard. NMED is authorized under 20 NMAC 4.1.900 (incorporating 40 C.F.R.

§270.32(b)(2)) to impose permit conditions for the protection of human health and the environment. Permit Condition IV.B.2.b fulfills this requirement.

3. The Condition Reflects A Critical Commitment By the Applicants Which Cannot Be Changed Without Affecting the Accuracy and Completeness of the Application

NMED regulations require the Applicants to submit an accurate and complete permit application. 20 NMAC 4.1.900 (incorporating 40 C.F.R. §270.11) requires the Applicants to certify that:

> . . . the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

On May 18, 1998, the Applicants informed former Secretary Weidler of their decision to dispose non-mixed waste at WIPP prior to permit issuance. See Attachment 4. This decision calls into question the accuracy and completeness of the application. First, as stated above, the Application never disclosed the Applicants' intent to dispose waste in a proposed RCRA- regulated unit prior to permit issuance. To the contrary, the Application contains the Applicants' express commitment to manage "all TRU waste" as "mixed waste" pursuant to a final permit. For instance, the Application defines the WIPP repository as a "miscellaneous unit" under the HWA and RCRA, describes the underground panels as regulated units under the HWA and RCRA, and acknowledges NMED's jurisdiction to regulate these units under state and federal law. These representations are buttressed by explicit statements to NMED Secretary Judith Espinosa. See Attachment 2. In addition, if the applicants had disclosed their intent prior to the issuance of the draft permit, NMED could have exercised several options including, but not limited to, the following:

- NMED could order the Applicants to submit a revised application which more accurately reflected the newly proposed course of action, similar to the September 2, 1994, order by NMED Secretary Espinosa mentioned in testimony on the regulatory history of this permit;

- NMED could request the applicants to submit additional information as "necessary to clarify, modify, or supplement previously submitted material", pursuant to 40 CFR §124.3(C) ; and

- NMED could deny the Application if it found that the Applicants had "knowingly and willfully misrepresented a material fact in the application for a permit", pursuant to the HWA (§74-4-4.2.D).

The Applicants' effort to withdraw this crucial commitment in public comments on the draft permit also raises substantial questions. The purpose of public comment is to gather information bearing on the draft permit; it is not an opportunity for the Applicants to propose substantive changes to the Application, particularly when such changes undermine the fundamental bases for the draft permit. After the Application is deemed complete, the Applicants can revise their

Application under limited circumstances. See 40 C.F.R. Section §124.3(c). For example, it is appropriate to allow the Applicants to revise their Application to provide accurate and complete information before NMED begins development of a draft permit. See 20 NMAC 4.1.900 (incorporating 40 C.F.R §270.10(c)). But the public comment period on the draft permit is not the appropriate time to revise a fundamental premise of the Application.

NMED's permit condition reflects a critical commitment in the Application. If the Applicants no longer intend to characterize all waste in compliance with the terms of the permit, for the reasons stated above, NMED must consider the Application to be inaccurate and incomplete. Further, NMED must recommend that the Application be remanded for revision to address critical issues regarding non-mixed waste, including whether the Applicants intend to dispose alleged non-mixed waste in a proposed RCRA-regulated unit, the quantity of non-mixed waste involved, the characterization of non-mixed waste, the potential VOC emissions and monitoring, and numerous other issues affecting human health and the environment.

III. CONCLUSION

NMED may prohibit the disposal of unpermitted and unregulated waste in RCRA-permitted units, such as the WIPP underground HWDUs. Such a prohibition may be necessary to ensure that only permitted RCRA waste is disposed under the WIPP permit. The Applicants applied for a RCRA permit in order to dispose waste in underground HWDUs. NMED's determination whether the Application satisfies the HWA application requirements, and NMED's subsequent development of a draft permit, were premised on the Applicants' representation that WIPP and the underground HWDUs would be constructed, designed, and operated for permitted (i.e., RCRA/HWA regulated) wastes. As a result, the non-mixed waste prohibition does not regulate non-mixed waste; rather, it prohibits the unauthorized disposal of unpermitted waste. Moreover, the non-mixed waste prohibition binds the Applicants to their commitment, repeated several times in their Application, that all waste would be treated as mixed waste. Finally, the non-mixed waste prohibition is necessary to ensure compliance with the environmental performance standards for miscellaneous units (20 NMAC 4.1.500 (incorporating 40 C.F.R. §§264.600 - .601)), and to protect human health and the environment (20 NMAC 4.1.900 (incorporating 40 C.F.R. §270.32(b)(2))).

ATTACHMENT 1

Department of Energy
Carlsbad Area Office
P.O. Box 3090
Carlsbad, New Mexico 88221

FEB 14 1994

CAO:GET:

Ms. Judith Espinosa, Secretary
New Mexico Environment Department
1190 St. Francis Dr.
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Espinosa:

In recent discussions, it has been suggested that there exists some confusion and/or concern about the Department of Energy's (DOE) intentions concerning waste disposal at the Waste Isolation Pilot Plant (WIPP) during the Resource Conservation and Recovery Act (RCRA) Part B permitting process. I want to clarify for you that the DOE has no plans or intentions of disposing of any wastes (neither hazardous, radioactive nor mixed) in the WIPP prior to the receipt of a RCRA Part B Disposal Phase permit.

All aspects of our waste disposal plans and intentions would necessarily be divulged during the continuation of the RCRA Part B permitting process that I requested in my letter to the New Mexico Environment Department (NMED) of January 13, 1994. Furthermore, our plans, intentions and approach to the disposal phase operations would be fully addressed by all interested parties (e.g. stakeholders) during the open permit review procedures that I suggested during our meeting with NMED on January 28, 1994 in Santa Fe.

I am certain that we will be able to openly and fully discuss all aspects of the disposal phase operation of the WIPP in the context of the RCRA Part B permit modification process. I remain convinced that that approach, which retains the New Mexico Environment Department in full control of the permitting process and is well within the discretionary authority of the Secretary, is in the best interests of all parties concerned.

I am hopeful that you will favorably consider my January 13th letter and request that we modify the RCRA Part B permit application. We are eager to begin the permit modification efforts and stakeholder interaction meetings in a formally planned and scheduled manner. Please contact me if you have questions or require additional information concerning DOE's position on these matters. I will be pleased to meet with you and other stakeholders for further discussions on these issues at a mutually convenient location and time.

Yours truly,

George E. Dials

George E. Dials
Manager
Carlsbad Area Office

TABLE 1 - CITATIONS REFLECTING THE APPLICANTS' INTENT TO MANAGE ALL TRU WASTE AS MIXED TRU WASTE

- Chapter A of the Application (page A-5, line 20+): "For purposes of this application, *all TRU waste is managed as though it were mixed.*"

- Chapter B of the Application (page B-2, line 24+): "*Once the WIPP facility has obtained a hazardous waste permit, the facility will be used for the permanent disposal of TRU waste, including TRU mixed waste* containing hazardous constituents regulated under the HWA. Prior to initiating the disposal of waste at the WIPP facility, however, the Applicant must also demonstrate compliance with the requirements for Performance Assessment in Title 40 of the Code of Federal Regulations (C.F.R.), Part 191 (EPA, 1993) and the requirements of the land disposal restrictions in 40 C.F.R. Part 268."

- Chapter C of the Application (page C-2, line 17+): "*The WIPP facility requires TRU waste characterization programs to adhere to the requirements specified in this WAP*, and enumerated in the WIPP Waste Acceptance Criteria (WAC), and the Transuranic Waste Characterization QAPP (DOE, 1995a). *All waste characterization activities* discussed in Section C-4 will be carried out at generator sites in accordance with this WAP."

- Chapter C of the Application (page C-3, line 31+): "The Applicants' objective is to operate and maintain the WIPP facility free of both chemical and radiological contamination. Therefore, as allowed by 20 NMAC 4.1, Subpart V, §264.13, and consistent with joint EPA and U.S. Nuclear Regulatory Commission (NRC) guidance, *all waste sampling and analyses will be conducted by the DOE generator sites in accordance with the requirements of this WAP.* The WAP specifies required characterization activities that the generator must complete in order to be able to provide the information needed to send TRU waste to the WIPP facility for disposal. In accordance with this WAP, the generator sites will conduct the required waste characterization activities."

- Chapter C of the Application (page C-27, line 9+): "*All TRU waste will be sampled and analyzed to determine the concentrations of VOCs* (presented in Table C-9) in headspace gases."

- Appendix C6 of the Application (Page C6-6, second bullet): "*Regardless of the hazardous or non-hazardous determination associated with any particular waste stream or individual waste container*, all contact-handled waste will be handled in the same manner during transportation to and emplacement at the WIPP. *All waste will be handled, stored, and disposed in a way that meets the requirements for hazardous waste.*"

- The Applicants assert throughout the Application (page B-12, line 34+; page D-10, line 2+; page D-77, line 12+; page I-3, line 41+; page I-3, line 44+; page I-13, line 1+; page I-14, line 11+ and 44+; Appendix I3) that under "the principle of co-detection, a spill or leak of a radioactive contamination from a waste container would also be assumed to be a

hazardous waste spill or release."

- Transuranic Quality Assurance Program Plan, Interim Change (DOE/CAO-94-1010, November 11, 1996, page 14)(QAPP): "In this WAP, the term TRU waste includes TRU and TRU mixed waste". This document outlines the Applicants' proposed characterization methodology for TRU waste, which was repeated in the Application : "*Therefore, the sampling and analysis requirements of [this document], as included in the permit application, are premised on the commitment that all waste will be characterized in the same manner.*"

- Transuranic Quality Assurance Program Plan (QAPP) (DOE/CAO-94-1010, Revision 0, April 30, 1995)(QAPP). The Application included substantial information from this document. Although the document was updated in 1996, it retained the same basic language and commitments regarding characterization of TRU waste: "*All TRU waste must be characterized to meet the DQOs as specified in Section 1.5 of this QAPP*". In addition, the document (Section 1.5) describes the Data Quality Objectives for solids sampling and analysis, radiography, and headspace gas analysis. The document, which refers generically to "TRU waste", reflects the Applicants' clear intent to characterize all TRU waste in accordance with RCRA.

- The Waste Acceptance Criteria for the Waste Isolation Pilot Plant (DOE/WIPP-069, Revision 5, April 1996) (WIPP WAC) does not distinguish between mixed and non-mixed TRU waste for purposes of characterization. For example, *Table 3.4.5.3-1 presents a summary of the CH-TRU waste characterization methods, but does not present different characterization requirements for mixed and non-mixed waste.* In fact, this table references the QAPP in a footnote, stating that characterization must be performed in accordance with the QAPP, which indicates that both mixed and non-mixed waste will be characterized in the same manner. With respect to RCRA, the WIPP WAC states (p. 3-28): "Sites shall prepare and transmit to the WIPP a Waste Stream Profile Form for *each waste stream* in accordance with Appendix E". In addition, Table 3.5.3.3 presents VOC limits applicable to both mixed and non-mixed waste; because the VOC limits apply to both types of waste, the same characterization methods must be performed to determine VOC content. Although the WIPP WAC notes some differences between mixed and non-mixed waste, and states that the WAP is the reference document for RCRA waste characterization, it states (p.3-3): "*Sites must characterize their waste using the methods defined in the WAP. These methods comply with the requirements defined in the QAPP...*".

- The WIPP Compliance Certification (October 1996) was not attached to or referenced in the Application. However, NMED examined this document and identified several commitments by the Applicants to fully characterize all waste streams. The Applicants make no distinction between mixed and non-mixed waste. For example Section 7.2.3.2: "*The DOE's waste characterization program requires 100 percent measurement of headspace gases*". This statement indicates that the Applicants intended to perform headspace gas analysis of <u>all</u> waste containers, regardless whether mixed or non-mixed.

ATTACHMENT 3

TABLE 2 - CITATIONS REFLECTING THE APPLICANTS' INTENT TO OBTAIN A RCRA PERMIT FOR ALL UNDERGROUND HWDUs

- Chapter A of the Application (page A-5, line 15+): "The geologic repository has been divided into ten discrete hazardous waste management units (HWMU) which are being permitted under 40 C.F.R. Part 264, Subpart X."

- Chapter B of the Application (page B-1, line 9+): "The subject of this permit application is TRU mixed waste disposal at the WIPP. For this permit application, discrete underground HWMUs are defined as eight panels, each containing seven rooms and two access drifts (Figure B-2), and the disposal area access drifts (designated as Panels 9 and 10, Figure B-2a). These units will be appropriately permitted under Title 20 of the New Mexico Administrative Code Chapter 4, Part 1 (20 NMAC 4.1), Subpart IX, §270.15."

- Chapter B of the Application (page B-9, line 2+): "In this application the Applicant is seeking a permit for the disposal of TRU mixed waste at the WIPP facility. Waste disposal will occur in the underground portion of the WIPP facility in areas designated as Panels 1 through 8. Each panel consists of seven rooms and two access drifts mined in a salt bed 2,150 ft (655 m) below the surface. The precise locations and descriptions of the TRU mixed waste units are given in Section B-1b."

- Chapter B of the Application (page B-22, line 1+): "The WIPP facility underground structures are located on the repository horizon 2,150 ft (655 m) under the surface. The underground structures include the active HWMUs, an area for future HWMUs (other panels), the shaft pillar area, interconnecting tunnels, and other areas unrelated to the Disposal Phase activities in this permit application. The underground HWMUs are defined as waste panels consisting of seven rooms and two access drifts each. The HWMUs included in this application are Panels 1 through 8 (Figure B-2), and the disposal area access drifts, designated as Panels 9 and 10."

- Chapter D of the Application (page D-2, line 3+): "The Disposal Phase will consist of receiving . . . contact-handled (CH) . . . TRU mixed waste shipping containers, unloading and transporting the waste containers to the underground HWMUs, emplacing the waste in the underground HWMUs, and subsequently achieving closure of the underground HWMUs in compliance with applicable state and federal regulations. The Applicants are seeking a permit to perform these disposal and closure activities."

- Chapter D of the Application (page D-16, line 3+): "The WIPP facility is a geologic repository mined within a bedded salt formation, which is defined in 20 NMAC 4.1, Subpart I, §260.10 as a miscellaneous unit. As such, HWMUs within the repository are eligible for permitting according to 20 NMAC 4.1, Subpart I, §260.10, and are regulated under 20 NMAC 4.1, Subpart V, Miscellaneous Units."

- Chapter D of the Application (page D-53, line 40+): "The Applicants are requesting a permit to dispose of 6.2 million ft^3 (175,600 m^3) of CH . . . TRU mixed waste in the underground HWMUs designated as Panels 1 through 10."

ATTACHMENT 4

Department of Energy

Washington, DC 20585

May 18, 1998

Secretary Mark E. Weidler
Environment Department
State of New Mexico
Harold Runnels Building
1190 St. Francis Drive
Sante Fe, New Mexico 87502-6110

Dear Secretary Weidler:

Secretary Peña has asked me to follow up with you concerning your letter of February 2, 1998, in which you indicated that "New Mexico would expect the DOE to demonstrate that any TRU [transuranic] waste to be shipped to the WIPP has been fully characterized in accordance with the requirements of RCRA." Enclosed is much of the information used to characterize the waste stream at the Los Alamos National Laboratory (LANL) that DOE has decided to send to WIPP. This waste is referred to as the "TA-55-43, combustible/noncombustible debris waste stream." DOE anticipates that LANL will begin shipping this waste to WIPP in mid-June after the Environmental Protection Agency's (EPA's) rule certifying WIPP's compliance with the disposal regulations becomes effective.

To date this is the only waste stream that DOE has approved for shipment to WIPP before it receives a RCRA Part B permit under the New Mexico Hazardous Waste Act (HWA). DOE will not make decisions about waste streams at other sites (for example, the Rocky Flats Environmental Technology Site or the Idaho National Engineering and Environmental Laboratory) until: (1) EPA completes it audits and inspections of these sites and certifies them; and (2) DOE finally determines that there is non-mixed waste at these sites that can be shipped prior to issuance of the RCRA permit.

There are three broad categories of information that the Department uses to characterize wastes for disposal at WIPP. "Program-level information" consists of information that the Carlsbad Area Office (CAO) uses to determine whether sites can adequately characterize and certify wastes for disposal at WIPP. Most of the documents that contain this information were included with DOE's Compliance Certification Application; if you have a copy of the application, you should already have many of them. Examples include: the Quality Assurance Program Description (QAPD); the Transuranic Waste Certification Quality Assurance Program Plan (QAPP); and the WIPP Waste Acceptance Criteria (WIPP-WAC). I have asked CAO to provide any additional information that it uses for this purpose. If you do not have a copy of the Compliance Certification Application, let me know and I will provide you with copies of the relevant portions.

The second category of information consists of "site-level information." This is the information that CAO and LANL use to characterize and certify wastes at LANL. Enclosed are the following documents containing this category of information:

1. The Acceptable Knowledge Summary Report for TA-55-43 (and four other waste stream) and copies of the documents referred to in that report with two exceptions. The two exceptions are documents that may contain unclassified controlled nuclear information (UCNI); if we confirm that they do, we will make arrangements that will allow you to receive them.

2. LANL's Transuranic Waste Quality Assurance Management Plan (often referred to as the QAPjP), LANL's Transuranic Waste Quality Assurance Management Plan (QAMP) and LANL's Transuranic Waste Certification Plan.

3. The waste management procedures for TA-55 (the facility where this waste was generated) cited in the Acceptable Knowledge Summary Report and prior versions for the period when these wastes were generated.

4. The current and prior versions of the inspection and packaging procedures for transuranic wastes for the period during which these wastes were generated.

I will send you additional site-level information as we gather it.

The third category of information is "container-level information." This information consists of information that confirms that individual containers meet the requirements for disposal at WIPP. Examples of this type of information include:

1. Video tapes of the real time radiography (RTR) that was performed on the drums that originally contained this waste. In order to meet certain transportation requirements, this waste is being repackaged. Each drum contains a number of sealed plastic bags containing waste. These bags are being removed from the drums and placed into waste storage boxes. During this repackaging process, LANL notes the presence of any item that does not meet the waste acceptance criteria for WIPP and removes

it from the waste stream. I have sent copies of these video tapes to Attorney General Udall; I will be sending copies to you as soon as I receive them from LANL.

2. "TRU Waste Storage Records" or "Waste Drum Reports" for each of the drums that are being repackaged. These reports contain detailed information on the contents of each drum. For example, the nature and weight of the material in each plastic bag in a drum is noted. These reports also note whether each bag (referred to as an item and given an "item id" number) contains any hazardous materials. Note that on the forms labeled "TRU Waste Storage Record" there is a box in the upper left quadrant of the first page labeled "Mixed Waste." If the drum does not contain mixed waste (as none of these do), the software that generates this form fills that box with gray stippling. Unfortunately, this stippling darkens when the forms are photocopied and it sometimes appears that the box is blackened.

I will send you additional information on individual containers as it is gathered. Much of this information has already been generated and will be sent to you as soon as I receive it. However, LANL is continuing to characterize individual containers, and thus some of this information is not yet available. I will send it to you as soon as it becomes available. Much of the characterization information that is not yet generated relates exclusively to the radioactive characteristics of the containers and is therefore not relevant to the HWA.

I am also sending this information and a copy of this letter to Attorney General Udall. Please call me at 202-586-6732 or my colleague, Paul Detwiler at 202-586-1371, if you have any questions about this information.

Sincerely,

Mary Anne Sullivan

Mary Anne Sullivan
Deputy General Counsel,
Environment and Civilian
and Defense Nuclear Programs

Enclosures

VOLATILE ORGANIC COMPOUND CONCENTRATION LIMITS

In Table IV.D.1 of the revised draft permit, the New Mexico Environment Department (NMED) established average measured volatile organic compound (VOC) concentration limits in the headspace gas of containers disposed in a single room within an Underground Hazardous Waste Disposal Unit (HWDU). Table IV.D.1 specifies the VOC Room-Based Concentration Limits (in parts per million by volume, or ppmv) for nine (9) VOCs. NMED derived these limits using risk assessment and other methodology to ensure compliance with the environmental performance standard for the migration of waste constituents in air.

I. REGULATORY STANDARD

NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.601) specify the miscellaneous unit environmental performance standards. The regulations state:

> A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit. . . Protection of human health and the environment includes, but is not limited to . . .
>
> (c) Prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air.

II. ANALYSIS

TRU mixed waste containers disposed at WIPP may contain VOCs in the vapor state within the headspace of the containers. There are several processes that may act on the TRU mixed waste within a container to generate gas (e.g., microbial degradation of waste, radiolysis of moisture). The container will be equipped with filter vents to prevent the buildup of gas which might damage the container. Due to the pressure differential created by the generation of gas within the container, the VOCs in the vapor state within the headspace will diffuse across the filter vents in the containers and will be released to the air within the HWDUs (i.e., disposal panel). See NMED Figure 1. The VOCs then will migrate through the mine ventilation system to the mine ventilation exhaust shaft outlet and the atmosphere. See NMED Figure 2. The VOC emissions from both an open room and closed room of an open disposal panel are depicted in NMED Figures 3 and 4.

The NMED and U.S. Environmental Protection Agency (EPA) require the Applicants to use site-specific risk assessment methodology to evaluate the potential risk to human health and the environment due to the emission of hazardous constituents - in this case, the emission of VOCs to air - from a miscellaneous unit. Based on WIPP-specific risk assessments, NMED and Applicants agree that the VOC concentrations in the headspace of containers must be limited to achieve the environmental performance standard for releases to air.

A. BACKGROUND

1. VOC Room-Based Concentration Limits

a. WIPP Application, Revision 5.0

Revision 5.0 of the WIPP RCRA Part B Permit Application (Application)(page C-11) stated that the WIPP facility would not dispose containers with headspace VOC concentrations resulting in emissions not protective of human health and the environment, but failed to specify protective VOC concentration limits. As a result, on November 2, 1995, NMED issued a Request for Information to the Applicants for information regarding VOC headspace gas concentrations, including analytical data, necessary to determine compliance with the environmental performance standard.

b. WIPP Application, Revision 5.2

On January 17, 1996, the Applicants submitted Revision 5.2 of the Application. Revision 5.2 (page C-18) stated that the Applicants had developed waste acceptance criteria limiting VOC headspace gas concentrations to ensure compliance with the environmental performance standard. Table C-5 presented the concentration limits for five (5) VOCs (carbon tetrachloride, chloroform, 1,1-dichloroethylene, 1,2-dichloroethane and methylene chloride). Revision 5.2 did not explain how these limits were derived. However, in their response to NMED's Request for Information (Chapter C. p.14), the Applicants suggested that the limits were based on the risk assessment contained in Appendix D9. In addition, Revision 5.2 (Appendix D9, Table D9-12) presented concentration limits for four (4) additional VOCs (chlorobenzene, 1,1,2,2-tetrachloroethane, toluene, and 1,1,1-trichloroethane). Revision 5.2 stated that these limits were based on saturated vapor concentrations. The Revision 5.2 VOC concentration limits are presented in Column (a) of NMED Table 1.

On March 14, 1996, NMED issued a Notice of Deficiency, requiring the Applicants to revise the Application to include the calculations and justifications for the VOC concentration limits in Table C-5.

c. WIPP Application, Revision 6.0

On April 12, 1996, the Applicants submitted Revision 6.0 of the Application. Revision 6.0 contained additional information regarding the VOC headspace concentration limits in Table C-5. The Applicants stated that the VOC headspace concentration limits in Table C-5 were "maximum average headspace concentrations". This meant that within an individual disposal room, the average VOC concentration must comply with the Table C-5 value, even if some containers in the disposal room exceeded the value. Revision 6.0 also contained a revised Table C-5 specifying concentration limits for nine (9) VOCs (carbon tetrachloride, chloroform, 1,1-dichloroethylene, 1,2-dichloroethane and methylene chloride, chlorobenzene, 1,1,2,2-tetrachloroethane, toluene, and 1,1,1-trichloroethane). Inexplicably, the concentration limit for methylene chloride (100,000 ppmv) was lower than the concentration limit in Revision 5.2 (368,500 ppmv), and the concentration limit of 1,1,1-trichloroethane (100,000 ppmv) was higher than the concentration limit in Revision 5.2 (29,717 ppmv). The Revision 6.0 VOC concentration limits are presented in Column (b) of NMED Table 1.

d. DOE Public Comments

In their written public comment regarding the revised draft permit, the Applicants requested the incorporation of Revision 6.0 VOC concentration limits for 1,1-dichloroethylene, 1,2-dichloroethane and 1,1,2,2-tetrachloroethane into the revised draft permit.

2. Risk Assessment Methodology

a. WIPP Application, Revision 5.0

NMED evaluated the risk assessment methodology used by the Applicants to derive the VOC concentration limits in Revision 5.0 of the Application. The risk assessment methodology was presented in Chapter D and Appendix D9. The discussion of potential risks due to releases to air was brief. See Section D-9d(3) and Table D-3. It purported to calculate the potential risks to human health from the release of VOCs from the headspace of waste containers to a WIPP waste underground worker and a hypothetical member of the public residing at the WIPP site boundary (e.g., the Land Withdrawal Act Boundary) during the WIPP's 35-year operational/closure period. The risk calculations were based on the emission of VOCs by diffusion through the container filters. The risk calculations also assumed that the VOC concentrations in the headspace of containers were the "weighted average drum headspace concentrations". These values were based on analytical data from headspace gas sampling of seven hundred (700) TRU mixed waste containers which the Applicants deemed representative of the waste destined for disposal at WIPP. The "weighted average drum headspace concentrations" are presented in Column (c) of NMED Table 1. Appendix D9 included tables presenting the equations, some assumptions, and the results of the risk calculations for a WIPP waste underground worker and a member of the public at the WIPP site boundary. However, Appendix D9 did not contain a detailed discussion of the assumptions and methodology used for the risk calculations.

On November 2, 1995 (as supplemented on November 16 and 30, 1995), NMED issued a request for additional information regarding the risk assessment, including calculations of the health and environmental risks from air emissions caused by containers breaching during a roof fall; a discussion of the appropriateness of calculating health and environmental risks from air emissions based on headspace gas data from a limited number of containers from two (2) generator sites, rather than representative samples from the full spectrum of containers at all generator sites; a description of the air dispersion model used to calculate VOC concentrations at the WIPP site boundary; and a detailed discussion of the assumptions and methodology used for the risk calculations in Appendix D9.

b. WIPP Application, Revision 5.2

On January 17, 1996, the Applicants submitted Revision 5.2 of the Application. Revision 5.2 (Chapter D) clarified that the risk calculations assumed that containers would remain intact while a panel was open; clarified that the risk calculations did not take credit for intact containers once a panel had been closed; provided a description of the air dispersion model; and included additional information regarding the risk calculations (Appendix D9). Further, the Applicants made two key statements regarding the "weighted average drum headspace concentrations" in their response to NMED's Request for Information (Chapter D). First, the Applicants stated that the headspace gas analyses had been performed on nine hundred thirty (930) drums, not seven

hundred (700) drums. Second, the Applicants asserted that, for purposes of modeling parameters, the drums were representative of the waste throughout the DOE complex.

Revision 5.2 (Chapter D, p. 35) also described the Applicants' proposed environmental performance standard for air emissions from the WIPP. The Applicants applied the environmental performance standard to individual VOCs emitted from the WIPP. For occupational exposure, the Applicants proposed an environmental performance standard consistent with the Eight-Hour Permissible Exposure Limits adopted by the Occupational Health and Safety Administration (OSHA). See 29 CFR §1910. For the public, the Applicants proposed an environmental performance standard based on the health effects of exposure to carcinogens and non-carcinogens. Specifically, the Applicants proposed an acceptable excess cancer risk of exposure to class A and class B carcinogens at one chance in a million of developing cancer (10^{-6}); an acceptable excess cancer risk of exposure to class C carcinogens at one chance in one hundred thousand (10^{-5}); and an acceptable level of risk of exposure to non-carcinogens at a hazard quotient of less than 1.0 (HQ ‹ 1).

Finally, the Applicants described the methodologies used to calculate the exposure concentrations for WIPP waste surface and underground workers and a member of the public living at WIPP site boundary, including the rationale for selecting the VOCs included in the risk assessments; the derivation of the "weighted average drum headspace concentrations"; the background for the equations used in the risk assessments; and the basic assumptions used in the risk assessment for a member of the public living at the WIPP site boundary (e.g., the average concentration of VOCs in the headspace of containers disposed at the WIPP would be the "weighted average VOC headspace concentrations"; the overall mine ventilation rate would be 425,000 standard cubic feet per minute (scfm); the gas pressure mechanism for forcing VOCs from closed waste disposal panels would be a combination of creep closure and gas generation; and the VOCs would be subject to dispersion between the exhaust shaft outlet and the WIPP site boundary).

Based on these risk assessments, the Applicants concluded that, for each of the nine (9) VOCs, the individual occupational exposures for WIPP surface and underground workers would be less than the OSHA limits, and the individual exposure for a member of the public living at the WIPP site boundary would be less than acceptable risk levels.

The Applicants described the methodology for using the results of the risk assessments to calculate VOC limits which would comply with the acceptable risk level for a member of the public living at the WIPP site boundary. See Appendix D9, Section 5.3. Because the risk assessment equations were linear, the Applicants established VOC limits by multiplying the ratio of acceptable risk level to calculated risk by the headspace concentration. In essence, the Applicants' proposed limits were back-calculated from the acceptable risk level for a member of the public living at the WIPP site boundary to derive the "maximum average concentration" of VOCs in the headspace of containers.

The Applicants disclosed these VOC limits in Table D9-11. The Applicants noted that for four (4) VOCs (1,1,2,2-tetrachloroethane, 1,1,1-trichloroethane, chlorobenzene, and toluene), the calculated limit was higher than the compound's saturated vapor concentration. See Appendix D9, pp.27-28. As a result, the Applicants proposed to set the VOC limits for these compounds at the saturated vapor concentrations as shown in Table D9-12 of the Application.

On March 14, 1996, NMED issued a Notice of Deficiency, requiring the Applicants to provide a calculation of the carcinogenic and non-carcinogenic risks to a WIPP non-waste surface worker within the fenced Property Protection Area of the WIPP facility. WIPP non-waste surface workers, such as managerial, secretarial, janitorial, and cafeteria employees, are not directly involved in waste management at the WIPP facility. NMED requested that the Applicants conduct this occupational exposure risk assessment using a reasonable worst-case scenario, because the OSHA standards used to evaluate the occupational exposures for WIPP waste surface workers might not apply to WIPP non-waste surface workers.

NMED also directed the Applicants to calculate a reasonable worst-case scenario risk assessment for WIPP waste underground workers, such as an "accident scenario" in which a roof fall occurs in a full disposal room just before or during closure. NMED requested this risk assessment because it had become clear that regardless whether the Applicants implemented ground control and geomechanical monitoring programs, the Applicants could not guarantee that a roof fall would not occur in an open panel, especially after waste was emplaced. In this light, the risk assessment was necessary to ensure that the Applicants' proposed VOC limits complied with the environmental performance standard after a roof fall in an open panel.

c. WIPP Application, Revision 6.0

On April 12, 1996, the Applicants submitted Revision 6.0 of the Application. The Applicants retained the environmental performance standards proposed in Revision 5.2, and made no changes to the previously-submitted risk assessment methodologies or conclusions regarding public exposure to VOCs. See Chapter D, pp.50, 56.

In response to NMED's Notice of Deficiency, Revision 6.0 contained the occupational exposure risk assessments for WIPP non-waste surface workers. Revision 6.0 also included a risk assessment for WIPP waste underground workers, although not expressly requested by NMED. For these risk assessments, the Applicants assumed that the average VOC concentrations in the headspace of containers within individual disposal rooms would be the VOC limits proposed in Table C-5. The risk assessments indicated that the calculated risk to WIPP non-waste surface and waste underground workers for the nine (9) individual VOCs were equal to or less than the acceptable risk levels.

In response to NMED's Notice of Deficiency, Revision 6.0 also provided an accident scenario risk assessment. See Appendix D9, Attachment 1. Two scenarios were evaluated: (1) a roof collapse in an open room (in an open panel) being filled with containers; and (2) a roof collapse in a closed room (in an open panel) with the ventilation barriers in place.

The Applicants used the following major assumptions for the open room/open panel scenario: (1) the roof collapse would cause twenty one (21) containers to fall and breach; (2) the headspace gas concentrations of the containers would be equal to the "maximum average headspace concentrations" proposed in Table C-5; and (3) the WIPP waste underground worker would be downstream of the open room. This scenario is depicted in NMED Figure 5. Critically, the VOC concentrations resulting from the roof fall would be a maximum acute exposure for the WIPP waste underground worker, because the VOC concentrations would be rapidly dissipated by the high mine ventilation air flow. The risk assessment concluded that, even given this maximum acute exposure, the WIPP waste underground worker would not be exposed to VOC concentrations greater than the National Institute for Occupational Safety and Health (NIOSH)

Recommended Exposure Limits, the NIOSH Immediately Dangerous to Life or Health (IDLH) Concentrations, and the American Conference of Governmental Industrial Hygienists (ACGIH) 8-Hour Time-Weighted Averages.

The Applicants used the following major assumptions for the closed room/open panel scenario: (1) the roof collapse would occur in a closed room with the ventilation barrier in place; (2) the headspace gas concentrations of the containers in the open room would be equal to the maximum average headspace concentrations proposed in Table C-5; (3) the VOC concentrations in the air gap above the containers were equal to the VOC concentrations in the headspace of the containers; (4) the majority (90%) of the contaminated air would escape into the overlying void space created by the collapsed section of the roof and would not be released into the fresh air flowing through the panel; and (5) the WIPP waste underground worker would be downstream of one end of the closed room. This scenario is depicted in NMED Figure 6. Critically, the VOC concentrations resulting from the roof fall would be a maximum acute exposure for the WIPP waste underground worker, because (1) the worker exposure would be very brief because the expulsion of contaminated air from the closed room would be a one-time occurrence; and (2) the VOC concentrations would be rapidly dissipated by the mine ventilation air flow. The risk assessment concluded that, even given this maximum acute exposure, the WIPP waste underground worker would not be exposed to VOC concentrations greater than the NIOSH Recommended Exposure Limits, the NIOSH IDLH Concentrations, and the ACGIH 8-Hour Time-Weighted Averages.

Although not specifically stated in Revision 6.0, the Applicants' primary conclusion from these risk assessments was that the proposed VOC limits in Table C-5 would ensure compliance with the environmental performance standard. For instance, Chapter C (p. 14) states that "the WAC have been developed to limit the VOC concentrations in the headspace of waste containers to those which when averaged will ensure compliance with the performance standards. These limits are presented in Table C-5 as VOC headspace concentration limits."

B. ANALYSIS OF APPLICANTS' PROPOSED VOC LIMITS

NMED has carefully examined the the Applicants' risk assessment and proposed VOC limits. While NMED generally agrees with the Applicants' assumptions, equations, and models, NMED still has several concerns.

As an initial matter, NMED could not establish the precise basis for the Table C-5 values. The Applicants did not submit the actual assumptions and equations used to calculate the proposed VOC limits in Table C-5 within Revision 6.0 of the Application. Moreover, between Revisions 5.2 and 6.0, the Applicants changed some Table C-5 values without explanation. For instance, in Revisions 5.2 and 6.0, the Table C-5 values for four (4) VOCs (carbon tetrachloride, chloroform, 1,1-dichloroethene and 1,2-dichloroethane) did not change, but three (3) other VOCs (chlorobenzene, 1,1,2,2-tetrachloroethane and toluene) changed without explanation. These values might have changed as a result of variations in the assumptions (e.g., the number of open panels) and models (e.g., an updated air dispersion model) between Revisions 5.2 and 6.0, but the Applicants declined to provide an explanation. A comparative history of the Table C-5 values is presented in NMED Table 1.

Second, the Applicants' proposed VOC limits for five (5) VOCs (carbon tetrachloride, chloroform, 1,1,-dichloroethylene, 1,2-dichloroethane, and methylene chloride) were based on

achieving, without any margin of safety, the Applicants' acceptable risk levels for individual VOCs. The margin of safety is critical because changes in the assumptions (e.g., increased gas generation rate, increased air dispersion factor, decreased mine ventilation rate) could result in a higher calculated risk to the resident at the WIPP site boundary. As a result, the Applicants could fill every disposal room in the underground with waste containers with an average concentration of the five (5) individual VOCs at the proposed limits and just meet the proposed acceptable risk levels without any margin of safety. Note that this concern does not apply to the Applicants' proposed limits for 1,1,2,2-tetrachloroethane, 1,1,1-trichloroethane, chlorobenzene, and toluene, since these limits were based on the saturated vapor concentrations for these VOCs.

Third, the Applicants failed to consider the additive effects of exposures to more than one VOC in air emissions from the WIPP. The Applicants evaluated risk from exposure to individual VOCs. They did not account for the total individual excess cancer risk due to exposure to multiple potentially carcinogenic compounds. EPA guidance (Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA 530-D-98-001A, July 1998) at page 7-3 states that within a specific pathway, a receptor may be exposed to more than one Chemical Of Potential Concern (COPC). The total cancer risk associated with exposure to all COPCs through a single exposure pathway is estimated by summing the cancer risk for all the COPCs for that pathway. In the EPA Region 6 Risk Management Addendum - Draft Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (EPA-R6-98-002, July 1998) at page ADD-3, the EPA suggests that "target levels" (e.g., acceptable risk levels) for carcinogenic risk should be based on the total individual risk associated with potential carcinogens released from a single facility and that the total individual risk should not exceed one in one hundred thousand (10^{-5}). The EPA Region 6 document also states that for RCRA permitting decisions, the acceptable risk range should be set between one in one hundred thousand and one in one million (10^{-5} to 10^{-6}). For air emissions from the WIPP, NMED believes that the acceptable risk level for a resident living at the WIPP site boundary should be one in one million (10^{-6}) to account for inherent uncertainties in the assumptions forming the basis of the risk calculations. Accordingly, the NMED calculated the total individual carcinogenic risk for the resident living at the WIPP site boundary (using the Permittees's proposed VOC limits) to be 1.7 in one hundred thousand (1.7×10^{-5}), or seventeen (17) times greater than an acceptable risk of one in one million (10^{-6}).

Fourth, for a WIPP non-waste surface worker, the exposure to 1,2-dichloroethane and 1,1,1-trichloroethane as individual COPC slightly exceeded the respective acceptable excess cancer risk levels. NMED's acceptable cancer risk level for a WIPP non-waste surface worker is one in one hundred thousand (10^{-5}). Assuming the Applicants' proposed VOC limits, NMED calculated the total individual carcinogenic risk to a WIPP non-waste surface worker near the WIPP exhaust shaft to be 2.6×10^{-5}, or 2.6 times greater than an acceptable risk of one in one hundred thousand (10^{-5}). As a result, NMED concluded that the Applicants' proposed VOC limits exposed a WIPP non-waste surface worker to an elevated cancer risk.

Finally, NMED determined that the Applicants' calculation of occupational exposures resulting from a roof fall (e.g., the accident scenario) was flawed. For instance, in both the open and closed room scenarios, the Applicants failed to evaluate occupational exposure to four (4) VOCs (chlorobenzene, 1,1,2,2-tetrachloroethane, toluene, and 1,1,1-trichloroethane).

For both the open and closed room scenarios, NMED also determined that the Applicants' proposed VOC limits would not protect the health of a WIPP waste underground worker as noted below.

For the open room scenario, NMED found that the Applicants' calculated VOC concentrations (based on the Applicants' proposed VOC limits) immediately after a roof fall were approximately half of the correct values. See Table D9-ATT 1-2. Moreover, NMED could not ascertain the source of the Applicants' erroneous values. In fact, NMED determined that the correct values for two (2) VOCs, 1,2-dichloroethane and 1,1,1-trichloroethane, immediately after a roof fall would exceed the IDLH limits. The NMED-calculated worker exposure concentrations and the corresponding NIOSH IDLH concentrations immediately after a roof fall in an open room are presented in NMED Table 2.

For the closed room scenario, NMED found that the Applicants' calculated VOC concentration of 1,2-dichloroethane (based on the Applicants' proposed VOC limit) immediately after a roof fall would exceed the IDLH limit. See Table D9-ATT 1-4. In addition, NMED discovered that the Applicants had not calculated VOC concentrations of four (4) VOCs, 1,1,2,2-tetrachloroethane, toluene, and 1,1,1-trichloroethane. When NMED calculated these concentrations (based on the proposed VOC limits) immediately after a roof fall, it determined that the concentrations would exceed the IDLH limits. The NMED-calculated worker exposure concentrations and the corresponding NIOSH IDLH concentrations immediately after a roof fall in a closed room are presented in NMED Table 2.

C. NMED'S CALCULATION OF VOC CONCENTRATION LIMITS

1. Draft Permit

In light of the above concerns regarding the Applicants' proposed VOC limits, NMED substantially lowered the proposed VOC limits in Table IV.D.1. NMED proposed these limits to ensure that air emissions from the WIPP would comply with the environmental performance standard of 20 NMAC 4.1.500 (incorporating 40 CFR §264.601(c)).

Revision 6.0 indicated that the "weighted average headspace concentrations" (Tables C2-1 and D9-1) were based on the results of headspace gas sampling from nine hundred thirty (930) drums and that these containers were considered representative of waste throughout the DOE complex. See Section D-9b(4)(c), p. D-52, ll. 32-35. The Revision 6.0, Table C-5, VOC headspace concentration limits were not based on actual samples of the headspace gas of containers. The Table C-5 VOC limits were intended to represent the maximum average VOC concentrations that could be disposed in the WIPP without air emissions exceeding environmental performance standards. However, NMED believed that the Table C-5 concentrations were not realistic for the purposes of determining modeling parameters because on average, the waste destined for WIPP would not exceed (or even approach) these concentrations. As a result, NMED believed that the VOC limits in the draft permit could be set at a level between the "weighted average headspace concentrations" and the limits in Table C-5 without creating operational difficulties for the Applicants.

Accordingly, NMED calculated the VOC limits by taking the log-average of the VOC limits in Table C-5 and the "weighted average headspace concentrations" in Table C2-1. The equation for this calculation was: 10**[(log(Table C-5) + log(Table C2-1))/2]. For instance, for carbon

tetrachloride, NMED used the equation: 10**[(log(7510) + log (376))/2] = 1680. NMED used the log-average because it was conservative (e.g., less than the arithmetic average), which is appropriate when dealing with values varying by orders of magnitude.

NMED used these VOC limits to calculate the Concentrations of Concern (COCs) for the Confirmatory Volatile Organic Compound Monitoring Program (VOC Program). See Attachment N. There is a direct (linear) relationship between (1) the VOC limits and the exhaust shaft concentrations for each VOC; and (2) the exhaust shaft concentrations for each VOC and the E-300 Drift COCs. NMED determined that the Applicants might have difficulty quantifying the E-300 Drift COCs because the COCs were close to, or below, the Method Detection Limits (MDLs) for the VOC Monitoring Program's proposed analytical methods. To ensure that the Applicants could reliably quantify the VOCs in the E-300 Drift for comparison to the COCs, NMED set the COCs no less than five (5) times the associated MDL. NMED then back-calculated the VOC limits necessary to achieve the desired COCs. NMED specified these VOC limits in Table IV.D.1 of the draft permit. These limits are presented in Column (d) of NMED Table 1.

It should be noted that these VOC limits were at least one order of magnitude higher than the "weighted average headspace concentrations" which the Applicants asserted were representative of waste throughout the DOE complex. These VOC limits also were 0.5 to 1.5 orders of magnitude lower than the Applicants' proposed VOC limits in Table C-5 of Revision 6.0.

2. Revised Draft Permit

In public comments regarding the draft permit, the Applicants argued that NMED's proposed VOC limits were substantially lower than necessary to protect human health and the environment. The Applicants also contended that NMED's proposed VOC limits were substantially lower than the Applicants' proposed VOC limits in Revision 6.0, which had been calculated in accordance with the applicable EPA and OSHA standards.

For the reasons stated above, NMED did not agree that the Applicants' proposed VOC limits were calculated in accordance with EPA guidance. However, in light of the Applicants' concerns, and in accordance with the environmental performance standard of 20 NMAC 4.1.500 (incorporating 40 CFR §264.601(c)), NMED reevaluated the proposed VOC limits in Table IV.D.1.

To calculate VOC limits primarily based on human health risk and occupational exposure, NMED conducted an independent risk assessment in accordance with EPA guidance, using appropriate assumptions regarding the operation of the WIPP facility. Specifically, NMED calculated the proposed VOC limits in Table IV.D.1 of the revised draft permit as follows:

a. Total Risk

The overriding criterion for specifying VOC limits is that for a maximally exposed person, the total risk from VOCs in the WIPP exhaust air (assuming a minimum overall mine ventilation rate of 260,000 scfm) will not exceed acceptable risk levels. NMED has set the acceptable risk levels as follows: (1) for a resident living at the WIPP site boundary, the total individual excess cancer risk from exposure to carcinogens and potential carcinogens shall be one in one million (10^{-6}); (2) for a WIPP non-waste surface worker, the total individual excess cancer risk from exposure to

carcinogens and potential carcinogens shall be one in one hundred thousand (10^{-5}); and (3) for all persons, the acceptable risk level for exposure to non-carcinogens shall be a Hazard Index of less than 1.0.

NMED determined that for all WIPP workers, a higher acceptable risk level was warranted because the Applicants could exert control over the occupational exposures of WIPP workers at the WIPP site. As the Applicants' "employees", these workers are covered by the OSHA occupational exposure standards and health and safety regulations of the Mine Safety and Health Administration (MSHA). Further, occupational exposures typically are not evaluated in facility risk assessments. Finally, WIPP workers would not be exposed for as long as residents living at the WIPP site boundary (e.g., approximately 10 years versus 35 years). On the other hand, NMED identified WIPP non-waste surface workers as the human receptors potentially receiving the largest chronic exposure to VOCs emitted by the WIPP. In addition, due to the proximity of the WIPP support buildings to the exhaust shaft, there is a potential for WIPP non-waste surface workers to be stationed in the exhaust shaft area. These WIPP non-waste surface workers may include workers who are potentially at greater risk than other WIPP workers due to age, disability, or medical condition. Finally, as discussed below, NMED could not discount the probability that WIPP waste underground workers would have acute exposure to elevated VOC concentrations resulting from a roof fall in an Underground HWDU. Therefore, NMED balanced these factors in specifying VOC limits that were based on worker exposure and the acceptable risk levels for WIPP workers.

To calculate the risk-based VOC limits, NMED developed a computer spreadsheet capable of reproducing the Applicants' results in Revision 6.0, Appendix D9. As noted above, although NMED generally concurred with the assumptions, equations, methodology, and models used by the Applicants, it changed the following assumptions: (1) decreased the minimum mine ventilation rate (425,000 scfm to 260,000 scfm); and (2) changed the Reference Concentration (RfC) for 1,1,1-trichloroethane to a compound-specific value. NMED Figure 7 presents the major assumptions NMED used in performing the risk assessment.

Because the WIPP non-waste surface worker was identified as the human receptor potentially receiving the largest chronic VOC exposure, NMED determined that the VOC limits should be established to ensure that this worker's total individual risk from VOCs in the WIPP exhaust air would not be greater than the acceptable risk level. To obtain the VOC limits, NMED apportioned a total carcinogenic risk of one in one hundred thousand (10^{-5}) equally between the carcinogenic VOCs, and a total non-carcinogenic hazard quotient of 1.0 equally between the carcinogenic VOCs. From these apportioned values, NMED back-calculated an initial set of VOC limits.

2. Chlorobenzene and Toluene

For two (2) VOCs (chlorobenzene and toluene), NMED reduced the initially calculated VOC limits to ensure that their concentrations in the air of a closed disposal room would not exceed the respective Lower Explosive Limit (LEL). In general, the LEL is defined as the lowest concentration of a chemical (fuel) in the air that will ignite. NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.31) require that "Facilities must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or . . . which could threaten human health or the environment." Because a closed disposal room is isolated from the mine ventilation system, the VOCs in the headspace would diffuse through container filters, but

not be removed by mine ventilation air. As a result, the VOC concentrations in the air of a closed disposal room would equilibrate to approximately the average concentration of the VOCs in the containers in the closed disposal room. Six (6) of the nine (9) regulated VOCs are flammable and have specific LELs. In this circumstance, a roof fall in a closed disposal room could produce friction (and sparks) resulting in gas ignition and explosion. Therefore, NMED reduced the VOC limits for chlorobenzene and toluene to ensure that the average concentrations of these VOCs in the air of a closed disposal room do not exceed the respective LELs.

3. Methylene Chloride

For one (1) VOC (methylene chloride), NMED specified a VOC limit below the acceptable risk level and LEL because the Applicants explicitly requested a lower limit in Revision 6.0.

4. 1,1,1-Trichloroethane and 1,2-Dichloroethane

For two (2) VOCs (1,1,1-trichloroethane and 1,2- dichloroethane), NMED established the VOC limit below the acceptable risk levels to ensure that the concentrations of these VOCs in the air of an Underground HWDU after a roof fall would not exceed the IDLH levels.

First, NMED evaluated whether the initial set of NMED calculated VOC limits would be protective of worker health after a roof fall in an Underground HWDU. For the most part, NMED used the Applicants' assumptions and equations in Revision 6.0, Appendix D9, Attachment 1. NMED then compared the results of these calculations to the most restrictive occupational exposure guidelines for each VOC (e.g., the most recent NIOSH and ACGIH guidelines). NMED's analysis indicated that for two (2) VOCs (1,2-dichloroethane and 1,1,1-trichloroethane), the initially calculated VOC limits must be decreased to ensure that the concentrations of these VOCs in the air immediately downstream of a roof fall event would not exceed the IDLH levels. The NMED- calculated worker exposure concentrations immediately after a roof fall (assuming VOC limits from the revised draft permit) are presented in Columns (d) and (e) of NMED Table 2.

In conclusion, NMED believes that the proposed VOC limits in Table IV.D.1 will ensure that VOC emissions from the WIPP will comply with the environmental performance standard for prevention of releases which may have adverse effects on human health or the environment due to migration of waste constituents in air. See 20 NMAC 4.1.500 (incorporating 40 CFR §264.601(c)). These limits specified in Table IV.D.1 are reproduced in Column (e) of NMED Table 1.

NMED also believes that the VOC limits in Table IV.D.1 address the Applicants' comments regarding the draft permit. For two (2) VOCs (carbon tetrachloride and chloroform), the proposed VOC limits are greater than requested by the Applicants in Revision 6.0. For one (1) VOC (methylene chloride), the proposed VOC limit is the same as requested by the Applicants in Revision 6.0. For the remaining six (6) VOCs, the proposed VOC limits are less than one order of magnitude different from those requested by the Applicants in Revision 6.0.

D. RESPONSE TO COMMENTS

1. Roof Fall

In public comments regarding the revised draft permit, the Applicants contended that NMED's proposed VOC limits based on the accident scenarios were arbitrary because NMED failed to consider the probability of the accident scenarios. See Comment E.1-156.
NMED believes that if the probability of the accident scenario (e.g., roof fall) is greater than zero, it is not a relevant factor in setting VOC limits to protect workers. Specifically, NMED's position is that if the probability of the accident scenario is greater than zero, the environmental performance standard supports the specified VOC limits to protect workers. In this case, NMED determined that the probability of the accident scenario is greater than zero, especially for the disposal rooms in Panel 1. The RCRA Contingency Plan (Revision 6.0, Chapter G, p.33) suggested that a roof fall is not likely because of monitoring and ground control programs at the WIPP. The Applicants' accident scenario evaluation states that a roof collapse in Panels 2 through 8 is considered an incredible event # 10^{-6} because the panels will be mined, filled with waste and closed before a roof fall in these panels becomes a concern. However, the Applicants state that Panel 1, which has a longer life span, has been addressed as a special case for the roof fall scenario. The Applicants further state that even in Panel 1, such a roof fall is considered unlikely (frequency of occurrence between 10^{-2} to 10^{-4}). See Revision 6.0, Appendix D9, Attachment 1. Both The RCRA contingency plan and Appendix D9, Attachment 1, reference the 1995 Safety Analysis Report (p.5-55) which acknowledged that the quantitative estimate of a seven hundred (700) ton roof fall in the Panel 1 disposal rooms ranges from one in one hundred (10^{-2}) to one in ten thousand (10^{-4}). As a result, NMED concluded that the probability of a roof fall in Panel 1 was significantly greater than zero (and greater than zero for Panels 2-8), and specified VOC limits for 1,2-dichloroethane and 1,1,1-trichloroethane to protect workers.

NMED acknowledges that the Applicants could protect WIPP waste underground workers from IDLH exposures resulting from a roof fall through the use of personal protection equipment, such as self contained breathing apparatus (SCBA). However, the Applicants did not propose the use of such equipment.

NMED notes that the VOC limits based on IDLH levels resolve the RCRA-related issues raised by some commenters regarding the stability of Panel 1. Specifically, twelve (12) commenters raised concerns regarding the predicted safe and useful life of Panel 1. See Comments B-1, N-12, N-69, N-81, N-82, S-1e, S-18, S-19, CC-2, DD-5, AA-2a, and AA-2b. Some of these comments recommended the prohibition of, or more stringent limitations on the use of Panel 1, as well as additional evaluation of panel stability. Four (4) comments suggested additional requirements for a ground control program. See Comments N-70, N-71, N-72, and N-73. NMED does not believe it is possible to guarantee that a roof fall will not occur in any disposal room, even if NMED imposed the most stringent ground control program. Moreover, NMED is cognizant that RCRA is intended to regulate hazardous wastes, not mine safety. Therefore, NMED determined that its authority extended to regulating the VOC concentrations in disposal rooms to protect workers in the event of a roof fall, but not to protecting workers from other consequences of a roof fall.

Finally, because NMED's proposed VOC limits would prevent acute exposures to WIPP waste underground workers, and given the dilution factor resulting from the large volume of ventilation air flowing through the WIPP exhaust shaft, NMED believes that WIPP non-waste surface workers and residents living at the WIPP site boundary would not be exposed to VOC concentrations exceeding acceptable risk levels.

2. Occupational Exposure

In public comments on the revised draft permit, the Applicants contended that the use of occupational exposure standards not established by OSHA would be arbitrary, and would unfairly burden the Applicants with an environmental performance standard more stringent than required for other RCRA facilities in New Mexico. See Comment E.1-156. As an initial matter, NMED notes that the VOC limits for 1,2-dichloroethane and 1,1,1-trichloroethane should not pose any operational problem for the Applicants, since they are more than two orders of magnitude greater than the "weighted average headspace concentrations" which the Applicants asserted were representative of waste throughout the DOE complex. Moreover, as noted above, NMED's primary rationale for establishing VOC limits based on accident scenarios was to address public concerns regarding the stability of Panel 1 and occupational exposures for WIPP underground waste workers working there. NMED believes that the environmental performance standard does not preclude protecting these workers and the WIPP non-waste surface workers from WIPP air emissions. Accordingly, NMED finds regulatory support for its decision to protect workers from VOC concentrations which may be immediately dangerous to life and health (IDLH):

1) 20 NMAC 4.1.500 (incorporating 40 CFR §264.31), Design and Operation of Facility

40 CFR §264.31 requires TSD facilities to be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air which could threaten human health. The regulation does not require a determination of the probability of the occurrence of any such release, nor does it set a maximum level of risk or potentiality. However, as noted above, absent a VOC headspace concentration limitation, an accident (e.g., a roof fall in a partially filled and open room or a filled and closed room) might cause the sudden increase in the concentration of VOCs released into the air (e.g., breached containers in a partially filled and open room or the explusion of contaminated air from a filled and closed room), exposing WIPP workers to VOC concentrations exceeding IDLH limits. (Note that NMED's position does not involve the potential release of plutonium or other radiological materials.) The simplest and most effective method of preventing such a release, or reducing the severity and/or impact of such a release, is to limit the VOC concentrations in each disposal room.

2) 20 NMAC 4.1.500 (incorporating 40 CFR §264.601), Environmental Performance Standards

40 CFR §264.601(c) establishes an environmental performance standard preventing air releases which may have an adverse effect on human health or the environment. Relevant factors include: (1) the volume and physical and chemical characteristics of the waste, including the potential emission and dispersal of gases, aerosols and particulates; (2) the effectiveness and reliability of systems and structures to reduce or prevent emissions of hazardous constituents; (3) the operating characteristics of the disposal unit; (4) the atmospheric, meteorologic, and topographic characteristics of the disposal unit and the surrounding area; and (5) the potential health risks resulting from exposure to hazardous constituents in the waste. These factors, among others, require the specification of VOC headspace concentration limits, and do not preclude NMED from protecting worker health. Such limits also are appropriate given the unique character and potential hazards of underground geological repositories (e.g., enclosed disposal operations, roof falls).

3) 20 NMAC 4.1.900 (incorporating 40 CFR §270.32), Establishing Permit Conditions

40 CFR §270.32 establishes a case-by-case approach for imposing permit conditions. In particular, 40 CFR §270.32(b)(2) authorizes the inclusion of conditions deemed necessary to protect human health and the environment, including conditions not expressly required by the RCRA regulations.

E. DEPARTMENT'S RECOMMENDED CHANGE TO REVISED DRAFT PERMIT, TABLE IV.D.1

While evaluating the VOC room-based concentration limits in response to public comments on the revised draft permit, NMED discovered an error in the equation for calculating the maximum one (1) minute VOC concentrations (e.g., the concentrations compared to the IDLH level) for the closed room roof fall scenario. The incorrect equation resulted in the underestimation of the maximum one (1) minute VOC concentrations.

NMED has recalculated the maximum one (1) minute VOC concentrations for the closed room roof fall scenario using the correct equation. See Table 3. The recalculated concentrations were compared to the IDLH levels. The comparison indicated the need to reduce some VOC limits to ensure that the VOC concentrations in the air of an Underground HWDU after a roof fall in a closed room would not exceed the IDLH levels. Specifically, NMED has determined to reduce the VOC limits in Table IV.D.1 as follows:

1) The concentration limit for 1,2-dichloroethane is reduced from 3,350 ppmv to 2,400 ppmv;

2) The concentration limit for 1,1,1-trichloroethane is reduced from 47,000 ppmv to 33,700 ppmv; and

3) The concentration limit for carbon tetrachloride is reduced from 11,475 ppmv to 9625 ppmv.

In addition, the reduction in concentration limits for these VOCs requires NMED to reapportion the carcinogenic risk for chloroform, 1,1-dichloroethene, and 1,1,2,2-tetrachloroethane. This reapportionment increases the VOC limits in Table IV.D.1 as follows:

1) The concentration limit for chloroform is increased from 9,130 ppmv to 9920 ppmv for chloroform;

2) The concentration limit for 1,1-dichloroethene is increased from 5,050 ppmv to 5490 ppmv; and

3) The concentration limit 1,1,2,2-tetrachloroethane is increased from 2,720 ppmv to 2960 ppmv.

The revised VOC Room-Based Concentration Limits are shown in Column (f) of Table 1.

NMED Table 1. History of VOC Headspace Concentration Limits

VOCs to be Limited	(a) Rev 5.2 Jan. 1996 (Table[s] C-5 and D9-12)	(b) Rev 6.0 Mar. 1996 (Table C-5)	(c) Rev 6.0 Mar. 1996 (Table D9-1)	(d) 5/15/98 Draft Permit (Table IV.D.1)	(e) 11/13/98 Revised Draft Permit (Table IV.D.1)	(f) Required Revisions to Table IV.D.1
	Maximum Average		Weighted Average	Maximum Average		
Carbon tetrachloride	7,510	7,510	375.5	1,680	11,475	9,625
Chlorobenzene	16,180[a]	17,660	12.5	1,470	13,000	13,000
Chloroform	6,325	6,325	25.3	1,300	9,130	9,920
1,1 Dichloroethylene	28,750	28,750	11.5	3,150	5,050	5,490
1,2 Dichloroethane	9,100	9,100	9.1	1,325	3,350	2,400
Methylene chloride	368,500	100,000	368.5	6,060	100,000	100,000
1,1,2,2, Tetrachloroethane	7,259[a]	7,924	9.4	1,420	2,720	2,960
Toluene	37,686[a]	41,135	19.4	3,600	11,000	11,000
1,1,1 Trichloroethane	29,717[a]	100,000	317.1	5,630	47,000	33,700

[a] Saturated vapor concentration from Table D9-12 in Revision 5.2

All concentrations in parts per million by volume (ppmv)

NMED Table 2. NMED Calculated Worker Exposure Concentrations Immediately After Roof Fall

VOCs	(a) Open Room	(b) Closed Room	(c) NIOSH IDLH	(d) Open Room	(e) Closed Room
	Assuming Maximum Average VOC Headspace Concentrations From Table C-5 of Revision 6.0			Assuming VOC Room-Based Concentration Limits From Table IV-D.1 of the Revised Draft Permit	
Carbon tetrachloride	55	112	200	84	171
Chlorobenzene	129	263	1000	95	194
Chloroform	46	94	500	66	136
1,1-Dichloroethylene	210	428	NA	39	75
1,2-Dichloroethane	66[a]	136[a]	50	24	50
Methylene Chloride	730	1489	2300	730	1490
1,1,2,2, Tetrachloroethane	58	118[a]	100	20	40
Toluene	300	613[a]	500	80	164
1,1,1 Trichloroethane	730[a]	1489[a]	700	343	700

[a] Worker Exposure Concentration Immediately After A Roof Fall Event Exceeds NIOSH IDLH Concentration

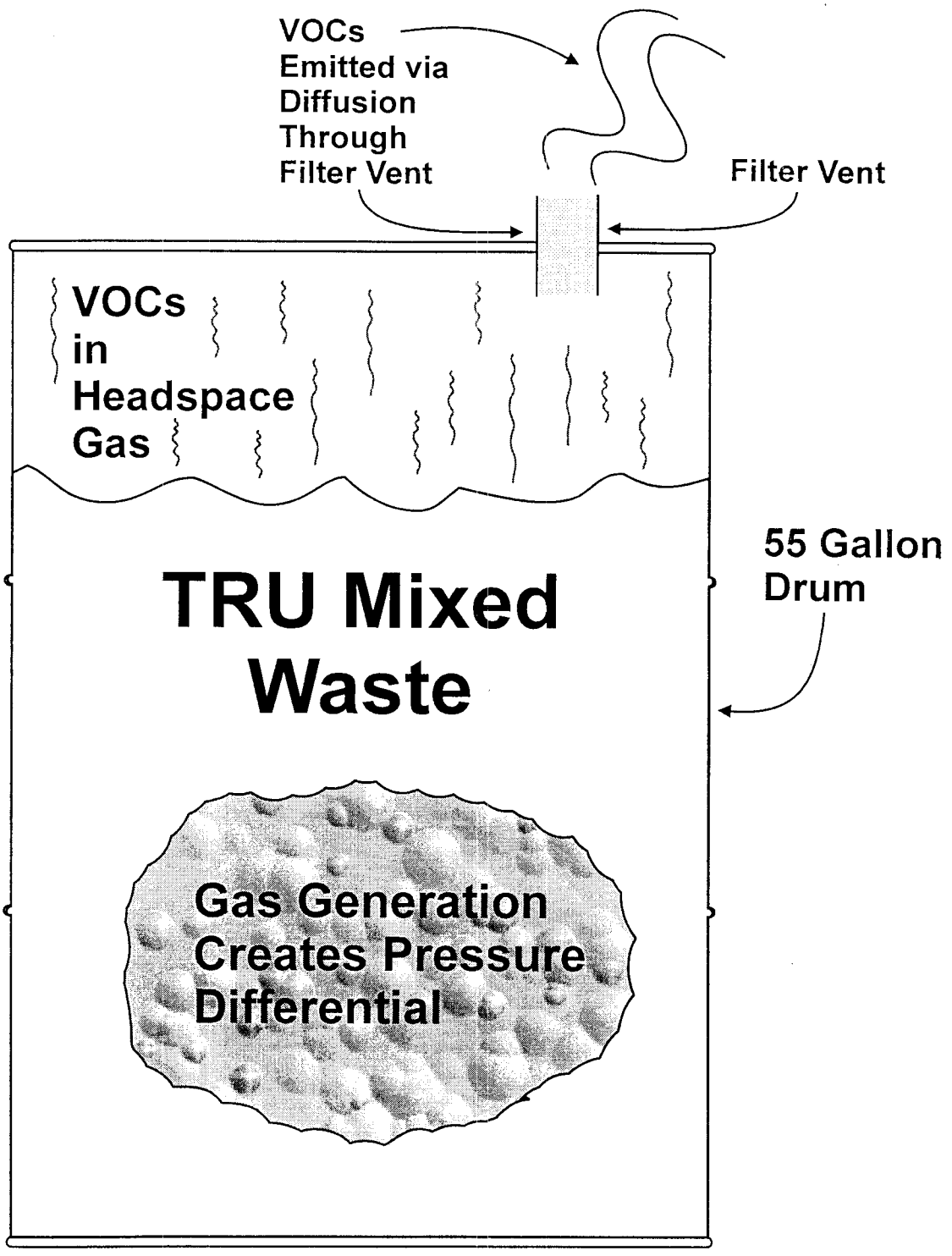
All concentrations in parts per million by volume (ppmv)

NMED Table 3. NMED Calculated Worker Exposure Concentrations Immediately After Roof Fall Using Corrected Equation

VOCs	(a) Open Room	(b) Closed Room	(c) NIOSH IDLH	(d) Open Room	(e) Closed Room
	Assuming Maximum Average VOC Headspace Concentrations From Table C-5 of Revision 6.0			Assuming Revised VOC Room-Based Concentration Limits	
Carbon tetrachloride	55	112	200	70	200
Chlorobenzene	129	263	1000	95	270
Chloroform	46	94	500	72	206
1,1-Dichloroethylene	210	428	NA	40	114
1,2-Dichloroethane	66[a]	136[a]	50	17	50
Methylene Chloride	730	1489	2300	730	2,077
1,1,2,2, Tetrachloroethane	58	118[a]	100	21	61
Toluene	300	613[a]	500	80	228
1,1,1 Trichloroethane	730[a]	1489[a]	700	246	700

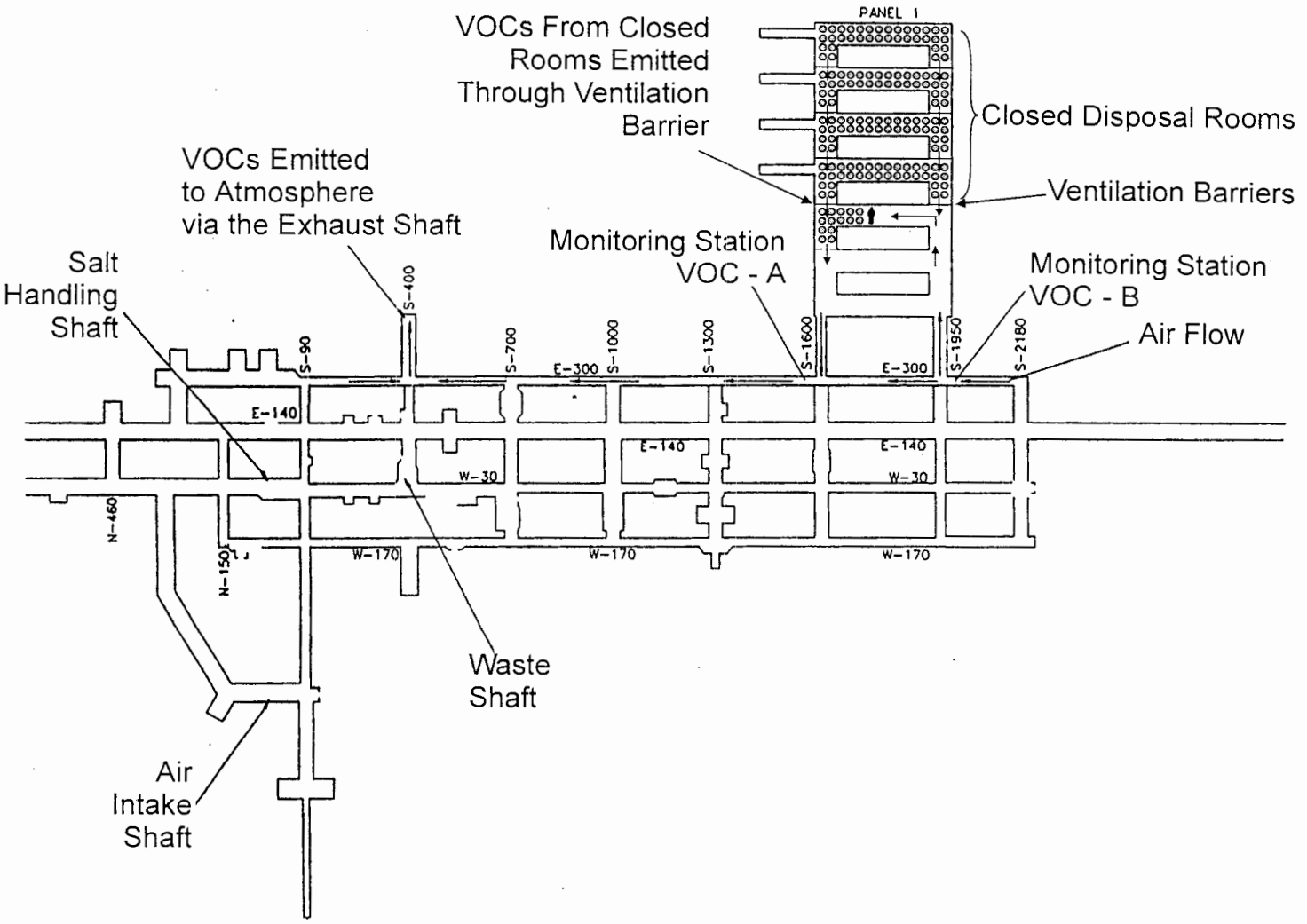
[a] Worker Exposure Concentration Immediately After A Roof Fall Event Exceeds NIOSH IDLH Concentration

All concentrations in parts per million by volume (ppmv)



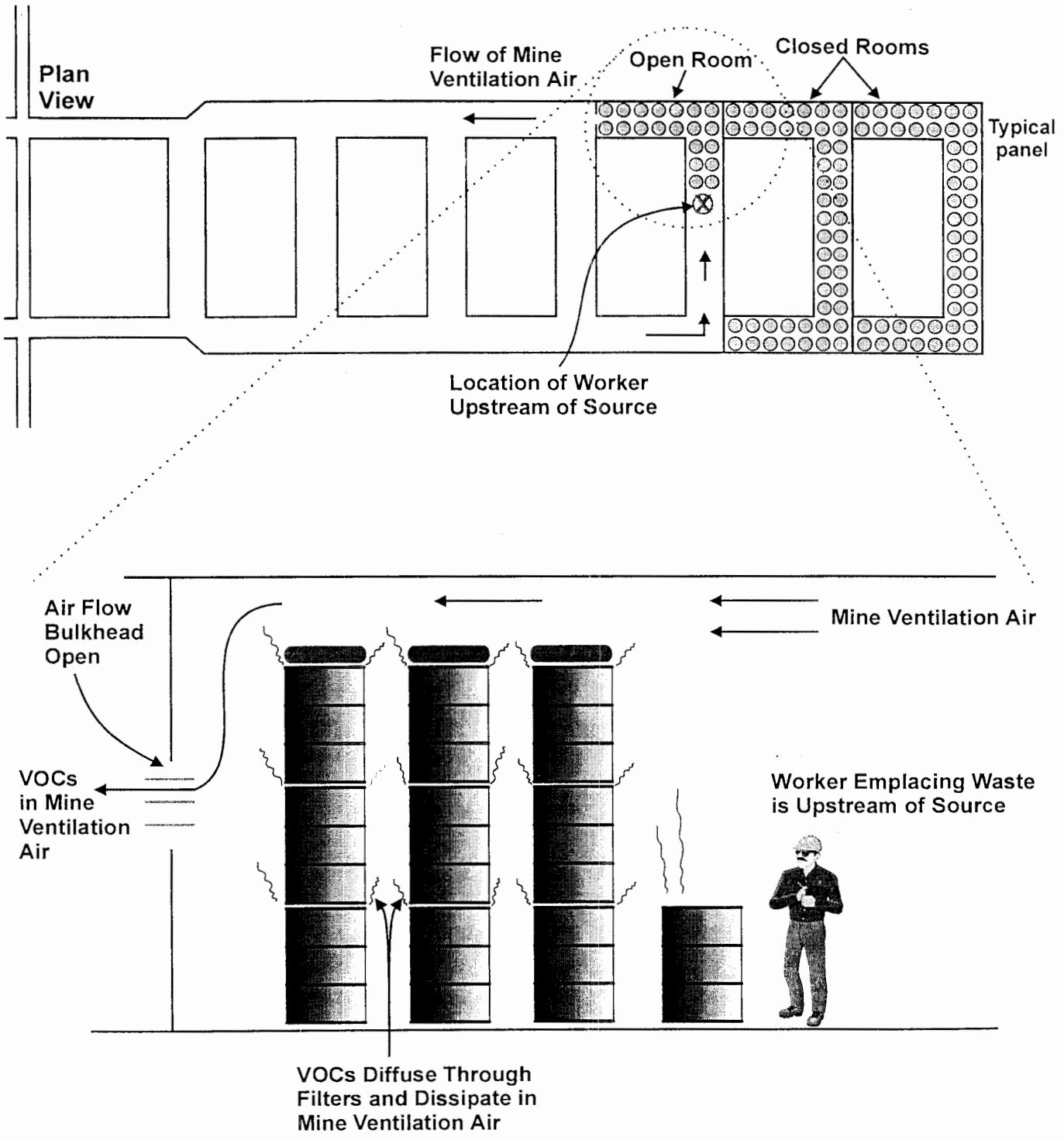
NMED Figure 1 - Mechanism for VOC Emissions From Containers

Not to scale



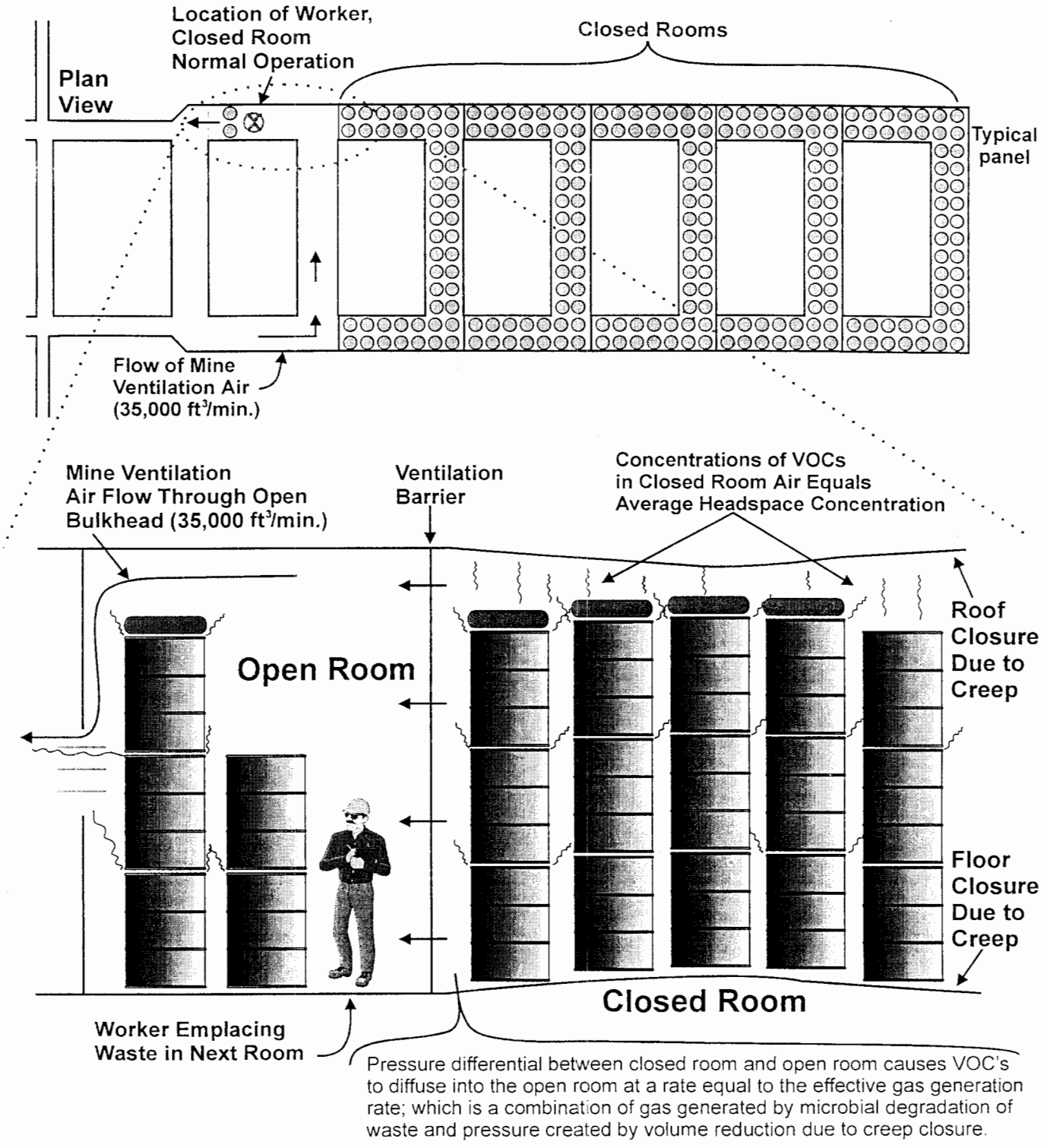
NMED Figure 2 - General Mine Ventilation Migration Pathway

Not to scale



NMED Figure 3 - VOC Emissions from an Open Room, Open Panel Under Normal Operation

Not to scale



NMED Figure 4 - VOC Emissions From a Closed Room, Open Panel Under Normal Operation

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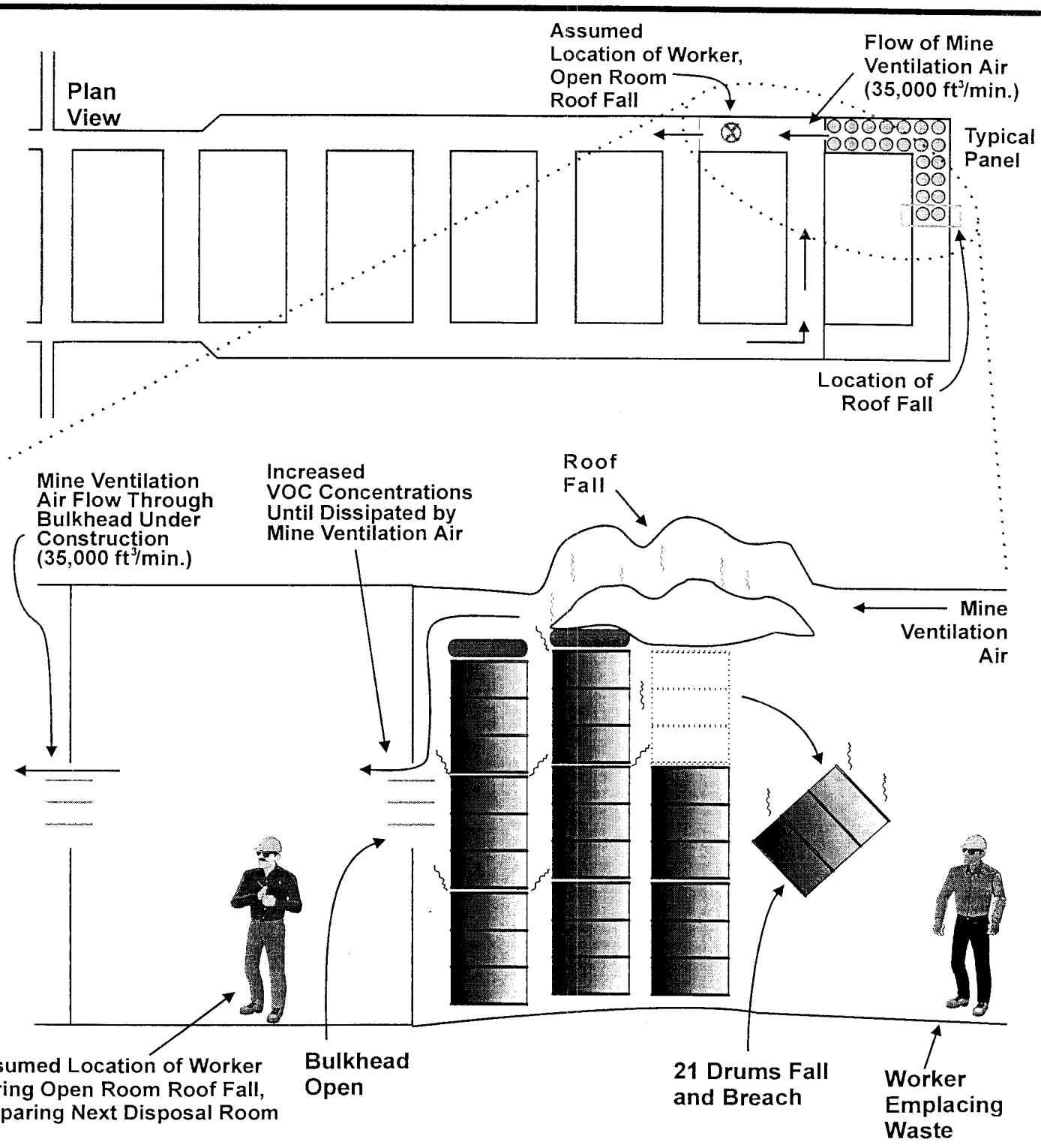
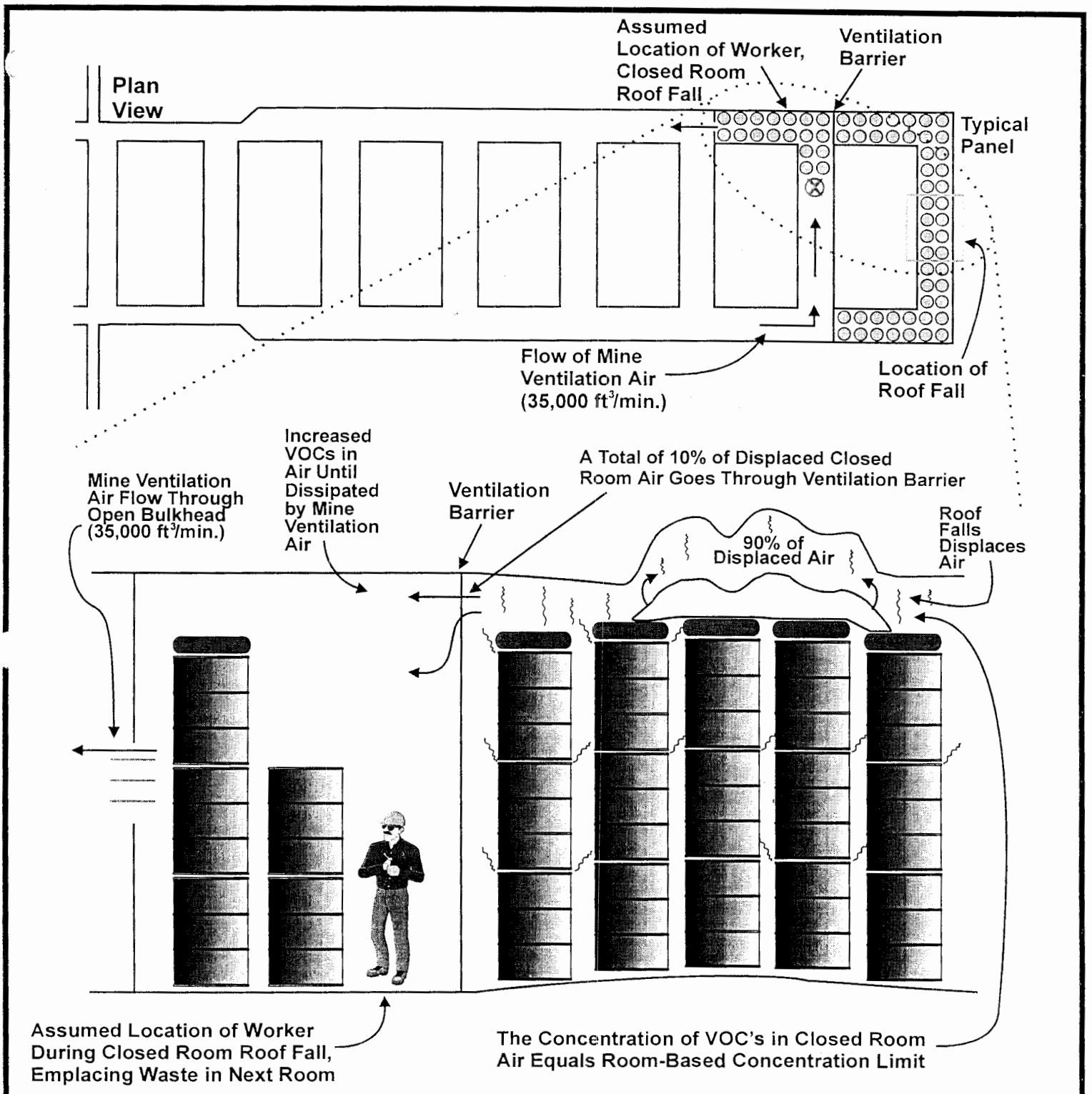


NMED Figure 5 - Roof Fall in an Open Room

Not to scale



NMED Figure 6 - Roof Fall in Closed Room

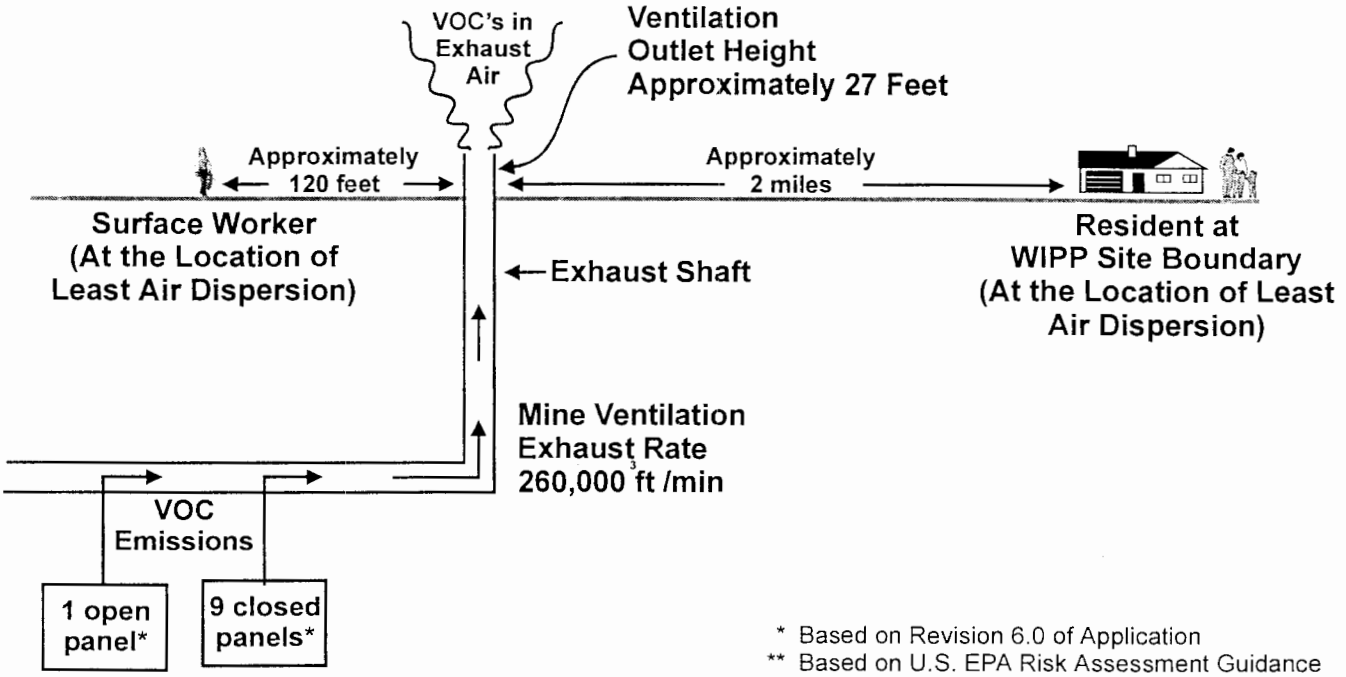
Not to scale

Surface Worker Assumptions

1920	Hours/Year **
10	Years **
1.23×10^{-2}	Air Dispersion Factor *
10^{-5}	Allowable Total Excess Cancer Risk **
1.0	Allowable Hazard Index **

Resident Assumptions

24	Hours/Day **
365	Days/Year **
35	Years *
1.2×10^{-4}	Air Dispersion Factor *
10^{-6}	Allowable Total Excess Cancer Risk **
1.0	Allowable Hazard Index **



* Based on Revision 6.0 of Application
** Based on U.S. EPA Risk Assessment Guidance

NMED Figure 7 - Risk Assessment Assumptions for Setting VOC Room - Based on Concentration Limits

Not to scale

CONFIRMATORY VOLATILE ORGANIC COMPOUND MONITORING PROGRAM

In the revised draft permit, the New Mexico Environment Department (NMED) determined to impose a condition for the implementation of a Confirmatory Volatile Organic Compound Monitoring Program (VOC Monitoring Program). The purpose of the VOC Monitoring Program is to confirm that the concentration of nine (9) VOCs listed in Permit Module IV (Tables IV.D.1 and IV.F.2.c) entrained in the air emissions from the Waste Isolation Pilot Plant (WIPP) Underground Hazardous Waste Disposal Units (HWDUs) do not exceed the environmental performance standard under 20 NMAC 4.1.500 (incorporating 40 CFR §264.601(c)).

I. REGULATORY STANDARD

NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.601) state:

> A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit . . . Protection of human health and the environment includes, but is not limited to . . .
>
> (c) Prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air.

In addition, NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.602) state:

> Monitoring, testing, analytical data, inspections, response, and reporting procedures and frequencies must ensure compliance with §§264.601 . . . as well as meet any additional requirements needed to protect human health and the environment as specified in the permit.

II. ANALYSIS

NMED specified that the Applicants implement the air monitoring program described in the Confirmatory VOC Monitoring Plan (Permit Attachment N) within 30 calender days of issuance of the Permit, and until the certified closure of all Underground HWDUs. NMED also specified reporting, notification, and remedial action requirements. NMED required the VOC Monitoring Program to ensure adequate monitoring to confirm compliance with the environmental performance standards for the Underground HWDUs. NMED required the reporting,

notification, and remedial action requirements to provide a mechanism for implementing remedial action in the event of noncompliance with the environmental performance standards.

A. BACKGROUND

The containers of TRU mixed waste to be disposed in the WIPP HWDUs may contain VOCs in the vapor state within the headspace of the containers. Each container will be vented through a filter vent. VOCs in the vapor state may diffuse across the filter vents into the air within a HWDU, become entrained in the exhaust air, migrate through the mine ventilation system to the atmosphere at the outlet of the mine ventilation exhaust shaft.

NMED has specified an environmental performance standard for the prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air. The standard is that the total individual risk associated with exposures to VOCs in the exhaust air from the WIPP repository (assuming a minimum running annual average mine ventilation rate of 260,000 cubic feet per minute) shall not exceed the following acceptable risk levels: (1) for a resident living at the WIPP site boundary (e.g., the Land Withdrawal Act boundary), a total individual risk from exposure to carcinogens and potential carcinogens of one in a million (10^{-6}); (2) for a WIPP non-waste surface worker, a total individual cancer risk from exposure to carcinogens and potential carcinogens of one in one hundred thousand (10^{-5}); and (3) for a resident living at the WIPP site boundary and a WIPP non-waste surface worker, a hazard index from exposure to non-carcinogens of less than 1.0.

The Applicants agree that the VOC concentrations in the headspace of containers must be limited to achieve the environmental performance standard. NMED specified these concentrations as VOC Room-Based Concentration Limits (Permit Module IV, Table IV.D.1), as more fully described in other technical testimony.

B. THE VOC MONITORING PROGRAM

1. Introduction

As noted above, NMED's primary goal for imposing the VOC Monitoring Program is to ensure compliance with the environmental performance standards. NMED's secondary goal is to ensure that the VOC Room-Based Concentration Limits are not exceeded. NMED's tertiary goal is to confirm the assumptions used in the risk assessment calculations and modeling. To achieve these goals, NMED must be able to determine the actual VOC concentrations entrained in the mine ventilation air from the Underground HWDUs. From a comparison of these measured concentrations to the calculated allowable concentrations, NMED can determine compliance with the environmental performance standards.

The VOC Monitoring Program is based on Appendix D20 of Revision 6.3 of the Application. Appendix D20 states that the Applicants also intended the VOC Monitoring Program to confirm

the assumptions and predictions used to demonstrate compliance with the environmental performance standards. However, the Applicants also suggested that upon a showing of compliance for Panel 1, no further monitoring would be necessary. NMED disagrees that a confirmation of the assumptions and predictions for Panel 1, a single panel, is adequate to ensure that VOC releases from other panels, singly and cumulatively, also will comply with the environmental performance standards. NMED notes that the Applicants' calculations reflect the possibility of significant VOC releases from closed Underground HWDUs. In addition, the actual magnitude of VOC releases from closed panels cannot be evaluated if the Applicants cease the monitoring program soon after the closure of Panel 1.

In developing the VOC Monitoring Program, NMED incorporated relevant requirements from the RCRA groundwater monitoring regulations (40 CFR §264 Subpart F) for two reasons. First, there are no specific regulations for air monitoring at a geologic repository. Second, the VOC Monitoring Program at WIPP is most analogous to a groundwater monitoring program. The VOC Monitoring Program will be implemented as a compliance monitoring program since the primary issue is limiting VOC concentrations from known emission points to ensure compliance with the environmental performance standards. As a result, the VOC Monitoring Program is similar to a RCRA Groundwater Compliance Monitoring Program, in which the concentrations of hazardous constituents in ground water are compared to concentration limits to determine whether the release of hazardous constituents requires corrective action.

2. Target VOCs

As noted above, NMED has specified nine (9) VOCs (Tables IV.D.1 and IV.F.2.c) as the target VOCs for the VOC Monitoring Program. NMED selected these VOCs because they represent approximately ninety (99) percent of the risk due to air emissions from the Underground HWDUs. See Revision 6.0, Appendix D13.

3. Monitoring Locations

The VOC Monitoring Program requires the collection of air samples from two monitoring stations, VOC-A and VOC-B, located in the E-300 drift of the underground geologic repository. First, the Applicants must measure the VOC concentrations in the mine ventilation exhaust air (e.g., VOC concentrations attributable to open and closed panels containing CH TRU mixed waste) by placing a VOC monitoring station (VOC-A) downstream of Panel 1. Station VOC-A will remain at the same location during the term of the permit, because the exhaust air from the three (3) HWDUs currently authorized for waste disposal will flow past this station. Second, the Applicants will measure background VOC concentrations (e.g., attributable to upstream sources) upstream of the any open panel. As a result, Station VOC-B will be initially located upstream from Panel 1; the location will change as new panels are being filled. In all cases, Station VOC-B will be located to ensure that it is upstream of the open panel receiving waste.

The number and initial locations of monitoring stations is based on Revision 6.3 of the Application. NMED believes that two (2) two monitoring stations is sufficient to measure the VOCs attributable to the HWDUs, because all mine ventilation air potentially containing VOCs from Panels 1, 2, and 3 will pass Monitoring Station VOC-A. Alternatively, NMED could have located Monitoring Station VOC-A at the top of the exhaust shaft, because VOCs entrained in the mine ventilation exhaust air also would pass this point. However, the large volume of air discharged through the exhaust shaft would make the detection of VOCs very difficult. In addition, the exhaust air at the top of the exhaust shaft may contain VOCs attributable to other sources in the underground geological repository (e.g., the mining area), making it difficult to determine the source and quantify the amount of VOCs attributable to the HWDUs. Further, NMED could not have located Monitoring Station VOC-A inside Panel 1, because the station would not monitor VOCs from other panels after Panel 1 closed.

In Revision 6.3, Appendix D20, the Applicants did not consider the need to move Monitoring Station VOC-B be upstream of the open panel, because they had proposed to cease air monitoring after closure of Panel 1. However, NMED has required the Applicants to continue the VOC Monitoring Program until certified closure of all HWDUs. Therefore, NMED has required the Applicants to relocate Monitoring Station VOC-B upstream of an open panel before disposing waste in order to ensure that the station collects data on VOC concentrations attributable to the open panel.

4. Calculation of Concentrations of Concern

NMED set the VOC Room-Based Concentration Limits to achieve the environmental performance standards. However, the VOC concentrations measured at Monitoring Station VOC-A cannot be directly compared with these limits because the station will be located in the E-300 drift downstream of Panels 1, 2 and 3, and the VOC concentrations in the exhaust air from a specific panel will be diluted by mixing with fresh air in the E-300 drift which did not flow through the panel. Therefore, NMED calculated the COCs at Monitoring Station VOC-A based on the VOC limits.

To derive the COCs for the nine (9) target VOCs, NMED first assumed that all disposal rooms in nine (9) closed HWDUs and one (1) open HWDU were filled with containers with VOC headspace concentrations equal to the Table IV.D.1 VOC Room-Based Concentration Limits. With the exception of two values (e.g., the container VOC headspace concentrations and the overall mine ventilation rate of 260,000 scfm), NMED used the assumptions and equations in Revision 6.0, Appendix D9 to calculate the actual exhaust shaft concentration for each target VOC due to emissions from Underground HWDUs. NMED then calculated the COCs at Monitoring Station VOC-A by multiplying each target exhaust shaft concentration by the ratio of the overall mine ventilation rate (260,000 scfm) and the mine ventilation rate through the E-300 drift (130,000 scfm).

There is a direct relationship between the actual average VOC concentrations in the headspace of containers in an Underground HWDU and the expected target VOC concentrations at the top of the exhaust shaft. Further, there is a direct relationship between the expected VOC concentrations at the top of the exhaust shaft and the COCs at monitoring station VOC-A. Therefore, if the VOC concentrations measured at Monitoring Station VOC-A (e.g., the difference between the VOC concentrations measured at Monitoring Stations VOC-A and VOC-B) are below the COCs, one can conclude that the Applicants are complying with the VOC limits and environmental performance standards. Similarly, one can conclude that the assumptions underlying the VOC limits are accurate.

5. Monitoring Frequency and Duration

The Applicants must begin VOC sampling at Monitoring Stations VOC-A and VOC-B within thirty (30) calender days of permit issuance. The Applicants must continue sampling until the certified closure of the last Underground HWDU.

In Revision 6.3, Appendix D20, the Applicants proposed to terminate sampling shortly after the certified closure of Panel 1. In their public comments on the first draft permit, the Applicants also stated that monitoring emissions from Panel 1 would be sufficient to confirm whether VOC emissions were an issue. See Comment 103. Finally, the Applicants stated that they proposed to monitor VOCs in Panel 1 only to confirm the Application's modeling data, which allegedly established that VOCs would not be emitted in significant quantities; if the Panel 1 data confirmed the model, Applicants asserted, monitoring the other panels would be duplicative and unnecessary.

For several reasons, NMED believes that the VOC Monitoring Program should continue throughout WIPP's operational period.

First, the environmental performance standards apply during the WIPP operational period. Therefore, VOC emissions from both open and closed panels must be monitored. The Applicants could not determine compliance with the environmental performance standards if the VOC monitoring program were terminated six (6) months after the closure of Panel 1.

Second, the equations and models used to derive the VOC Room-Based Concentration Limits are based on numerous assumptions, including the assumptions used to calculate expected emissions from closed panels. These calculations assume that closed panels would contribute a significant portion of the total VOCs emitted from WIPP. To confirm these assumptions, and to protect human health and the environment if these assumptions were wrong, the Applicants must monitor VOC emissions throughout the WIPP operational period.

Third, the VOC Monitoring Program is the only way to monitor for the component of the VOC emissions due to the radiolysis of waste. While the VOC concentrations in the headspace of a TRU mixed waste container, or group of TRU mixed waste containers, initially may comply with

the VOC limits, the radiolysis of waste may generate additional VOCs, increasing the VOC concentrations in the headspace of containers or disposal rooms above the VOC limits. Under the VOC Monitoring Program, sampling can be used to detect these VOCs.

Based on these concerns, NMED believes it is reasonable to initially require the Applicants to implement the VOC Monitoring Program throughout the operational period of the WIPP facility. However, the Applicants may request a permit modification to reduce or eliminate the requirements for VOC monitoring, based on data collected since the inception of VOC monitoring.

The VOC Monitoring Program requires routine sampling two (2) times per week. NMED notes that the Applicants specified this frequency of sampling in Revision 6.3, Appendix D20. NMED believes that this frequency of sampling is acceptable, because the physical conditions in the disposal rooms are not expected to change rapidly and the volume of waste containers to be emplaced on a weekly basis is anticipated to range from 784 drums to 1568 drums (or 6 to 12 percent of the assumed capacity of a disposal room). Thus, if samples are collected two (2) times per week, the sample results will be representative of 3 to 6 percent of the assumed capacity of the open disposal room. Since the environmental performance standards are based on long-term average exposures, minor variations in the VOC concentrations emitted from a HWDU, or even occasional exceedences of the VOC limits, should not be cause for concern. As noted above, the Applicants may seek a permit modification to reduce this frequency of sampling based on data collected since the inception of VOC monitoring.

6. Sampling and Analysis Methods

NMED adopted the Applicants' proposal for VOC sampling method, laboratory analysis, and quality assurance, as specified in Revision 6.3, Appendix D20. The VOC sampling method is based on the concept of pressurized sample collection as specified in the EPA Compendium Method TO-14. The TO-14 sampling concept uses 6-liter SUMMA® passivated stainless-steel canisters to collect integrated air samples at each sample location. The samples will be analyzed using gas chromatography/mass spectrometry (GC/MS) under an established QA/quality control (QC) program. Laboratory analytical procedures have been developed based on the concepts contained in both EPA Compendium TO-14 and the draft *EPA Contract Laboratory Program - Statement of Work* (CLP-SOW) *for Volatile Organics Analysis of Ambient Air in Canisters*.

NMED believes that VOC sampling method is appropriate since the EPA Compendium TO-14 method is an EPA-recognized sampling concept for VOC sampling and speciation. It can be used to provide integrated samples, or grab samples, and compound quantitation for a broad range of concentrations. The canister sampling system and GC/MS analytical method are particularly appropriate for the VOC Monitoring Program because a relatively large sample volume is collected, and multiple dilutions and reanalyses can be performed to ensure identification and quantification of target VOCs within the working range of the method. Because the contract-required quantitation limits (CRQL) proposed by the EPA in the CLP-SOW

are 5 parts per billion by volume (ppbv) or less for the nine target compounds, low VOC concentrations can be measured.

7. Data Evaluation and Reporting

The Applicants must collect a sample from each monitoring station on designated sample days. After receiving the laboratory analytical data from an air sampling event, the Applicants must validate the data and evaluate whether the VOC emissions exceed the COCs.

NMED calculated the COCs using the permitted mine ventilation rate of 260,000 scfm and the expected flow rate at Monitoring Station VOC-A of 130,000 scfm. However, because these rates may vary at the time of sampling, the Applicants must measure and record these rates during each sampling event. In addition, the Applicants must measure and record the temperature and pressure during each sampling event in order to convert these rates conditions during the sampling event for conversion to standard flow rates.

If the air samples were collected under the typical mine ventilation rate conditions, then the analytical data will be used without further manipulation. The concentration of each target VOC detected at Station VOC-B will be subtracted from the concentration detected at Station VOC-A. The resulting VOC concentration represents the concentration of VOCs being emitted from the open and closed Underground HWDUs upstream of Station VOC-A (or the Underground HWDU VOC emission concentration.)

If the Applicants collected the samples under atypical flow rates, they must normalize the results from both monitoring stations to the permitted/expected flow rates. The data must be normalized because changes in the flow rates directly and significantly affect the the measurable VOC concentrations. For instance, an increased mine ventilation exhaust rate will tend to "dilute" the measured VOC concentrations compared to the VOC concentrations measured under the permitted/expected flow rates. The Applicants must normalize the data using the relevant equation in Permit Attachment N. Then the Applicants must subtract the normalized concentration of each target VOC detected at Station VOC-B from the normalized concentration detected at Station VOC-A. The resulting concentration represents the VOC emission concentration from the HWDU(s).

The Applicants must compare the calculated VOC emission concentration (e.g., the difference between Monitoring Stations VOC-A and VOC-B) directly to relevant COC. If the value exceeds the COC, the Applicants must notify the Secretary in writing, within five (5) working days of obtaining validated analytical results.

The Applicants also must average the air sampling event with the data collected during the previous twelve (12) months to calculate the running annual average concentration for each target VOC. If this value exceeds the COC, the Applicants must notify the Secretary in writing, within five (5) working days. In addition, the Applicants must undertake remedial action,

including the cessation of disposal in the active disposal room and the installation of ventilation barriers. If this value exceeds the COC for six (6) consecutive months, the Applicants must close the affected Underground HWDU. NMED believes these conditions are necessary to ensure compliance with the environmental performance standards for air emissions from the WIPP. Moreover, the notification and remedial action requirements provide the sole mechanism to prevent harm to the public and the environment should the measured VOC concentrations exceed the COCs despite the Applicants' compliance with other conditions of the permit (e.g., the VOC Room-Based Concentration Limits).

NMED believes that this approach is superior to the Applicants' proposal in Revision 6.3, Appendix D20. Specifically, the Permittees proposed that for Panel 1, they would subtract the concentration of each target VOC measured measured at Monitoring Station VOC-B from the concentration measured at Monitorig Station VOC-A, and compare the value to the COCs. They would evaluate these concentrations quarterly to confirm their calculations. If the average measured concentrations for Panel 1 confirmed the calculations, then the Applicants proposed to cease sampling. The Applicants deemed the calculations "confirmed" if the annual average concentration were below the predicted values, but would only "consider" additional sampling if it exceeded a predicted value.

As discussed above, NMED rejected this proposal for many reasons, including the Applicants' failure to account for changes in mine ventilation rates, the lack of a mechanism to calculate and evaluate annual average VOC concentrations from other panels besides Panel 1; the lack of a mechanism to report air sampling data and calculations to NMED; and the absence of a remedial action plan for any exceedance of the COCs.

III. RESPONSE TO COMMENTS

A. VOC MONITORING IS NOT NECESSARY

In public comments regarding the draft permit, the Applicants contended that the VOC Monitoring Program was unnecessary. See Comment 103. The Applicants cite EPA guidance which suggests that air monitoring is not necessary if an applicant can demonstrate compliance with health-based standards by at least an order of magnitude. The Applicants argue that they have demonstrated that, even under a worst-case scenario, public exposure to VOCs would always be one order of magnitude below acceptable levels. The Applicants conclude that air monitoring should not be required, except to confirm the modeling of Panel 1.

NMED disagrees that the Applicants have demonstrated that, under a worst-case scenario, the public exposure to VOCs will always be one order of magnitude below acceptable levels:

1) The Applicants' alleged demonstration assumed that the VOC headspace concentrations in the containers would be the "weighted average headspace concentrations" derived from a "representative" sample of containers destined for emplacement at WIPP.

However, the Applicants requested allowable drum headspace concentration limits based on a Maximum Allowable Average VOC Headspace Concentrations, not the "weighted average headspace concentrations". The Maximum Allowable Average VOC Headspace Concentrations were based on ensuring that the VOC concentrations emitted by WIPP would not exceed a risk level for a resident at the WIPP site boundary between one in a million or a one in one hundred thousand excess cancer risk target level depending on the specific VOC. As a result, the Maximum Allowable VOC Headspace Concentrations actually were calculated to achieve, with no margin of safety, the acceptable risk levels for individual VOCs. Simply, the public easily could be exposed to VOC concentrations within an order of magnitude of acceptable levels.

2) The Applicants' derivation of Maximum Allowable VOC Headspace Concentrations violated EPA guidance by failing to account for the total individual excess cancer risk associated with exposures to multiple potential carcinogens. As a result, the Applicants' demonstration was not performed correctly and could not be used to demonstrate that public exposure to VOCs would always be one order of magnitude below acceptable levels.

3) To derive the VOC Room-Based Concentration Limits for potential carcinogenic VOCs, NMED used the Applicants' equations and assumptions. As noted above, NMED's acceptable levels for total individual excess cancer risk from exposure to VOCs from WIPP were (1) one in a million for a resident living at the WIPP site boundary; and (2) one in one hundred thousand for a WIPP non-waste surface worker. As a result, NMED's VOC Room-Based Concentration Limits were calculated to just achieve the acceptable risk levels for VOC concentrations from WIPP.

Based on these findings, NMED concludes that the potential VOC exposure may exceed one order of magnitude below acceptable levels, and that it is appropriate to impose a compliance monitoring program at WIPP.

B. THE VOC MONITORING PROGRAM IS EXCESSIVE

In public comments regarding the draft permit, the Applicants asserted that the VOC Monitoring Program was excessive. See Comment 103. The Applicants contested NMED's specification of two different methods for achieving compliance with environmental performance standards: (1) a maximum allowable average headspace concentration measured by headspace gas sampling on every container; and (2) the VOC Monitoring Program. The Applicants urged NMED to select a single method.

NMED determined to retain both methods for the following reasons:

1) The requirement for one hundred (100) percent headspace gas sampling is necessary because it is a key confirmatory analysis in the acceptable knowledge process and the only chemical analytical method used for debris waste characterization.

2) The VOC Monitoring Program is necessary to confirm numerous assumptions underlying the equations and model used to derive the VOC Room-Based Concentration Limits, including (1) the diffusion characteristics of the drum filters; (2) the effective gas generation rate in closed rooms and panels; (3) the number of drums per panel; (4) the number of open and closed panels; and (5) the overall mine ventilation rate.

3) The VOC Monitoring Program is needed to protect human health and the environment in the event any of these assumptions is incorrect. In other words, even if the Applicants complied with the VOC limits, it is possible that the VOC concentrations could exceed the acceptable risk levels. The VOC Monitoring Program, with its associated reporting, notification, and remedial action requirements, provides the data to determine compliance with the environmental performance standards, as well as the appropriate mechanism to protect human health and the environment if acceptable risk levels are exceeded.

Finally, NMED notes that the Applicants have the option of requesting a permit modification to reduce or eliminate the requirements of the VOC Monitoring Program based on the collected evidence.

C. POST-CLOSURE VOC MONITORING IS NOT NECESSARY

In public comments regarding the draft permit, the Applicants contended that post-closure monitoring was unnecessary because there was no possible pathway for a VOC release after closure. See Comment 103. The Applicants noted that panel closure involved sealing off the ventilation system leading from the disposal area to the outside atmosphere, which in turn would seal off any VOC migration pathway. The Applicants also argued that the requirement to monitor for six (6) after closure of the last panel would interfere with final facility closure.

NMED concurred with the Applicants' position. Accordingly, in the revised draft permit, NMED required the Applicants to implement the VOC Monitoring Program only until certified closure of all Underground HWDUs.

D. THE VOC CONCENTRATIONS OF CONCERN ARE TOO STRINGENT

In public comments on the first draft permit, the Applicants argued that the VOC Concentrations of Concern (COCs) were substantially less than the Appendix D20 values which were adequate to protect human health and the environment. See Comment 103.

NMED does not agree. The NMED set the VOC COCs below the Appendix D20 values to protect human health and the environment. The NMED derived the VOC COCs from the VOC Room-Based Concentration Limits listed in Table IV.D.1. As noted above, NMED revised these limits to ensure that VOC concentrations from the WIPP were below acceptable risk levels. As a result, NMED also revised the VOC COCs. Specifically, NMED derived the COCs for the nine (9) target VOCs by (1) calculating the actual exhaust shaft concentrations assuming all disposal

rooms in nine (9) closed HWDUs and one (1) open HWDU were filled with containers with VOC headspace concentrations equal to VOC Room-Based Concentration Limits; and (2) using the VOC COCs to calculate the target exhaust shaft concentration given the ratio of the overall mine ventilation rate and the mine ventilation rate through the E-300 Drift.

NMED also disputes the Applicants' contention that the VOC COCs in Revision 6.3, Appendix D20 were correct. First, the Applicants failed to provide specific information necessary to confirm the accuracy of equations and methods used to calculate the VOC COCs in Appendix D20. Second, based on the available information, NMED believes that for chlorobenzene and 1,1,1-trichloroethane, the Applicants calculated the VOC COCs in Appendix D20 using an erroneous Averaging Time (AT) of seventy (70) years, rather than ten (10) years. This error resulted in COCs seven (7) times greater than appropriate. Further, the Applicants apparently used the incorrect (non-carcinogenic) Reference Dose (RfD) for 1,1,1-trichloroethane. This error, which was compounded by the incorrect AT, resulted in a COC nearly two thousand four hundred (2400) times greater than appropriate. If NMED had allowed the Applicants to use these incorrectly calculated COCs, the threshold for detecting unsafe VOC concentrations would have been dramatically incorrect.

Also with respect to the VOC COCs in the first draft permit, the Applicants contended that the EPA guidance on no-migration petitions distinguished between EPA public exposure limits and OSHA occupational standards. Specifically, the Applicants aserted that the EPA disapproved the application of public exposure limits to workers because worker exposures are short term, unlike a member of the public residing near the facility, and (2) worker exposures are preventable and/or controllable, unlike exposures to a member of the public residing near the facility. On this basis, the Applicants concluded that the application of public exposure limits to workers, at least to the extent that the limits were less than the OSHA occupational standards, would be arbitrary.

NMED does not believe that the rationale or methods used to adjust the VOC COCs are arbitrary. For the revised draft permit, NMED adjusted the VOC limits (and by corrolary, the COCs) (1) to ensure that the VOC concentrations in the air of a closed disposal room do not exceed the Lower Explosive Limit (LEL) for the chlorobenzene and toluene; (2) to ensure that the VOC concentrations in a HWDU immediately after a roof fall do not exceed the NIOSH immediately dangerous to life and health (IDLH) concentration for 1,2-dichloroethane and 1,1,1-trichloroethane; and (3) to incorporate a limit for methylene chloride. In addition, NMED notes that the VOC COCs are considerably higher than they might have been had NMED based the COCs on the "weighted average" headspace concentrations proposed by the Applicants.

MINE VENTILATION RATES

In the revised draft permit, NMED determined to impose conditions for the maintenance of a minimum mine ventilation exhaust rate of 260,000 standard cubic feet per minute (scfm) or 60,000 scfm in filtration mode, and a minimum active room ventilation rate of 35,000 scfm when workers are present in the room. The minimum mine ventilation exhaust rate condition is based on the direct relationship between the minimum mine ventilation exhaust rate and the concentration of volatile organic compounds (VOCs) at the top of the Waste Isolation Pilot Plant (WIPP) exhaust shaft. Any decrease in the minimum mine ventilation exhaust rate would result in an increase in the concentration of VOCs at the top of the WIPP exhaust shaft, possibly causing a violation of NMED's specified environmental performance standard. The minimum active room ventilation rate condition is based on the direct relationship between the minimum active room ventilation rate and the underground worker exposure concentration of VOCs in an open room. Any decrease in the active room mine ventilation rate would result in an increase in the concentration of VOCs in an open room, possibly causing a violation of the environmental performance standard (based on Occupational Safety and Health Administration (OSHA) standards and National Institute for Occupational Safety and Health (NIOSH) guidelines).

I. REGULATORY STANDARD

NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.601) state:

> A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit . . . Protection of human health and the environment includes, but is not limited to . . .
>
> (c) Prevention of any release that may have adverse effects on human health and the environment due to migration of waste constituents in the air.

The Applicants acknowledge that in order to achieve the environmental performance standard for releases to air, the concentration of VOCs in the headspace of containers disposed in Underground Hazardous Waste Disposal Units (HWDUs) must be limited, which in turn limits the concentration of VOCs in WIPP emissions. As a result, NMED has calculated VOC Room-Based Concentration Limits (VOC limits) to prevent air releases that may adversely effect human health and the environment. See Permit Module IV, Table IV.D.1. The VOC limits ensure that the total individual risk associated with exposures to VOCs emitted by WIPP will not exceed

acceptable risk levels. NMED calculated the VOC limits by conducting an independent risk assessment using EPA guidance. NMED's methodology is fully explained in my technical testimony regarding VOC limits.

II. ANALYSIS

A key assumption in calculating the VOC Limits is the minimum mine ventilation rate. To protect human health and the environment, NMED established a minimum mine ventilation exhaust rate of 260,000 scfm or 60,000 scfm in filtration mode. However, the Applicants contend that this rate does not allow flexibility in mine operation for the safe and efficient management of the underground repository. For instance, the Applicants suggest that the specification of a minimum rate would result in violation of the permit for a reduction or discontinuation of mine ventilation due to events beyond the Applicants' control (e.g.,power outages) or activities necessary to ensure safe operation (e.g., regular maintenance).

NMED concurs that in certain definable circumstances, the Applicants require flexibility to operate the ventilation system at flow rates lower than the 260,000 scfm or 60,000 scfm in filtration mode. While the minimum mine ventilation exhaust rate must be maintained in the long term to comply with the VOC limits, infrequent short term variations do not pose a threat to human health and the environment since the risk assessment used to calculate the VOC limits is based on long-term exposure (e.g., 35 years). Accordingly, NMED proposes to revise Permit Condition IV.E.3.c. to state that "the Permittees shall maintain a minimum running annual average mine ventilation exhaust rate of 260,000 standard ft^3/min", and delete the phrase "(or 60,000 standard ft^3/min in filtration mode)". The specification of a minimum running annual average mine ventilation exhaust rate will ensure long-term compliance with NMED's specified environmental performance standard, while allowing the Applicants the flexibility needed to maintain the mine ventilation equipment and account for other occurrences which may result in short-term decreases in the mine ventilation exhaust rate.

The specification of the mine ventilation exhaust rate as a running annual average necessitates the specification of a ventilation rate monitoring plan, which describes among other things, the methods and frequency for measuring and recording the mine ventilation exhaust rate, the active room ventilation rate, and the method for calculating the running annual average. Since the NMED decided to impose conditions for the maintenance of a minimum mine ventilation exhaust rate and a minimum active room ventilation rate after submission and review of the Application, the Application did not contain adequate information to develop the ventilation rate monitoring plan. Accordingly, NMED proposes to add language to the final permit (Permit Conditions IV.H.3 and IV.F.2.b) specifying a schedule of compliance for the submittal of a mine ventilation rate monitoring plan.

At a minimum, the mine ventilation rate monitoring plan should address: (1) the objectives of the monitoring; (2) the design of the monitoring program (including monitoring schedule and monitoring equipment); (3) monitoring procedures; (4) equipment calibration and maintenance;

(5) data evaluation, reporting and recordkeeping; and (6) and quality assurance. NMED recommends that the Applicants measure and record (in the operating record) the mine ventilation exhaust rate and the active room ventilation rate on an hourly basis, and record (in the operating record) the date and time when workers are present in an active disposal room. NMED also recommends that the Applicants calculate the running annual average mine ventilation exhaust rate and evaluate whether the active room ventilation rate has been met on a monthly basis, and report the calculated results in the Confirmatory VOC Monitoring Annual Report.

The Applicants also contend that the specification of a minimum active room ventilation rate of 35,000 scfm does not allow flexibility in mine operation for the safe and efficient management of the underground repository.

NMED does not agree. The Applicants submitted an underground worker VOC exposure analysis in Revision 6.3 of the Application (Appendix D9) which demonstrated that during normal operations these workers would not be exposed to VOC concentrations greater than the appropriate OSHA standards. The Applicants also submitted an analysis which demonstrated that after a roof fall in an open panel these workers would not be exposed to VOC concentrations greater than the applicable NIOSH immediately dangerous to life and health (IDLH) levels or OSHA standards. The active room ventilation rate of 35,000 scfm is one of the factors in this analysis. The Applicants did not propose or justify an alternate specific minimum active room ventilation rate that would ensure that during normal operations and after a roof fall in an open panel these workers would not be exposed to VOC concentrations greater than the IDLH levels or OSHA standards during. Therefore, NMED believes that specification of the minimum active room ventilation rate of 35,000 scfm when workers are present is appropriate.

DETECTION MONITORING PROGRAM

I. INTRODUCTION

NMED determined to impose a Detection Monitoring Program (DMP) for ground water quality in Permit Condition V.A:

> This Module specifies the requirements of the Detection Monitoring Program (DMP) . . . A DMP is necessary to demonstrate compliance with the environmental performance standard for the Underground HWDUs, as specified in 20 NMAC 4.1.500 (incorporating 40 CFR 264.601(a)). This environmental performance standard requires prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in the ground water or subsurface environment.

II. DISCUSSION

A. RELATIONSHIP TO PERMIT APPLICATION

The Application contended that ground water monitoring was not required at WIPP:

> Groundwater monitoring at the WIPP in accordance with Title 20 of the New Mexico Administrative Code, Chapter 4, Part 1 (20 NMAC 4.1), Subpart V, §264.90, is not required to ensure protection of human health and the environment and that migration of contaminants from the repository via the groundwater pathway during the Disposal Phase and post-closure care period is unlikely.

See Chapter E, page E-1. As a result, the Applicants did not submit a ground water monitoring program. Instead, the Applicants requested a waiver from ground water monitoring.

NMED determined that the Application was deficient because it lacked a ground water monitoring program. In the Notice of Deficiency (NOD) for Revision 5.2 of the Application, issued on March 14, 1996, NMED stated:

> The permit application, in both Chapters D and E, fails to adequately demonstrate that hazardous constituents will not migrate beyond the point of compliance during the post closure period (see General Comment 1, Chapter E). Revise the permit application to include a pre-disposal groundwater monitoring plan designed to establish concentrations of hazardous constituents prior to emplacement of waste in the repository. Furthermore, in the event that a

> groundwater monitoring waiver request is denied, revise the permit application to include a post-closure groundwater monitoring plan in accordance with 20 NMAC 4.1, Subpart V, 264 Subpart F. Ensure the groundwater monitoring plan is complementary to post-closure monitoring required by 40 CFR §194.42(d).

AR #960308. NMED clarified the NOD by letter dated March 29, 1996:

> With regard to your request for a groundwater monitoring waiver described in Chapter E in the WIPP RCRA Part B . . . HRMB is stating its intent to draft a permit which requires DOE/WID to include a groundwater monitoring plan in accordance with 20 NMAC 4.1, Subpart V, §264 Subpart F . . . This requirement for a detection monitoring plan is in addition to that requested in Chapter D, General Comment 8, on page 40 of the NOD.

AR #960325.

B. PUBLIC COMMENTS

The Applicants did not dispute the DMP requirement in public comments on either the draft permit or revised draft permit.

C. REGULATORY ANALYSIS

NMED evaluated the Applicants' request for a waiver from ground water monitoring and determined that the Applicants had failed to satisfy the waiver requirements of under 20 NMAC 4.1.500 (incorporating 40 CFR §264.90(b)(4)), which state:

> (b) The owner or operator's regulated unit or units are not subject to regulation for releases into the uppermost aquifer under this subpart if . . .
>
> (4) The Regional Administrator finds that there is no potential for migration of liquid from a regulated unit to the uppermost aquifer during the active life of the regulated unit (including the closure period) and the post-closure care period specified under §264.117. This demonstration must be certified by a qualified geologist or geotechnical engineer. In order to provide an adequate margin of safety in the prediction of potential migration of liquid, the owner or operator must base any predictions made under this paragraph on assumptions that maximize the rate of liquid migration.

Specifically, NMED was not convinced the waiver request demonstrated that there was no potential for migration of liquid. Further, NMED could not determine whether the Applicants

had based their predictions on assumptions that maximized the predicted rate of liquid migration.

In addition to RCRA and HWA, WIPP must comply with DOE Order 5400.1, The General Environmental Protection Program, which states:

> GROUNDWATER MONITORING PROGRAM Groundwater that is or could be affected by DOE activities shall be monitored to determine and document the effects of operations on groundwater quality and quantity and to demonstrate compliance with DOE requirements and applicable Federal, State, and local laws and regulations.

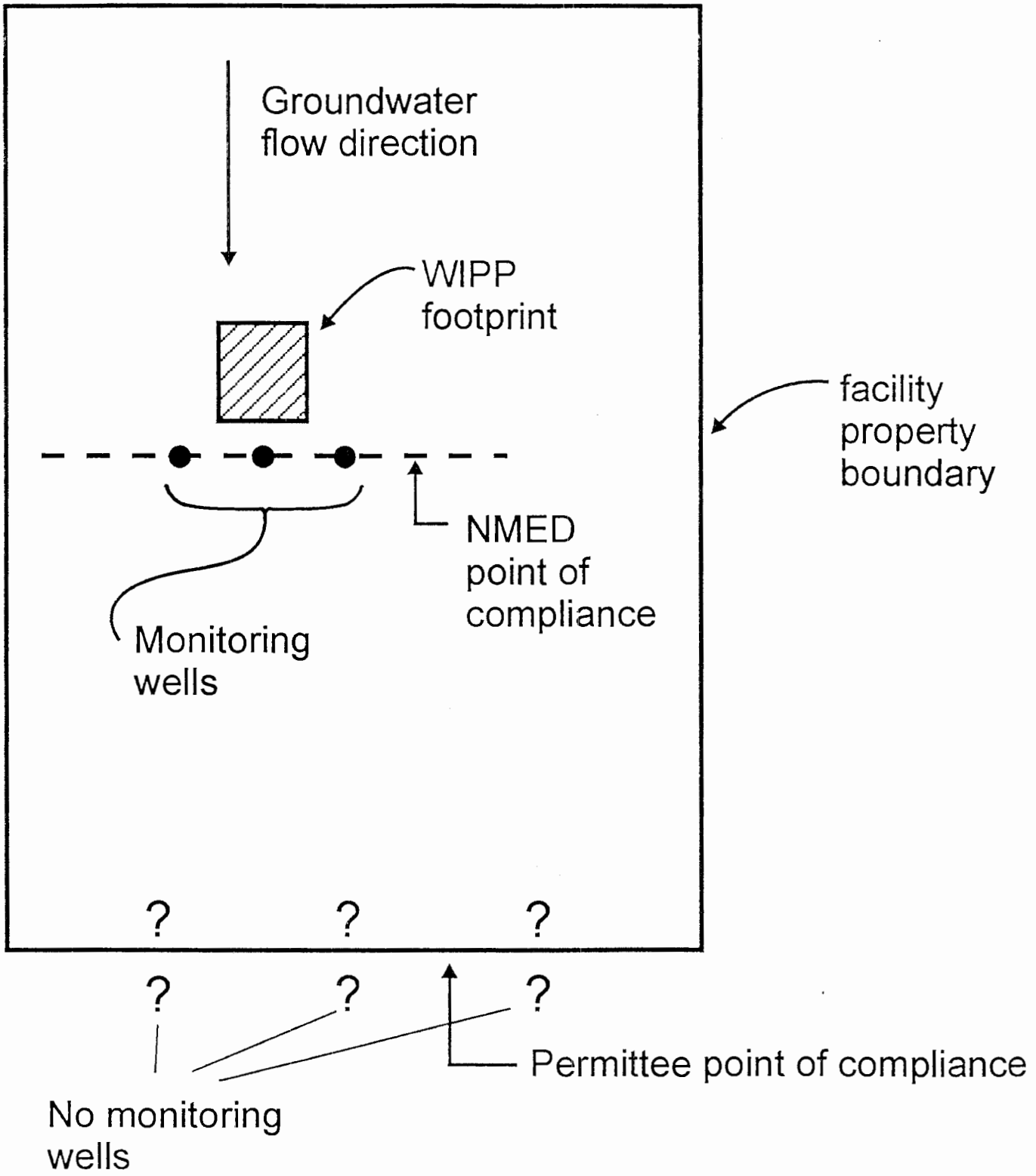
Pursuant to DOE Order 5400.1, DOE already was implementing a ground water monitoring program. According to the Application,

> DOE Order 5400.1 . . . requires that all DOE facilities prepare a groundwater protection plan and report groundwater monitoring data annually to the Office of Operational Safety as part of a site environmental report. This plan is implemented at the Waste Isolation Pilot Plant through the Groundwater Surveillance Plan . . . . (Chapter E, page E-5).
>
> The DOE has established this Groundwater Monitoring Program (GMP) Plan to define and protect groundwater resources at the WIPP . . . The policy driver for this program is 20 NMAC 4.1, Subpart V, §§264.600 to 264.603, which requires monitoring for miscellaneous units . . . DOE Order 5400.1 (IV-10[c]) also instructs that 'where appropriate, groundwater monitoring programs shall be designed and implemented in accordance with 40 CFR Part 264 Subpart F or 40 CFR 265 Subpart F.' (Appendix D18, page D18-8).

Although these earlier efforts used non-RCRA compliant monitoring wells, the Application stated:

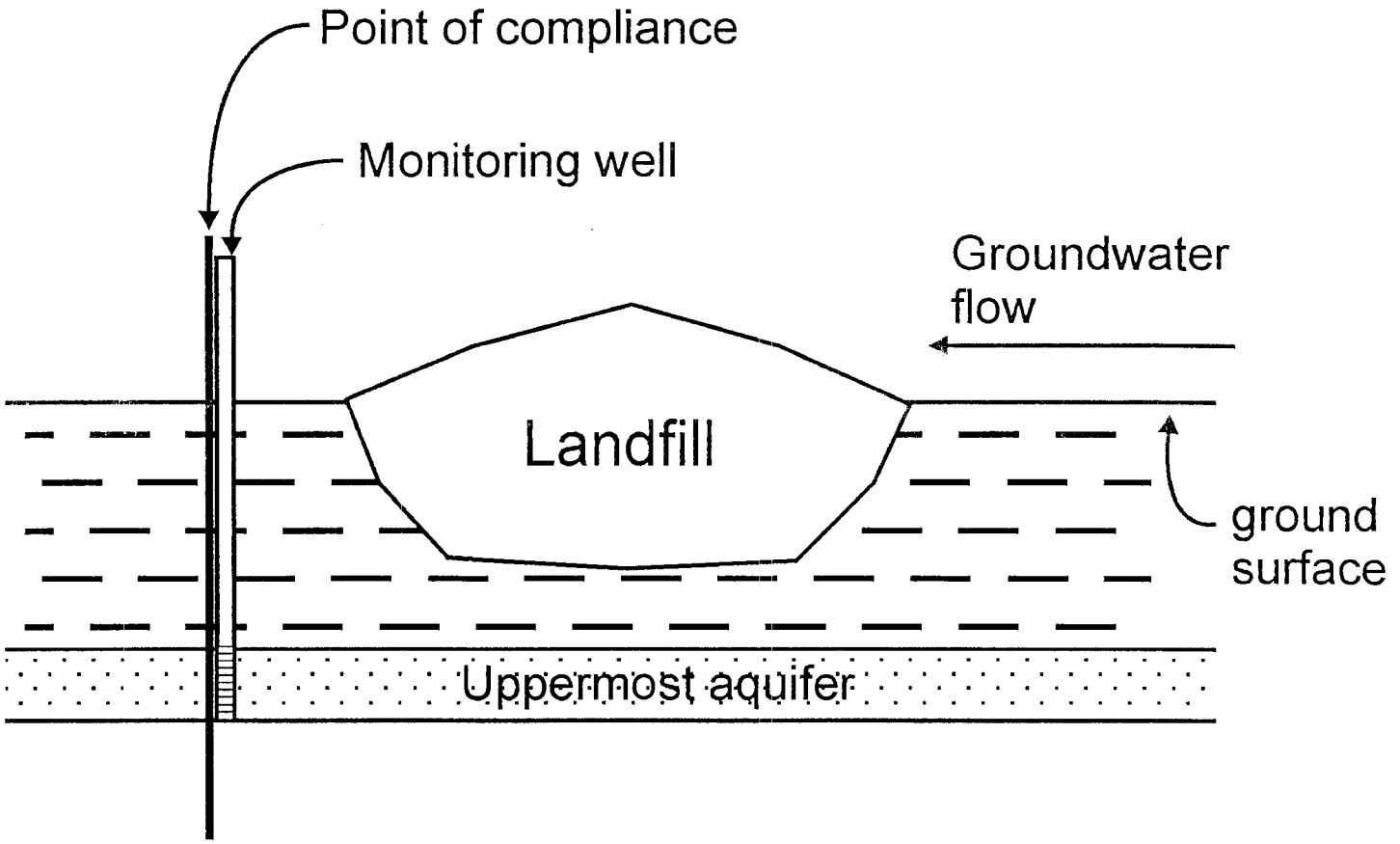
> The new monitoring wells of the WIPP [Groundwater Surveillance Program (GWSP)] have been constructed to the specifications provided in the RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (EPA, 1986a) and are now being used to establish background water quality and water levels in accordance with 20 NMAC 4.1, Subpart V, §264.94(b)(4). These WIPP GWSP wells will be used as the monitoring installations for the WIPP Groundwater Detection Monitoring Program as required by 20 NMAC 4.1, Subpart V, §§264.90 through 264.101. (Appendix D18, page D18-8).

In light of these statements, NMED determined that the Applicants could implement a DMP to ensure achievement of the environmental performance standard in 20 NMAC 4.1.500 (incorporating 40 CFR §264.601), which requires the Applicants to prevent "any releases that may have adverse effects on human health or the environment due to migration of waste constituents in the ground water or subsurface environment . . . ." NMED believes that a DMP is the only method to detect such a release. Without an explicit permit condition requiring a DMP, the Applicants would not be required to submit ground water quality data to NMED. On the other hand, the DMP does not oppose an additional burden on the Applicants because they already implement a ground water monitoring program.



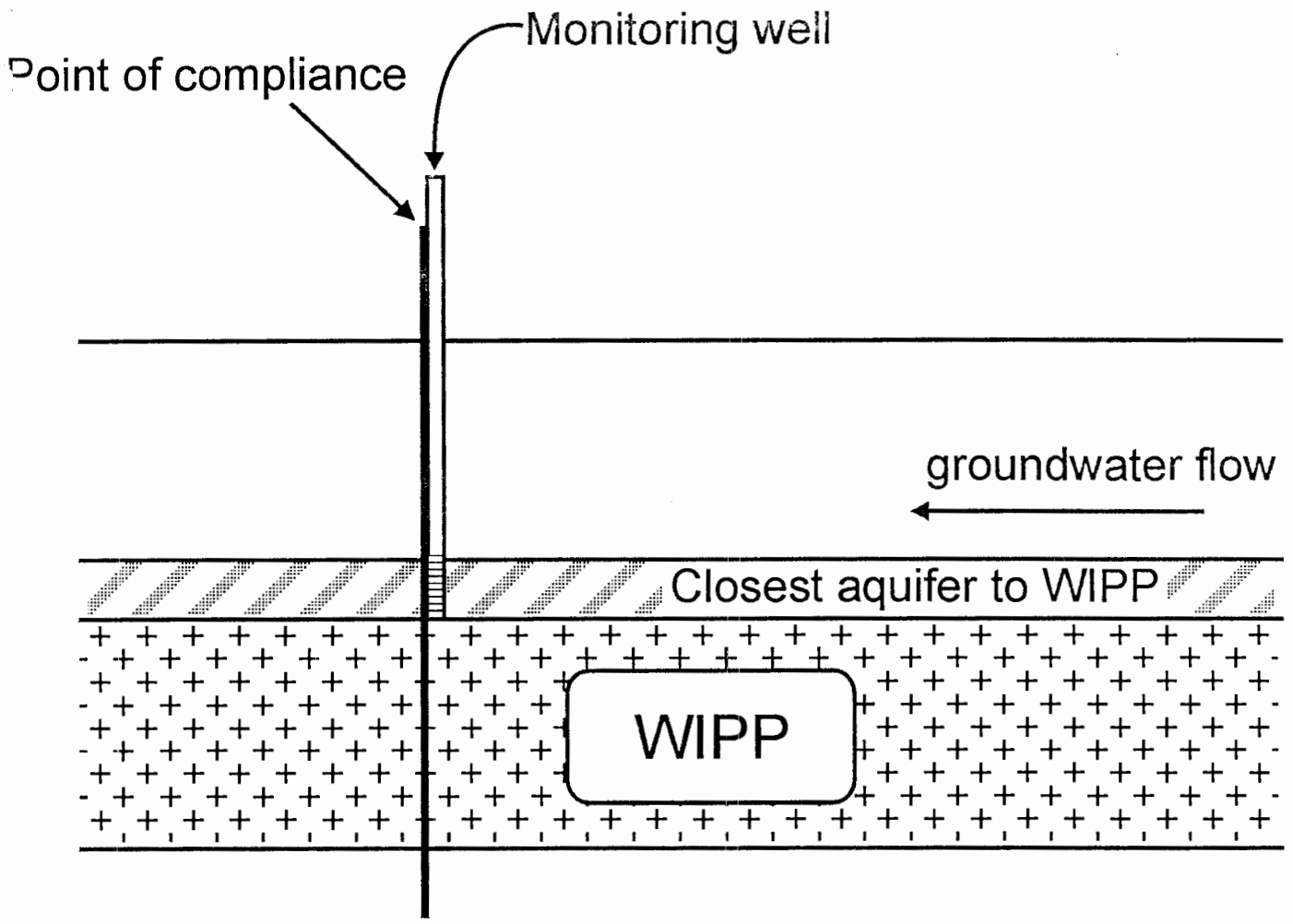
WIPP Detection Monitoring

Schematic - Not To Scale



Typical Detection Monitoring Schematic

(not to scale)



WIPP Detection Monitoring Schematic

(not to scale)

POINT OF COMPLIANCE

I. INTRODUCTION

The revised draft permit requires a Detection Monitoring Program (DMP). The purpose of the DMP is to monitor ground water quality downgradient of the waste management area to detect statistically significant evidence of contamination. 20 NMAC 4.1.500 (incorporating 40 CFR §264.98(f)(2)). The monitoring occurs at the Point of Compliance (POC), defined as the vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units. 20 NMAC 4.1.500 (incorporating 40 CFR §264.95(a)).

Because of the unique geologic and hydrologic characteristics of the Waste Isolation Pilot Plant (WIPP), strict application of this definition of POC does not comport with the intent of the DMP, and does not best achieve the environmental performance standard. 20 NMAC 4.1.500 (incorporating 40 CFR §264.601). WIPP is unique because it lies approximately two thousand one hundred fifty (2150) feet below ground level, with aquifers overlying the geological repository, and over approximately fifteen hundred (1500) feet of very low permeability salts and anhydrites occur below the unit separating the WIPP from the closest aquifer underlying the repository. As a result, NMED believes that any release during the operational period -however remote- would occur up the repository shafts. Any release of hazardous constituents most likely would occur to the Culebra Member of the Rustler Formation, which overlies the geological repository. Accordingly, establishing the POC in the uppermost aquifer underlying the geological repository would not monitor the aquifer most likely to be contaminated by a release of hazardous constituents and, therefore, would not comport with the intent of the DMP, nor best achieve the environmental performance standards.

To achieve the intent of the DMP and best attain the environmental performance standards, NMED proposed the following POC in Module V.B of the revised draft permit:

> The point of compliance is the vertical surface located at the hydraulically downgradient limit of the Underground HWDUs [Hazardous Waste Disposal Units] that extends to the Culebra Member of the Rustler Formation [20 NMAC 4.1.500 (incorporating 40 CFR §§264.95, 264.601, and 264.602)]. The Permittees shall conduct the DMP at the DMWs [Detection Monitoring Wells] specified in Table V.C.1, and as required by 20 NMAC 4.1.500 (incorporating 40 CFR §§264.98 and 264.601).

In response to public comments regarding this condition, NMED proposes to change the POC:

> The point of compliance is the vertical surface located perpendicular to the groundwater flow direction at the DMWs that extends to the Culebra Member of

the Rustler Formation [20 NMAC 4.1.500 (incorporating 40 CFR §§264.95, 264.601, and 264.602)]. The Permittees shall conduct the DMP at the DMWs specified in Table V.C.1, and as required by 20 NMAC 4.1.500 (incorporating 40 CFR §§264.98 and 264.601).

The new language moves the POC downgradient to the DMP wells. The new POC ensures that the DMP wells and POC coincide, as provided in 20 NMAC §264.98(b), while still ensuring compliance with the environmental performance standards. Although the new POC is not at the vertical surface immediately hydraulically downgradient of the HWDUs, the new POC is as protective as the original POC because it monitors potential releases well before a release would occur beyond the facility boundary and is consistent with EPA guidance for Subpart X units.

II. BACKGROUND

In Revision 6.2 of the Application, the Applicants submitted a ground water monitoring plan which defined the POC as the Land Withdrawal Act (LWA) Boundary, approximately 1.5 miles from the southernmost limit of the waste management area. The Applicants affirmed this POC in Revision 6.4 of the Application.

III. ANALYSIS

A. REVISED DRAFT PERMIT

NMED regulations require the NMED Secretary to specify the POC for application of the ground water protection standard of 40 CFR §264.92, and states that the POC is the vertical surface located at the hydraulically downgradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units. 20 NMAC 4.1.500 (incorporating 40 CFR §264.95).

Permit Condition V.B of the revised draft permit defines the POC as the "vertical surface located at the hydraulically downgradient limit of the [underground hazardous waste disposal units (HWDUs)] that extends to the Culebra Member of the Rustler Formation." However, given the unique hydrogeology of WIPP, the POC extends to the lowermost aquifer overlying the regulated unit, not the uppermost aquifer underlying the regulated units.

The intent of the RCRA ground water regulations is to monitor the first aquifer most likely to be affected by a release of hazardous constituents from a regulated unit. This aquifer also should be a zone that poses the most likely release pathway to a biological receptor. If a zone other than this pathway were monitored, such as one that is highly saline or of limited areal extent, the most likely release pathway to a biological receptor might be overlooked.

For most hazardous waste disposal units (e.g., landfills) under normal conditions, a release of hazardous constituents would move in a downward direction from the regulated unit. As a result,

the release first would affect the uppermost aquifer underlying the regulated unit. In addition, a typical regulated unit (e.g., landfill) under normal conditions would not be sited beneath an aquifer. Therefore, for typical regulated units under normal conditions, the POC should be established in the uppermost aquifer underlying the regulated unit to provide the earliest warning of ground water contamination. However, in the case of WIPP, the closest potential ground water contaminant pathway lies in the Culebra Member -- above the WIPP. As a result, the regulatory intent -- providing the earliest warning of ground water contamination -- is achieved by monitoring the Culebra Member.

NMED believes that the WIPP shafts are the only possible pathway for hazardous constituent migration pathway during the operational period that could result in a release of hazardous constituents. In fact, EPA reached the same conclusion in granting the 1991 No Migration Variance for the WIPP Test Phase, which authorized the storage of hazardous waste without treatment to land disposal restriction levels. While NMED believes that the possibility of a release is remote, a release through the WIPP shaft pathway first would impact the Culebra Member, the closest aquifer to the WIPP facility along this migration pathway. In light of this potential migration pathway, NMED established the POC in the Culebra Member.

EPA agrees that the designation of this POC, rather than the Applicants' proposed LWA boundary, is appropriate when considering migration through the WIPP shafts: "The Agency proposes that the point of compliance, for the purpose of assessing migration out the unit by way of the shafts, be defined as the point where the Salado Formation (i.e., the salt bed) meets the overlying Rustler Formation". 55 FR 13074. NMED believes that the Culebra Member of the Rustler Formation is the first aquifer that is a migration pathway to the facility boundary above this Salado-Rustler contact. However, NMED does not believe that it is necessary to install monitoring wells within the Culebra Member at the WIPP shafts, as such installation could disrupt rock units around the shafts and the revised POC is sufficiently protective of human health and the environment. Further, EPA did not mandate NMED concurrence with EPA's designation (55 47782), thus allowing NMED to establish a POC consistent with the intent of 20 NMAC 4.1.500 (incorporating 40 CFR §§264.98 and 264.601).

As indicated previously, NMED considers a release to the uppermost aquifer underlying the HWDUs -- the Bell Canyon Formation -- to be highly unlikely, and certainly less likely than a release to the Culebra Member, in light of the exceptional thickness and low permeability of the Salado and Castile Formations which occur between WIPP and the Bell Canyon Formation. Given the low likelihood of a release to the Bell Canyon Formation, a POC in that formation would not comport with the regulatory intent.

With regard to the current location of the DMP wells, NMED believes that given the unique conditions at WIPP, the placement of wells should be flexible. At this time, it appears that the hydrologic system is still in flux, and further equilibration may occur. In addition, NMED believes that the DMP (as well as the parallel DOE Groundwater Monitoring Program) will produce a substantial amount of hydrologic information to guide future well placement.

Additional information may be obtained from the parallel DOE Groundwater Monitoring Program, and further analysis by other interested parties could provide additional ground water-related information. Rather than immediately requiring the Applicants to install more wells closer to the waste management area, NMED will monitor using the existing DMP wells, with the understanding that NMED may revise the network if warranted by new information. NMED has the authority to require such a revision under 20 NMAC 4.1.900 (incorporating 40 CFR §264.41(a)).

Of course, throughout this process, NMED (and the public) will have access to the DMP results, which includes data from the seven (7) groundwater quality (WQSP) wells in the DMP network, as well as water level monitoring at a number of other wells of concern to the public. In addition, the DOE's WIPP Groundwater Monitoring Program includes numerous wells not contained in the DMP that will provide water level and other information; NMED will consider this information when evaluating the DMP.

B. REVISED POINT OF COMPLIANCE

As discussed above, NMED proposes to revise the POC defined in the revised draft permit. While the POC in the revised draft permit tracks the regulatory requirement in 20 NMAC 4.1.500 (incorporating 40 CFR §264.95), it does not coincide with the DMP wells which provide ground water quality data at WIPP.

NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.98(a)) require the owner or operator to "install a ground-water monitoring system at the compliance point as specified under §264.95." NMED's revised POC meets this requirement. Critically, the Applicants could not comply with this requirement at the original POC or the Applicants' proposed POC, because there are no DMP wells located there. Furthermore, NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.98(f)(1)) require, in determining the existence of statistically significant evidence of contamination, the owner or operator to compare data from the POC to background ground water quality. NME's revised POC ensures that the Applicants obtain ground water quality data from the DMP wells.

NMED's decision to revise the POC is consistent with EPA guidance, which allows flexibility in locating the POC at Subpart X units. NMED's decision takes advantage of this flexibility, while assuring protection of human health and the environment. By establishing the POC at the DMP wells, NMED ensures that the Applicants will monitor ground water quality more than one (1) mile upgradient of the facility boundary. This distance ensures that NMED will detect ground water contamination long before a release, if any, reaches the LWA boundary.

1. RCRA COMPLIANCE

As a geologic repository, WIPP is regulated as a Subpart X miscellaneous unit under 20 NMAC 4.1.500 (incorporating 40 CFR Part 264, Subpart X. NMED has broad discretion to establish site-specific requirements to ensure compliance with the environmental performance standards in Subpart X. Specifically the Subpart X ground water regulation states:

> Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limits to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit.

20 NMAC 4.1.500 (incorporating 40 CFR §264.601).

The permit conditions requiring a DMP and establishing the location of the POC and DMP wells constitute "detection and monitoring requirements" which are necessary to achieve the environmental performance standards of 20 NMAC 4.1.500 (incorporating 40 CFR §264.601). Although a release during WIPP's operational period may be unlikely, NMED believes that ground water monitoring, at least for the foreseeable future, would be prudent.

2. EPA GUIDANCE

EPA guidance allows flexibility in locating the POC. In the Subpart X Draft Permit Writer's Guidance (1993), EPA states that "an alternative point of compliance may be appropriate for [Subpart X] units". Although EPA discussed the issue in the context of preventing damage to wells (e.g., detonation of explosives), EPA's statement recognizes the unique nature of Subpart X units. In the case of WIPP, the installation of additional DMP wells to collect data at a different POC before the system has equilibrated could result in unnecessary well installation. However, if NMED receives additional information indicating the DMP and POC do not adequately protect human health and the environment, NMED can modify the permit as authorized in 20 NMAC 4.1.900 (incorporating §270.41(a)(2)).

EPA guidance also recognizes the need for flexibility in DMP design. In the Draft Hazardous Waste Storage and Disposal in Geologic Repositories Permit Guidance under the Resource Conservation and Recovery Act (EPA/530-SW-001, September, 1998), EPA states that "permit conditions specifying performance monitoring requirements for hazardous waste repositories will be formulated on a case-by-case basis." In addition, EPA recognizes that "groundwater monitoring may differ considerably from typical groundwater monitoring", provided the monitoring complies with 40 CFR §264.97. In light of the current DMP locations, the site hydrogeology, and the likelihood of a release, NMED believes that the proposed DMP and POC will detect any release long before it reaches the accessible environment.

In the No Migration Determination for the WIPP Test Phase, the EPA designated a POC in the Salado Formation. 55 FR 47782. However, the EPA's designation relied on different regulatory authority, and only considered migration within the Salado Formation; it could not consider migration in the uppermost aquifer, as required under 20 NMAC 4.1.500 (incorporating 40 CFR Subpart F). As the EPA stated: "The State RCRA permit is significantly broader than a no-migration determination . . .[The Hazardous Waste Act] permit may include certain requirements already imposed under EPA's no migration determination, or it may establish more stringent requirements." NMED's designation of the POC arises from 20 NMAC 4.1.500 (incorporating §264.92), which requires establishment of the POC in the closest aquifer below (or in the case of WIPP, above) the hazardous waste disposal unit -- the Culebra Member of the Rustler Formation.

IV. PUBLIC COMMENTS

In public comments submitted on August 14, 1998, and December 22, 1998, the Applicants argued that the POC should be revised for two (2) reasons.

First, the Applicants argued that the POC legally could not be located upgradient of the proposed DMP wells. NMED agrees with the Applicants. In response, NMED has revised the location of the POC, as set forth in this testimony.

Second, the Applicants argued that the horizontal dimensions of the POC did not account for the "WIPP waste management area" which the Applicants asserted should include the Salado Formation extending to the WIPP LWA boundary. The Applicants relied on the EPA's No Migration Variance Determination for the WIPP Test Phase, citing EPA's conclusion that the four (4) square mile WIPP site represented the appropriate lateral disposal boundary.

NMED declines to relocate the POC more than seven thousand (7000) downgradient of the revised POC. First, NMED already considered the EPA No Migration Determination when establishing the DMP and POC requirements. The EPA's "unit boundary" applies to migration of hazardous constituents in the Salado Formation which does not contain any aquifers, while NMED's POC is designed to detect a release to the uppermost aquifer from the WIPP repository, as required in 20 NMAC 4.1.500 (incorporating 40 CFR 264 Subpart F). EPA concluded, and NMED agrees, that migration within the Salado Formation to the LWA boundary during the operational period will not occur, and the only pathway for migration during the operational period is the WIPP shafts. Hence, NMED has required monitoring of the Culebra Member, which is the first aquifer that may be encountered through this migration pathway. Moreover, the EPA's selection of the Salado Formation was based on the underground injection "no migration" regulations and the associated "injection zone", which allows some contaminant migration in a specified geologic interval.[1] However, the EPA noted that "migration of hazardous constituents

[1] The EPA did not consider the WIPP to be an injection well, but found that these regulations provided useful guidance regarding the application of the injection zone concept in a "no migration" determination.

at hazardous levels from out of the . . . repository into unconfined aquifers lying above or below the salt bed would constitute migration from the unit". 55 FR 13074 (emphasis added). This migration is the subject of the WIPP permit. Accordingly, NMED's decision to establish the POC to detect migration in the overlying/underlying units is consistent with the EPA's conclusion regarding migration from the Salado Formation.

NMED also notes that the EPA's conclusion was developed with a long-term ten thousand (10,000) year post-closure timeframe in mind. For example, EPA stated that its discussion "focuses on long term migration of hazardous constituents, once the repository has been sealed". 55 FR No. 220, 13075, April 6, 1990. Moreover, the EPA clarified that the POC for the WIPP operational period is the "point where vented repository air exits from the exhaust shaft and enters the general atmosphere" Id. at 13076. While this POC applied to the air pathway, NMED believes that any release to the ground water migration pathway during the WIPP operational period would occur on the same route, and therefore, ground water monitoring should focus on the most probable pathway above the Salado Formation. Any DMP and POC must consider this migration route.

Notably, NMED's interpretation of the POC requirement considers the containment capabilities of the Salado Formation, because NMED does not believe that migration within the Salado Formation to the LWA boundary will occur during the operational period. For this reason, NMED does not require monitoring of the interbeds within the Salado Formation. NMED does not believe that any release during the WIPP operational period to the Salado interbeds poses a threat to human health and the environment.

NMED cannot adopt the Applicants' proposed POC for a number of reasons. First, there are no wells at the LWA boundary. As a result, the Applicants would have to install additional wells at considerable expense to implement their proposed POC. Second, the Applicants would have to delay waste disposal operations until these wells were completed, because the permit requires monitoring during waste disposal operations. Third, the Applicants' proposed POC would never trigger compliance monitoring (e.g., monitoring following detection of a release), because the only wells which could trigger this monitoring are located within the waste management area, not at the POC. In other words, the Applicants might detect a release at the DMP wells, but would not be required to implement compliance monitoring until the release crossed the POC. If the POC were established at the LWA boundary, this situation could result in a release from the waste management area continuing for years until detection.

CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

I. INTRODUCTION

In Module VII of the revised draft permit, the New Mexico Environment Department (NMED) determined to impose conditions for the implementation of Corrective Action for Solid Waste Management Units (SWMUs) at the Waste Isolation Pilot Plant (WIPP). This testimony explains the statutory and regulatory justification for those conditions, and provides a detailed discussion of the corrective action process, including key definitions, concepts, and components of the process. Key definitions and concepts include (1) the definition of release; (2) the nature and extent of contamination; (3) future land use; and (4) action levels. Key components include (1) RCRA Facility Assessment; (2) Release Assessment; (3) RCRA Facility Investigation (including the Risk Assessment); (4) Interim Measures; (5) Corrective Measures Study; and (6) Corrective Measures Implementation.

II. DISCUSSION

A. STATUTORY AND REGULATORY BACKGROUND

NMED's determination to impose corrective action requirements is based upon clear and express statutory and regulatory support. The Resource Conservation and Recovery Act (RCRA) requires permits issued after 1984 to contain corrective action requirements for releases of hazardous wastes or constituents from a SWMU, regardless when the waste was placed in the SWMU, as necessary to protect human health and the environment. See RCRA Sections 3004(u) and 3004(v), as amended by Public Law 98-616 (November 8, 1984). The New Mexico Hazardous Waste Act (HWA) and NMED regulations at 20 NMAC 4.1.500 (incorporating 40 CFR §264.101) imposes the same requirement on permits issued after April 8, 1987. NMSA 1978, Sections 74-4-4.A.5.h and 74-4-4.2.C (Repl. Pamp. 1993). In addition, the HWA Section 74-4-4.A.5.i and 20 NMAC 4.1.500 (incorporating 40 CFR §264.101(c)) require corrective action beyond the facility boundary where necessary to protect human health and the environment, unless the facility owner or operator demonstrates to the Environment Secretary's satisfaction that, despite the owner's or operator's best efforts, the owner or operator could not obtain permission to undertake such action. Finally, NMED is authorized to impose terms and conditions in a permit as deemed necessary to protect human health and the environment. HWA Section 74-4-4.2.C; 20 NMAC 4.1.900 (incorporating 40 CFR §270.32(b)(1)). Module VII is based on the EPA Region 6 Model Hazardous and Solid Waste Amendments (HSWA) Permit.

1. BACKGROUND

The history of RCRA corrective action began with the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA. HSWA directed the EPA to require corrective action for all releases of hazardous waste and hazardous constituents from SWMUs at any facility seeking a RCRA permit (e.g., Treatment, Storage or Disposal Facilities or TSDFs,) regardless when the

waste was placed in the units. When corrective action could not be completed prior to permit issuance, HSWA directed the EPA to establish corrective action schedules for compliance and financial assurance. In addition, HSWA contained an omnibus provision directing the EPA to ensure that every permit contained terms and conditions deemed necessary to protect human health and the environment. RCRA Section 3004 (u) and (v).

In July 1985, the EPA codified the corrective action requirements at 40 CFR §264.90(a)(2) and 264.101, and the omnibus provision at 40 CFR §270.32(b)(2). See 50 FR 28702 (July 15, 1985). These regulations reiterated the statutory language of RCRA Section 3004(u), by requiring facility owners and operators seeking RCRA permits to institute corrective action to protect human health and the environment, or when such action could not be completed prior to permit issuance, to implement schedules for compliance and financial assurance.

In December 1987, the EPA codified additional corrective action requirements at 40 CFR §264.101(c). See 52 Fed.Reg. 45788 (December 1, 1987). These regulations reiterated the statutory language of RCRA Section 3004(v), by requiring corrective action for releases beyond the facility boundary. These regulations also established permit application requirements to implement the corrective action regulations.

On July 27, 1990, the EPA proposed detailed regulations to implement the RCRA corrective action program. See 55 FR 30798 (July 27, 1990). The proposal was designed to be the analogue to the CERCLA program's National Oil and Hazardous Substances Pollution Contingency Plan). As such, the RCRA corrective action program addressed both technical (e.g., cleanup levels, remedy selection, points of compliance) and procedural (e.g., definitions, permitting, reporting) issues. The proposal emphasized the need for site-specific flexibility in cleanup programs, stating:

> Because of the wide variety of sites likely to be subject to corrective action, EPA believes that a flexible approach, based on site-specific analyses is necessary. No two cleanups will follow exactly the same course, and therefore, the program has to allow significant latitude to the decision maker in structuring the process, selecting the remedy, and setting cleanup standards appropriate to the specifics of the situation.

55 FR 30802. The proposal generated significant public comment. As a result, the EPA has finalized only a few sections, but the bulk of the proposal is used as guidance for corrective actions by the EPA and NMED.

2. STATE PRIMACY FOR CORRECTIVE ACTION

The State of New Mexico has received final authorization from the EPA to administer, implement, and enforce corrective action requirements under RCRA and HSWA. 61 Fed.Reg. 2450 (January 26, 1996). As a result, New Mexico now assumes primary responsibility for implementing the provisions of the RCRA, including the corrective action program.

3. EPA NOTICE OF ADVANCE RULEMAKING

On May 1, 1996, the EPA published an Advance Notice of Proposed Rulemaking (ANPR) to introduce its proposed strategy for promulgating corrective action regulations, and to request public comment on a variety of concepts and issues regarding corrective action. See 61 FR 19432 (May 1, 1996). Because the EPA's philosophy and strategies had evolved since 1990, the ANPR included a general status report on the corrective action program, and provided guidance on a number of topics not fully addressed in 1990.

a. Risk-Based Decision Making

The ANPR emphasized that the fundamental goal of the corrective action program is to control or eliminate risks to human health and the environment. Risk-based decision making is a broad concept currently being implemented by both the EPA and NMED. Upon identification of a release from a SWMU and the characterization of the nature and extent of contamination, the agency evaluates the degree of potential risk that the release poses to each human and environmental receptor to decide whether to require implementation of corrective measures, as well as the degree of remediation. Whenever possible, the agency considers site-specific information regarding actual and potential contaminant migration pathways and actual and potential receptors, rather than generic (and possibly overly conservative) assumptions. The ANPR indicated that risk-based decisions are important in the corrective action program, because it ensures that corrective actions fully protect human health and the environment, given reasonable exposure assumptions and the actual threat to human health and the environment. A key requirement of the risk-based decision making process is that all risk-based decisions must be based on data of appropriate quantity and quality.

b. Refinement of Definitions

The EPA's 1990 proposed corrective action program included definitions for several terms important to defining the applicability of RCRA corrective action. The EPA and NMED generally have interpreted these terms as proposed in 1990, except as clarified by the ANPR, which refined several definitions, including solid waste management unit, hazardous waste, and hazardous constituent.

The 1990 proposal defined SWMU as "any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released." 55 FR 30874. The ANPR confirmed that a one-time spill of solid waste containing hazardous constituents which had not been adequately cleaned up would not constitute a SWMU. 61 FR 19443. The ANPR also introduced the term Area of Concern (AOC) to address the spill scenario, and generally to refer to releases which warrant investigation or remediation under the "omnibus" authority (regardless whether the releases are associated with a specific SWMU). EPA Region 6 and NMED consider an AOC to be any discernable unit or area which, in the opinion of the EPA Administrator or Environment

Secretary, may have received solid or hazardous waste or waste containing hazardous constituents at any time. EPA Region 6 and NMED may require an investigation of an AOC to determine whether it is a SWMU.

Also of interest for the WIPP RCRA Permit is the definitions of hazardous waste and hazardous constituents. RCRA Section 3004(u) and HWA Section 74-4-4.2.B require corrective action for releases of "hazardous wastes or constituents". The EPA and NMED interpret "hazardous waste" as any waste that is hazardous within the meaning of RCRA Section 1004(5). This definition is broader than wastes listed or identified under RCRA Section 3001. The EPA and NMED consider the reference to "constituents" to be significant, because it indicates that the corrective action program was intended to extend to hazardous constituents regardless whether they satisfy the definition of "hazardous waste" or were derived from "hazardous waste". Under this interpretation, the corrective action program applies to hazardous constituents derived from nonhazardous solid waste. Accordingly, the revised draft permit defines "hazardous constituents" as any constituent identified in 20 NMAC 4.1.200 (incorporating 40 CFR §261 Appendix VIII), any constituent identified in 20 NMAC 4.1.500 (incorporating 40 CFR §264 Appendix IX), any constituent identified in a hazardous waste listed in 20 NMAC 4.1.200 (incorporating 40 CFR §261 Subpart D), or any constituent identified in a toxicity characteristic waste in 20 NMAC 4.1.200 (incorporating 40 CFR §261.24, Table 1).

B. KEY CONCEPTS

1. DEFINITION OF RELEASE

The term "release" is a key concept for RCRA corrective action. The EPA defines "release" as "any spilling leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment". 50 FR 28713 (July 15, 1985). In the 1990 proposal, the EPA added the following language to the definition: ". . . including abandonment or discarding of barrels, containers and other closed receptacles containing hazardous waste or hazardous constituents". 55 FR 30874. NMED has incorporated the regulatory definition and the additional language from the 1990 proposal into the revised draft permit.

For RCRA corrective action, NMED considers a release of hazardous waste or constituents to have occurred if (1) a hazardous waste or a waste containing hazardous constituents was managed directly on or within the ground surface at a SWMU (e.g., an unlined landfill or surface impoundment); (2) it is known that a release of hazardous constituents from a SWMU or AOC came into contact with any environmental medium (e.g., a leak or spill from a SWMU or AOC contacted soil, surface water, or ground water outside the unit); or (3) chemical analyses of samples of any environmental medium (e.g., soil, surface water, ground water, or air), collected within, adjacent to, or down gradient from a SWMU or AOC detect organic hazardous constituents above the method detection limit, or detect inorganic hazardous constituents above background concentrations.

2. NATURE AND EXTENT OF CONTAMINATION

Once it has been established that hazardous constituents have been released from a SWMU or AOC, the owner or operator must characterize the nature and extent of contamination. Typically, this characterization is conducted during the RCRA Facility Investigation (RFI). Critically, this characterization occurs before the owner or operator assesses the potential risk to human health and the environment and the necessary corrective measures.

The requirement to characterize the nature and extent of contamination before making risk-based decisions is a key component of the RCRA corrective action program. Many facilities attempt to conduct human health and ecological risk assessments based on the limited sampling data collected during the RCRA Facility Assessment (RFA) or the Release Assessment (RA). However, the limited sampling data typically collected during a RFA or RA may not detect the highest concentrations of hazardous constituents, or the release may have migrated beyond the sampling area.

The ANPR emphasized that "Before cleanup decisions can be made, some level of characterization is necessary to ascertain the nature and extent of contamination at a site and to gather information necessary to support selection and implementation of appropriate remedies". 61 FR 19444. The ANPR also noted that

> Carefully designed and implemented RFIs are critical to accurately characterize the nature, extent, direction, rate, movement, and concentration of releases at a given facility. This information is needed to determine potential risks to human health and the environment and support development and [to] implementation of corrective measures should they prove necessary. It can be used to eliminate facilities which are shown not to present unacceptable risks from further consideration. A successful RFI will identify the presence, movement, fate, and risks associated with environmental contamination at a site and will elucidate the chemical and physical properties of the site likely to influence contamination migration and cleanup.

Id. For this reason, the EPA requires characterization of the nature, extent, and concentration of releases from a SWMU or AOC before the owner or operator may conduct a risk assessment or make human health risk-based decisions regarding the need for corrective actions.

The EPA and NMED regulations do not establish a specific definition of the term "nature and extent of contamination". Rather, the EPA and NMED define "nature and extent of contamination" on a site-specific basis which considers the potentially impacted media and unit-specific characteristics. For ground water, the extent of contamination typically is delineated to federal or state drinking water standards or to the first confining layer or hydrologic barrier. For surface water, contamination is measured against federal or state water quality standards. For soil, contamination is measured against the analytical detection limits for organic constituents

and background concentrations for inorganic constituents, or against generic or site-specific action levels.

The characterization of the nature and extent of contamination does not have to be an exhaustive effort. For some sites, adequate information to support cleanup decisions can be obtained through characterization to risk-based concentrations or other investigation endpoints, provided the data are sufficient to identify potential "hot spots" (e.g., areas with high levels of contamination). For example, if a release to soil has been detected at a SWMU in which waste was managed directly on the ground surface over an area of several acres, the collection of a few soil samples within the SWMU may not be sufficient to delineate the extent of contamination and ensure the absence of "hot spots".

3. ACTION LEVELS

As part of the risk-based decision making process, the EPA and NMED have adopted the concept of action levels to streamline the decision whether a SWMU release requires additional corrective action activities (e.g., investigations, evaluation of corrective measures alternatives, site-specific risk assessments). The revised draft permit proposes action levels for chemical-specific concentrations that have been or could be developed for each environmental medium, probable land use, and receptor. Whenever possible, action levels are based on promulgated federal or state standards for chemicals and environmental media (e.g., non-zero drinking water Maximum Contaminant Levels, Ambient Water Quality Criteria, National Ambient Air Quality Standards, etc.). If promulgated standards are not available, the action levels are derived using up-to-date chemical-specific toxicity information and standardized exposure assumptions. These action levels are developed on a facility-specific basis or taken from standardized lists (i.e., generic action levels). Currently, several EPA regions have developed standardized lists (such as the EPA Region 6 Human Health Media Specific Screening Levels), or standardized cleanup levels for RCRA corrective actions.

Once the owner or operator establishes that the nature and extent of contamination has been characterized, and the concentrations of hazardous constituents in each environmental media to which a receptor could be exposed (e.g., exposure point concentration), it compares these concentrations to the designated action levels. If the exposure point concentrations do not exceed the action levels, and the site characteristics are consistent with the assumptions underlying the action levels, a "No Further Action" (NFA) determination may be issued without the performance of a screening-level or site-specific risk assessment.

Because action levels protect receptors from exposure to a single hazardous constituent in a single environmental medium, and are applied without a screening-level or site-specific risk assessment, NMED believes that action levels should be established at the more protective end of the risk range (e.g., 10^{-6}), using conservative exposure and land use assumptions (e.g., residential future land use). If an owner or operator proposes action levels at the less protective end of the risk range (e.g., 10^{-4} to 10^{-5}), NMED requires these action levels to account for potential exposure to multiple hazardous constituents in multiple environmental media. Nonetheless, NMED

believes that action levels based on less conservative exposure and land use assumptions may be warranted in light of site-specific conditions, such as current and reasonably anticipated use of a site for industrial purposes. (In the event that a NFA is based on non-residential action levels, the owner or operator must comply with permit conditions requiring additional risk evaluations should it contemplate a different land use).

4. DATA QUALITY OBJECTIVES

Data Quality Objectives area critical to risk-based decision-making under the RCRA corrective action program. The overall degree of data quality or uncertainty that a decision maker is willing to accept is called the Data Quality Objective (DQO) for a decision. All data gathering strategies should be tailored to the purpose for which the data will be used. DQOs are used to specify the quality of the data, usually in terms of precision, bias, representativeness, comparability and completeness. The DQO approach applies to the entire measurement system (e.g., sampling locations, methods of collection and handling, field analysis, etc.), not just to laboratory analytical operations. DQOs can and should be used to ensure that environmental data are scientifically valid, defensible, and of an appropriate level of quality given the intended use for the data. DQOs for collecting data to determine whether a release of hazardous constituents has occurred, or to make risk-based decisions must include stringent controls on data quality.

5. USE OF EXISTING DATA

For facilities that have been in existence for a number of years (e.g., the WIPP), and for facilities with proactive site owners or operators, there may be a large body of data regarding the environmental setting (including the nature and extent of contamination) collected outside the RCRA corrective action process. As a general principle, there is no need to recollect non-time-dependent information, and in fact, the EPA and NMED encourage the use of such information in the RCRA corrective action process. This information may be contained in reports or other formats not traditionally used for RCRA corrective action (e.g.., engineering boring logs generated by local utility companies or during building construction). This information is acceptable provided the owner or operator converts the information into a usable format. Owners and operators who are conducting site characterization independently should document the quality of their information carefully. Thorough documentation increases the data's usefulness in the corrective action process. To determine whether existing data may be used in the corrective action process, NMED evaluates the nature and quality of the information in light of the goals of the corrective action investigation. If DQOs have been established, NMED can directly evaluate the data. For instance, the DQOs for a specific corrective action decision could be a minimum analytical detection limit considerably lower than used to generate the existing data. In this case, "non-detects" in the existing data could not be used to justify NFA, but could be used to identify "hot-spots", or to plan a second phase study using more sensitive analytical methods. On the other hand, if the analytical detection limit were below the acceptable risk level, "non-detects in the existing data could be used, even if more sensitive methods were available.

If NMED is aware of pertinent existing information at the time of issuance of a permit or order, NMED may reference the information in the facility investigation requirements, or if the data has sufficient quality and quantity, it may determine that the data satisfies site investigation needs.

6. FUTURE LAND USE

The concept of future land use is critical to successful risk-based decision-making under RCRA corrective action. The EPA and NMED considers current and reasonable foreseeable land use, and corresponding exposure scenarios, in determining the need for, and timing of, RCRA corrective measures. Future land use typically is defined as residential or non-residential (or industrial). Because facilities subject to RCRA corrective action are typically industrial, an assumption of non-residential future land use may be appropriate. However, the EPA and NMED routinely question this assumption, because an industrial facility might include offices, child care areas, and on-site residences. Therefore, the EPA and NMED consider public input, including input from local planning and zoning commissions and community advisory groups, to be crucial in determining future land use.

A future residential land use scenario assumes unrestricted use of the site and the most conservative assumptions regarding human exposures to hazardous constituents (e.g., thirty (30) years of exposure, three hundred fifty (350) days per year). The residential scenario also assumes that children will be present at the site, and that the groundwater beneath the facility may be used in some manner. A future industrial land use scenario assumes restricted use of the site, and that exposures will occur to adult workers only during working hours (e.g., twenty (20) years and two hundred fifty (250) days per year). The industrial scenario assumes that children will not be present (except perhaps as trespassers), and that the groundwater beneath the site will not be consumed. It should be noted that for large facilities, the future land use could be different for different portions of the site.

In determining the future land use of a site, the EPA and NMED consider several factors, including past site use and zoning, current use and zoning, other current or potential on-site uses, adjacent land uses and zoning, public input from local authorities and citizens, and the viability of the owner or operator.

During the initial evaluation of the RFI data (including the comparison of exposure point concentrations to action levels), or during the performance of a screening-level risk assessment (e.g., to support a NFA determination), a residential future land use scenario is the most appropriate assumption for the following reasons: (1) The comparison of exposure point concentrations to action levels and screening-level risk assessments are typically conducted prior to the facility obtaining data and input from state and local planning and zoning commissions and the general public that would be required to support a non-residential future land use; (2) the residential future land use scenario includes conservative exposure assumptions, and therefore is the easiest scenario for the EPA and NMED to defend; and (3) the residential future land use

scenario obviates the need to revisit any NFA determinations should the land use ultimately become industrial.

During the performance of a site-specific risk assessment, an industrial future land scenario may be appropriate. Such assessment involves the detailed evaluation of contamination pathways and receptors and decisions regarding site-specific media cleanup levels and corrective measures. Given the detailed nature and expected costs of this assessment, the owner or operator may find it cost-effective to obtain the public input and data to support a future industrial land use assumption.

Finally, NMED notes that if a NFA determination is based on the assumption of future industrial land use, NMED will revisit that determination if the future land use changes to residential. NMED also notes that if an future industrial land use is assumed during the development of site-specific cleanup levels or the selection and design of corrective measures, the corrective measures should include enforceable institutional controls (e.g., deed restrictions), physical controls (fencing, caps, etc.), and other requirements, which would be triggered if the future land use changes.

C. CORRECTIVE ACTION PROCESS

As noted above, NMED relies on the EPA's proposed regulations (July 27, 1990) and ANPR (May 1, 1996) for guidance in implementing the RCRA corrective action program. EPA's proposed regulations structured the corrective action process around five (5) elements: (1) RCRA Facility Assessment (RFA); (2) RCRA Facility Investigation (RFI); (3) Interim/Stabilization Measures; (4) Corrective Measures Study (CMS); and (5) Corrective Measures Implementation (CMI). The ANPR discussed a sixth element, a Release Assessment (RA), which typically occurs between the RFA and RFI. These six (6) elements occur, to one degree or another, at most sites subject to RCRA corrective action requirements, although the EPA emphasizes that the elements should be viewed as evaluations necessary to make good cleanup decisions, not prescribed steps for all corrective actions at all facilities.

Currently, NMED is developing a Risk-Based Decision Process for corrective action that incorporates the six (6) elements identified by the EPA. However, NMED expects that the Risk-Based Decision Process will be procedurally flexible to allow an owner or operator to focus on the stabilization and/or cleanup of releases, rather than wasting valuable time and resources fulfilling administrative paperwork requirements. The NMED Risk-Based Decision Process, as currently envisioned. is described below, and a flow chart describing the corrective action process is attached to this testimony.

1. RCRA FACILITY ASSESSMENT

a. Purpose

The RCRA Facility Assessment (RFA), the first element, is a mandatory requirement of the RCRA corrective action program. During a RFA, the regulatory agency compiles existing information on environmental conditions at the facility, including information to identify SWMUs and AOCs, document releases and potential releases of hazardous waste or hazardous constituents from the SWMUs and AOCS, and determine potential pathways and receptors. This information is used to develop the initial site conceptual model and to identify SWMUs and AOCs requiring corrective action in the RCRA permit.

b. Potential Outcomes

The typical outcome of a RFA is a report describing the SWMUs and AOCs at a facility. The RFA Report also may include conclusions regarding the need for further actions at each unit based on the potential occurrence of a release. The conclusions regarding the need for further actions may include NFA, confirmatory sampling, RFI, or interim/stabilization measures.

For SWMUs and AOCs in which hazardous constituents are not and were not managed or from which there was no release of hazardous constituents (e.g., units with adequate engineered release controls), NMED typically concludes that no further action (NFA) is needed. For SWMUs and AOCs where (1) historical or current evidence suggests the occurrence of a release, but for which there is no information regarding the presence of hazardous constituents; (2) the unit's condition suggests the occurrence of a release, but for which there is no direct evidence (e.g., heavy staining on a concrete outdoor waste container storage pad without curbing); or (3) for which it is not possible to visually assess the occurrence of a release (e.g., underground industrial wastewater sewer lines or manholes), NMED typically concludes that confirmatory sampling is needed.

For SWMUs and AOCs with a documented release of hazardous constituents (e.g., visual observation during the RFA, file records, or records indicating direct contact of hazardous constituents with an environmental medium), NMED typically concludes that a RFI is needed.

For SWMUs and AOCs for which it was clear, from the RFA, that a release had occurred which require immediate attention to prevent or mitigate a threat to human health and the environment (e.g., contamination of a drinking water supply exceeding MCLs), NMED typically concludes that interim/stabilization measures are needed.

c. HSWA Permit Module

NMED uses the results of a RFA to identify and include SWMUs and AOCs requiring further investigation or remediation in the HSWA module of a RCRA permit issued under HWA Sections 74-4-4.A.5.h and 74-4-4.2.

d. Site Conceptual Model

A RFA also is used to develop the initial site conceptual model for the facility, which is an important component for implementation of RCRA corrective action at many sites. A site conceptual model is a three-dimensional picture of site conditions that conveys what is known or suspected about the sources, releases, contaminant fate and transport, exposure pathways and potential receptors, and risks. The site conceptual model is based on the available information, and evolves as more information is obtained. The site conceptual model may be used to present hypotheses that additional investigations could confirm or refute, to determine the the need for interim measures, to support risk-based decision-making and to aid in identification and design of potential corrective measure alternatives. The site conceptual model is not a mathematical or computer model, but these tools are often used to help evaluate current information and predict future conditions. Because the site conceptual model is dynamic, it should be tested and refined from the beginning of corrective action to the completion of remediation.

2. RELEASE ASSESSMENTS

a. Purpose

A Release Assessment (RA) (also known as a Phase I RCRA Facility Investigation or Confirmation Sampling) is used to confirm or reduce uncertainty about SWMUs, AOCs, and potential releases identified during the RFA. Under the corrective action process as originally conceived, NMED, EPA, and the owner or operator typically moves directly from the RFA to full-scale site characterization under the RFI. However, as they gained experience, the agencies have found it advantageous in some cases to conduct a limited release assessment after the RFA, but before full scale site characterization, in order to focus subsequent investigations or eliminate SWMUs and AOCs from further consideration. A RA can be especially helpful in cases where the RFA is old or where the regulatory agency and owner or operator disagree about the inclusion of one or more SWMUs or AOCs in the site characterization. Information collected during a RA can be used to focus site characterizations on the releases and exposure pathways which pose the greatest risk to human health and the environment, and to eliminate SWMUs and AOCs from full-scale site characterization. For example, the RFA might identify an old waste pile as a SWMU. The owner or operator might present information demonstrating removal of the waste, but little or no information may be available to confirm that any release was adequately remediated to appropriate cleanup levels. During a RA, the owner or operator could conduct highly focused sampling to confirm that ~~any~~ release did not occur or was adequately remediated.

b. Sampling Strategy

A RA should employ a focused sampling strategy that is biased toward locations and environmental media most likely to have received a release based on visual observation or knowledge of the SWMU or AOC. For large SWMUs and AOCs, this sampling could incorporate statistically valid grid sampling or sampling at specified intervals along sewer line paths. All sampling should be conducted in accordance with detailed sampling and quality assurance project plans. The quality of the collected data must be very high, because it will be

used to make decisions regarding the need for further action. As a result, standard sampling techniques and laboratory analysis with low detection limits should be used.

c. Determination of Release Occurrence

The primary use of a RA is to determine whether a release of hazardous constituents has occurred from a SWMU. NMED and EPA consider that a release has occurred from a SWMU or AOC if hazardous constituents are found in an environmental medium in concentrations above the method detection limit for organic constituents or background concentrations for inorganic constituents. In many instances, an owner or operator will attempt to compare the RA sampling data to action levels or other generic human health risk-based concentrations to determine whether a release has occurred. However, this comparison is not appropriate, because the criteria for determining whether a release has occurred are based on method detection limits or background concentrations, not action levels or other generic human health risk-based concentrations. In addition, the owner or operator often attempts to conduct a risk assessment using the limited data collected during a RA to show that no further action is required at a SWMU or AOC. This approach also is not appropriate, because it is unlikely that the limited sampling conducted during a RA is sufficient to delineate the nature and extent of the release of hazardous constituents at the level necessary to conduct a risk assessment or make risk-based decisions. For example, the RA sampling may not have been conducted in the areas with the highest concentrations of hazardous constituents, or the main portion of the release may have migrated beyond the sampled area.

d. Action When No Release Has Occurred

If the RA indicates that a release has not occurred, the owner or operator may request a NFA determination for the SWMU or AOC by petitioning the NMED Secretary for a Class III Permit modification to terminate the RFI/CMS process for that unit. NMED reviews the relevant information, as well as any public comments. If NMED determines to grant the NFA petition, NMED removes the SWMU or AOC from the Corrective Action Module of the RCRA permit.

e. Action When Release Has Occurred

If the RA indicates that a release of hazardous waste or hazardous constituents has occurred from a SWMU or AOC, NMED evaluates the data to determine whether to require interim measures to prevent or mitigate threats to human health or the environment. If NMED determines not to require interim measures, the owner or operator must conduct a RFI to determine the nature and extent of the release and to gather data to evaluate the risk to human health and the environment. NMED uses the RFI to determine the need for corrective measures at the SWMU or AOC. In cases involving relatively simple delineation of the extent of contamination and the obvious need for corrective measures, NMED and the owner or operator may decide, based on the RA to skip the RFI and begin planning and implementation of corrective measures. In these cases, the owner or operator completes the delineation of the extent of contamination during the implementation of the corrective measures.

3. RCRA FACILITY INVESTIGATION

a. Purpose

The second major element is the RCRA Facility Investigation (RFI). A RFI is required if a release is known to have occurred at a SWMU. The purpose of a RFI is to collect data of adequate quantity and quality to assess the risk to human health and the environment, and to determine the need for corrective measures to mitigate the impact to human health and the environment. In order to assess the risk to human health and the environment, the RFI must delineate the extent of contamination and determine the exposure point concentrations for all potentially impacted receptors. Because the physical and chemical properties of each potential migration pathway directly influences the extent of contamination, a RFI initially must characterize the environmental setting. Further, a RFI must collect data to determine potentially affected human populations and environmental systems, as well as their exposure point concentrations. Finally, a RFI may be used to determine whether the release poses an immediate threat to human health or the environment requiring the implementation of interim/stabilization measures.

b. Delineation of Contamination

NMED and EPA require an accurate characterization of the nature and extent of releases at a facility before conducting a risk assessment or making human health risk-based decisions regarding corrective actions. This requirement is reflected in Permit Conditions VII.H.1, VII.H.3.c, VII.H.4.b, and VII.H.5 of the Corrective Action Module, which authorize the use of risk assessments to derive clean-up levels and justify NFA determinations after the Applicants have determined the full vertical and horizontal nature and extent of contamination at each SWMU, AOC, or group of SWMUs and AOCs. These permit conditions ensure that the limited sampling data from RFAs and RAs are not used to assess human health and ecological risks. Specifically, NMED was concerned that the limited sampling data typically produced by RFAs and RAs would not detect the highest concentrations of hazardous constituents, or that the hazardous constituents might have migrated beyond the sampling area.

EPA guidance documents support the requirement to delineate the nature and extent of contamination prior to making risk-based decisions. For instance, the EPA guidance document entitled Risk Assessment Guidance for Superfund: Human Health and Evaluation Manual, Part A, Office or Emergency and Remedial Response, EPA 540/1-89/002 (December 1989)(RAGS), recommends focusing the human health evaluation on characterizing the nature and extent of contamination, the potential exposures, and the potentially exposed populations, in order to determine the risks to be reduced or eliminated. Id. at 3-1. For the characterization of soil contamination (the primary medium of concern for the WIPP SWMUs), RAGS notes that soil, a medium of direct contact exposure, is often the main source of contaminants released into other media. See 4-11. As a result, the number, location, and type of soil samples significantly affect the risk assessment. RAGS also notes that soil sampling is complicated by the generally heterogeneous nature of soil, which requires the collection of numerous samples to obtain

sufficient data for the calculation of exposure concentrations. Because "hot spots" significantly effect direct exposures, the sampling plan must be designed to detect and characterize these "hot spots" through extensive sampling, field screening, visual observation, or a combination of these methods.

c. Exposure Point Concentrations

One of the primary objectives of a RFI is to determine the exposure point concentrations for each receptor potentially impacted by a release from a SWMU or AOC. The exposure point concentration is the amount of a chemical in an environmental medium to which a person or receptor has been or may be exposed. NMED requires the exposure point concentration to be set using either the maximum concentration of each hazardous constituent detected in each environmental media, or the ninety five (95) percent upper confidence limit (UCL) of the arithmetic mean of the concentration of each hazardous constituent detected in each environmental media. This requirement is supported by the EPA Supplemental Guidance to RAGS, Calculating the Concentration Term, Office of Solid Waste and Emergency Response. Publication 9285.7-081 (May 1992)(RAGS Supplement). The RAGS Supplement recommends that the concentration term (e.g., the exposure point concentration) in the intake equations be based on the UCL for the SWMU or AOC. The RAGS Supplement notes that Superfund site sampling data have shown that data sets containing fewer than ten (10) samples per exposure area provide a poor estimate of the mean concentration, data sets containing between ten (10) to twenty (20) samples per exposure area provide a better estimate of the mean, and data sets containing between twenty (20) to thirty (30) samples per exposure area provide a fairly consistent estimate of the mean (e.g., the UCL is close to the mean). Owners and operators should use the RAGS Supplement in planning site characterizations and evaluating the adequacy of existing site information.

d. Flexible Processes

The EPA's 1990 proposed regulations described the types of information required during a RFI. These information requirements have been incorporated into the RFI Scope of Work Sections of the Model HSWA Permits adopted by several EPA regions, including EPA Region 6, to ensure that the permits are applicable to a broad range of facilities. NMED and EPA recognize that these information requirements may not be necessary for all facilities, provided owners and operators gather sufficient information to support clean-up decisions. As a result, NMED and EPA believe that RFIs should be tailored to site-specific conditions, including the SWMUs, AOCs, releases, and exposure pathways of greatest concern.

Permit Condition VII.U specifies a detailed RFI Scope of Work. This degree of detail ensures that the Applicants consider the potential for a release to affect all environmental media, and that the permit language is sufficiently broad to address the most probable conditions at the facility.

In their public comments regarding the revised draft permit, the Applicants challenged several RFI information requirements as unnecessary. See Comments 133, 137, 138, and 139a. The Applicants indicated that this information was not necessary for all WIPP SWMUs, because they anticipated limited contamination and impacts to migration pathways.

NMED believes that the permit language provides sufficient flexibility for the Applicants to tailor the RFI to site-specific conditions. Permit Condition VII.U.1 authorizes the Applicants to propose changes to the RFI Scope of Work: "If the Permittees believe that certain requirements of the Scope of Work are not applicable, the specific requirements shall be identified and a detailed rationale for inapplicability shall be provided." For instance, the Applicants could tailor the RFI Scope of Work to site-specific conditions in which the vertical and horizontal extent of contamination is small and the depth to ground water deep. In these circumstances, the Applicants could propose to focus the initial investigation on delineating the extent of contamination in the soil. The Applicants could reason that it would not be necessary to characterize the extent of ground water contamination, because the site hydrogeology significantly minimized the risk of ground water contamination. However, the Applicants would have to commit to conducting further investigation if the soil sampling indicated the potential for ground water contamination.

e. Plans and Performance

The RFI should be conducted in accordance with detailed sampling and quality assurance plans. To this end, the Corrective Action Module establishes requirements for a RFI Work Plan, which guides the RFI. The RFI Work Plan includes plans for project management, data collection, management, and quality assurance, site safety and health, and community relations. An owner or operator can consult EPA guidance documents, such as the RCRA Facility Investigation Guidance Document, EPA 530/SW-89-031, Volumes I-IV, (May 1989) during the development of the RFI Work Plan.

The initial phase of a RFI could involve field screening site characterization technologies (e.g., direct push technologies for sampling soil gas, soil and/or ground water and on-site sample analysis) to roughly delineate the extent of contamination. This approach may be appropriate given the lower data quality levels typically associated with these techniques. Once the extent of contamination is roughly delineated, the owner or operator can employ standard sampling techniques and laboratory analyses with lower detection limits to collect high quality data confirming the rough delineation.

The scope of a RFI varies widely depending on site-specific conditions, including the characteristics of hazardous constituents. A RFI need not be an exhaustive effort. For WIPP SWMUs, the RA indicates that releases to soil contain relatively low concentrations of RCRA metals. Accordingly, the Applicants could collect samples (e.g., on a random grid spacing with a statistically significant number of sample points) to confirm that the RA did not miss any "hot spots". In addition, the Applicants could collect sufficient data to calculate the exposure point concentrations for use in a risk assessment. Alternatively, the Applicants could use a phased

approach; the first phase would collect soil samples in the vicinity of locations where the concentration of inorganic constituents exceeded background levels; the second phase would collect soil sample progressively farther and deeper from these locations, until the full extent of contamination is delineated; the final phase would collect samples from other environmental media (e.g., ground and surface water) if the soil samples indicated a potential release to other environmental media.

f. Data Evaluation

As discussed earlier, the primary purpose of a RFI is to collect data of adequate quantity and quality to assess risk to human health and the environment, and to determine the need for corrective measures to mitigate such risks. Once the owner or operator has collected adequate data to characterize the nature and extent of contamination and migration pathways, it uses the data to determine the exposure point concentrations.

g. Action Levels

The owner or operator initially evaluates risk to human health and the environment by comparing the exposure point concentrations and action levels. If the exposure point concentrations do not exceed the action levels, the owner or operator may request a "no further action" determination for the SWMU or AOC by petitioning the NMED Secretary for a Class III Permit modification to terminate the RFI/CMS process. The petition must include an evaluation of the potential for leaching soil contaminants into ground water at concentrations posing a human health concern.

If the SWMU or AOC has released hazardous constituents into the air, ground water, surface water, or sediment (regardless whether the exposure point concentrations exceed the action levels), Permit Condition VII.H.3.b requires the Applicants to conduct a baseline risk assessment to determine the need for stabilization/ interim measures. A "baseline risk assessment" is a risk assessment (e.g., a screening-level or site-specific risk assessment) in which the input consists of data regarding existing site conditions (e.g., current land use, exposure pathways, exposure point concentrations). A baseline risk assessment is necessary to determine if the release poses unacceptable risks to human health. In addition, the Applicants should determine whether hazardous constituents have caused ground water contamination exceeding the action levels at or beyond the facility boundary. If the release poses an unacceptable risk to human health or the hazardous constituents have caused ground water contamination exceeding the action levels at or beyond the facility boundary, the Applicants should implement interim/stabilization measures.

If NMED and the owner or operator concludes, based on the RFI, that corrective measures will be required, the owner or operator should prepare a Corrective Measures Study, as discussed below, and establish media-specific clean-up levels.

If the exposure point concentrations exceed the action levels, corrective measures may not be required automatically, because the action levels may have been established at the more protective end of the allowable risk range (e.g., established using conservative exposure and land

use assumptions). These conservative assumptions may not apply under site-specific conditions. For example, the concentration of hazardous constituents in ground water beneath a SWMU may exceed the MCLs, but NMED may know that the ground water cannot be used for drinking water due to naturally high salinity or turbidity. As a result, corrective action may not be required automatically, but the situation may warrant further evaluation of risks to human health or the environment. This further evaluation may include screening-level and site-specific human health and ecological risk assessments and the development of media-specific clean-up levels.

4. SCREENING-LEVEL RISK ASSESSMENT

The first step in a screening-level risk assessment is the calculation of chemical-specific and medium-specific screening levels that protect human health and the environment. These screening levels are developed using readily available information and data. Because of the limited amount of data, and the high level of uncertainty regarding its quality, screening assumptions tend to be conservative. In this way, potential risks are not underestimated or overlooked. These conservative assumptions can be reevaluated during subsequent phases of the risk-based decision process (e.g., site-specific risk assessments), as more and better data regarding site- and receptor-specific conditions become available. The second step in a screening-level risk assessment is the determination whether an exposure pathway has been completed (e.g., whether a potential receptor has been, or could be, exposed to hazardous constituents).

NMED is developing a process for performing human health screening-level risk assessments and calculating human health risk-based chemical- and media-specific screening levels. This process will be consistent with standard EPA risk assessment methods, as described in Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part B (EPA /530/R-92/003, 1991), the EPA Region 6 Human Health Media-Specific Screening Levels (1998), and the EPA Region 9 Preliminary Remediation Goals.

In addition, NMED is developing a process for performing ecological screening-level risk assessments and calculating ecological risk-based chemical- and media-specific screening levels. This process will be consistent with standard EPA ecological risk assessment methods as described in Guidelines for Ecological Risk Assessment (EPA/630/R-95/002F, 1998), and Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final (EPA/540/R-97/006, 1997).

The exposure point concentrations are compared to the screening levels to determine whether the risk is within acceptable limits. If the exposure point concentrations do not exceed the screening levels, or no exposure pathways are complete, the owner or operator may request a “no further action” determination. On the other hand, if the risk associated with the release of hazardous constituents is not within acceptable limits, the owner or operator may proceed to the Corrective Measures Study. Alternatively, the owner or operator may perform a site-specific risk assessment and develop site-specific cleanup levels.

5. SITE-SPECIFIC RISK ASSESSMENT

a. Introduction

If the owner or operator chooses to conduct a site-specific risk assessment, it must perform both human health and ecological site-specific risk assessments to calculate the chemical- and medium-specific risk-based levels.

The owner or operator should work with NMED to develop the plan for these assessments. The assessments should comply the methods described in the following EPA guidance documents: Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual, Part A (EPA/540/1-89/002, 1989), Part B (EPA/540/R-92/003, 1991), and Part D (EPA/540/R-97/033, 1998); Guidelines for Ecological Risk Assessment (EPA/630/R-95/002F, 1998); Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (EPA/630/R-95/002F, 1997); Framework for Ecological Risk Assessment (EPA/630/R-92/001, 1992).

b. Site-Specific Cleanup Levels

The site-specific risk assessment may be used to establish interim or final clean-up levels for each environmental medium. The term "cleanup level" refers to site- and media-specific concentrations of hazardous constituents that reflect potential risks in light of toxicity, exposure pathways, and fate and transport characteristics. While the owner or operator may propose clean-up levels for each environmental media, NMED makes the final decision after evaluating the site-specific data and obtaining public comment. NMED intends to remediate SWMUs and AOCs to protective risk-based media-specific cleanup levels (e.g., MCLs and state cleanup levels); when such levels are used, the assumptions underlying the levels must be consistent with the site-specific conditions at the facility. When such levels are not available, NMED intends to remediate SWMUs and AOCs to protective media-specific site-specific levels (e.g., developed through site-specific risk assessments).

NMED's risk reduction goal is to reduce the risk from exposure to carcinogens such that, for any medium, the excess risk of cancer to an individual exposed during a lifetime ranges from 10^{-6} (e.g., an exposed individual has an estimated upper bound excess probability of developing cancer of one in a million), to 10^{-4} (e.g., an exposed individual has an estimated upper bound excess probability of developing cancer of one in ten thousand). NMED's risk reduction goal is to reduce the risk from exposure to noncarcinogens such that, for any medium, the hazard index does not exceed one (1). The hazard index is calculated by summing two or more hazard quotients for multiple noncarcinogens and/or multiple exposure pathways. The hazard quotient is the ratio of a single noncarcinogen exposure level over a specified time period to a reference dose for the noncarcinogen over a similar exposure period.

NMED considers available risk-based media clean-up levels to be protective if the risk is between 10^{-4} and 10^{-6}. All things being equal, NMED prefers remedies at the more protective

end of the risk range. Therefore, owners or operators should use 10^{-6} as the point of departure when developing site-specific media clean-up levels.

Nonetheless, using 10^{-6} as the point of departure does not establish a strict presumption that all final clean-ups will attain that level of risk reduction. Given the diversity of the corrective actions and the emphasis on site-specific solutions, as well as technical limitations, NMED may approve other levels of risk reduction.

Media-specific clean-up levels must account for the fate and transport characteristics of hazardous constituents. For example, the exposure point concentration of a hazardous constituent in soil may be below the acceptable risk level for direct human contact, but site-specific conditions may encourage the infiltration of precipitation, resulting in ground water contamination exceeding the ground water clean-up level.

If the site-specific risk assessment indicates that the media-specific clean-up levels have not been exceeded, and the risk is acceptable, the owner or operator may request a "no further action" determination by petitioning the NMED Secretary for a Class III Permit modification to terminate the RFI/CMS process. If NMED grants the petition, the SWMU or AOC is removed from the Corrective Action Module of the facility's permit. On the other hand, if the site-specific risk assessment indicates that the media-specific clean-up goals have been exceeded, the owner or operator performs a Corrective Measures Study.

5. Interim/Stabilization Measures

Interim/stabilization measures include a broad spectrum of institutional or physical corrective actions, conducted prior to the final remedy selection, to control or abate ongoing threats to human health or the environment, prevent or abate further releases from SWMUs and AOCs, or prevent and minimize the spread of contamination. An overriding goal of the RCRA corrective action program is the reduction of risk by implementing interim/stabilization measures at the earliest possible time. Interim/stabilization measures include source removal, installing ground water pump-and-treat systems to minimize off-site migration of ground water contamination plumes, and institutional controls (e.g., fencing and signs) to minimize direct contact.

As noted in Permit Condition VII.L, the decision to require interim/stabilization measures is site- and unit-specific, and is based on several factors, including the time necessary to develop and implement a final corrective measure, the actual and potential exposure to human and environmental receptors, the actual and potential contamination of drinking water supplies and sensitive ecosystems, and the potential for further degradation of the environmental medium. NMED does not anticipate the necessity for interim/stabilization measures at WIPP.

6. CORRECTIVE MEASURES STUDY

a. Purpose

If NMED or EPA determine that a release poses an unacceptable risk to human health or the environment, the owner or operator must select and implement corrective measures. There are a broad universe of corrective measures for remediating contamination. Therefore, the owner or operator must prepare a Corrective Measure Study (CMS) to evaluate the range of potential corrective measures and their advantages and disadvantages for remediating a release in light of site-specific conditions and corrective action objectives.

b. Components

The primary elements of a CMS are the CMS plan, CMS performance, and the CMS report/summary. Permit Condition VII.V describes each of these elements in detail.

The CMS plan should include a description of the current situation, the establishment of corrective action objectives, a description of the CMS approach, and an implementation schedule. The key component of the CMS Plan is the owner or operator's proposal of site-specific corrective action objectives. In fact, this proposal, which derives from the prior establishment of site-specific clean-up levels, may have already been established.

The CMS performance includes the identification, screening, development, evaluation, and recommendation of potential corrective measures for removal, containment, and treatment of contamination. Permit Condition VII.V.4 specifies detailed requirements for CMS performance, including the requirement to identify all possible alternatives for the removal, containment, and treatment of contamination. In their public comments regarding the revised draft permit, the Applicants argued that this requirement is not necessary. See Comment 142. NMED disagrees. The Corrective Action Module must be broad enough to address all possible contamination scenarios at WIPP, including any releases discovered after permit issuance.

The Corrective Action Module also specifies the criteria for screening the CMS's preliminary list of potential corrective measures to eliminate measures that are infeasible, rely on technologies that are unlikely to work, or that will not achieve the corrective action objectives within a reasonable time period. After applying these criteria, the Applicants must develop a workable number of corrective action alternatives that individually, or in combination, adequately address the contamination and corrective action objectives. The Applicants must conduct laboratory or bench-scale testing, as necessary, to evaluate the workability of specific corrective measures, evaluate any relevant technical, environmental, human health, and institutional issues, and prepare cost estimates.

The CMS report/summary presents the CMS results, as well as the Applicants' recommendations for selecting specific corrective measures, including the rationale, preliminary design, and expected performance. Once NMED approves the CMS report/summary, NMED initiates a proceeding to modify the permit to specify the corrective measures and an implementation schedule. The modification process ensures that the public has an opportunity to review and comment on the proposed corrective measures.

c. Streamlining the CMS Process

The CMS process often occurs for SWMUs involving the release of hazardous constituents which impact a large area or several environmental media, or which involve complex geologic or hydrogeologic conditions complicating remediation. However, NMED and EPA do not believe that the CMS process is warranted for the sole purpose of completing paperwork. At many facilities, a release may have impacted a relatively small area or a single environmental medium, or standard engineering solutions may be readily used. In these situations, the CMS process may not be necessary. Rather, the preferred corrective measure may be apparent early in the RCRA corrective action process (perhaps as early as the RFI). As a result, the analysis of potential corrective measures would be highly focused. Permit Condition VII.V.1 recognizes this possibility by authorizing the Applicants to bypass certain CMS requirements, provided they identify the bypassed requirement and the rationale for bypassing it.

d. Implementation

Corrective Measures Implementation (CMI) involves the detailed design, construction, operation, maintenance, and monitoring of corrective measures. The CMI requirements may be specified in a modification to the Corrective Action Module (or a consent order issued in an enforcement action). Regardless where the CMI requirements are specified, they must include a description of the proposed corrective measures, the clean-up levels, compliance schedules and demonstration, and reporting requirements. The design portion of the CMI includes conceptual design, preliminary operation and maintenance plans, intermediate design plans and specifications, and final design plans and specifications, a construction quality assurance plan, and a health and safety plan. The owner or operator must construct the corrective measure as specified in the design portion. Upon completion of construction, the owner or operator must submit a construction completion report to NMED or EPA. After NMED or EPA approves the report, the owner or operator begins the operation and maintenance phase. The owner or operator must operate and maintain the corrective measure until NMED determines that the corrective action objectives have been achieved.

To determine whether corrective action objectives have been achieved, the owner or operator must conduct performance monitoring. In particular, performance monitoring is important for ground-water remediation, because the concentration and distribution of contamination may change over time. It also is important for corrective measures that rely on engineering controls (e.g., liners, covers, barrier walls), because poorly designed or constructed engineering controls can allow continued releases of hazardous constituents. NMED or EPA may make decisions regarding the completion of corrective measures on a site-by-site or facility-wide basis. The public should be given an opportunity to review and comment on all proposals regarding the completion of corrective measures.

Attachment 1: The New Mexico Environment Department Risk-Based Corrective Action Process