ENTERED Cathy

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

NOV 9 1994

OFFICE OF THE SECRETARY

Bonita — Please review + provide comments to me. Thanks Kathy

Ms. Judith Espinosa, Secretary
State of New Mexico
Environment Department
P.O. Box 26110
Santa Fe, NM 87502

Dear Ms. Espinosa:

Enclosed is the Department of Energy's Waste Isolation Pilot Plant report entitled No-Migration Determination Annual Report for the Period September 1993 Through August 31, 1994. This report is required by the Conditional No-Migration Determination for the Department of Energy Waste Isolation Pilot Plant (55 FR 47700, November 14, 1990).

If there are any questions concerning this report please call Kent Hunter of my staff at (505) 234-8101.

Sincerely,

George E. Dials

George E. Dials,
Manager

Enclosure

cc w/enclosure:
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C&C File

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M * E * M * O * R * A * N * D * U * M

DATE: December 2, 1994

TO: John Parker, Program Manager

FROM: Patrick W. McCasland, WRS III

SUBJECT: Comments on "No-Migration Determination Annual Report for the Period September 1, 1993 through August 31, 1994", DOE/WIPP-94-2029

Elements of this document comply with the NMD granting conditions as published in the *Federal Register* (1990). The DOE appears to be using this document as a tool, transitioning from the non-existent site test phase NMD, with a very limited source term, to the disposal phase No-Migration Variance Petition.

P.3, Table 1-1, 7.:

"Calculated concentrations at the Exhaust Shaft - N/A"

Cmment: Although the NMD doesn't require data from this location until waste is emplaced, baseline concentrations and resultant baseline calculations should be included. If not in this document, then as a separate WIPP VOC baseline emissions summary report. The exhaust shaft concentrations for the 5 primary VOCs should be calculated and compared to the "levels of regulatory concern listed in the NMD (55 FR 47705c)". Data presented for TCA (1,1,1-trichloroethane) are consistently above the MDL and average 6.2 ppbv.

P.4-38: Waste Characterization

Comment: The TRU Waste Characterization QAPP is referenced here and will be used by generator sites to develop and implement their specific QAPjPs. Knowledge of process remains primary, with statistical sampling and examination considered reasonably confirmatory by DOE.

P.9, 2.4.2

Real-Time Radiography is referred to as "Radiography" in the QAPP.

P.39, para.1:

"These data are used to document that there has been no airborne migration of hazardous constituents, attributed to emplaced waste, from the WIPP unit boundary in concentrations exceeding the health-base criteria."

Comment: The health-based criteria should be presented in the report.

P.44, para 1:

"These results suggest that the +/- 10 percent accuracy objective for Method Relative Accuracy sampling is too conservative."

Comment: I would agree with this statement, based on the justification presented.

P.75, para 5:

"Background VOC data have been collected and compiled under the current VOC Monitoring Plan. The upper 95% confidence level of background concentrations will be added to the regulatory limits to determine the overall limit for the constituent."

Comment: The regulatory limits and background levels should not be additive. Background data should be used to calculate contributions from the waste. The standard here should be calculated health-based exposure thresholds for the VOCs in soils, groundwater, and air.

WIPP Library

DOE/WIPP-94-2029

No-Migration Determination Annual Report for the Period September 1, 1993 through August 31, 1994

November 1994

United States Department of Energy
Carlsbad Area Office
Waste Isolation Pilot Plant
Carlsbad, New Mexico

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ACRONYMS

ANL-W QAPjP	*Argonne National Laboratory-West Hot Fuel Examination Facility Quality Assurance Project Plan for the Waste Isolation Pilot Plant Experimental Test Program*
C of C	Certificate of Compliance
CAO	Carlsbad Area Office
CCl_4	Carbon tetrachloride
CFR	Code of Federal Regulations
CH_2Cl_2	Methylene chloride
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
Freon 113	1,1,2-Trichloro-1,2,2-trifluoroethane
IDC	Item description code
INEL	Idaho National Engineering Laboratory
kg	Kilogram
KOP	Knowledge of process
LEL	Lower explosive limit
LWA	Land Withdrawal Act
MDL	Method detection limit
MRA	Method relative accuracy
NMD	No-Migration Determination
NMED	New Mexico Environment Department

ACRONYMS

(Continued)

NMVP	No-Migration Variance Petition
NRC	Nuclear Regulatory Commission
ppbv	Parts per billion by volume
ppmv	Parts per million by volume
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QA/QC	Quality assurance/Quality control
RCRA	Resource Conservation and Recovery Act
RPD	Relative percent difference
RTR	Real-time radiography
RWMC-QAPjP	*Radioactive Waste Management Complex Quality Assurance Project Plan for the Waste Isolation Pilot Plant Experimental Test Program*
SOP	Standard operating procedure
SNL	Sandia National Laboratories
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TRU	Transuranic
TRUPACT	Transuranic Package Transporter
VOC	Volatile organic compound
WAC	Waste Acceptance Criteria

ACRONYMS

(Continued)

WID	Waste Isolation Division
WIPP	Waste Isolation Pilot Plant

EXECUTIVE SUMMARY

This report summarizes the activities of the U.S. Department of Energy (DOE) that were developed, and are currently conducted, to demonstrate compliance with the No-Migration Determination (NMD) (EPA, 1990a) issued for the Waste Isolation Pilot Plant (WIPP) by the U.S. Environmental Protection Agency (EPA). Presented in this report are all relevant data finalized during the period September 1, 1993, through August 31, 1994. Data collected during this period, but not finalized by August 31, 1994, will be presented in the next NMD Annual Report.

In October 1993, the DOE made the decision to implement a revised test strategy that eliminated tests involving radioactive mixed waste at the WIPP facility. The WIPP is now moving toward a permanent disposal phase. A No-Migration Variance Petition (NMVP) for this new phase is now being developed. Until a new NMD is obtained from the EPA, the site is maintaining compliance with the conditions set forth in the current NMD, although some of the activities specifically related to the test phase have ceased.

Waste characterization, volatile organic compound (VOC) monitoring, performance assessment (PA) status, facility changes, and progress toward the disposal phase NMVP are covered in this report. The report also contains information relevant to the data presented.

The focus for the waste characterization program during this reporting has been on obtaining the necessary waste-characterization data which will support a disposal-phase NMVP. Guidance on the content and extent of this program has been obtained from the test-phase NMD.

The VOC Monitoring Program has been implemented and has been operational since 1991. Data from three of the four designated air monitoring stations are included in this report. No data were obtained for the fourth monitoring station. To date, a substantial amount of air data has been collected, and the background levels of target hazardous constituents have been quantified.

The most recent PA detailing the repository's performance under Subpart B of the 1985 EPA standard, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Wastes* (Title 40 CFR Part 191) (EPA, 1985), is the December 1992 Sandia National Laboratory's PA annual summary report. Results from the 1992 PA were reported in the 1993 NMD annual report and were the starting point for a Compliance Status Report (CSR) published in March 1994. The CSR provided a statement of where the WIPP project is with regard to demonstrating compliance to the long-term performance standards applicable to the WIPP. The CSR was sent to EPA for review and comment.

The DOE routinely evaluates changes in the WIPP facility conditions and operations to ensure that those changes which could potentially affect the facility's compliance status with the NMD

are identified. The DOE has not identified any reportable changes to the facility during this reporting period.

The DOE is currently in the process of defining a source term to model the transport of hazardous constituents. The results of these modeling efforts will serve as the basis for the disposal-phase NMVP. This petition is currently under development and is scheduled for phased submittal to the EPA beginning in May 1995.

Overall, the format and content of this report are similar to those of previous NMD Annual Reports (DOE, 1991a; DOE, 1992; DOE 1993). Any substantive changes in the format or types of data presented have resulted from comments received from the EPA on previous reports or from conversations and correspondence in which the EPA expressed a desire to see additional data.

1.0 INTRODUCTION

1.1 REPORT DESCRIPTION

This report fulfills the annual reporting requirement as specified in the Conditional No-Migration Determination (NMD) for the U.S. Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP), published in the *Federal Register* on November 14, 1990 (EPA, 1990a). This report covers the project activities, programs, and data obtained during the period September 1, 1993, through August 31, 1994, to support compliance with the NMD[1].

In the NMD, the U.S. Environmental Protection Agency (EPA) concluded that the DOE had demonstrated, to a reasonable degree of certainty, that hazardous constituents will not migrate from the WIPP disposal unit during the test phase of the project, and that the DOE had otherwise met the requirements of 40 CFR Part 268.6, *Petitions to Allow Land Disposal of a Waste Prohibited Under Subpart C of Part 268* (EPA, 1986a), for the WIPP facility. By granting the NMD, the EPA has allowed the DOE to temporarily manage defense-generated transuranic (TRU) mixed wastes, some of which are prohibited from land disposal by Title 40 CFR Part 268, *Land Disposal Restrictions* (EPA, 1986a), at the WIPP facility for the purposes of testing and experimentation for a period not to exceed 10 years.

In granting the NMD, the EPA imposed several conditions on the management of the experimental waste used during the WIPP test phase. One of these conditions is that the DOE submit annual reports to the EPA to demonstrate the WIPP's compliance with the requirements of the NMD. In the proposed No-Migration Variance (EPA, 1990b) and the final NMD, the EPA defined the content and parameters that must be reported on an annual basis. These reporting requirements are summarized in Table 1-1 and are cross-referenced with the sections of the report that satisfy the respective requirement.

During this reporting period, the DOE made the decision to implement a revised test strategy to conduct laboratory-based test with both simulated and real TRU waste in lieu of tests involving waste at the WIPP facility. Although the NMD was written specifically for the test phase, and is not applicable to the permanent disposal of TRU waste at the WIPP, compliance to the conditions set by the NMD will continue. No experimental data involving TRU waste at the WIPP facility for the test phase were collected during this reporting period, but the other required parameter data will be published in this report.

---

[1]This is the fourth NMD annual report submitted by the DOE for the WIPP project. The first NMD report, entitled *Waste Isolation Pilot Plant No-Migration Determination Annual Report for the Period November 1990 Through September 1991* (DOE/WIPP 91-059), was submitted to EPA Region VI and EPA Office of Solid Waste and Emergency Response on November 14, 1991. The second report, entitled *No-Migration Determination Annual Report for the Period October 1991 through August 1992* (DOE/WIPP 92-057), was submitted November 14, 1992. Revision 1 of the second report was issued to EPA in February 1993. The third report, entitled *No-Migration Determination Annual Report for the Period September 1992 through August 1993* (DOE/WIPP 93-062), was submitted November 14, 1993.

For some sections of this report, no relevant data were available prior to the cutoff date of August 31, 1994. These sections, therefore, will describe the program-level activities and procedures that will eventually yield the relevant data and demonstrate compliance with the applicable NMD requirement.

1.2 REPORTING PERIOD

Because of a change in the reporting period from the 1991 report (DOE 1991a), the 1992 NMD Annual Report (DOE, 1992), submitted to EPA in November 1992, covered an 11-month reporting period (October 1991 through August 1992) rather than a 12-month period.[2] As noted in the 1992 NMD Annual Report, the 1993 report covers a 12-month period (September 1992 through August 1993), as will this report and all subsequent reports unless otherwise directed by the EPA, or unless the DOE identifies a need to deviate from the reporting period and receives prior approval from the EPA.

[2]The reasons for these changes are described in detail in the 1992 submittal (DOE/WIPP 92-057, Section 1.1).

TABLE 1-1

ANNUAL REPORT REQUIREMENTS SPECIFIED IN THE NO-MIGRATION DETERMINATION

REQUIREMENT	SOURCE[3]	SECTION
1. A description of the tests to-date and their results	55 FR 47720c	4.0
2. Modifications to the test plan	55 FR 47720c	4.0
3. A summary of DOE's current understanding of the repository's performance	55 FR 47720c	4.0
4. Waste characterization data from pre-test waste characterization	55 FR 47720c	2.0
5. An annual data summary of air monitoring data (as described in Requirements 6-8)	55 FR 47720c	3.0
6. Annual data summaries and summaries of data accuracy, precision, and completeness at each monitoring location	55 FR 47720c/13092c	3.0
7. Calculated concentrations at the exhaust shaft	55 FR 47720c/13092c	N/A*
8. Documentation of the actual method detection limit achieved for each targeted analyte	55 FR 47720c/13092c	3.0

*N/A - This monitoring is not required until immediately prior to placing containers of TRU wastes in the test room (55 FR 47720b/13090a).

[3]Some of the NMD requirements are delineated in the proposed No-Migration Variance and incorporated by reference into the final NMD. In this report, references to these requirements are cited as "(55 FR x/y)," where "x" is the page number from the *Federal Register* (FR) for the final NMD, and "y" is the page number from the *Federal Register* for the proposed variance. Also, in this report the lower case letters following a *Federal Register* citation indicate the column of text in which the reference is located (i.e., a = first column, b = second column, and c = third column).

2.0 WASTE CHARACTERIZATION

The WIPP waste characterization program has been implemented to address two requirements of the Resource Conservation and Recovery Act (RCRA). The first requirement is the no-migration demonstration required by 40 CFR Part 268, *Land Disposal Restrictions*, and the second requirement is the general waste analysis required by 40 CFR Part 264, *Standards for Owners and Operators of Treatment, Storage, and Disposal Facilities* (EPA, 1980a), or Title 40 CFR Part 265, *Interim Status Standards for Owners and Operators of Treatment, Storage, and Disposal Facilities* (EPA, 1980b).

The DOE initiated waste characterization activities at the Idaho National Engineering Laboratory (INEL) and the Rocky Flats Plant (RFP) to support the test phase. With the cancellation of the testing at the WIPP facility, the activities at these sites have been redirected to the disposal phase NMVP. In addition, the DOE has initiated activities at other sites for the collection of waste characterization data for the disposal phase. These data will be used in the development of the No-Migration Variance Petition being developed for the disposal phase. The waste characterization data that were reported in the NMD Annual Report for 1993 will be reiterated in this report to provide a more comprehensive view of the waste characterization data obtained to date for waste intended to have been emplaced in the repository for the experimental program.

Waste characterization data that supported the test-phase no-migration demonstration were provided in accordance with the requirements of the NMD issued by the EPA. The NMD requires the DOE to perform specific waste characterization activities for wastes that would have been included in the WIPP test phase. Analyses show that the waste to be shipped was representative of the waste described in the DOE's NMVP (DOE, 1989a) and that no waste container included flammable mixtures of gases in any layer of confinement.

To ensure that these required programs were properly implemented, the DOE issued Revision 1 of DOE/EM/48063-1, entitled *Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization Program* (DOE, 1991b). This document, referred to as the QAPP, provided instructions to generator sites for the characterization of their wastes to demonstrate compliance with the requirements of the test-phase NMD, general waste analysis (as specified in 40 CFR Parts 264.13 and 265.13), and the test-phase Experiments. The QAPP was reviewed by the EPA and the New Mexico Environment Department (NMED) to ensure that the data quality objectives, the analytical requirements, and the quality assurance/quality control (QA/QC) measures were within the EPA's requirements for the NMD compliance program. The *TRU Waste Characterization Quality Assurance Program Plan* (DOE, 1994) has recently been issued by the DOE to address waste characterization activities for the disposal phase. This new QAPP will be used by the generator sites to implement their waste characterization programs. The EPA is currently in the process of reviewing the new QAPP.

To meet the requirements for general waste analysis, the DOE is to provide data that can increase confidence in its knowledge of the physical and chemical characteristics of the waste. The hazardous constituents present in the TRU waste have been documented principally through relevant knowledge of the materials used in the processes that generated the waste. Therefore, waste characterization results will be used, in part, to verify process knowledge.

The results of the waste characterization program for the first seven bins of waste planned for shipment to the WIPP are documented in the following sections. Table 2-1 presents general information about each bin: bin number, date sampled, drum numbers[4], waste type, waste category, and characterization methods. The data reports for the containers listed in Table 2-1 were received, reviewed, and accepted by the DOE for the test phase.

Table 2-1 also contains the RCRA hazardous waste codes for each bin of waste sampled as part of the waste characterization program. Initial determinations of hazardous waste codes are based on knowledge of the materials and processes used to generate the waste, as documented in EGG-WM-6503, *TRU Waste Sampling Program,* (Clements et al., 1985), the source of the basic data used by the EPA Office of Solid Waste in determining mean and maximum headspace concentrations listed in the NMD. If analyses performed for the WIPP program indicate that additional hazardous waste codes are appropriate, they are added.

The waste characterization results contained in this section are reported as the 90 percent upper confidence limit values (X_{UL}) of the measured concentrations. These values are calculated in accordance with Section 12.6.1 of the QAPP.

2.1 NO-MIGRATION DETERMINATION COMPARABILITY

The NMD requires comparability assessments of the waste planned for shipment to the WIPP facility and the waste descriptions presented in the NMVP. These assessments include a comparison of waste characterization results to mean and maximum concentrations used in the NMVP. The EPA states in the NMD that the "DOE must ensure that the analytical data derived from the actual test-phase wastes are similar to the petition estimates. Wastes that are not compositionally similar may not be placed in the WIPP" (55 FR 47709c). The following sections discuss the DOE's compliance with the NMD comparability requirements.

waste description in NMD must match area of the waste

2.1.1 Mean Headspace Concentrations

why not a more conservative approach using max rather than average?

Based on the average concentration of volatile organic compounds (VOCs) measured in the headspace of waste containers, the DOE modeled the release of hazardous constituents into the air. While only a limited amount of actual headspace information was available at the time the NMVP was prepared, the data did provide a reasonable basis for modeling. The EPA, in turn, considered these mean values for air releases in its no-migration finding. In order to ensure

[4]TRU waste is transferred from drums into bins at the generator site prior to shipment to the WIPP. A bin typically holds four to six drums of TRU waste.

that the test-phase waste was compositionally similar to the waste used in the NMVP, the EPA requires that comparability be based on the mean values. Consequently, the EPA requires that the DOE compare "the predicted mean values (multiplied by 10) against the average of the measured concentrations of the headspace of all drums of a single waste type used to make up each bin" (55 FR 47710c). The allowable average concentrations for each waste type are reported in Table 2-2.

The DOE collected sufficient information on drum headspace gas to make the necessary comparisons. However, because the bin was the container to be used to contain waste at the WIPP facility during the bin-scale portion of the test phase, the determination of the comparability of the test waste against the values in Table 2-2 is based on the samples of the bin headspace. Since the criterion is based upon the operational modeling, it is logical to take and compare samples from the operational container. The bin headspace sample is a "mean" headspace sample since the bin is the only layer of confinement and is considered representative of the entire void volume of the bin.

Headspace samples were taken at the Idaho National Engineering Laboratory (INEL) in accordance with EGG-WM-9527, entitled *Radioactive Waste Management Complex Quality Assurance Project Plan for the Waste Isolation Pilot Plant Experimental Test Program* (RWMC-QAPjP) (DOE, 1991c). Data for the bins listed in Table 2-1 are summarized in Table 2-3. All bin samples listed comply with the EPA requirement for comparability to the mean headspace concentration values.

2.1.2 Maximum Headspace Concentrations

The EPA requires the DOE to make a comparison of maximum headspace gas concentrations "to ensure that the wastes to be emplaced in the WIPP are in fact similar to the wastes described in the petition" (55 FR 47710a). The EPA acknowledged the expectation that the data collected during the test-phase waste characterization program would most likely differ from the data used in the petition as a result of more stringent QA/QC requirements. To account for this, the EPA allows the maximum concentrations to vary by a factor of two and concludes that such variation represents a "reasonable expectation" of comparability.

The EPA requires that the DOE apply the maximum criterion to the contents of individual drums to be placed in the bins. The EPA states, "If the measured concentration of any of the pertinent hazardous constituents in the drum headspace exceeds the allowable maximum, the contents of the drum from which the sample was collected cannot be shipped to or emplaced in the WIPP, unless DOE subsequently treats the waste so as to reduce headspace concentrations to below the maximum levels" (55 FR 47710b). Table 2-4 provides the comparability requirements from the NMD with regard to the maximum allowable headspace concentrations.

Determination of the comparability of the test-phase waste against the maximum levels in Table 2-4 is based on headspace samples taken from (1) the 55-gallon poly bag and (2) the inner layers of confinement with void volumes greater than 1 liter. To be conservative, the DOE compares the highest constituent concentration detected among all layers sampled to the

NMD-required maximum levels. At the INEL, the sampling of 55-gallon drum poly bags and inner layers of confinement is performed in accordance with W0096-00420 ES, entitled *Argonne National Laboratory-West, Hot Fuel Examination Facility Quality Assurance Project Plan for the Waste Isolation Pilot Plant Experimental Test Program* (ANL-W QAPjP) (DOE, 1991d). Data for the drums used to fill the bins listed in Table 2-1 are provided in Tables 2-5 through 2-11.

2.2 FLAMMABILITY

As a condition of granting the NMD, the EPA prohibits the emplacement of potentially flammable wastes. The EPA has defined a mixture as "potentially flammable" if the headspace gas or a mixture of gases exceeds 50 percent of the lower explosive limit (LEL) of the mixture in air.

In order to ensure that the flammability requirements are being met, the EPA has specified that every container be tested for hydrogen, methane, and flammable VOCs as a class. As a result of the heterogeneity of the waste and packaging practices, the EPA requires that all layers of confinement be sampled until the DOE can show that the container headspace is representative of the entire void volume of the waste container. Therefore, the DOE will continue to collect data from the drum inner layers of confinement and analyze the data until a demonstration can be made that the drum headspace is representative of the entire void volume of the drum.

Because of the radioactive nature of the waste, the potential for the generation of hydrogen through radiolysis exists. This means that even though a bin headspace sample may show the absence of potentially flammable mixtures of gases at the time of sampling and analysis, over time, hydrogen generation as a result of radiolysis may result in the creation of potentially flammable mixtures. In order to ensure that this possibility is properly addressed, the EPA imposed the flammability requirements as "emplacement" requirements; that is, containers must not exceed the flammability limits at the time of emplacement at the WIPP facility. Since the radiolytic generation of hydrogen is somewhat predictable, the EPA allows the DOE to calculate a "time to emplacement" based on headspace samples, waste type, and knowledge of the quantity of radioactivity in the waste. These calculations are used to determine the period of time after sampling that hydrogen/methane concentrations will remain below 50 percent of the LEL of the mixture in air. The guidelines for performing the requisite calculations are contained in Section 12.6.3 of the QAPP.

The conditions of the NMD also limit the quantity of flammable VOCs allowed in the waste at the time of emplacement. The EPA has defined headspace VOC concentration levels of 500 parts per million by volume (ppmv) or greater to be "significant levels." If any headspace VOC concentration equals or exceeds this level, the DOE may perform an explicit flame test to determine if a flammable mixture can be formed with air. Any container that exceeds this limit and fails the explicit flame test cannot be emplaced in the WIPP.

The NMD further states, with regard to flammable concentrations, "If testing shows that VOCs are insignificant, i.e., below 500 ppmv, DOE may determine the lower explosive limit

for the mixture from the lower explosive limits of methane and hydrogen using the LeChatelier formula" (55 FR 47709c). Therefore, since VOC concentrations above 500 ppmv cannot be emplaced in the WIPP, the DOE limits the "time of emplacement" calculation to hydrogen and methane, as allowed by the NMD.

Sampling of bins for flammability determination at the INEL is performed in accordance with the RWMC-QAPjP. The NMD requires that "no waste container should be emplaced in the underground repository if it contains flammable mixtures of gases in any layer of confinement" (55 FR 47709b). Since the bin is the container to be emplaced in the repository during the test phase, compliance determinations are made using data from the bin headspace as delineated in the QAPP. During the test phase of the project, inner layers of confinement are slashed prior to placement of waste in bins. Consequently, the bin is the only layer of confinement, and the bin headspace sample is considered representative of the entire void volume.

Flammability data for the bins listed in Table 2-1 are provided in Table 2-12. No bin flammability data was reported for this reporting period. The bins are still in existence, and flammability data is being collected for safety reasons. Since the bins are no longer destined for emplacement at the WIPP, the flammability data collected do not correspond to the conditions of the test-phase NMD and are not provided to the WIPP for inclusion in this report.

2.3 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

The QA/QC requirements for the waste characterization program are defined in the NMD. The EPA requires that all testing satisfy the QA/QC requirements described in the EPA report entitled, *Quality Assurance and Quality Control* (EPA, 1990c), and meet the QA objectives of $\pm$ 10 percent on precision and accuracy (55 FR 47709c) for hydrogen, methane, and flammable VOCs as a class. Data quality objectives for the waste characterization program are contained in the QAPP.

Generator/storage sites are presently required to implement the data quality objectives and other aspects of the QA/QC program at their respective sites through the issuance of Quality Assurance Project Plans (QAPjPs), which become the standard for data validation. The QAPP presently requires three levels of data validation: one at the laboratory level, where the data are initially generated; one at the generator/storage site project level; and one, based on a review of the bin data package, at the WIPP facility. Based on the review of the data packages for the waste containers listed in Table 2-1, the DOE has determined that these bins are acceptable per the NMD waste characterization requirements.

2.4 DISCUSSION OF RESULTS

The analytical data produced from samples collected from the bins planned for shipment to the WIPP facility and the drums used to fill the bins demonstrate that each bin may be managed at the WIPP facility in compliance with the waste characterization requirements of the NMD.

2.4.1 Headspace Analyses

Analyses of drum headspace VOCs (i.e., 55-gallon poly bag and inner layers of confinement) and bin headspace VOCs yielded results consistent with knowledge of process and previous DOE sampling programs. Concentrations of NMD VOC hazardous constituents were several orders of magnitude below NMD-specified limits (Table 2-3 and Tables 2-5 through 2-11). Other VOCs detected were consistent with knowledge of process and previous DOE sampling programs.

Concentrations of flammable VOCs measured in bin headspace were significantly less than the 500 ppmv total flammable VOC action limit specified in the NMD. As explained in Section 2.2 of this report, compliance with the 500 ppmv total flammable VOC requirement is assessed using bin headspace samples.

Since the data for the characterization of only seven bins and their associated drums have been received to-date, insufficient data are available to draw other meaningful conclusions regarding data trends.

2.4.2 Real-Time Radiography and Visual Examination

The DOE conducted real-time radiography (RTR) and visual examination (including weighing) for the contents of each waste drum in accordance with the QAPP. The RTR examination, coupled with process knowledge, provides a general idea of the types of materials that may be found in a drum. Visual examination, and a comparison with the RTR results, provides a higher degree of verification of the drum contents. A comparison of the mass estimates obtained by these two methods is contained in Tables 2-13 through 2-19.

2.4.3 Excluded Drums

Drums are excluded by the INEL from the WIPP Experimental Bin Program for nonconformances with the WIPP Waste Acceptance Criteria (WAC) (DOE, 1991e), the TRUPACT-II Certificate of Compliance (C of C) (NRC, 1992), the WIPP Waste Analysis Plan (DOE, 1991f), and the NMD. As noted in Table 2-20, the most common reason for exclusion of drums is nonconformance to the TRUPACT-II C of C criteria. One drum, RF002202850, intended to be loaded into Bin IDRFBN9200006, was excluded as a result of nonconformance with the NMD requirements. A carbon tetrachloride (CCl_4) concentration of 9,000 ppmv was detected in the 55-gallon poly bag headspace sample of this drum. This concentration was in excess of the NMD comparability requirement of 5,800 ppmv. Drums determined to contain U-235 are excluded from the program for the present time. Currently, the INEL cannot certify drums that contain U-235. Other excluded drums and the reasons for their exclusion are shown in Table 2-20.

why 235 & not Pu

TABLE 2-1

SUMMARY OF CONTAINERS FOR WHICH DATA WERE RECEIVED AND ACCEPTED AT THE WIPP FACILITY DURING THE 1993 REPORTING PERIOD

BIN NUMBER[1]	DATE BIN SAMPLED	CONTAINER NUMBER (drums)	RCRA HAZARDOUS WASTE CODES	WASTE TYPE/ WASTE CATEGORY[2]	GENERATOR/ STORAGE SITE	CHARACTER-IZATION[3]	
						NMD	KOP
IDRFBN9100001	08/22/91	RF0005101913 RF000241922 RF000239823 RF000238171 RF000501917	F001, F002, D008	Type II / Glass	INEL	A,B	C,D
IDRFBN9100002	12/10/91	RF003702288 RF004101402 RF004101405 RF003702147	F001, F002, D008	Type II / Glass	INEL	A,B	C,D
IDRFBN9100001a	12/18/91	Resampling of bin # IDRFBN9100001. No individual drums sampled.	No change	Type II / Glass	INEL	A,B	C,D
IDRFBN9100003	01/08/92	RF003702274 RF000239538 RF000501960 RF000239815	F001, F002, D008	Type II / Glass	INEL	A,B	C,D
IDRFBN9100001b	04/29/92	Second resampling of bin # IDRFBN9100001. No individual drums sampled.	No change	Type II / Glass	INEL	A,B	C,D
IDRFBN9100002a	05/13/92	Resampling of bin # IDRFBN9100002. No individual drums sampled.	No change	Type II / Glass	INEL	A,B	C,D
IDRFBN9100003a	08/19/92	Resampling of bin # IDRFBN9100003. No individual drums sampled.	No change	Type II / Glass	INEL	A,B	C,D

TABLE 2-1

SUMMARY OF CONTAINERS FOR WHICH DATA WERE RECEIVED AND ACCEPTED AT THE WIPP FACILITY DURING THE 1993 REPORTING PERIOD (Continued)

BIN NUMBER[1]	DATE BIN SAMPLED	CONTAINER NUMBER (drums)	RCRA HAZARDOUS WASTE CODES	WASTE TYPE/ WASTE CATEGORY[2]	GENERATOR/ STORAGE SITE	CHARACTER-IZATION[3]	
						NMD	KOP
IDRFBN9100001c	09/03/92	Third resampling of bin # IDRFBN9100001. No individual drums sampled.	No change	Type II / Glass	INEL	A,B	C,D
IDRFBN9100002b	09/16/92	Second resampling of bin # IDRFBN9100002. No individual drums sampled.	No change	TYPE II / Glass	INEL	A,B	C,D
IDRFBN9200005	09/16/92	RF000235966 RF000236125 RF000236173 RF03100881A RF003100999	F001,F002,D008	TYPE II / Metal	INEL	A,B	C,D
IDRFBN9200004	11/04/92	RF007300700 RF003100833 RF003100990 RF001901716 RF003100808	F001, F002, D008	TYPE II / Metal	INEL	A,B	C,D
IDRFBN9200006	06/23/93	RF003102035 RF000210305 RF074403844 RF009200025 RF007300162	F001, F002, F005, D008	TYPE III / Combustible	INEL	A,B	C,D
IDRFBN9300007	07/01/93	RF077403807 RF001905236 RF074403822 RF008903886	F001, F002, F005, D008	TYPE III / Combustible	INEL	A,B	C,D

* See Table 2-1 notes on the following page.

TABLE 2-1

SUMMARY OF CONTAINERS FOR WHICH DATA WERE RECEIVED AND ACCEPTED AT THE WIPP FACILITY DURING THE 1993 REPORTING PERIOD (Continued)

[1]Headspace samples were taken from each individual drum used to fill the bins and from the bins themselves. To ensure that bin contents do not reach flammable levels after sampling and prior to bin emplacement, the DOE calculates a "time of emplacement" in which headspace gas concentrations will remain below 50 percent of their lower explosive limit (LEL). This approach is described in Section 2.2. If a bin is not emplaced within this time, it must be resampled prior to emplacement. Lower-case letters following the bin numbers in this report indicate the number of the bin resampling (a = first resampling, b = second resampling, etc.).

[2]Waste categories are listed in the *Resource Conservation and Recovery Act Part B Permit Application*, Revision 3 (DOE/WIPP 91-005).

[3]CHARACTERIZATION CODES:

A - NMD comparability
B - NMD flammability
C - Real-time radiography
D - Visual examination

INEL - Idaho National Engineering Laboratory
NMD - No-Migration Determination
KOP - Knowledge of process

TABLE 2-2

MEAN HEADSPACE CONCENTRATIONS ALLOWED BY THE NO-MIGRATION DETERMINATION

	WASTE TYPE[1]			
CONSTITUENT	TYPE I	TYPE II	TYPE III	TYPE IV
	CONCENTRATION, vol. % and (ppmv)			
Carbon tetrachloride	0.24 (2,400)	0.26 (2,600)	0.30 (3,000)	6.90 (69,000)
Methylene chloride	0.39 (3,900)	0.42 (4,200)	0.33 (3,300)	0.93 (9,300)
Trichloroethylene	0.25 (2,500)	0.28 (2,800)	0.29 (2,900)	0.38 (3,800)

Source: 55 FR 47711a, November 14, 1990

[1]WASTE TYPES:

Type I - Solidified aqueous or homogeneous inorganic solids
Type II - Solid inorganics
Type III - Solid organics
Type IV - Solidified organics

TABLE 2-3

RESULTS OF BIN HEADSPACE ANALYSES TO DEMONSTRATE COMPARABILITY TO THE MEAN HEADSPACE CONCENTRATIONS IN THE NO-MIGRATION DETERMINATION

		Constituent		
		Carbon tetrachloride	Methylene chloride	Trichloroethylene
NMD Criteria Conc. in vol. % and (ppmv) **Type II Waste** **Type III Waste**		0.26 (2,600) 0.30 (3,000)	0.42 (4,200) 0.33 (3,300)	0.28 (2,800) 0.29 (2,900)
Bin Number	**Waste Type**	**RESULTS OF ANALYSES, X_{UL}, vol. % and (ppmv)[1]**		
IDRFBN9100001	II	2.0 E-6 (0.020)	1.4 E-4 (1.4)	4.0 E-6 (0.040)
IDRFBN9100001a	II	2.2 E-6 (0.022)	1.0 E-4 (1.0)	2.6 E-6 (0.026)
IDRFBN9100001b	II	3.0 E-5 (0.30)	1.3 E-4 (1.3)	3.0 E-6 (0.030)
IDRFBN9100001c	II	1.5 E-6 (0.015)	1.5 E-4 (1.5)	3.2 E-6 (0.032)
IDRFBN9100002	II	1.1 E-5 (0.11)	1.3 E-4 (1.3)	7.1 E-4 (7.1)
IDRFBN9100002a	II	2.3 E-5 (0.23)	2.4 E-4 (2.4)	1.3 E-4 (1.3)
IDRFBN9100002b	II	1.3 E-5 (0.13)	2.5 E-4 (2.5)	6.4 E-5 (0.64)
IDRFBN9100003	II	4.5 E-6 (0.045)	7.5 E-4 (7.5)	1.9 E-5 (0.19)
IDRFBN9100003a	II	1.5 E-5 (0.15)	1.9 E-3 (19.0)	2.1 E-5 (0.21)
IDRFBN9100004	II	3.1 E-5 (0.31)	3.6 E-4 (3.6)	6.1 E-5 (0.61)
IDRFBN9200005	II	1.8 E-6 (0.018)	2.5 E-5 (0.25)	5.9 E-6 (0.059)
IDRFBN9200006	III	8.7 E-5 (0.87)	1.0 E-4 (1.0)	1.2 E-4 (1.2)
IDRFBN9300007	III	1.4 E-3 (14.0)	7.2 E-6 (0.072)	2.7 E-4 (2.7)

X_{UL} = 90 percent upper confidence limit value of the measured concentration

[1]A value equal to the Method Detection Limit (MDL) (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure.

TABLE 2-4

MAXIMUM HEADSPACE CONCENTRATIONS ALLOWED BY THE NO-MIGRATION DETERMINATION

	WASTE TYPE[1]			
CONSTITUENT	TYPE I	TYPE II	TYPE III	TYPE IV
	CONCENTRATION, vol. % and (ppmv)			
Carbon tetrachloride	0.08 (800)	0.18 (1,800)	0.58 (5,800)	8.18 (81,800)
Methylene chloride	0.44 (4,400)	0.84 (8,400)	0.50 (5,000)	1.42 (14,200)
1,1,1-Trichloroethane	1.88 (18,800)	5.68 (56,800)	2.12 (21,200)	14.96 (149,600)
Trichloroethylene	0.08 (800)	0.34 (3,400)	0.28 (2,800)	0.28 (2,800)
1,1,2-Trichloro-1,2,2-trifluoroethane	0.05 (500)	1.62 (16,200)	5.74 (57,400)	20.80 (208,000)

Source: 55 FR 47710b, November 14, 1990

[1]WASTE TYPES:

Type I - Solidified aqueous or homogeneous inorganic solids
Type II - Solid inorganics
Type III - Solid organics
Type IV - Solidified organics

TABLE 2-5

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9100001

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type II Waste Conc. in vol. % and (ppmv)		0.18 (1,800)	0.84 (8,400)	5.68 (56,800)	0.34 (3,400)	1.62 (16,200)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	X_{UL}, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF0005101913	1	4.4 E-6 (0.044)	1.9 E-3 (19)	3.5 E-2 (350)	5.2 E-6 (0.052)	6.1 E-6 (0.061)	2.2 E-2 (220)	ND	1.68 E-2 (168) [8]
	2	1.3 E-4 (1.3)	4.5 E-3 (45)	5.9 E-2 (590)	1.6 E-4 (1.6)	1.5 E-4 (1.5)	2.8 E-2 (280)	ND	3.80 E-2 (380) [6]
	2	1.3 E-5 (0.13)	3.5 E-3 (35)	5.2 E-2 (520)	1.6 E-5 (0.16)	1.5 E-5 (0.15)	2.4 E-2 (240)	ND	3.75 E-2 (375) [9]
RF000241922	1	1.0 E-5 (0.10)	7.0 E-5 (0.70)	2.7 E-4 (0.27)	1.0 E-5 (0.10)	1.0 E-5 (0.10)	ND	ND	1.21 E-3 (12.1) [0]
	2	5.5 E-6 (0.055)	2.0 E-5 (0.20)	1.2 E-4 (0.12)	6.6 E-6 (0.066)	6.3 E-6 (0.063)	2.3 E-2 (230)	ND	1.48 E-3 (14.8) [1]
	2	5.8 E-6 (0.058)	4.0 E-5 (0.40)	4.7 E-4 (0.47)	6.9 E-6 (0.069)	6.6 E-6 (0.066)	3.1 E-2 (310)	ND	5.39 E-3 (53.9) [3]
	2	7.2 E-6 (0.072)	5.0 E-5 (0.50)	6.8 E-4 (0.68)	8.6 E-6 (0.086)	3.0 E-5 (0.30)	3.7 E-2 (370)	ND	3.06 E-3 (30.6) [3]
	2	7.2 E-6 (0.072)	5.0 E-5 (0.50)	4.4 E-4 (0.44)	8.6 E-6 (0.086)	8.3 E-6 (0.083)	3 E-2 (300)	ND	1.62 E-3 (16.2) [1]
RF000239823	1	5.0 E-5 (0.50)	5.0 E-3 (50)	8.2 E-3 (82)	6.0 E-5 (0.60)	6.0 E-5 (0.60)	2.3 E-2 (230)	ND	1.81 E-3 (18.1) [2]
	2	3.0 E-5 (0.30)	5.2 E-3 (52)	1.1 E-2 (110)	3.0 E-5 (0.30)	3.0 E-5 (0.30)	ND	ND	4.51 E-3 (45.1) [5]
	2	3.0 E-5 (0.30)	5.6 E-3 (56)	1.1 E-2 (110)	3.0 E-5 (0.30)	6.0 E-5 (0.60)	ND	ND	4.50 E-3 (45.0) [5]
RF000238171	1	5.0 E-5 (0.50)	3.9 E-4 (3.9)	3.9 E-3 (39)	2.2 E-4 (2.2)	6.0 E-5 (0.60)	ND	ND	2.48 E-3 (24.8) [2]
	2	6.9 E-6 (0.069)	6.0 E-5 (0.60)	2.2 E-3 (22)	3.0 E-5 (0.30)	7.9 E-6 (0.079)	ND	ND	1.61 E-3 (16.1) [2]
	2	6.9 E-6 (0.069)	5.0 E-5 (0.50)	2.0 E-3 (20)	3.0 E-5 (0.30)	8.0 E-6 (0.080)	ND	ND	1.59 E-3 (15.9) [2]
RF000501917	1	5.5 E-6 (0.055)	5.9 E-4 (5.9)	1.2 E-2 (120)	6.6 E-6 (0.066)	6.2 E-6 (0.062)	ND	ND	1.45 E-2 (145) [6]
	2	3.0 E-5 (0.30)	5.7 E-4 (5.7)	1.1 E-2 (110)	3.0 E-5 (0.30)	3.0 E-5 (0.30)	3.1 E-2 (310)	ND	2.11 E-2 (211) [5]
	2	3.0 E-5 (0.30)	8.8 E-4 (8.8)	1.8 E-2 (180)	3.0 E-5 (0.30)	3.0 E-5 (0.30)	ND	ND	1.92 E-2 (192) [4]

X_{UL} = 90 percent upper confidence limit value of the measured concentration

[1] Layers: 1 = 55 gallon poly bag; 2 = Inner confinement (> 1 L void volume).
[2] For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure. (QAPP)
[3] For Hydrogen and Methane, if the value is below MDL, it is denoted ND (Not detected).
[4] For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected," it must be present at a concentration at or above the MDL.

TABLE 2-6

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9100002

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type II Waste Conc. in vol. % and (ppmv)		0.18 (1,800)	0.84 (8,400)	5.68 (56,800)	0.34 (3,400)	1.62 (16,200)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	X_{UL}, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF003702288	1	1.0 E-4 (1.0)	1.2 E-3 (12)	1.9 E-2 (190)	1.3 E-4 (1.3)	1.2 E-4 (1.2)	ND	ND	5.17 E-2 (517) [5]
RF004101402	1	1.4 E-5 (0.14)	3.0 E-3 (30)	4.9 E-3 (49)	3.3 E-5 (0.33)	1.6 E-5 (0.16)	6.8 E-2 (680)	ND	1.15 E-2 (115) [7]
	2	1.1 E-5 (0.11)	1.3 E-3 (13)	2.8 E-3 (28)	1.4 E-5 (0.14)	1.2 E-5 (0.12)	3.9 E-2 (390)	ND	2.73 E-2 (273) [5]
	2	1.1 E-5 (0.11)	1.4 E-3 (14)	3.5 E-3 (35)	1.3 E-5 (0.13)	1.2 E-5 (0.12)	5.2 E-2 (520)	ND	3.04 E-2 (304) [6]
RF004101405	1	2.0 E-5 (0.20)	3.8 E-3 (38)	1.8 E-2 (180)	6.6 E-4 (6.6)	2.4 E-5 (0.24)	5 E-2 (500)	ND	6.85 E-2 (685) [8]
RF003702147	1	1.1 E-4 (1.1)	4.2 E-4 (4.2)	7.4 E-3 (74)	1.6 E-3 (16)	1.3 E-4 (1.3)	ND	ND	7.62 E-2 (762) [5]

X_{UL} = 90 percent upper confidence limit value of the measured concentration

[1]Layers: 1 = 55-gallon poly bag; 2 = Inner confinement (> 1 L void volume).
[2]For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure.(QAPP)
[3]For Hydrogen and Methane, if the value is below MDL, it is denoted ND (Not detected).
[4]For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected", it must be present at a concentration at or above the MDL.

TABLE 2-7

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9100003

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type II Waste Conc. in vol. % and (ppmv)		0.18 (1,800)	0.84 (8,400)	5.68 (56,800)	0.34 (3,400)	1.62 (16,200)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	X_{tx}, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF003702274	1	1.9 E-4 (1.9)	5.8 E-3 (58)	0.12 (1200)	3 E-4 (3)	2.2 E-4 (2.2)	2.6 E-2 (260)	ND	0.1096 (1096) [3]
RF000239538	1	9.1 E-5 (0.91)	2.9 E-4 (2.9)	4.1 E-3 (41)	5.1 E-6 (0.051)	4.9 E-6 (0.049)	ND	ND	1.95 E-2 (195) [6]
	2	6.8 E-5 (0.68)	1.9 E-4 (1.9)	6.3 E-3 (63)	7.7 E-6 (0.077)	7.4 E-6 (0.074)	ND	ND	3.55 E-2 (355) [7]
RF000501960	1	2.2 E-5 (0.22)	2.2 E-4 (2.2)	5.1 E-2 (510)	2.1 E-3 (21)	2.5 E-5 (0.25)	2.4 E-2 (240)	ND	3.76 E-2 (376) [5]
	2	2.2 E-4 (2.2)	8.6 E-4 (8.6)	7.9 E-2 (790)	4.8 E-3 (48)	2.5 E-4 (2.5)	3.4 E-2 (340)	ND	7.23 E-2 (723) [4]
RF000239815	1	4.3 E-5 (0.43)	2.4 E-3 (24)	4.6 E-3 (46)	5.1 E-6 (0.051)	4.9 E-6 (0.049)	ND	ND	9.5 E-4 (9.5) [5]
	2	3.3 E-5 (0.33)	2.8 E-3 (28)	1.1 E-2 (110)	3.8 E-5 (0.38)	3.0 E-4 (3.0)	ND	ND	1.34 E-3 (13.4) [2]
	2	3.2 E-5 (0.32)	1.5 E-3 (15)	8.9 E-3 (89)	2.8 E-5 (0.28)	7.4 E-6 (0.074)	2.6 E-2 (260)	ND	1.23 E-3 (12.3) [2]

X_{tx} = 90 percent upper confidence limit value of the measured concentration

[1]Layers: 1 = 55-gallon poly bag; 2 = Inner confinement (> 1 L void volume).
[2]For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure. (QAPP)
[3]For Hydrogen and Methane, if the value is below MDL, it is denoted ND (Not detected).
[4]For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected," it must be present at a concentration at or above the MDL.

TABLE 2-8

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9100004

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type II Waste Conc. in vol. % and (ppmv)		0.18 (1,800)	0.84 (8,400)	5.68 (56,800)	0.34 (3,400)	1.62 (16,200)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	X_{UL}, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF007300700	1	2.2 E-5 (0.22)	1.8 E-3 (18)	5.8 E-3 (58)	7.7 E-4 (7.7)	2.5 E-5 (0.25)	3.4 E-2 (340)	ND	1.76 E-2 (176) [4]
	2	1.3 E-5 (0.13)	1.7 E-4 (1.7)	9.9 E-5 (0.99)	1.8 E-5 (0.18)	1.5 E-5 (0.15)	6.4 E-2 (640)	ND	1.76 E-3 (17.6) [1]
	2	6.0 E-6 (0.060)	9.9 E-5 (0.99)	8.1 E-4 (8.1)	8.5 E-5 (0.85)	7.0 E-6 (0.070)	ND	ND	8.01 E-3 (80.1) [9]
RF003100833	1	1.8 E-5 (0.18)	5.4 E-4 (5.4)	4.4 E-2 (440)	2.1 E-5 (0.21)	2.1 E-5 (0.21)	2 E-2 (200)	ND	3.60 E-3 (36.0) [6]
	2	3.3 E-5 (0.33)	1.7 E-4 (1.7)	1.3 E-2 (130)	3.8 E-5 (0.38)	3.7 E-5 (0.37)	ND	ND	1.29 E-3 (12.9) [1]
RF003100990	1	1.3 E-5 (0.13)	2.9 E-3 (29)	2.8 E-2 (280)	1.6 E-5 (0.16)	3.2 E-5 (0.32)	ND	ND	2.48 E-3 (24.8) [4]
RF001901716	1	4.0 E-6 (0.04)	9.8 E-5 (0.98)	8.9 E-3 (89)	5.4 E-4 (5.4)	3.8 E-5 (0.38)	0.131 (1310)	ND	4.30 E-3 (43.0) [9]
RF003100808	1	4.0 E-6 (0.04)	4.5 E-3 (45)	6.5 E-2 (650)	2.5 E-4 (2.5)	2.3 E-4 (2.3)	2.9 E-2 (290)	ND	5.53 E-3 (55.3) [1]
	2	8.2 E-5 (0.82)	2.5 E-4 (2.5)	3.5 E-2 (350)	9.8 E-5 (0.98)	9.4 E-5 (0.94)	5.9 E-2 (590)	ND	2.50 E-3 (25.0) [1]

X_{UL} = 90 percent upper confidence limit value of the measured concentration

[1]Layers: 1 = 55-gallon poly bag; 2 = Inner confinement (> 1 L void volume).
[2]For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure. (QAPP)
[3]For Hydrogen and Methane, if the value is below MDL, it is denoted ND (Not detected).
[4]For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected," it must be present at a concentration at or above the MDL.

TABLE 2-9

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9200005

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type II Waste Conc. in vol. % and (ppmv)		0.18 (1,800)	0.84 (8,400)	5.88 (58,800)	0.34 (3,400)	1.62 (16,200)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	$X_{0.9}$, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF000235966	1	8.0 E-5 (0.80)	8.4 E-5 (0.84)	5.7 E-3 (57.0)	1.3 E-2 (130)	4.4 E-4 (4.40)	6.2 E-2 (620)	ND	2.52 E-2 (252) [8]
	2	7.0 E-6 (0.07)	7.0 E-6 (0.07)	9.0 E-7 (0.009)	9.0 E-6 (0.09)	8.0 E-6 (0.08)	4.9 E-2 (490)	ND	8.74 E-4 (9.00) [0]
RF000236125	1	6.5 E-5 (0.65)	2.6 E-4 (2.60)	6.1 E-3 (61.0)	2.2 E-2 (220)	9.9 E-5 (0.99)	2.6 E-2 (260)	ND	4.25 E-2 (425) [13]
RF000236173	1	1.7 E-4 (1.70)	4.1 E-3 (41.0)	1.4 E-3 (14.0)	3.2 E-2 (320)	1.5 E-3 (15.0)	5.7 E-2 (570)	ND	4.17 E-2 (417) [7]
RF03100881A	1	3.4 E-5 (0.34)	1.1 E-3 (11.0)	2.4 E-4 (2.40)	4.3 E-2 (430)	1.4 E-4 (1.40)	2.1 E-2 (210)	ND	4.25 E-2 (425) [9]
	2	9.6 E-5 (0.96)	9.2 E-5 (0.92)	1.1 E-4 (1.10)	1.2 E-2 (120)	1.1 E-4 (1.10)	9.0 E-3 (90)	ND	1.11 E-2 (111) [2]
	2	2.0 E-4 (2.00)	1.9 E-4 (1.90)	2.4 E-4 (2.40)	3.0 E-2 (300)	2.4 E-4 (2.40)	2.3 E-2 (230)	ND	1.33 E-2 (133) [2]
	2	1.1 E-5 (0.11)	1.0 E-5 (0.10)	1.2 E-5 (0.12)	7.1 E-3 (71.0)	1.2 E-5 (0.12)	8.0 E-3 (80)	ND	2.56 E-2 (256) [2]
	2	1.8 E-4 (1.80)	1.7 E-4 (1.70)	2.2 E-4 (2.20)	2.5 E-2 (250)	2.1 E-4 (2.10)	2.2 E-2 (220)	ND	3.32 E-3 (33.0) [2]
	2	5.0 E-5 (0.50)	5.0 E-5 (0.50)	1.1 E-5 (0.11)	2.8 E-3 (28.0)	1.9 E-5 (0.19)	9.0 E-3 (90)	ND	2.27 E-2 (227) [9]
	2	1.1 E-5 (0.11)	1.0 E-4 (1.00)	1.2 E-5 (0.12)	1.8 E-3 (18.0)	1.2 E-5 (0.12)	9.0 E-3 (90)	ND	3.08 E-3 (31.0) [2]
	2	2.2 E-5 (0.22)	2.0 E-5 (0.20)	2.6 E-5 (0.26)	1.3 E-3 (13.0)	2.5 E-5 (0.25)	8.0 E-3 (80)	ND	2.14 E-3 (21.0) [2]
RF003100999	1	2.2 E-5 (0.22)	3.2 E-3 (32.0)	2.7 E-5 (0.27)	9.2 E-3 (92.0)	2.4 E-5 (0.24)	1.9 E-2 (190)	ND	1.18 E-2 (118) [4]
	2	1.2 E-5 (0.12)	6.0 E-5 (0.60)	1.7 E-5 (0.17)	4.7 E-4 (4.70)	9.0 E-6 (0.09)	4.4 E-2 (440)	ND	1.31 E-3 (13.1) [4]

$X_{0.9}$ = 90 percent upper confidence limit value of the measured concentration

[1]Layers: 1 = 55-gallon poly bag; 2 = Inner confinement (> 1 L void volume).
[2]For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure. (QAPP)
[3]For Hydrogen and Methane, if the value is below MDL, it is denoted ND (Not detected).
[4]For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected," it must be present at a concentration at or above the MDL.

TABLE 2-10

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9200006

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type III Waste Conc. in vol. % and (ppmv)		0.58 (5,800)	0.50 (5,000)	2.12 (21,200)	0.28 (2,800)	5.74 (57,400)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	X_{UL}, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF003102035	1	4.0 E-6 (0.04)	3.5 E-6 (0.035)	1.0 E-3 (10.0)	2.0 E-5 (0.20)	5.6 E-6 (0.056)	8.0 E-3 (80)	ND	4.09 E-3 (41.0) [4]
RF074403844	1	6.8 E-5 (0.68)	2.1 E-4 (2.10)	5.7 E-3 (57.0)	1.5 E-4 (1.50)	5.3 E-5 (0.53)	2.3 E-2 (230)	ND	2.78 E-2 (278) [6]
RF009200025	1	1.0 E-3 (10.0)	3.1 E-3 (31.0)	5.6 E-2 (560)	2.3 E-3 (23.0)	9.3 E-2 (930)	2.6 E-2 (260)	ND	1.71 E-1 (1709) [7]
RF007300162	1	2.8 E-4 (2.80)	3.1 E-4 (3.10)	3.1 E-2 (310)	5.6 E-2 (560)	3.5 E-4 (3.50)	8.0 E-3 (80)	ND	1.05 E-1 (1054) [6]
RF000210305	1	2.2 E-4 (2.20)	1.5 E-3 (15.0)	3.7 E-2 (370)	4.4 E-2 (440)	1.8 E-4 (1.80)	8.0 E-3 (80)	ND	7.86 E-2 (786) [7]
	2	3.3 E-5 (0.33)	1.1 E-4 (1.10)	8.1 E-3 (81.0)	5.1 E-3 (51.0)	2.5 E-5 (0.25)	3.1 E-2 (310)	ND	1.02 E-2 (102) [6]
	2	4.5 E-5 (0.45)	2.1 E-4 (2.10)	6.6 E-3 (66.0)	3.3 E-3 (33.0)	3.5 E-5 (0.35)	3.5 E-2 (350)	ND	1.10 E-2 (110) [8]
	2	3.4 E-5 (0.34)	9.1 E-5 (0.91)	6.3 E-3 (63.0)	4.4 E-3 (44.0)	1.8 E-5 (0.18)	3.4 E-2 (340)	ND	1.32 E-2 (132) [8]
	2	1.3 E-4 (1.30)	5.0 E-4 (5.00)	2.3 E-2 (230)	1.1 E-2 (110)	9.9 E-5 (0.99)	3.2 E-2 (320)	ND	3.32 E-2 (332) [8]

X_{UL} = 90 percent upper confidence limit value of the measured concentration

[1]Layers: 1 = 55-gallon poly bag; 2 = Inner confinement (> 1 L void volume).
[2]For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure. (QAPP)
[3]For Hydrogen and Methane, if the value is below MDL, it is denoted ND (Not detected).
[4]For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected," it must be present at a concentration above the MDL.

TABLE 2-11

RESULTS OF HEADSPACE ANALYSES OF DRUMS USED TO FILL BIN # IDRFBN9300007

		Constituent							
		Carbon tetrachloride	Methylene chloride	1,1,1-Trichloroethane	Trichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	Hydrogen	Methane	Flammable VOCs
NMD Criteria Type III Waste Conc. in vol. % and (ppmv)		0.58 (5,800)	0.50 (5,000)	2.12 (21,200)	0.28 (2,800)	5.74 (57,400)	Not applicable		
		RESULTS OF ANALYSES							
Drum Number	Layer[1]	X_{UL}, vol. % and (ppmv)[2]					vol. % and (ppmv)[3]		vol. % and (ppmv) [# VOCs detected][4]
RF077403807	1	1.3 E-4 (1.30)	1.6 E-3 (16.0)	3.2 E-2 (320)	1.4 E-4 (1.40)	1.8 E-4 (1.80)	2.2 E-2 (220)	ND	3.66 E-2 (366) [7]
RF001905236	1	2.1 E-1 (2100)	6.2 E-4 (6.20)	8.7 E-3 (87.0)	1.6 E-2 (160)	2.5 E-5 (0.25)	6.2 E-2 (620)	ND	2.27 E-1 (2275) [6]
RF074403822	1	6.7 E-5 (0.67)	5.1 E-4 (5.10)	1.4 E-2 (140)	6.8 E-4 (6.80)	1.2 E-6 (0.012)	2.3 E-2 (230)	ND	2.00 E-2 (200) [8]
RF008903886	1	3.7 E-4 (3.70)	4.3 E-4 (4.30)	4.9 E-2 (490)	8.5 E-3 (85.0)	3.5 E-5 (0.35)	2.1 E-2 (210)	ND	1.31 E-1 (1315) [8]

X_{UL} = 90 percent upper confidence limit value of the measured concentration

[1]Layers: 1 = 55-gallon poly bag; 2 = Inner confinement (> 1 L void volume); H = Highest constituent concentration among layers sampled.
[2]For these five constituents, a value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if the constituent is not detected by the analytical procedure. (QAPP)
[3]For Hydrogen and Met[illegible] if the value is below MDL, it is denoted ND (Not detected).
[4]For the purposes of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected. For a VOC to be "detected," it must be present at a concentration above the MDL.

TABLE 2-12

FLAMMABILITY DATA REQUIRED BY THE NO-MIGRATION DETERMINATION*

	Parameter				
	Flammable VOCs[1]	Hydrogen[2]	Methane[2]	LeChatelier Calculation[3]	Emplacement Time[4]
NMD Criteria Conc. in vol. % and (ppmv)	5.00 E-2 (500)	2.0 (20,000)	2.5 (25,000)	0.5	Not applicable
	RESULTS OF ANALYSES				
Bin Number	X_{m_i}, vol. % and (ppmv)			Unitless	Days
IDRFBN9100001	1.21 E-3 (12.1)	2.08 E-2 (208)	1.563 E-2 (156.3)	8.3 E-3	150
IDRFBN9100001a	2.3 E-4 (2.3)	2.5 E-2 (250)	8 E-3 (80)	7.9 E-3	150
IDRFBN9100001b	3.5 E-4 (3.5)	2.71 E-2 (271)	1.1 E-2 (110)	9 E-3	150
IDRFBN9100001c	3.4 E-4 (3.4)	2.8 E-2 (280)	1.1 E-2 (110)	9.2 E-3	150
IDRFBN9100002	7.54 E-3 (75.4)	0.157 (1,570)	7.4 E-3 (74)	4.08 E-2	144
IDRFBN9100002a	7.46 E-3 (74.6)	0.225 (2,250)	1.1 E-2 (110)	5.8 E-2	140
IDRFBN9100002b	5.53 E-3 (55.3)	0.224 (2,240)	1.1 E-2 (110)	5.82 E-2	140
IDRFBN9100003	1.70 E-3 (17.0)	2.4 E-2 (240)	8 E-4 (8)	6.2 E-3	150
IDRFBN9100003a	1.28 E-2 (128)	4.6 E-2 (460)	1.1 E-2 (110)	1.37 E-2	149
IDRFBN9100004	1.4 E-3 (14)	4.0 E-2 (400)	1.1 E-2 (110)	1.22 E 2	150
IDRFBN9200005	3.4 E-4 (3.4)	2.7 E-2 (270)	1.2 E-2 (120)	9.15 E-3	150
IDRFBN9200006	2.6 E-3 (26)	3.6 E-2 (360)	1.1 E-2 (110)	1.12 E-2	157
IDRFBN9300007	1.3 E-3 (13)	1.8 E-2 (180)	1.1 E-2 (110)	6.70 E-3	158

* See Table 2-12 notes on following page.

TABLE 2-12

FLAMMABILITY DATA REQUIRED BY THE NO-MIGRATION DETERMINATION (Continued)

$X_{1,1}$ = 90 percent upper confidence limit value of the measured concentration

[1]If 500 ppmv or greater of flammable VOCs are detected, the DOE must perform an explicit flame test to determine if a flammable mixture can be formed with air. For the purpose of calculating the total flammable VOC concentration, a value of one-half the MDL is used when a flammable VOC is not detected by the analytical procedure.

[2]A value equal to the MDL (adjusted to the 90 percent upper confidence limit) is reported if hydrogen or methane is not detected by the analytical procedure.

[3]LeChatelier's calculation:

$C_1/LEL_1 + C_2/LEL_2$ = Reported value (This value is unitless)

where, C_1 = measured concentration of hydrogen (vol. percent); C_2 = measured concentration of methane (vol. %)
LEL_1 = lower explosive limit of hydrogen (4.0 vol. %); LEL_2 = lower explosive limit of methane (5.0 vol. %)

[4]The procedure for determining emplacement time is contained in Section 12.6.3 of the QAPP (DOE, 1991c). If the bin is not emplaced at the WIPP within the required emplacement time, the DOE will resample the bin and calculate a new emplacement time.

TABLE 2-13

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9100001

		Drum Number				
		RF000238171	RF000241922	RF000501917	RF000501913	RF000239823
IDC Code		442	442	442	442	442
Cellulosics (kg)	RTR	1.84	0.00	1.84	1.84	1.84
	Visual	1.84	0.00	1.84	1.84	1.84
	Difference	0.00	0.00	0.00	0.00	0.00
Plastics (kg)	RTR	2.27	2.27	2.72	1.81	0.91
	Visual	1.70	3.13	1.79	1.95	1.69
	Difference	0.57	-0.87	0.93	-0.14	-0.78
Corroding Metal-Steel (kg)	RTR	3.55	0.00	3.55	3.55	3.55
	Visual	3.55	0.00	3.55	3.55	3.55
	Difference	0.00	0.00	0.00	0.00	0.00
Solid Inorganic Wastes (kg)	RTR	49.06	80.25	52.20	48.11	49.92
	Visual	43.29	73.51	46.73	43.59	42.88
	Difference	5.77	6.74	5.48	4.52	7.04
Totals (kg)	RTR	56.72	82.52	60.32	55.32	56.22
	Visual	50.38	76.64	53.91	50.94	49.96
	Difference	6.34	5.88	6.40	4.38	6.26

IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-14

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9100002

		Drum Number			
		RF003702288	RF003702147	RF004101402	RF004101405
IDC Code		440	440	442	442
Cellulosics (kg)	RTR	0.00	0.00	1.84	0.92
	Visual	0.11	0.13	1.91	0.96
	Difference	-0.11	-0.13	-0.07	-0.04
Plastics (kg)	RTR	13.38	16.33	1.81	0.57
	Visual	11.64	16.07	1.53	1.87
	Difference	1.75	0.26	0.28	-1.30
Corroding Metal-Steel (kg)	RTR	0.00	0.00	3.55	1.78
	Visual	0.00	0.00	3.56	1.78
	Difference	0.00	0.00	0.00	0.00
Solid Inorganic Wastes (kg)	RTR	27.67	34.02	95.39	85.28
	Visual	22.38	28.01	89.93	79.96
	Difference	5.29	6.01	5.46	5.32
Totals (kg)	RTR	41.05	50.35	102.59	88.54
	Visual	34.12	44.22	96.93	84.56
	Difference	6.93	6.13	5.66	3.98

IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-15
REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9100003

		Drum Number				
		RF003702274	RF000239538	RF000501960	RF000501960 (RFR Rep)	RF000239815
IDC Code		440	442	442		442
Cellulosics (kg)	RTR	0.00	1.84	1.84	1.84	1.84
	Visual	0.09	2.12	1.94		2.09
	Difference	-0.09	-0.28	-0.10	-0.10*	-0.24
Plastics (kg)	RTR	9.53	1.82	0.91	1.02	1.02
	Visual	13.02	1.69	1.71		1.56
	Difference	-3.49	0.127	-0.80	-0.69*	-0.54
Corroding Metal-Steel (kg)	RTR	0.00	3.55	3.55	3.55	3.55
	Visual	0.00	3.94	3.61		3.88
	Difference	0.00	-0.39	-0.06	-0.06*	-0.33
Solid Inorganic Wastes (kg)	RTR	29.03	41.28	45.59	45.81	45.36
	Visual	19.47	34.47	38.91		39.10
	Difference	9.56	6.81	6.78	6.90*	6.25
Totals (kg)	RTR	38.56	48.48	51.89	52.23	51.77
	Visual	32.56	42.23	46.18		46.63
	Difference	5.90	6.25	5.71	6.05*	5.15

* - The values for the difference are calculated using the visual value from drum number RF000501960
IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-16

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9100004

		Drum Number				
		RF007300700	RF003100833	RF003100990	RF001901716	RF003100808
IDC Code		480	480	480	480	480
Cellulosics (kg)	RTR	0.00	0.00	0.10	0.00	0.00
	Visual	0.10	0.056	0.72	0.00	0.14
	Difference	-0.10	-0.06	-0.62	0.00	-0.14
Plastics (kg)	RTR	7.30	3.60	5.90	3.60	6.80
	Visual	9.20	3.22	3.12	2.33	3.52
	Difference	-1.90	0.38	2.78	1.27	3.28
Rubber (kg)	RTR	0.00	0.00	0.20	0.20	0.20
	Visual	1.71	0.21	0.98	1.13	0.24
	Difference	-1.71	-0.21	-0.78	-0.93	-0.04
Corroding Metal-Steel (kg)	RTR	48.40	10.50	15.00	10.40	5.70
	Visual	71.29	10.32	10.97	6.57	1.23
	Difference	-22.89	0.18	4.03	3.83	4.47
Corroding Metal-Al (kg)	RTR	38.70	8.40	12.00	7.30	3.40
	Visual	8.83	3.58	9.22	8.12	6.03
	Difference	29.87	4.82	2.78	-0.82	-2.63

TABLE 2-16

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9100004
(Continued)

		Drum Number				
		RF007300700	RF003100833	RF003100990	RF001901716	RF003100808
IDC Code		480	480	480	480	480
Non-Corroding Metal (kg)	RTR	9.70	2.10	3.00	3.10	2.30
	Visual	6.14	0.00	2.35	0.06	0.05
	Difference	4.56	2.10	0.65	3.04	2.25
Solid Inorganic Wastes (kg)	RTR	0.70	0.70	0.70	0.20	0.04
	Visual	1.13	2.68	2.92	0.01	1.70
	Difference	-0.43	-1.98	-2.22	0.19	-1.66
Totals (kg)	RTR	104.80	25.30	36.90	24.80	18.44
	Visual	97.40	20.07	30.28	18.22	12.91
	Difference	7.40	5.23	6.62	6.58	5.53

IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-17

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9200005

		Drum Number				
		RF000235966	RF000236125	RF000236173	RF03100881A	RF003100999
IDC Code		480	480	480	480	480
Cellulosics (kg)	RTR	1.36	0.00	2.27	4.99	0.00
	Visual	0.35	0.22	0.04	0.05	5.38
	Difference	1.01	-0.22	2.23	4.94	-5.38
Other Organics (kg)	RTR	0.00	0.00	0.00	0.00	0.00
	Visual	0.05	0.00	0.00	0.00	0.00
	Difference	-0.05	0.00	0.00	0.00	0.00
Plastics (kg)	RTR	5.90	2.72	6.80	9.07	4.77
	Visual	6.74	6.96	3.99	2.90	2.13
	Difference	-0.84	-4.24	2.81	6.17	2.64
Rubber (kg)	RTR	0.23	0.23	0.00	0.00	0.45
	Visual	0.20	0.06	0.12	2.59	0.06
	Difference	0.03	0.17	-0.12	-2.59	0.39
Corroding Metal-Steel (kg)	RTR	84.04	60.00	35.06	19.35	12.42
	Visual	77.65	56.28	11.66	20.11	9.64
	Difference	6.39	3.72	23.40	-0.76	2.78
Corroding Metal-Al (kg)	RTR	14.59	13.21	8.11	3.60	7.81
	Visual	0.02	0.00	4.08	9.67	1.78
	Difference	14.57	13.21	4.03	-6.07	6.03

TABLE 2-17

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9200005
(Continued)

		Drum Number				
		RF000235966	RF000236125	RF000236173	RF03100881A	RF003100999
IDC Code		480	480	480	480	480
Non-Corroding Metal (kg)	RTR	1.36	0.00	2.27	5.00	0.00
	Visual	12.05	4.00	22.89	0.42	0.00
	Difference	-10.69	-4.00	-20.62	4.58	0.00
Solid Inorganic Wastes (kg)	RTR	0.36	0.04	0.73	0.36	0.00
	Visual	1.27	2.56	1.72	0.89	0.70
	Difference	-0.91	-2.52	-0.99	-0.53	-0.70
Unknown (kg)	RTR	0.00	0.00	0.00	0.00	0.00
	Visual	2.05	0.00	3.65	0.00	0.00
	Difference	-2.05	0.00	-3.65	0.00	0.00
Totals (kg)	RTR	107.84	76.20	55.24	42.37	25.45
	Visual	100.38	70.08	48.15	36.63	19.69
	Difference	7.46	6.12	7.09	5.74	5.76

IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-18

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9200006

		Drum Number				
		RF000210305	RF074403844	RF009200025	RF007300162	RF003102035
IDC Code		337	337	336	335	339
Cellulosics (kg)	RTR	0.11	0.00	19.06	52.33	0.00
	Visual	0.50	0.04	2.17	13.56	0.00
	Difference	-0.39	-0.04	16.89	38.77	0.00
Plastics (kg)	RTR	16.62	15.72	9.53	0.68	2.04
	Visual	24.13	13.40	14.03	3.96	9.18
	Difference	-7.51	2.32	-4.50	-3.28	-7.14
Rubber (kg)	RTR	15.15	8.32	0.23	0.00	36.97
	Visual	2.88	0.14	1.85	1.67	34.47
	Difference	12.27	8.18	-1.62	-1.67	2.50
Corroding Metal-Steel (kg)	RTR	0.00	0.00	1.36	0.00	0.00
	Visual	0.00	0.00	5.40	0.45	0.00
	Difference	0.00	0.00	-4.04	-0.45	0.00
Non-Corroding Metal (kg)	RTR	1.25	0.00	0.23	0.00	36.97
	Visual	0.00	0.00	0.43	0.00	32.43
	Difference	1.25	0.00	-0.20	0.00	4.54
Solid Inorganic Wastes (kg)	RTR	3.05	0.76	0.00	0.00	0.00
	Visual	4.06	4.96	0.97	34.55	0.00

TABLE 2-18

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9200006
(Continued)

		Drum Number				
		RF000210305	RF074403844	RF009200025	RF007300162	RF003102035
IDC Code		337	337	336	335	339
	Difference	-1.01	-4.20	-0.97	-34.55	0.00
Inorganic Sludge (kg)	RTR	0.00	0.00	0.00	0.00	0.00
	Visual	0.00	0.00	0.16	0.00	0.00
	Difference	0.00	0.00	-0.16	0.00	0.00
Unknown (kg)	RTR	0.00	0.00	0.00	0.00	0.00
	Visual	0.00	0.00	2.39	0.00	0.00
	Difference	0.00	0.00	-2.39	0.00	0.00
Totals (kg)	RTR	36.18	24.80	30.41	53.01	75.98
	Visual	31.57	18.54	27.40	54.19	76.08
	Difference	4.61	6.26	3.01	-1.18	-0.10

IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-19

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9300007

		Drum Number			
		RF077403807	RF001905236	RF074403822	RF008903886
IDC Code		337	339	337	338
Cellulosics (kg)	RTR	0.00	0.00	0.00	5.36
	Visual	0.01	0.17	0.05	11.03
	Difference	-0.01	-0.17	-0.05	-5.67
Plastics (kg)	RTR	21.68	0.91	16.74	5.82
	Visual	11.91	1.43	10.99	5.32
	Difference	9.77	-0.52	5.75	0.50
Rubber (kg)	RTR	1.17	52.60	7.21	0.00
	Visual	0.85	52.28	0.28	2.58
	Difference	0.32	0.32	6.93	-2.58
Corroding Metal-Steel (kg)	RTR	0.00	0.00	0.00	5.36
	Visual	0.00	0.00	0.00	0.19
	Difference	0.00	0.00	0.00	5.17
Non-Corroding Metal (kg)	RTR	0.57	52.60	0.00	2.69
	Visual	0.31	48.19	0.00	0.00
	Difference	0.26	4.41	0.00	2.69

TABLE 2-19

REAL-TIME RADIOGRAPHY ESTIMATED MASSES VS. VISUAL EXAMINATION DETERMINED MASSES

BIN # IDRFBN9300007
(Continued)

		Drum Number			
		RF077403807	RF001905236	RF074403822	RF008903886
IDC Code		337	339	337	338
Solid Inorganic Wastes (kg)	RTR	0.09	0.00	0.05	6.98
	Visual	7.68	0.87	9.59	3.14
	Difference	-7.59	-0.87	-9.54	3.84
Totals (kg)	RTR	23.51	106.11	24.00	26.21
	Visual	20.76	102.94	20.91	22.26
	Difference	2.75	3.17	3.09	3.95

IDC - Item Description Code
kg - Kilograms
RTR - Real-Time Radiography

TABLE 2-20

EXCLUDED DRUMS

Drum Number	Bin Number	Nonconformance	Reason for Exclusion
RF004500559	IDRFBN9100001	Contained U-235 [1]	Not applicable
RF002800598	IDRFBN9100001	Contained free liquid	WIPP WAC
RF001902106	IDRFBN9100004	Possible pressurized container	WIPP WAC
RF003101490	IDRFBN9100004	Possible pressurized container	WIPP WAC
RF005400341	IDRFBN9200005	Contained free liquid	WIPP WAC
RF005500375	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF002800659	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF000241353	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF002201038	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF002800703	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF002301549	IDRFBN9200005	Less than 100 nCi/g	WIPP WAC
RF003100946	IDRFBN9200005	Less than 100 nCi/g	WIPP WAC
RF001901607	IDRFBN9200005	Possible pressurized container	WIPP WAC
RF001901991	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF000239134	IDRFBN9200005	Excessive decay heat	TRUPACT-II C of C
RF000108833	IDRFBN9200006	Contained free liquid	WIPP WAC
RF074403825	IDRFBN9200006	Drum flammable VOC > 500 ppmv	TRUPACT-II C of C[2]
RF000237798	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF002302673	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF002202850	IDRFBN9200006	Excessive carbon tetrachloride	NMD
RF001908888	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF001905358	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF002203352	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF001905574	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF001215294	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C

TABLE 2-20

EXCLUDED DRUMS

(Continued)

Drum Number	Bin Number	Nonconformance	Reason for Exclusion
RF002500316	IDRFBN9200006	Excessive decay heat	TRUPACT-II C of C
RF074403768	IDRFBN9300007	Contained free liquid/ Excessive decay heat	WIPP WAC/ TRUPACT-II C of C
RF005500406	IDRFBN9300007	Less than 100 nCi/g	WIPP WAC
RF074403890	IDRFBN9300007	Contained free liquid	WIPP WAC
RF000108844	IDRFBN9300007	Less than 100 nCi/g	WIPP WAC
RF074403907	IDRFBN9300007	Contained free liquid	WIPP WAC
RF074403900	IDRFBN9300007	Contained free liquid	WIPP WAC
RF074403740	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001901846	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF002500319	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF000210253	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF002500321	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001901850	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001901849	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001904355	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001904149	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001905199	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF000210256	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF000108870	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001905261	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C
RF001905674	IDRFBN9300007	Excessive decay heat	TRUPACT-II C of C

[1]At present, INEL is not capable of certifying drums suspected of containing, or determined to contain, U-235.

TABLE 2-20

EXCLUDED DRUMS

(Continued)

[2]Usage of the TRUPACT-II prohibits the transportation of containers exceeding the 500 ppmv limit. For this reason, Drum RF074403825 was excluded from Bin IDRFBN9200006.

3.0 VOLATILE ORGANIC COMPOUND MONITORING PROGRAM

The VOC Monitoring Program (WID, 1991a) is designed to measure the concentration of airborne VOCs within the WIPP underground facility and in the ambient air aboveground. These data are used to document that there has been no airborne migration of hazardous constituents, attributed to emplaced waste, from the WIPP unit boundary in concentrations exceeding health-based criteria. Presently, there are four VOC sampling locations at the WIPP facility. These four locations are designated as air monitoring stations.

The four air monitoring stations are defined as follows (see Figure 3-1):

- Station VOC-1 is located at Station A near the top of the exhaust shaft.
- Station VOC-2 is located on the surface near the air intake shaft.
- Station VOC-8 is located in the Panel 1 ventilation air intake passageway.
- Station VOC-9 is located in the Panel 1 ventilation air outlet passageway.

Prior to November 1993, a fifth monitoring station existed and was designated as a source monitoring station. Station VOC-10 was located in Room 1 of Panel 1 and was designated as a source monitoring station because it was designed to sample gas vented from a carbon sorption bed prior to release into the mine atmosphere. This bed was designed to remove VOCs from any gas vented from the experimental bins. No sampling was conducted at VOC-10 during this reporting period.

VOC sampling and analysis reported in this section are performed using guidance included in *Compendium Method TO-14, The Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using SUMMA® Passivated Canister Sampling and Gas Chromatographic Analysis* (EPA, 1988a) as a basis. The VOC samplers are operated by WIPP facility personnel, and sample analyses are performed by a contract laboratory. Laboratory analyses are designed to routinely quantify five target compounds: carbon tetrachloride (CCl_4); methylene chloride (CH_2Cl_2); trichloroethylene (TCE); 1,1,1-trichloroethane (TCA); and 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113). Laboratory standard operating procedures (SOPs) allow for positive identification of seven additional nontarget compounds: perchloroethylene, chloroform, bromoform, dichloroethane, dichloroethylene, toluene, and chlorobenzene. Other VOCs found in the samples are tentatively identified as part of the analysis methods.

Controlling documents for the VOC Monitoring Program are listed in Section 7.2. This list of documents includes operating procedures, contract laboratory procedures, and technical references.

VOC Monitoring Program activities for the period September 1, 1993, through August 31, 1994, are presented in the following sections. Data are also included for one sample collected at VOC-1 on August 30, 1993. For this one sample data were not validated in time for the 1993 NMD reporting period.

3.1 PROGRAM ACTIVITIES STATUS REPORT

Program activities through August 31, 1994, included routine and quality control sample collection, sampler certifications, evaluation of method relative accuracy (MRA) procedures, performance of method detection limit (MDL) studies, and an audit of the contract analytical laboratory. Each of these activities is discussed below.

3.1.1 VOC Monitoring Program

The NMD requires that "monitoring in the exhaust shaft (VOC-1) begin 30 days prior to the emplacement of any experimental wastes underground" and that monitoring at the remaining four stations commence "prior to emplacement of any bins containing TRU wastes in the rooms" (55 FR 47720b/13090a). Beginning on September 1, 1993, weekly sampling was conducted at Station VOC-1 (exhaust shaft). No sampling schedule was established for the other three sites. After the October 1993 DOE announcement, the focus of the monitoring effort changed from support of the test-phase NMD to development of a baseline concentration database for disposal-phase operations. Sampling began in November 1993 at Station VOC-8 (Panel 1 air intake) to define baseline VOC concentrations underground. In January 1994, the sampling frequency at Stations VOC-1 and VOC-8 were reduced from once each week to once every two weeks. At the same time, sampling was initiated on the same schedule at Station VOC-2 (air intake shaft). No data were obtained at Station VOC-9 during the reporting period. The monitoring data obtained from Stations VOC-1, VOC-2, and VOC-8 for the period September 1, 1993, through August 31, 1994, are presented below. Results obtained after August 31, 1994 will be included in the next Annual Report.

3.1.1.1 Monitoring Results

Four sampling systems for the VOC monitoring program are in place and operational. Samples have been collected at three monitoring locations to verify system operational readiness and the adequacy of operating procedures and to develop a baseline VOC concentration database. Tables 3-1, 3-2, and 3-3 present the analytical results and the data qualifiers for the VOC-1, VOC-2, and VOC-8 air monitoring locations. Two significant digits are reported for measured concentrations greater than or equal to 0.10 parts per billion by volume (ppbv). For smaller measured concentrations, only one significant digit is reported. The dates listed in the tables represent sample beginning dates. Three sampling stations had an established sampling schedule over at least a portion of this reporting period. The established weekly sampling schedule for VOC-1 was maintained from September, 1993, through December 31, 1993. Beginning in January 1994, sampling was conducted at the sampling stations once every two calendar weeks.

For the analytical results presented in Tables 3-1 through 3-3, the routine laboratory reporting detection limit is 0.2 ppbv for laboratory results with a dilution factor of 1. For dilution factors greater than one, the 0.2 ppbv value is multiplied by the dilution factor to calculate the laboratory reporting limit for a diluted sample. The laboratory reporting detection limits were experimentally determined by the contract laboratory following the procedures described in 40 CFR Part 136, Appendix A.

Values for constituents detected at concentrations less than the laboratory reporting detection limits are estimated. If a particular compound was not detected in a sample, then one-half of the laboratory reporting detection limit was used in the summary tables, and the results are qualified with a "U". For example, in Table 3-3, a value of 0.10 ppbv has been included in the data summary for TCE for all "U" qualified results. This numerical substitution is made in Table 3-1 to allow annual average concentrations to be calculated. The use of this substitution may cause the annual average concentration to be overestimated.

Data qualifiers used in Tables 3-1 through 3-3 are defined as follows:

J - This flag indicates an estimated value and is used when mass spectral data indicate the presence of the compound, but the result is less than the specified reporting limit.

B - This flag is used whenever the analyte is detected in the blank as well as in the sample. In all cases, the concentrations of analytes detected in the blanks were estimated, because the concentrations were below the laboratory reporting detection limit.

U - This flag is used when the compound was not detected in the sample. The reported value is one-half the laboratory reporting limit (nominally 0.2 ppbv). This substitution is made so that annual average concentrations can be calculated as required by the NMD.

Jv - This flag is used when the associated results are considered to be estimated based on findings of the WIPP data validation procedure. The Jv qualifier is applied to analytical results when minor deviations of program QC or documentation requirements are discovered and are not subsequently corrected by the laboratory.

The data in the tables reflect the day-to-day variability in concentrations in and around the facility as a result of ongoing operations and changes in VOC concentrations in the ambient air aboveground.

Table 3-4 presents a summary of laboratory method blank analyses performed as part of routine sample analyses. The dates appearing in Table 3-4 are the dates that the method blank samples were analyzed. Four of the 56 methylene chloride blank results were greater than 0.2 ppbv. Methylene chloride is a common laboratory chemical and the four slightly elevated blank results are not an indication of problems in the analytical system. None of the blank results for the other four target compounds was greater than 0.2 ppbv, the limit described for laboratory method blanks in Compendium Method TO-14.

3.1.1.2 Unit Boundary Concentrations

The NMD requires that data obtained from samples collected at Station VOC-10 be used to monitor compliance with the levels of regulatory concern listed in the NMD (55 FR 47705a). With the change in mission for the facility announced by DOE in October 1993, the ongoing data collection efforts will be used to establish baseline concentrations at the facility and to assist in developing the monitoring program for the disposal phase. Station VOC-10 was decommissioned in November 1993, and no sampling was conducted at this location during the period covered by this report.

3.1.2 Sampler Certifications

As part of Method TO-14 and as required by the NMD, the VOC samplers for Stations VOC-1, VOC-2, and VOC-8 were certified to ensure cleanliness and reliable sample recovery. Each air monitoring station has a spare sampling system, which allows one sampler to be recertified while the other is in operation. This design ensures sampling capabilities at all times. Recertification is conducted after every three months of sampling for each installed sampler. Recertification is also required annually for any sampler not used within a twelve month period. The sampler flow rate projected for routine monitoring is used for the entire certification process. The certification procedure is a two-step process for each sampler. First, a sample of high-purity zero air is collected through the sampler to evaluate sampler cleanliness. Second, a sample of calibration gas is collected through the sampler to evaluate target compound recovery.

The zero air certification for air samplers (Stations VOC-1, 2, 8, and 9) requires that the samplers contribute 0.5 ppbv or less of each target compound detected in the zero air sample. These criteria are outlined in the document, *VOC Monitoring Quality Assurance Project Plan* (WID, 1991b), hereafter referred to as the VOC QAPjP. Tables 3-5 through 3-7 present the results from certifications performed on the sampling systems.

As presented in Tables 3-5 through 3-7, the 50 individual constituent zero air values for air monitor certifications were found at a concentration less than 0.5 ppbv. The data in the tables represent only certified samplers. No data are included for the cleaning iterations that failed to satisfy the cleaning criteria. Samplers were recleaned and re-evaluated until they met the cleanliness criteria.

The calibration gas recovery limits established for the program are described in the VOC QAPjP. Recovery for any individual target compound must be between 75 and 120 percent, with the additional stipulation that the average recovery for all target compounds must be between 90 and 110 percent. As shown in the tables, the average recovery values were between 90 and 110 percent for all samplers. All of the individual constituent recovery values were between 75 and 120 percent.

As the certification results in Tables 3-5 through 3-7 indicate, all samplers meet the program certification criteria.

3.1.3 Program Precision

Table 3-8 is a summary of field (sampling) precision data. These data represent duplicate samples that were collected at each monitoring station. Relative percent difference (RPD) was calculated for each set of duplicate samples. The RPD is reported in Table 3-8 for each of the target compounds for analytical results greater than the laboratory reporting detection limit (i.e., no calculations were made for "J" or "ND" results). For the 30 individual calculated RPDs, 25 of the values are within the program QA objective of $\pm$ 15 percent, included in the VOC QAPjP.

Table 3-9 presents a summary of laboratory (analytical) precision data. These data represent contract laboratory precision information for the VOC Monitoring Program. No RPD was calculated for "J" and "ND" entries. The results indicate that 35 of the 36 calculated individual calculated RPD values are within the program QA objective of ± 15 percent as defined in the VOC QAPjP.

3.1.4 Program Accuracy

As required in the NMD, the DOE has developed a procedure to evaluate MRA. The NMD defines MRA sampling as the concurrent collection of matrix spike and matrix duplicate samples. For the MRA sampling procedure, approximately 11 liters of gas are collected in each of two sample canisters using the sampling system (see Figure 3-2). After collecting 11 liters of gas, the valve on the canister connected to Port 2 is closed. An audit gas source (e.g., Scott Micrograv Gas Mixture) is then connected to the sampling system inlet, and 1 liter of this gas is added to the canister connected to Port 1 (see Figure 3-3). The contents of this canister represent the matrix spike sample; the other canister (Port 2) contains the matrix duplicate sample.

Based on previous analytical results, a matrix spike audit gas was ordered and obtained from a vendor. Ten MRA evaluations were conducted during this reporting period. Results of these evaluations are presented in Table 3-10. In general, the present MRA procedure is capable of achieving the ± 10 percent accuracy objective for one or more compounds for each pair of samples. Of the 50 individual MRA values obtained for the three samplers during this reporting year, 22 are within the ± 10 percent accuracy window. Forty of the results are within a ± 20 percent accuracy window. Data obtained for samples 503 and 504 appear to be an anomaly. Both field and laboratory records show that the samples were collected and analyzed correctly.

Six samples of the matrix spike audit gas were collected and subsequently analyzed by the laboratory to determine the accuracy of the vendor's certificate of analysis. The supplied audit gas was certified by the vendor to be accurate within ± 10 percent of the stated value for each constituent. Individual constituent concentrations in the audit gas reported by the vendor are approximately 25 ppbv for all target compounds. The analytical accuracy results for the audit gas are presented in Table 3-11. Variability between the contract laboratory and the vendor's certification can be attributed to uncertainty associated with the analytical method.

Because not all of the calculated MRA values were within the ± 10 percent accuracy objective, a detailed error component analysis has been performed. The analysis defined the relative standard deviations at a 95 percent confidence level for the individual components of the MRA calculation described in the VOC QAPjP. The components and their associated 95 percent confidence level relative standard deviations follow:

Concentration of the VOC in the matrix spike - 0.25
Concentration of the VOC in the matrix duplicate - 0.25
Concentration of the VOC in the audit gas - 0.10
Total pressure in the matrix spike - 0.05
Pressure in the matrix duplicate - 0.05

An error propagation analysis was performed using these values and the MRA equation. When the final error equation was evaluated using typical values for each variable, total propagated uncertainties as high as 0.90 were obtained (at the 95 percent confidence level). These results suggest that the ± 10 percent accuracy objective for MRA sampling is too conservative. Data obtained to date can be used to redefine the objective for the disposal phase monitoring.

Table 3-12 presents a summary of laboratory accuracy data. The contract laboratory tracks accuracy on a weekly basis for five compounds: 1,1-dichloroethene, benzene, TCA, toluene, and chlorobenzene. For the data in the table, 190 of the 240 accuracy values were within the QA objective of 90 to 110 percent.

3.1.5 Program Completeness

Completeness for the field effort was based on the sampling schedules for each monitoring location. For the period August 30, 1993, through August 31, 1994, 100 percent of the scheduled samples were collected and the field data validated. Data validation has been performed on the analytical data packages using the methods described in the EPA draft document, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses* (EPA, 1988b) as guidance. To date, completeness, as defined by the VOC QAPjP for these analytical packages, is 100 percent.

3.1.6 Matrix-Specific Method Detection Limit Studies

The method used to determine the matrix-specific MDL is described in Chapter 1, "Quality Control," of the EPA document SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA, 1986b) and in 40 CFR Part 136, Appendix B.

According to the first of these documents, the MDL

> is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. For operational purposes, when it is necessary to determine the MDL in the matrix, the MDL shall be determined by multiplying the appropriate one-sided 99% t-statistic by the standard deviation obtained from a minimum of three analyses of a matrix spike containing the analyte of interest at a concentration three to five times the estimated MDL.

Further, a matrix spike is defined as

> an aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

In the proposed No-Migration Variance (55 FR 13091c), the EPA stated that "the method limit of quantitation [shall] be determined separately for the bin, alcove, and exhaust shaft monitoring locations due to the possible occurrence of differential matrix effects associated with the presence of salt aerosols in the repository environment." In addition, the method limit of quantitation was to be

established annually for each analyte. These requirements were retained in the final NMD, and the EPA defined the "method limit of quantitation" to be synonymous with the term "method detection limit" as described above (55 FR 47708c).

For the VOC Monitoring Program matrix-specific MDL study, three samples obtained at Station VOC-1 that contained concentrations of some of the target constituents near those required for the matrix-specific MDL study were used (see Table 3-13). The samples collected at VOC-1 represent a salt mine air sample matrix. The first sample (number 489) was initially analyzed three times using a 100 milliliter (ml) aliquot of the sample matrix rather than the 500 ml aliquot used for routine analysis. This analytical procedure effectively dilutes the sample matrix by a factor of five. The dilution was necessary to reduce the high concentrations of TCA to the appropriate level. Next, the sample was spiked with a mixture of the remaining four target compounds, diluted by a factor of 1.33, and analyzed a further three times. An MDL value was calculated for each of the target compounds. The results are summarized in Table 3-13.

For the other two samples (numbers 492 and 493), three 50 ml aliquots of the original sample matrix were analyzed to achieve an effective dilution factor of 10 for the TCA concentrations. The original sample matrix was analyzed three additional times using 500 ml aliquots to obtain concentrations of the other four target compounds. MDL values were calculated for each of the five target compounds for both samples. These results are also presented in Table 3-13. The MDL laboratory summaries for these data are included in Appendix A.

The equivalent laboratory reporting detection limit for each compound is calculated by multiplying the average MDL value by a factor between 5 and 10, as specified in SW-846. The MDL is meant to represent the best possible detecting ability the laboratory can expect, given optimum instrument performance and optimum sample matrix conditions. However, in day-to-day operations of the laboratory, optimal conditions are not expected. Therefore, the laboratory multiplies the MDL by a factor between 5 and 10 to determine the practical quantitation limit, which is then used as the laboratory reporting detection limit. This practice is used to give the laboratory a safety factor to account for the day-to-day variation in instrument and method performance.

The resulting ranges of laboratory reporting detection limits are included in Table 3-13. Based on the results of the MDL study presented in this table, it appears that the current laboratory reporting detection limits (0.2 ppbv) can be increased. These reporting limits will be re-evaluated during the next reporting period.

3.1.7 Laboratory Audit

An audit of the contract laboratory was conducted by the WID Quality and Regulatory Assurance Department during the period August 8 through 11, 1994. There were no findings documented during the audit. Of the four observations made by the audit team, only one required a response from the laboratory.

3.2 FUTURE ACTIVITIES

The planned activities that will occur over the next reporting period are presented in this section.

3.2.1 System Enhancements

The flow characteristics of the samplers over a 24-hour sample period have been evaluated. The results of the evaluations suggested that the mechanical flow controller in each sampler at Stations VOC-1, 2, 8, and 9 should be replaced with electronic mass flow controllers. These modifications began during this reporting period and are scheduled to be completed during the next reporting period.

3.2.2 VOC Monitoring

The VOC Monitoring Program has been initiated, and test samples have been collected. Presently, all equipment is deployed, and the operational and analytical procedures have been established. As part of the monitoring program, all planned QA/QC activities are being implemented.

System readiness has been demonstrated, but waste receipt is not imminent. For the 1994-1995 period, the VOC Monitoring Program Manager will define the sampling schedule. It is anticipated that a sampling frequency of every other week will be maintained at Stations VOC-1, VOC-2, and VOC-8 during the next reporting period. The purpose of the monitoring is to obtain sufficient baseline concentration and QA/QC data to support monitoring program development for the disposal phase.

Duplicate samples and method relative accuracy samples will be collected as directed by the VOC Monitoring Program Manager. Laboratory QA/QC activities are being performed on the samples that have been collected. The contract analytical laboratory has been audited, and program audits of site activities are being performed on a periodic basis.

A computerized analytical data management system has been developed and implemented to streamline existing data acquisition and analysis activities. Data summaries will be routinely updated to track program operations and prepare annual NMD reports.

Maintenance and calibration procedures for the VOC samplers have been implemented and will continue throughout the next reporting period.

3.2.3 Sampler Certification

A sampler certification schedule has been established. The sampler for each monitoring location is certified quarterly, with the dates for the certification procedure being determined by the date the sampler is placed in service and the date of the first sample. This schedule will be maintained unless data are obtained that warrant changes.

3.2.4 Program Precision

To evaluate field precision, duplicate samples will be collected as directed by the VOC Monitoring Program Manager. Replicate sample analyses will be performed by the contract laboratory to evaluate laboratory data precision.

3.2.5 Program Accuracy

Additional MRA samples will be collected. Routine samples will be collected after each MRA sampling event to ensure that no sampler contamination has occurred. In addition, the contract laboratory will continue to track accuracy for five compounds on a weekly basis.

3.2.6 Disposal-Phase VOC Monitoring

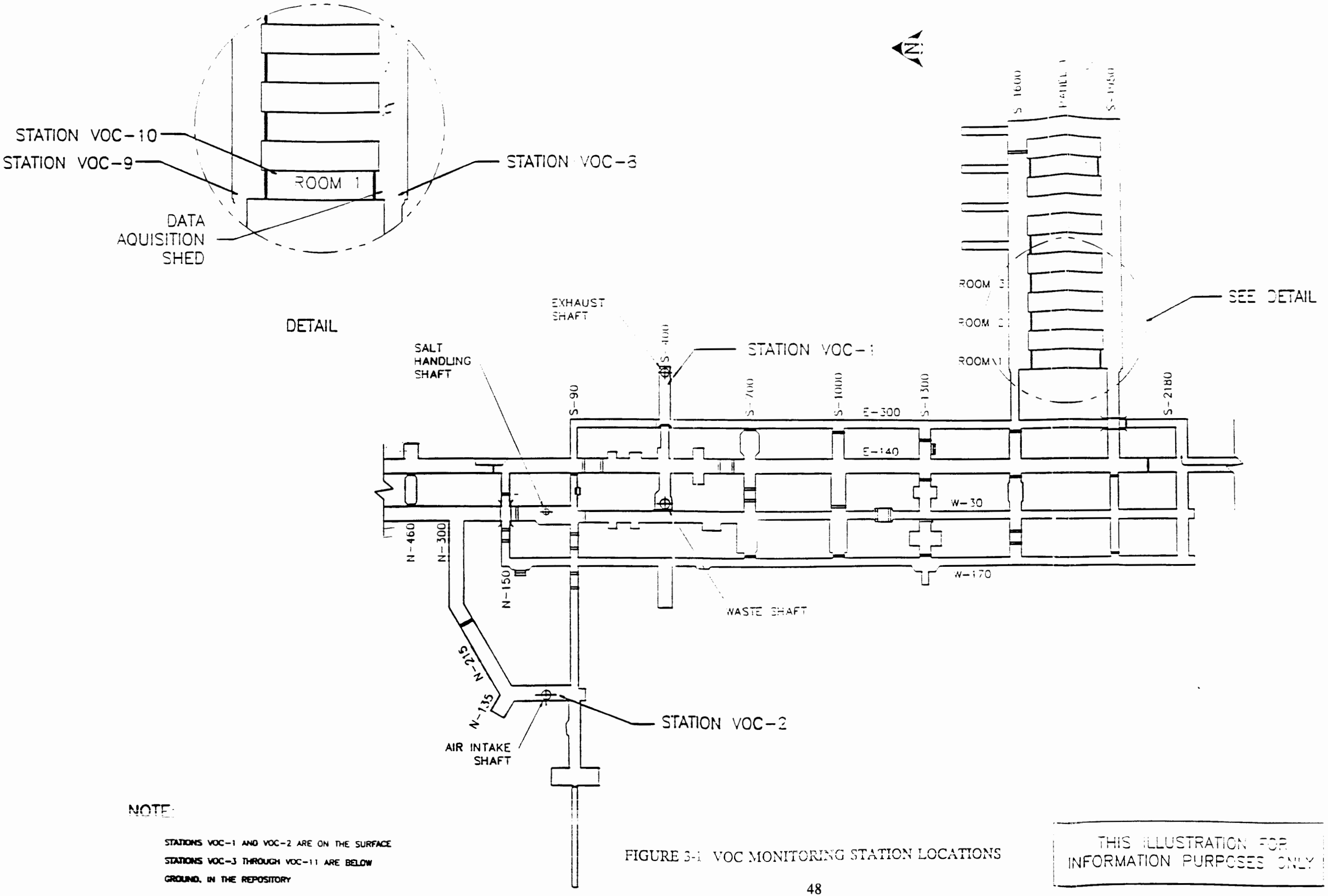
WIPP will issue a revised VOC Monitoring plan for the operational portion of a disposal-phase No-Migration Variance Petition in the next reporting period. The current monitoring plan will remain in effect until a determination is made on the petition, and the new plan is implemented.

3.3 VOC MONITORING DATA REPORTING

The next report for the VOC Monitoring Program will contain annual summaries of the following data:

1. Individual concentrations for each target compound by sample day
2. Calculated annual average concentrations for target compounds at each sampling location.
3. Calculated field and laboratory data precision
4. Calculated field and laboratory data accuracy
5. Calculated VOC monitoring program completeness
6. Results of the MDL studies conducted at VOC-1
7. Results of the MRA sampling at each monitoring location

Additional data will also be included in the report, as necessary, to document program activities.

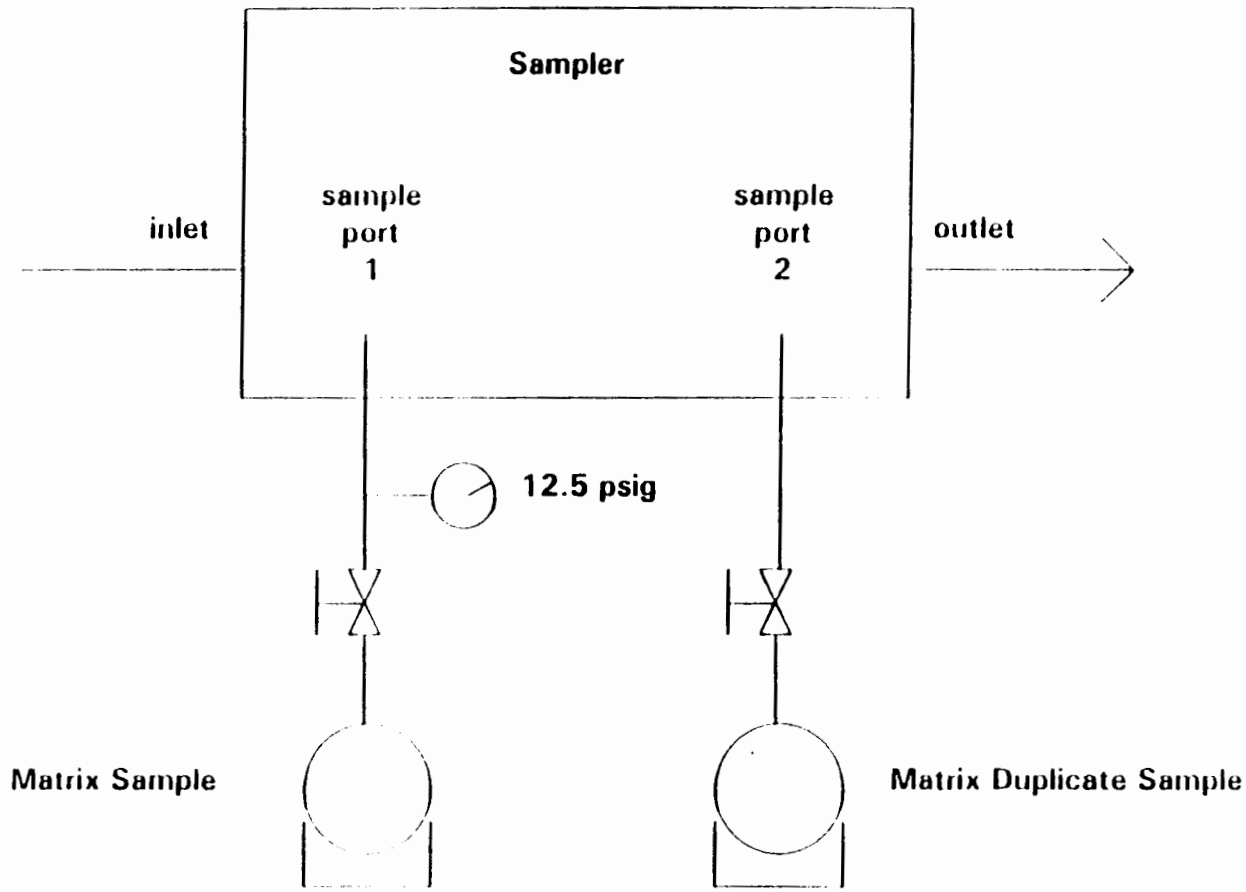


NOTE:

STATIONS VOC-1 AND VOC-2 ARE ON THE SURFACE
STATIONS VOC-3 THROUGH VOC-11 ARE BELOW GROUND, IN THE REPOSITORY

FIGURE 3-1 VOC MONITORING STATION LOCATIONS

THIS ILLUSTRATION FOR INFORMATION PURPOSES ONLY



Note: At end of 22 hours of sampling each canister contains approximately 11 liters of matrix air

Figure 3.2 Method Relative Accuracy Sampling Configuration during first 11 liters of sample

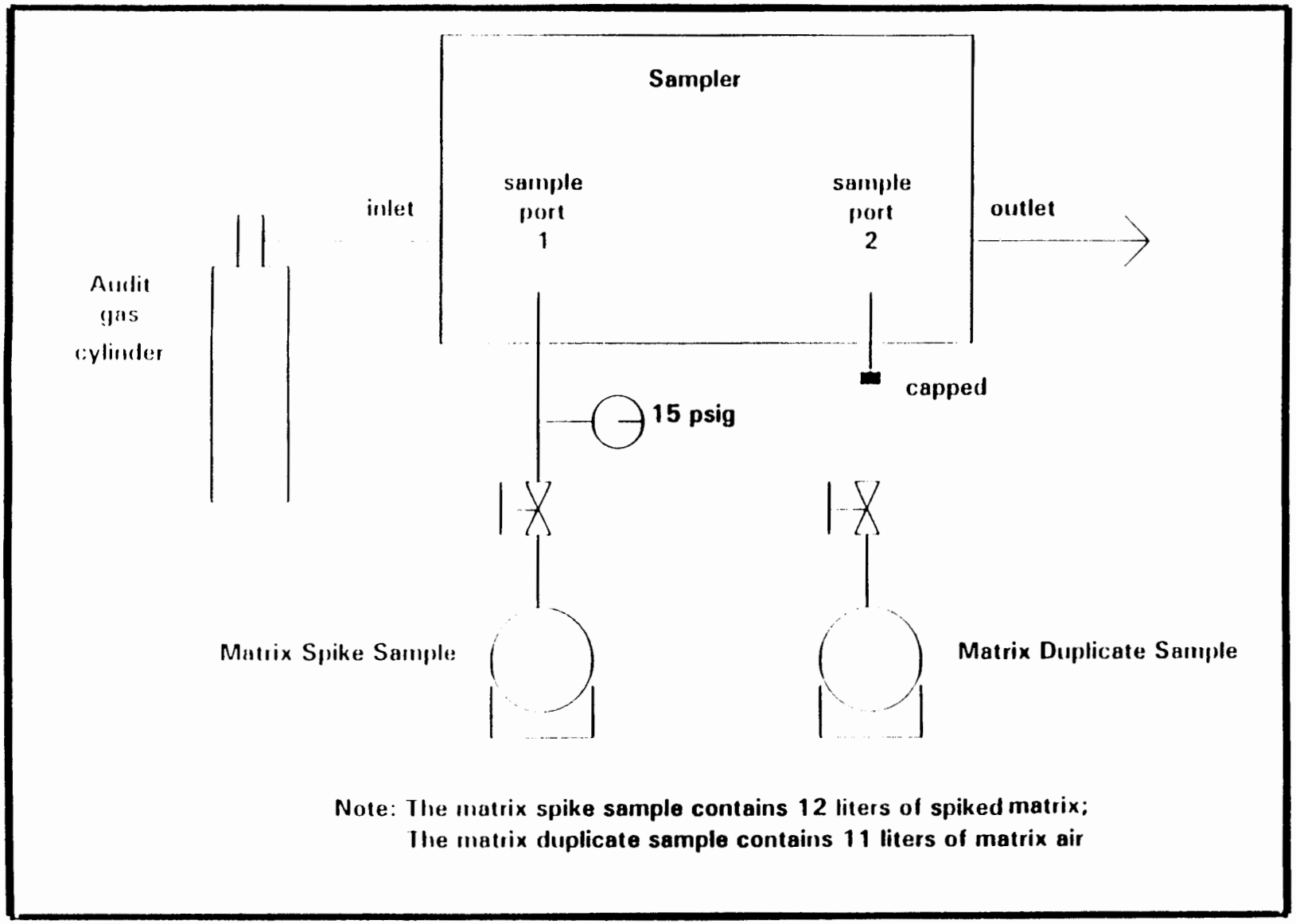


Figure 3.3 Method Relative Accuracy Sampling Configuration for adding 1 liter of Audit gas

TABLE 3-1

VOC MONITORING PROGRAM DATA - STATION VOC-1

		CONCENTRATION (ppbv)									
SAMPLE DATE	SAMPLE NUMBER	Freon 113		CH_2Cl_2		TCA		CCl_4		TCE	
08/30/93	403	0.54	B	0.10	U	36		0.07	J	0.10	U
09/07/93	404	0.70	B	0.34	JB	5.8		0.20	U	0.20	U
09/16/93	406	9.8	B	0.18	JB	16		0.09	J	0.10	U
09/23/93	408	0.17	J	0.21	B	1.9		0.13	J	0.04	J
09/29/93	410	1.6	B	0.46	B	7.9		0.09	J	0.10	U
10/06/93	412	0.18	J	0.21	B	21		0.13	J	0.56	
10/12/93	415	0.06	J	0.28	B	48		0.10	U	0.10	U
10/20/93	417	1.2		0.23	B	1.7		0.12	J	0.10	U
10/28/93	419	0.90		0.15	J	1.9		0.07	J	0.10	U
11/05/93	423	0.52	B	0.22	B	24		0.09	J	0.02	J
11/07/93	424	0.25	JB	0.24	B	1.8		0.09	J	0.01	J
11/15/93	426	0.50	B	0.16	JB	1.8	Jv	0.06	J	0.01	J
11/23/93	428	0.10	U	2.8	J	4.9	J	0.66	J	2.3	J
12/01/93	431	0.17	J	0.10	U	3.0		0.07	J	0.08	J
12/09/93	433	0.11	J	0.16	JB	0.22		0.06	J	0.20	
12/16/93	437	0.46		0.36	B	1.8		0.06	J	0.09	J
12/19/93	439	0.12	J	0.21	B	0.26		0.12	J	0.10	U
12/27/93	441	0.14	J	0.24	BJv	1.9	Jv	0.14	J	0.07	J
01/06/94	443	0.60		0.25	B	1.5		0.15	J	0.10	J
01/19/94	446	0.25		0.29	B	1.8	B	0.16	J	0.08	J
02/01/94	453	4.8		0.39		1.2		0.14	J	0.10	U
02/14/94	456	2.4		0.10	U	0.44		0.13	J	0.10	U
03/03/94	461	0.10	U	0.10	U	1.1		0.10	J	0.10	U
* 03/16/94	466	0.10	U	1.4		1.2		0.56		0.42	
03/29/94	474	0.10	U	0.10	U	0.47		0.10	U	0.10	U
04/11/94	477	0.13	J	0.38		3.6		0.11	J	0.10	U
04/27/94	484	0.10	U	0.10	U	4.2		0.10	U	0.10	U
05/11/94	489	0.10	U	0.10	U	1.3		0.10	U	0.10	U
05/24/94	492	0.25		0.19	JB	1.9		0.11	J	0.08	J
06/07/94	498	0.11	J	0.19	JB	5.1		0.07	J	0.28	

TABLE 3-1

VOC MONITORING PROGRAM DATA - STATION VOC-1

(Continued)

		CONCENTRATION (ppbv)									
SAMPLE DATE	SAMPLE NUMBER	Freon 113		CH_2Cl_2		TCA		CCl_4		TCE	
06/23/94	502	0.11	J	0.45		3.5		0.06	J	0.10	U
07/06/94	508	0.29	B	0.17	J	1.3		0.05	J	0.04	J
07/19/94	510	0.25	B	1.2	B	1.8		0.10	U	0.10	U
08/01/94	518	1.2	B	1.3	B	6.3		0.10	U	0.13	J
08/18/94	522	0.10	U	2.4		1.6		0.10	U	0.10	U
MINIMUM		0.06	J	0.10	U	0.22		0.05	J	0.01	J
MAXIMUM		9.8	B	2.8	J	48		0.66	J	2.3	J
AVERAGE		0.81		0.45		6.2		0.13		0.18	

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
TCA - 1,1,1-Trichloroethane
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

J - This flag indicates an estimated value, and is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.
B - This flag is used whenever the analyte is found in the blank as well as in the sample.
U - This flag indicates that the analyte was not detected in the sample. The value reported with the "U" is one-half the laboratory reporting limit for that compound.
Jv - This flag is used when the associated results are considered estimated based on findings of the WIPP data validation. The Jv qualifier is applied to analytical results when minor deviations of program QC or documentation requirements are discovered and not subsequently corrected by the laboratory.

* Sample results are questionable because sample duration was 14 hours.

TABLE 3-2

VOC MONITORING PROGRAM DATA - STATION VOC-2

		CONCENTRATION (ppbv)									
SAMPLE DATE	SAMPLE NUMBER	Freon 113		CH_2Cl_2		TCA		CCl_4		TCE	
01/06/94	444	0.17	J	0.21	B	0.25	J	0.14	J	0.08	J
01/19/94	448	0.16	J	0.25	B	0.33	B	0.14	J	0.08	J
02/01/94	452	0.14	J	0.39	B	0.31		0.11	J	0.04	J
02/14/94	457	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
03/03/94	462	0.10	U	0.10	U	0.14	J	0.10	J	0.10	U
03/16/94	468	0.10	U	0.10	U	0.19	J	0.10	U	0.10	U
03/29/94	472	0.10	U	0.10	U	0.15	J	0.10	U	0.10	U
04/11/94	479	0.10	U	0.10	U	0.15	J	0.10	U	0.20	J
04/28/94	483	0.10	U	0.10	U	0.19	J	0.10	U	0.10	U
05/11/94	487	0.10	J	0.20	B	0.14	J	0.09	J	0.22	B
05/24/94	494	0.10	J	0.10	U	0.13	J	0.09	J	0.10	J
06/07/94	499	0.18	JB	0.10	U	0.08	J	0.03	J	0.03	J
06/23/94	505	0.09	J	0.14	J	0.12	J	0.07	J	0.15	J
07/06/94	506	0.16	J	0.31	B	0.45		0.40		0.92	
07/19/94	512	0.21	B	0.36	B	0.58		0.10	U	0.21	
07/25/94	516	0.42	B	0.60	B	0.16	J	0.08	J	0.08	J
08/01/94	519	0.20	B	0.26	B	0.13	J	0.10	U	0.10	U
08/18/94	523	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
MINIMUM		0.09	J	0.10	U	0.08	J	0.03	J	0.03	J
MAXIMUM		0.42	B	0.60	B	0.58		0.40		0.92	
AVERAGE		0.15		0.20		0.21		0.11		0.16	

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane CCl_4 - Carbon tetrachloride
CH_2Cl_2 - Methylene chloride TCE - Trichloroethylene
TCA - 1,1,1-Trichloroethane

J - This flag indicates an estimated value, and is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.
B - This flag is used whenever the analyte is found in the blank as well as in the sample.
U - This flag indicates that the analyte was not detected in the sample. The value reported with the "U" is one-half the laboratory reporting limit for that compound.

TABLE 3-3
VOC MONITORING PROGRAM DATA - STATION VOC-8

		CONCENTRATION (ppbv)									
SAMPLE DATE	SAMPLE NUMBER	Freon 113		CH_2Cl_2		TCA		CCl_4		TCE	
11/23/93	429	0.13	J	0.2[illegible]	B	56		0.15	J	0.43	
12/09/93	434	0.21	J	0.77	B	2.2		0.07	J	0.15	J
12/16/93	435	0.14	J	0.30	B	4.5		0.06	J	0.12	J
12/20/93	440	0.11	J	0.18	JB	0.23		0.06	J	0.10	J
12/27/93	442	0.14	J	0.19	JB	0.47	Jv	0.13	J	0.13	J
01/06/94	445	0.17	J	0.24	B	0.72		0.17	J	0.17	J
01/19/94	450	0.46		0.44	B	0.51	B	0.15	J	0.14	J
02/01/94	455	0.25		0.22	B	0.24		0.11	J	0.13	J
02/14/94	459	0.59		0.10	U	0.26		0.13	J	0.10	U
03/04/94	4[illegible]3	0.16	J	2.3	B	0.25		0.10		0.10	U
03/16/94	470	0.10	U	0.10	U	0.24		0.10	U	0.10	U
03/29/94	473	0.10	U	0.10	U	3.3		0.10	U	0.10	U
04/11/94	478	0.10	U	0.10	U	2.2		0.10	U	0.10	U
04/28/94	485	0.10	U	0.10	U	0.28		0.10	U	0.10	U
05/11/94	488	0.10	J	0.24	B	0.25		0.08	J	0.09	JB
05/24/94	496	3.0		0.28	B	0.27		0.12	J	0.10	U
06/07/94	501	0.15	J	0.20	B	0.65		0.07	J	0.10	U
06/23/94	503	0.22	B	0.14	JB	0.10	J	0.10	U	0.10	U
07/06/94	507	0.12	J	0.22	B	0.16	J	0.09	J	0.10	U
07/25/94	514	0.19	JB	0.25	B	0.10	U	0.10	U	0.10	U
08/01/94	521	0.21	B	0.19	JB	0.16	J	0.10	U	0.10	U
08/18/94	524	0.10	U	0.42		0.10	U	0.10	U	0.10	U
MINIMUM		0.10	J	0.10	U	0.23		0.06	J	0.09	JB
MAXIMUM		3.0		2.3	B	56		0.17	J	0.43	
AVERAGE		0.32		0.34		4.5		0.10		0.13	

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane CCl_4 - Carbon tetrachloride
CH_2Cl_2 - Methylene chloride TCE - Trichloroethylene
TCA - 1,1,1-Trichloroethane

J - This flag indicates an estimated value, and is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.
B - This flag is used whenever the analyte is found in the blank as well as in the sample.
U - This flag indicates that the analyte was not detected in the sample. The value reported with the "U" is one-half the laboratory reporting limit for that compound.
Jv- This flag is used when the associated results are considered estimated based on findings of the WIPP data validation. The Jv qualifier is applied to analytical results when minor deviations of program QC or documentation requirements are discovered and not subsequently corrected by the laboratory.

TABLE 3-4

VOC MONITORING PROGRAM DATA - METHOD BLANK

		CONCENTRATION (ppbv)									
ANALYSIS DATE	METHOD BLANK	Freon 113		CH_2Cl_2		TCA		CCl_4		TCE	
09/24/93	ABLKI5	0.12	J	0.12	J	0.10	U	0.10	U	0.10	U
10/02/93	ABLKJ3	0.16	J	0.13	J	0.10	U	0.10	U	0.10	U
10/03/93	ABLKJ4	0.14	J	0.12	J	0.10	U	0.10	U	0.10	U
10/13/93	ABLKM4	0.15	U	0.16	J	0.10	U	0.10	U	0.10	U
10/14/93	ABLKK9	0.13	J	0.10	U	0.10	U	0.10	U	0.10	U
10/15/93	ABLKN1	0.15	U	0.18	J	0.10	U	0.10	U	0.10	U
10/15/93	ABLKL1	0.12	J	0.10	U	0.10	U	0.10	U	0.10	U
10/18/93	ABLKL3	0.16	J	0.17	J	0.10	U	0.10	U	0.10	U
10/22/93	ABLKO3	0.15	U	0.22		0.10	U	0.10	U	0.10	U
10/23/93	ABLKO5	0.15	U	0.20	J	0.10	U	0.10	U	0.10	U
10/27/93	ABLKP4	0.15	U	0.18	J	0.10	U	0.10	U	0.10	U
10/28/93	ABLKP5	0.15	U	0.18	J	0.10	U	0.10	U	0.10	U
11/03/93	ABLKQ5	0.15	U	0.15	J	0.10	U	0.10	U	0.10	U
11/08/93	ABLKQ11	0.15	U	0.20		0.10	U	0.10	U	0.10	U
11/09/93	ABLKM6	0.15	U	0.10	U	0.10	U	0.10	U	0.10	U
11/10/93	ABLKR4	0.15	U	0.18	J	0.10	U	0.10	U	0.10	U
11/11/93	ABLKR6	0.08	J	0.16	J	0.10	U	0.10	U	0.10	U
11/18/93	ABLKM9	0.16	J	0.14	J	0.10	U	0.10	U	0.10	U
11/19/93	ABLKM10	0.16	J	0.15	J	0.10	U	0.10	U	0.10	U
11/24/93	ABLKT4	0.15	U	0.16	J	0.10	U	0.10	U	0.10	U
12/01/93	ABLKN9	0.13	J	0.11	J	0.10	U	0.10	U	0.10	U
12/02/93	ABLKP2	0.11	J	0.09	J	0.10	U	0.10	U	0.10	U
12/13/93	ABLKV5	0.15	U	0.17	J	0.10	U	0.10	U	0.10	U
12/14/93	ABLKV8	0.15	U	0.16	J	0.10	U	0.10	U	0.10	U
12/16/93	ABLKV9	0.15	U	0.17	J	0.10	U	0.10	U	0.10	U
12/28/93	ABLKW9	0.15	U	0.12	J	0.10	U	0.10	U	0.10	U
12/30/93	ABLKX3	0.15	U	0.12	J	0.10	U	0.10	U	0.10	U
01/19/94	ABLKY1	0.10	U	0.13	J	0.10	U	0.10	U	0.10	U
01/23/94	ABLKY5	0.10	U	0.20	J	0.10	U	0.10	U	0.10	U
02/02/94	ABLKA3	0.10	U	0.22		0.18	J	0.10	U	0.10	U
02/04/94	ABLKA8	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U

TABLE 3-4

VOC MONITORING PROGRAM DATA - METHOD BLANK

(Continued)

		CONCENTRATION (ppbv)									
ANALYSIS DATE	METHOD BLANK	Freon 113		CH_2Cl_2		TCA		CCl_4		TCE	
02/05/94	ABLKB2	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
02/15/94	ABLKC5	0.10	U	0.19	J	0.10	U	0.10	U	0.10	U
02/17/94	ABLKD2	0.10	U	0.19	J	0.10	U	0.10	U	0.10	U
02/18/94	ABLKD6	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
02/24/94	ABLKE8	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
03/10/94	ABLKI0	0.10	U	0.38		0.10	U	0.10	U	0.10	U
03/16/94	ABLKI4	0.10	U	0.18	J	0.10	U	0.10	U	0.10	U
03/31/94	ABLKK5	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
04/14/94	ABLKN2	0.10	U	0.14	J	0.10	U	0.10	U	0.10	U
04/08/94	ABLKL9	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
04/09/94	ABLKM1	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
04/18/94	ABLKN8	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
04/26/94	ABLKO8	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
05/10/94	ABLKQ6	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
05/16/94	ABLKR5	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
05/31/94	ABLKC0	0.10	U	0.13	J	0.10	U	0.10	U	0.05	J
06/13/94	ABLKD7	0.10	U	0.15	J	0.10	U	0.10	U	0.10	U
06/13/94	ABLKX3	0.12	J	0.11	J	0.10	U	0.10	U	0.10	U
06/16/94	ABLKE2	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
06/22/94	ABLKE8	0.10	U	0.20	J	0.10	U	0.10	U	0.10	U
06/29/94	ABLKA6	0.14	J	0.13	J	0.10	U	0.10	U	0.10	U
07/07/94	ABLKF7	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
07/11/94	ABLKD7	0.13	J	0.13	J	0.10	U	0.10	U	0.10	U
07/14/94	ABLKG6	0.10	U	0.18	J	0.10	U	0.10	U	0.10	U
08/10/94	ABLKA4	0.15	J	0.24		0.10	U	0.10	U	0.10	U
08/15/94	ABLKC1	0.13	J	0.19	J	0.10	U	0.10	U	0.10	U
08/25/94	ABLKE5	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
AVERAGE		0.12		0.15		0.10		0.10		0.10	

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

TABLE 3-4

VOC MONITORING PROGRAM DATA - METHOD BLANK

(Continued)

TCA - 1,1,1-Trichloroethane

J - This flag indicates an estimated value, and is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.

U - This flag indicates that the analyte was not detected in the sample. The value reported with the "U" is one-half the laboratory reporting limit for that compound.

TABLE 3-5

VOC SAMPLER CERTIFICATIONS

STATION VOC-1

COMPOUND	MONITORING STATION Type of Monitor Certification Date Serial Number		
	VOC-1 Air 10/06/93 0791-03	VOC-1 Air 01/14/94 0791-04	VOC-1 Air 06/01/94 0890-04
	Zero Air Concentration (ppbv)		
1,1,1-Trichloroethane	ND	ND	ND
Methylene chloride	0.03	0.06	ND
Carbon tetrachloride	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ND	ND
Trichloroethylene	ND	ND	ND
	Calibration Gas (Percent Recovery)		
1,1,1-Trichloroethane	97	112	99
Methylene chloride	105	94	98
Carbon tetrachloride	100	105	100
1,1,2-Trichloro-1,2,2-trifluoroethane	104	96	98
Trichloroethylene	96	101	100
Average percent recovery	100	102	99

NOTES:

1. Zero air concentrations were calculated as the concentrations of a target compound in the sample minus the concentration of the target compound in the zero air cylinder.

2. Certification limits:
   Zero air concentrations: ≤ 0.5 ppbv for air samplers and ≤ 5.0 ppbv for source samplers.
   Recovery: Between 75 and 120 percent for any individual target compound and between 90 and 110 percent for the average recovery of all target compounds.

3. All samplers are certified.

4. ND = Not detected

TABLE 3-6

VOC SAMPLER CERTIFICATIONS

STATION VOC-2

COMPOUND	MONITORING STATION Type of Monitor Certification Date Serial Number			
	VOC-2 Air 08/09/93 0981-02	VOC-2 Air 10/19/93 1190-01	VOC-2 Air 10/21/93 0791-02	VOC-2 Air 06/16/94 0791-01
	Zero Air Concentration (ppbv)			
1,1,1-Trichloroethane	0.03	ND	ND	ND
Methylene chloride	ND	ND	0.14	ND
Carbon tetrachloride	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	0.01	0.01	ND	ND
Trichloroethylene	0.04	ND	ND	ND
	Calibration Gas (Percent Recovery)			
1,1,1-Trichloroethane	103	102	101	106
Methylene chloride	106	107	100	99
Carbon tetrachloride	102	104	97	104
1,1,2-Trichloro-1,2,2-trifluoroethane	100	105	100	98
Trichloroethylene	104	104	101	105
Average percent recovery	103	104	100	102

NOTES:

1. Zero air concentrations were calculated as the concentrations of a target compound in the sample minus the concentration of the target compound in the zero air cylinder.

2. Certification limits:
   Zero air concentrations: ≤ 0.5 ppbv for air samplers and ≤ 5.0 ppbv for source samplers.
   Recovery: Between 75 and 120 percent for any individual target compound and between 90 and 110 percent for the average recovery of all target compounds.

3. Sampler is certified.

4. ND = Not detected

TABLE 3-7

VOC SAMPLER CERTIFICATIONS

STATION VOC-8

COMPOUND	MON ORING STATION Type of Monitor Certification Date Serial Number		
	VOC-8 Air 09/13/93 0791-02	VOC-8 Air 09/23/93 0981-01	VOC-8 Air 06/21/94 0791-02
	Zero Air Concentration (ppbv)		
1,1,1-Trichloroethane	0.09	ND	ND
Methylene chloride	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ND	ND
Trichloroethylene	0.01	ND	ND
	Calibration Gas (Percent Recovery)		
1,1,1-Trichloroethane	103	105	95
Methylene chloride	101	98	103
Carbon tetrachloride	101	103	98
1,1,2-Trichloro-1,2,2-trifluoroethane	103	102	100
Trichloroethylene	104	103	101
Average percent recovery	102	102	99

NOTES:

1. Zero air concentrations were calculated as the concentrations of a target compound in the sample minus the concentration of the target compound in the zero air cylinder.

2. Certification limits:
   Zero air concentrations: ≤ 0.5 ppbv for air samplers and ≤ 5.0 ppbv for source samplers.
   Recovery: Between 75 and 120 percent for any individual target compound and between 90 and 110 percent for the average recovery of all target compounds.

3. Sampler is certified.

4. ND = Not detected

TABLE 3-8

EVALUATION OF FIELD PRECISION BY COMPOUND

START DATE	STATION	COMPOUND	CONCENTRATION (ppbv) Primary		Duplicate		Difference	RPD
10/06/93	VOC-1	Freon 113	0.16	J	0.16	J		
12/16/93	VOC-8	Freon 113	0.14	J	0.17	J		
12/16/93	VOC-1	Freon 113	0.46		0.41		0.05	11
01/19/94	VOC-1	Freon 113	0.25		0.27		-0.02	-7.7
01/19/94	VOC-2	Freon 113	0.16	J	0.13	J		
01/19/94	VOC-8	Freon 113	0.46		0.45		0.01	2.2
* 03/16/94	VOC-1	Freon 113	0.10	U	0.10	U		
03/16/94	VOC-2	Freon 113	0.10	U	0.10	U		
03/16/94	VOC-8	Freon 113	0.10	U	0.10	U		
05/24/94	VOC-1	Freon 113	0.25		0.27		-0.02	-7.7
05/24/94	VOC-2	Freon 113	0.10	J	0.11	J		
05/24/94	VOC-8	Freon 113	3.0		3.1		-0.10	-3.3
07/19/94	VOC-1	Freon 113	0.25	B	0.22	B	0.03	13
07/19/94	VOC-2	Freon 113	0.21	B	0.21	B	0.0	0.0
07/25/94	VOC-8	Freon 113	0.19	JB	0.21	B		
07/25/94	VOC-2	Freon 113	0.42	B	0.23	B	0.19	58
10/06/93	VOC-1	CH_2Cl_2	0.21	B	0.20	JB		
12/16/93	VOC-8	CH_2Cl_2	0.30	B	0.34	B	-0.04	-13
12/16/93	VOC-1	CH_2Cl_2	0.36	B	0.23	B	0.13	44
01/19/94	VOC-1	CH_2Cl_2	0.29	B	0.24	B	0.05	19
01/19/94	VOC-2	CH_2Cl_2	0.25	B	0.27	B	-0.02	-7.7
01/19/94	VOC-8	CH_2Cl_2	0.44	B	0.38	B	0.06	15
* 03/16/94	VOC-1	CH_2Cl_2	1.4		0.10	U		
03/16/94	VOC-2	CH_2Cl_2	0.10	U	0.10	U		
03/16/94	VOC-8	CH_2Cl_2	0.10	U	0.10	U		
05/24/94	VOC-1	CH_2Cl_2	0.19	JB	0.16	JB		
05/24/94	VOC-2	CH_2Cl_2	0.10	U	0.16	JB		
05/24/94	VOC-8	CH_2Cl_2	0.28	B	0.31	B	-0.03	-10
07/19/94	VOC-1	CH_2Cl_2	1.2	B	0.24	B	0.96	133
07/19/94	VOC-2	CH_2Cl_2	0.36	B	0.35	B	0.01	2.8

TABLE 3-8

EVALUATION OF FIELD PRECISION BY COMPOUND

(Continued)

START DATE	STATION	COMPOUND	CONCENTRATION (ppbv) Primary		Duplicate		Difference	RPD
07/25/94	VOC-8	CH_2Cl_2	0.25	B	0.25	B	0.0	0.0
07/25/94	VOC-2	CH_2Cl_2	0.60	B	0.30	B	0.30	67
10/06/93	VOC-1	TCA	21		21		0.0	0.0
12/16/93	VOC-8	TCA	4.5		4.2		0.30	6.9
12/16/93	VOC-1	TCA	1.8		1.8		0.0	0.0
01/19/94	VOC-1	TCA	1.8	B	2.1	B	-0.30	-15
01/19/94	VOC-2	TCA	0.33	B	0.32	B	0.01	3.1
01/19/94	VOC-8	TCA	0.51	B	0.54	B	-0.03	-5.7
* 03/16/94	VOC-1	TCA	1.2		1.2			
03/16/94	VOC-2	TCA	0.19	J	0.19	J		
03/16/94	VOC-8	TCA	0.24		0.24		0.0	0.0
05/24/94	VOC-1	TCA	1.9		2.1		-0.20	-10
05/24/94	VOC-2	TCA	0.13	J	0.11	J		
05/24/94	VOC-8	TCA	0.27		0.28		-0.01	-3.6
07/19/94	VOC-1	TCA	1.8		1.9		-0.10	-5.4
07/19/94	VOC-2	TCA	0.58		0.59		-0.01	-1.7
07/25/94	VOC-8	TCA	0.10	U	0.13	J		
07/25/94	VOC-2	TCA	0.16	J	0.14	J		
10/06/93	VOC-1	CCl_4	0.14	J	0.14	J		
12/16/93	VOC-8	CCl_4	0.06	J	0.10	U		
12/16/93	VOC-1	CCl_4	0.06	J	0.08	J		
01/19/94	VOC-1	CCl_4	0.16	J	0.14	J		
01/19/94	VOC-2	CCl_4	0.14	J	0.15	J		
01/19/94	VOC-8	CCl_4	0.15	J	0.14	J		
* 03/16/94	VOC-1	CCl_4	0.56		0.10	U		
03/16/94	VOC-2	CCl_4	0.10	U	0.10	U		
03/16/94	VOC-8	CCl_4	0.10	U	0.10	U		

TABLE 3-8

EVALUATION OF FIELD PRECISION BY COMPOUND

(Continued)

START DATE	STATION	COMPOUND	CONCENTRATION (ppbv) Primary		Duplicate		Difference	RPD
05/24/94	VOC-1	CCl_4	0.11	J	0.10	J		
05/24/94	VOC-2	CCl_4	0.09	J	0.09	J		
05/24/94	VOC-8	CCl_4	0.12	J	0.12	J		
07/19/94	VOC-1	CCl_4	0.10	U	0.10	U		
07/19/94	VOC-2	CCl_4	0.10	U	0.10	U		
07/25/94	VOC-8	CCl_4	0.10	U	0.10	U		
07/25/94	VOC-2	CCl_4	0.08	J	0.07	J		
10/06/93	VOC-1	TCE	0.56		0.54		0.02	3.6
12/16/93	VOC-8	TCE	0.12	J	0.10	U		
12/16/93	VOC-1	TCE	0.09	J	0.14	J		
01/19/94	VOC-1	TCE	0.08	J	0.06	J		
01/19/94	VOC-2	TCE	0.08	J	0.07	J		
01/19/94	VOC-8	TCE	0.14	J	0.16	J		
* 03/16/94	VOC-1	TCE	0.42		0.40			
03/16/94	VOC-2	TCE	0.10	U	0.10	U		
03/16/94	VOC-8	TCE	0.10	U	0.10	U		
05/24/94	VOC-1	TCE	0.08	J	0.10	U		
05/24/94	VOC-2	TCE	0.10	J	0.10	U		
05/24/94	VOC-8	TCE	0.10	U	0.10	U		
07/19/94	VOC-1	TCE	0.10	U	0.10	U		
07/19/94	VOC-2	TCE	0.21		0.10	U		
07/25/94	VOC-8	TCE	0.10	U	0.10	U		
07/25/94	VOC-2	TCE	0.08	J	0.10	J		

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
TCA - 1,1,1-Trichloroethane
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

J - This flag indicates an estimated value, and is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.
B - This flag is used whenever the analyte is found in the blank as well as in the sample.
U - This flag indicates that the analyte was not detected in the sample. The value reported with the "U" is one-half the laboratory reporting limit for that compound.

* Sample results are questionable because sample duration was 14 hours. Relative percent difference were not calculated for these samples.

TABLE 3-9

EVALUATION OF LABORATORY PRECISION BY COMPOUND

		CONCENTRATION (ppbv)					
COMPOUND	SAMPLE #	Original		Duplicate		Difference	RPD
Freon 113	451	0.45		0.43		0.02	4.5
Freon 113	455	0.25		0.25		0.0	0.0
Freon 113	462	0.10	U	0.10	U		
Freon 113	465	36		31		5.0	15
Freon 113	471	0.10	U	0.10	U		
Freon 113	478	0.10	U	0.10	U		
Freon 113	481	32		31		1.0	3.2
Freon 113	485	3.2		3.2		0.0	0.0
Freon 113	504	5.3	B	5.4	B	-0.10	-1.9
Freon 113	507	0.12	J	0.12	J		
Freon 113	519	0.20	B	0.20	B	0.0	0.0
Freon 113	525	2.4		2.5		-0.10	-4.1
CH_2Cl_2	451	0.38	B	0.35	B	0.03	8.2
CH_2Cl_2	455	0.22	B	0.23	B	-0.01	-4.4
CH_2Cl_2	462	0.10	U	0.10	U		
CH_2Cl_2	465	38	B	32	B	6.0	17
CH_2Cl_2	471	0.10	U	0.10	U		
CH_2Cl_2	478	0.10	U	0.10	U		
CH_2Cl_2	481	33	B	33	B	0.0	0.0
CH_2Cl_2	485	3.4		3.3		0.10	3.0
CH_2Cl_2	504	5.[illegible]	B	5.2	B	0.10	1.9
CH_2Cl_2	507	0.22	B	0.21	B	0.01	4.7
CH_2Cl_2	519	0.26	B	0.26	B	0.0	0.0
CH_2Cl_2	525	2.7		2.7		0.0	0.0
TCA	451	0.54	B	0.53	B	0.01	1.9
TCA	455	0.24		0.25		-0.01	-4.1
TCA	462	0.14	J	0.13	J		
TCA	465	23		23		0.0	0.0
TCA	471	0.24		0.23		0.01	4.3
TCA	478	2.2		2.1		0.10	4.7
TCA	481	23		22		1.0	4.4

TABLE 3-9

EVALUATION OF LABORATORY PRECISION BY COMPOUND

(Continued)

		CONCENTRATION (ppbv)					
COMPOUND	SAMPLE #	Original		Duplicate		Difference	RPD
TCA	485	2.8		3.1		-0.30	-10
TCA	504	4.5		4.5		0.0	0.0
TCA	507	0.16	J	0.15	J		
TCA	519	0.13	J	0.15	J		
TCA	525	2.2		2.2		0.0	0.0
CCl_4	451	0.14	J	0.16	J		
CCl_4	455	0.11	J	0.12	J		
CCl_4	462	0.10	U	0.10	U		
CCl_4	465	27		26		1.0	3.8
CCl_4	471	0.10	U	0.10	U		
CCl_4	478	0.10	U	0.10	U		
CCl_4	481	25		24		1.0	4.1
CCl_4	485	2.9		3.1		-0.20	-6.7
CCl_4	504	4.9		4.9		0.0	0.0
CCl_4	507	0.09	J	0.09	J		
CCl_4	519	0.10	U	0.10	U		
CCl_4	525	2.1		2.1		0.0	0.0
TCE	451	0.16	J	0.15	J		
TCE	455	0.13	J	0.13	J		
TCE	462	0.10	U	0.10	U		
TCE	465	21		20		1.0	4.9
TCE	471	0.10	U	0.10	U		
TCE	478	0.10	U	0.10	U		
TCE	481	23		23		0.0	0.0
TCE	485	2.4		2.5		-0.10	-4.1
TCE	504	4.0		3.9		0.10	2.5
TCE	507	0.10	U	0.10	U		
TCE	519	0.10	U	0.10	U		

TABLE 3-9

EVALUATION OF LABORATORY PRECISION BY COMPOUND

(Continued)

		CONCENTRATION (ppbv)					
COMPOUND	SAMPLE #	Original		Duplicate		Difference	RPD
TCE	525	1.9		1.9		0.0	0.0

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
TCA - 1,1,1-Trichloroethane
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

J - This flag indicates an estimated value, and is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.
B - This flag is used whenever the analyte is found in the blank as well as in the sample.
U - This flag indicates that the analyte was not detected in the sample. The value reported with the "U" is one-half the laboratory reporting limit for that compound.

TABLE 3-10

METHOD RELATIVE ACCURACY RESULTS

	Method Relative Accuracy Results (percent)									
	Sample Station Sample Numbers									
COMPOUND	VOC-8 463-464	VOC-1 474-475	VOC-2 479-480	VOC-8 485-486	VOC-1 489-490	VOC-2 499-500	VOC-2 503-504	VOC-1 508-509	VOC-2 519-520	VOC-8 524-525
Freon 113	2.7	-3.3	1.4	4.7	14	-2.3	-120	7.7	3.0	-1.6
CH_2Cl_2	5.0 Jv	-16	-3.1	-2.3	9.6	-6.2	-126	10	11	-2.3
TCA	31	12	23	20	13	12	-104	16	-7.4	8.3
CCl_4	18	-3.1	5.0	11	19	0.08	-119	17	-10	11
TCE	27	-0.04	18	26	30	12	-80	11	14	19

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
TCA - 1,1,1-Trichloroethane
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

Jv - This flag is used when the associated results are considered estimated based on findings of the WIPP data validation. The Jv qualifier is applied to analytical results when minor deviations of program QC or documentation requirements are discovered and not subsequently corrected by the laboratory.

TABLE 3-11

ANALYTICAL ACCURACY FOR AUDIT GAS

	Accuracy (percent by sample number)						
COMPOUND	421	460	465	476	481	491	Average
Freon 113	-16	-27	-34	-27	-19	6.7	-19
CH_2Cl_2	-28	5.7	-43 Jv	-25	-25	5.7	-18
TCA	-1.6	10	10	6.3	10	22	9.5
CCl_4	-0.4	-4.2	-4.2	-0.4	3.5	11	0.9
TCE	-5.1	11	18	14	11	26	13

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
TCA - 1,1,1-Trichloroethane
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

Jv - This flag is used when the associated results are considered estimated based on findings of the WIPP data validation. The Jv qualifier is applied to analytical results when minor deviations of program QC or documentation requirements are discovered not subsequently corrected by the laboratory.

TABLE 3-12

LABORATORY ACCURACY RESULTS FOR CANISTER DATA PACKAGES

	Percent Recovery by Compound				
WEEK OF	DCE	Benzene	TCE	Toluene	Chlorobenzene
09/19/93	97	102	106	98	99
09/29/93	82	97	90	98	93
10/11/93	108	113	115	110	111
10/15/93	84	102	82	81	85
10/18/93	111	108	105	112	110
10/25/93	111	114	120	124	114
10/27/93	114	104	121	116	112
11/03/93	91	86	90	88	87
11/08/93	96	90	89	87	92
11/09/93	112	110	107	108	106
11/10/93	113	113	111	115	109
11/18/93	101	98	97	101	98
11/24/93	102	103	100	99	101
11/29/93	94	96	99	94	96
12/07/93	96	92	95	94	95
12/14/93	105	99	95	105	104
12/16/93	99	102	114	92	94
12/17/93	86	87	92	94	92
12/20/93	90	80	121	100	100
12/21/93	93	121	103	94	105
12/28/93	92	92	98	102	100
01/19/94	99	96	98	98	100
01/28/94	85	97	91	93	92
02/04/94	103	100	99	99	99
02/11/94	96	86	95	86	93
02/16/94	90	92	92	93	93
02/18/94	89	90	87	90	89
03/04/94	100	106	100	109	94
03/15/94	111	113	110	111	112
03/24/94	103	94	101	101	101

TABLE 3-12

LABORATORY ACCURACY RESULTS FOR CANISTER DATA PACKAGES

(Continued)

	Percent Recovery by Compound				
WEEK OF	DCE	Benzene	TCE	Toluene	Chlorobenzene
03/26/94	103	105	12	101	101
04/04/94	107	105	105	106	102
04/15/94	99	97	105	101	96
04/26/94	106	110		106	105
05/10/94	114	107	96	108	106
05/24/94	101	103	102	101	102
05/31/94	111	111	110	109	110
06/07/94	96	101	91	100	91
06/10/94	104	103	100	102	102
06/14/94	110	101	98	99	97
06/22/94	101	98	110	105	101
06/27/94	96	90	98	95	91
07/06/94	118	95	97	92	95
07/08/94	91	95	96	93	92
07/14/94	107	105	107	106	106
08/10/94	95	103	102	99	103
08/12/94	122	106	106	107	108
08/24/94	100	101	100	100	101
AVERAGE	101	100	101	100	100
MINIMUM	82	80	82	81	85
MAXIMUM	122	121	121	124	114

DCE - 1,1-Dichloroethene
TCE - Trichloroethylene

TABLE 3-13

METHOD DETECTION LIMIT (MDL) STUDY

	MDL Study Results (ppbv)				Laboratory Detection Limit	
COMPOUND	489	492	493	Average	5 X MDL	10 X MDL
Freon 113	0.16	0.11	0.092	0.12	0.60	1.2
CH_2Cl_2	0.33	0.23	0.20	0.25	1.25	2.5
TCA	0.03	0.29	0.088	0.14	0.70	1.4
CCl_4	0.32	0.07	0.025	0.14	0.70	1.4
TCE	0.33	0.23	0.053	0.20	1.0	2.0

Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoroethane
CH_2Cl_2 - Methylene chloride
TCA - 1,1,1-Trichloroethane
CCl_4 - Carbon tetrachloride
TCE - Trichloroethylene

4.0 STATUS OF THE PERFORMANCE ASSESSMENT

4.1 TESTS TO-DATE AND RESULTS

The revised focus of the WIPP project has changed the role of the Performance Assessment (PA). In the past, preliminary PAs were performed to exercise the computer codes which modeled the performance of the repository; therefore, the results have not been determined to be suitable for compliance demonstration. Additional activities will be required to refine the PA models. The Accelerated Compliance Program will focus on activities and experiments which are directly relevant to a demonstration of compliance with the long-term disposal regulations of 40 CFR Part 191 and 40 CFR Part 268.6.

4.2 MODIFICATIONS TO THE TEST PLAN

On October 21, 1993, a decision was made by the DOE to implement a revised test strategy to conduct laboratory-based tests with both simulated and real TRU waste in lieu of tests involving waste at the WIPP facility. This change in the test strategy will make the portions of the test phase Plan irrelevant to the activities at the WIPP site.

For the new focus for data collection, the DOE has developed the Enhanced Laboratory Program (ELP) for the implementation at a national laboratory. The ELP was a direct result of the DOE's decision to shift the focus from the WIPP test phase to the Accelerated Compliance Program in order to expediate the beginning of disposal operations. The ELP is designed to provide data to be used for the development of the gas generation model which is important to long-term repository PA.

4.3 CURRENT UNDERSTANDING OF THE REPOSITORY'S PERFORMANCE

Preliminary PAs detailing the predicted long-term performance of the WIPP repository are currently prepared by Sandia National Laboratories (SNL). The most recent version of SNL's preliminary PA report is entitled, *Preliminary Performance Assessment for the Waste Isolation Pilot Plant, December 1992* (SNL, 1992). The applicability of the data presented in this PA to the permanent disposal of waste at the WIPP facility is now being investigated. The verification of the data collected has not been completed.

PA is the process by which the DOE prepares predictions of the long-term performance of a disposal system in accordance with the long-term regulations of 40 CFR Part 191, Subpart B, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes* (EPA, 1985) and 40 CFR Part 268.6, *Petitions to Allow Land Disposal of a Waste Prohibited Under Subpart C of Part 268.*

Preliminary PAs are no longer being reported annually. The methodology used for PA analyses included the development of conceptual models, scenarios, mathematical and computer codes, and the use of measured data and other information to perform calculations to predict the disposal system's performance. At this time, not all data and numerical models are considered to be sufficient and qualified to be used in a compliance determination. Consequently, results from the 1992 PA calculations have not been determined to be suitable for compliance determinations and are to be

regarded as preliminary. However, programs are underway to complete the process of establishing data and models that are suitable for compliance determinations.

A program that will factor into the determination of the nature and frequency of future PA runs is called Systems Prioritization Methodology (SPM). This is an approach that DOE Carlsbad Area Office (CAO) will use for programmatic decisionmaking. The SPM is designed to integrate the concerns of shareholders, project participants and other groups in programmatic decisionmaking. This process will: 1) identify alternative sets of programmatic activities, 2) solicit stakeholder input relative to these alternative activity sets, 3) allow the DOE-CAO to make decisions relative to the future of the WIPP program that are sensitive to the concerns of stakeholders and project participants, and 4) thereby meet the objectives and expectations of both the DOE and WIPP regulators. By using this process, the DOE will determine the data needs for the demonstration of compliance. These data requirements will be fulfilled through experimentation and then incorporated into future PA analyses.

5.0 FACILITY CHANGES

The DOE has a standard operating procedure (WID, 1991c) in place to review and report changes in conditions affecting the NMD. This procedure ensures timely EPA notification, as required by the NMD (55 FR 47720c), of any changes in conditions at the unit and/or environment that significantly depart from the conditions described in the variance and affect the potential for migration of hazardous constituents from the unit. If any such change is planned, the EPA will be notified in writing 30 days in advance of the change. If it is unplanned, EPA will be notified within ten days. No such changes in conditions at the unit and/or environment have occurred to-date that warrant notifying the EPA. The DOE maintains documentation of reviews conducted by the task force.

Even though the work scope of the WIPP site has been altered, this procedure is still in place until the No-Migration Variance Petition for the disposal phase has been submitted to and approved by the EPA.

6.0 PROGRESS TOWARD THE DISPOSAL PHASE NO-MIGRATION VARIANCE PETITION

With the incorporation of the Accelerated Compliance Program at the WIPP site, the focus of activity has moved toward preparing compliance documentation for a permanent disposal phase. The No-Migration Variance Petition (NMVP) for permanent disposal is being developed at this time.

The DOE CAO has identified the information needs which must be fulfilled prior to completion of a disposal-phase No-Migration Variance Petition (NMVP). A needs assessment to identify the information needed was performed using *"No-Migration" Variances to the Hazardous Waste Land Disposal Prohibitions: A Guidance Manual for Petitioners (Draft)* (EPA, 1992) The CAO plans to submit the NMVP to the EPA in phases. The short-term (operational) portion of the petition will be submitted in May 1995 and the long-term (post-closure) portion in June, 1996. This approach allows the EPA to begin review on schedule while allowing additional time for the experimental and long-term modeling efforts to mature.

The waste characterization program has taken on a much larger number of generators than were intended to be accepted in the test phase. The DOE is currently implementing a waste characterization program at each of the generator facilities as defined in the Quality Assurance Program Plan (QAPP). Each generator will develop a Quality Assurance Project Plan which, include or references the procedures to be implemented to meet the quality requirements in the QAPP. Over six hundred drums of characterization data and some sludge sampling data are expected to be included in the first submittal of the NMVP.

Currently, a chemical source term is being developed for inclusion in future PA analysis. In the absence of a detailed characterization, certain bounding assumptions will be made relative to the transport of hazardous constituents in the gas and/or liquid phases. Volatile Organic Compound (VOC) headspace data are being collected and will be used as the source for operational migration calculations.

Background VOC data have been collected and compiled under the current VOC Monitoring Plan. The upper 95% confidence level of background concentrations will be added to the regulatory limits to determine the overall limit for the constituent. Work is currently underway to develop a VOC Monitoring Plan for disposal operations. This new plan will be submitted in the disposal-phase NMVP.

The Project Technical Baseline (PTB) is being prepared and is due for completion the first quarter of FY95. This document contains the site characterization, facility description, and other information concerning the WIPP. In the interest of consistency of documentation, sections that correspond to the NMVP will be taken from the PTB.

7.0 REFERENCES

7.1 DOCUMENT REFERENCES

Clements, T. L. and D. E. Kudera, (Clements et al.) 1985. *TRU Waste Sampling Program*, Volume 1, Waste Characterization, EEG-WM-6503, September 1985.

DOE (U.S. Department of Energy), 1989a. *Waste Isolation Pilot Plant No-Migration Variance Petition*, Rev. 1, DOE/WIPP 89-003, March 1990.

DOE, 1989b. *WIPP Test Phase Plan: Performance Assessment*, DOE/WIPP 89-011, Rev. 0 (Rev. 1 in preparation), Carlsbad, NM.

DOE, 1991a. *Waste Isolation Pilot Plant No-Migration Determination Annual Report for the Period November 1990 Through September 1991*, DOE/WIPP 91-059, November 1991.

DOE, 1991b. *Quality Assurance Program Plan for the Waste Isolation Pilot Plant Experimental-Waste Characterization Program*, Rev. 1, DOE/EM/48063-1, July 1991.

DOE, 1991c. *Radioactive Waste Management Complex Quality Assurance Project Plan for the Waste Isolation Pilot Plant Experimental Test Program*, EGG-WM-9527.

DOE, 1991d. *Argonne National Laboratory - West, Hot Fuel Examination Facility Quality Assurance Project Plan for the Waste Isolation Pilot Plant Experimental Test Program*, W0096-00420 ES.

DOE, 1991e. *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, WIPP-DOE-069, Rev. 4, December 1991.

DOE, 1991f. *WIPP Resource Conservation and Recovery Act Part B Permit Application*, Rev. 3, DOE/WIPP 91-005, Chapter C, Waste Analysis Plan.

DOE, 1992. *No-Migration Determination Annual Report for the Period October 1991 through August 1992*, DOE/WIPP 92-057, November 1992 (Rev. 1 issued February 1993).

DOE, 1993. *No-Migration Determination Annual Report for the Period September 1992 through August 1993*, DOE/WIPP 93-062, November 1993.

DOE, 1994. *TRU Waste Characterization Quality Assurance Program Plan*, Rev. B, Draft, CAO-94-1010, July 8, 1994.

EPA (U.S. Environmental Protection Agency), 1980a. Title 40 CFR Part 264, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*.

EPA, 1980b. Title 40 CFR Part 265, *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*.

EPA, 1985. Title 40 CFR Part 191, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes*.

EPA, 1986a. Title 40 CFR Part 268, *Land Disposal Restrictions*.

EPA, 1986b. SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, Third Edition, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1988a. *Compendium Method TO-14, The Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using SUMMA™ Passivated Canister Sampling and Gas Chromatographic Analysis*, May 1988.

EPA, 1988b. *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, U.S. Environmental Protection Agency Data Review Work Group, February 1, 1988 (Draft).

EPA, 1990a. Federal Register, *Conditional No-Migration Determination for the Department of Energy Waste Isolation Pilot Plant (WIPP)*, Volume 55, No. 220, pp. 47700-47721, November 14, 1990.

EPA, 1990b. Federal Register, *Notice Proposing to Grant a Conditional Variance to the Department of Energy Waste Isolation Pilot Plant (WIPP) From Land Disposal Restrictions*, Volume 55, No. 67, pp. 13068-13094, April 6, 1990.

EPA, 1990c. *Quality Assurance and Quality Control*, August 1990.

EPA, 1992. *"No-Migration" Variances to the Hazardous Waste Land Disposal Prohibitions: A Guidance Manual for Petitioners*, EPA530-R-023, Office of Solid Waste, Washington DC., July 1992.

NRC (U.S. Nuclear Regulatory Commission), 1992. *Certificate of Compliance No. 9218, Revision 4, for the Model No. TRUPACT-II Shipping Container*, Washington, D.C., 1992.

PL (Public Law, 102d Congress), 1992. Public Law 102-579, *Waste Isolation Pilot Plant Land Withdrawal Act*, 102d Congress, Washington, D.C., October 1992.

SNL (Sandia National Laboratory), 1992. *Preliminary Performance Assessment for the Waste Isolation Pilot Plant, December 1992*, Volume 1: Third Comparison with 40 CFR 191, Subpart B, Albuquerque, New Mexico, December 1992.

WID (Waste Isolation Division), 1991a. WP 12-6, *VOC Monitoring Plan* (Rev. 1), January 21, 1994.

WID, 1991b. WP 12-7, *VOC Monitoring Quality Assurance Project Plan* (Rev. 2), January 21, 1994.

WID, 1991c. WP 02-706, *Reviewing and Reporting Changes in Conditions Affecting the No-Migration Determination*, December 1991.

7.2 UNCITED REFERENCES

Bertram-Howery, S. G., et al., 1990. *Preliminary Comparison with 40 CFR Part 191, Subpart B for the Waste Isolation Pilot Plant,* December 1990, SAND90-2347, Albuquerque, NM: Sandia National Laboratories.

DOE (U.S. Department of Energy), *TRUPACT-II Content Codes (TRUCON)*, DOE/WIPP 89-004.

DOE, NuPac (Nuclear Packaging, Inc.), 1992, *Safety Analysis Report for the TRUPACT-II Shipping Package*, Rev. 12.

EPA, *Quality Assurance and Quality Control, Environmental Protection Agency*, 1990.

Helton, J. C., et al., 1992. *Preliminary Comparison with 40 CFR Part 191, Subpart B for the Waste Isolation Pilot Plant,* December 1991, SAND91-0893/1,2,3,4, Albuquerque, NM: Sandia National Laboratories.

IT (International Technology), Contract Laboratory, *Canister Cleaning and Preparation SOP, No. 04-006-00*, January 30, 1991. (Currently in revision)

IT, Contract Laboratory, *Quality Assurance Project Plan (QAPP) for Volatile Organic Compound Monitoring*, June 1, 1991. (Currently in revision)

IT, Contract Laboratory, *VOC Canister Analysis SOP, No. 09-002-02*, June 12, 1991. (Currently in revision)

IT, Contract Laboratory, *Quality Assurance Project Plan (QAPP) for Certification of VOC Canister Samplers*, September 1994, Revision 2.

IT, Contract Laboratory, *Standard Operating Procedure for Certification of VOC Canister Samplers*, September 1994, Revision 2.

Marietta, M. G., et al., *Performance Assessment Methodology Demonstration: Methodology Development for Evaluating Compliance with EPA 40 CFR 191, Subpart B, for the Waste Isolation Pilot Plant*, SAND89-2027, Albuquerque, NM: Sandia National Laboratories, 1989.

Perry, R. H., D. W. Green, and J. O. Maloney, 1984, *Perry's Chemical Engineers' Handbook*, 6th Edition, McGraw-Hill Book Company: New York, New York.

Reklaitis, G. V., A. Ravidran, and K. M. Ragsdell, 1983, *Engineering Optimization, Methods and Applications*, John Wiley and Sons: New York, New York.

WID, WP 12-EM1622, *VOC Sample Canister Handling*, (Rev. 0, 6/21/91).

WID, WP 12-EM4501, *VOC-8, 9, and 10 Trouble Alarms*, (Rev. 0, 6/21/91).

WID, WP 12-EM3200, *Environmental Housekeeping and Cleanliness Control*, (Rev. 0, 6/22/91).

WID, WP 12-EM3201, *Environmental VOC Chain of Custody*, (Rev. 0, 6/28/91).

WID, WP 12-EM1630, *VOC Sampler Timer Programming and Flow Control*, (Rev. 1, 7/31/92).

WID, WP 12-EM1642, *VOC-1 Method Relative Accuracy Sampling*, (Rev. 0, 9/4/91).

WID, WP 12-EM1643, *VOC-2 Method Relative Accuracy Sampling*, (Rev. 0, 9/10/91).

WID, WP 12-EM1644, *VOC-8 Method Relative Accuracy Sampling*, (Rev. 0, 9/10/91).

WID, WP 12-EM1645, *VOC-9 Method Relative Accuracy Sampling*, (Rev. 0, 9/10/91).

WID, WP 12-EM3203, *VOC Monitoring Data Management*, (Rev. 0, 2/24/92).

WID, WP 12-AD3209, *VOC Monitoring Laboratory Data Review and Validation*, (Rev. 0, 1/21/94).

METHOD DETECTION LIMIT STUDY
WIPP_VOC MONITORING

WORK ORDER #:	4609		
DATE:	7/94	T TEST	
ITAS ID#:	AD6891	6.965	
MATRIX:	VOC-1		
CLIENT ID#:	493		

FILE NAME	AD6891	AD6891R3	AD6891R4			
DATE:	7/07/94	7/08/94	7/11/94	SDEV	MDL	RANGE
FREON 113 *	0.235	0.261	0.244	0.013	0.092	OK
METHYLENE CHLORIDE *	0.146	0.177	0.203	0.029	0.199	OK
CARBON TETRACHLORIDE *	0.088	0.095	0.093	0.004	0.025	OK
TRICHLOROETHENE *	0.06	0.065	0.075	0.008	0.053	OK

FILE NAME	AD6891R2	AD6891R5	AD6891R6			
DATE:	7/08/94	7/11/94	7/12/94	SDEV	MDL	RANGE
1,1,1-TRICHLOROETHANE **	0.196	0.186	0.171	0.013	0.088	OK

* 500ML OF ORIGINAL MATRIX ANALYZED.

** 50ML OF ORIGINAL MATRIX ANALYZED.

NOTE: TEST FOR VALIDITY BASED ON A NOMINAL CONCENTRATION OF 0.2PPB V/V

REFERENCE : 40 CFR PART 136 APPENDIX B

METHOD DETECTION LIMIT STUDY
WIPP_VOC MONITORING

WORK ORDER #:	4431	
DATE:	7/94	T TEST
ITAS ID#:	AD5734	6.965
MATRIX:	VOC-1	
CLIENT ID#:	489	

FILE NAME	AD5734R3	AD5734R4	AD5734R5			
DATE:	7/12/94	7/14/94	7/15/94	SDEV	MDL	RANGE
FREON 113 *	0.283	0.3	0.253	0.024	0.166	OK
METHYLENE CHLORIDE *	0.522	0.575	0.482	0.047	0.325	NO
CARBON TETRACHLORIDE *	0.326	0.347	0.259	0.046	0.320	NO
TRICHLOROETHENE *	0.353	0.383	0.29	0.047	0.331	NO

FILE NAME	AD5734	AD5734R	AD5734R2			
DATE:	7/07/94	7/08/94	7/11/94	SDEV	MDL	RANGE
1,1,1-TRICHLOROETHANE **	0.243	0.239	0.248	0.005	0.031	OK

* SPIKED WITH STANDARD CX-487 AND ANALYZED AT 500ML. ORIGINAL MATRIX DILUTED 1 TO 1.33.

** 100ML OF ORIGINAL MATRIX ANALYZED.

NOTE: TEST FOR VALIDITY BASED ON A NOMINAL CONCENTRATION OF 0.2PPB V/V

REFERENCE : 40 CFR PART 136 APPENDIX B

METHOD DETECTION LIMIT STUDY
WIPP_VOC MONITORING

WORK ORDER #:	4609		
DATE:	7/94	T TEST	
ITAS ID#:	AD6890	6.965	
MATRIX:	VOC-1		
CLIENT ID#:	492		

FILE NAME	AD6890	AD6890R	AD6890R3			
DATE:	7/07/94	7/08/94	7/11/94	SDEV	MDL	RANGE
FREON 113 *	0.209	0.237	0.235	0.016	0.109	OK
METHYLENE CHLORIDE *	0.151	0.211	0.206	0.033	0.232	NO
CARBON TETRACHLORIDE *	0.092	0.107	0.111	0.010	0.070	OK
TRICHLOROETHENE *	0.06	0.124	0.076	0.033	0.232	NO

FILE NAME	AD6890R2	AD6890R4	AD6890R5			
DATE:	7/08/94	7/11/94	7/12/94	SDEV	MDL	RANGE
1,1,1-TRICHLOROETHANE **	0.252	0.187	0.174	0.042	0.291	NO

* 500ML OF ORIGINAL MATRIX ANALYZED.

** 50ML OF ORIGINAL MATRIX ANALYZED.

NOTE: TEST FOR VALIDITY BASED ON A NOMINAL CONCENTRATION OF 0.2PPB V/V

REFERENCE : 40 CFR PART 136 APPENDIX B