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ROCKY FLATS PLANT
QUALITY ASSURANCE PROJECT PLAN

WASTE ISOLATION PILOT PLANT EXPERIMENTAL - WASTE CHARACTERIZATION PROGRAM

JANUARY 15, 1992

EG&G Rocky Flats
Rocky Flats Plant
P.O. Box 464
Golden, Colorado 80402

Prepared for the
U.S. Department of Energy
Rocky Flats Office

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QUALITY ASSURANCE PROJECT PLAN

WASTE ISOLATION PILOT PLANT EXPERIMENTAL-WASTE CHARACTERIZATION PROGRAM

This document is maintaned by the Quality Program Development group of Waste Programs. Direct comments and requests for revisions to Quality Program Development or the Waste Programs TRU Waste Program Manager.

TITLE:

QUALITY ASSURANCE PROJECT PLAN
WASTE ISOLATION PILOT PLANT
EXPERIMENTAL-WASTE CHARACTERIZATION PROGRAM

APPROVED BY:

1/17/92

J. M. Kersh / Date
Associate General Manager,
Environmental and Waste Management

CONCURRING APPROVALS:

1/10/92

G. L. Potter
Waste Programs

1/12/92

R. V. Morgan
Waste Operations

12/15/91

W. A. Kirby
Quality Assurance

1/14/92

D. M. Krieg
Traffic

1/19/92

G. A. O'Leary
TRU Waste Program Manager

1/13/92

A. W. McLaurin
Quality Program Development

1/13/92

N. J. Roberts
Safeguards Measurements

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PREFACE

The following assumptions were made when drafting the QAPjP.

In Section 9, where the definitions of several required QC checks are listed, sampling manifold and equipment blanks appear to describe the same thing. Therefore, it was assumed that sampling manifold blanks for drums and innermost layers of confinement are sufficient to comply with these requirements.

The table listing the analytes for gases and VOC analyses was not completely filled out in the QAPP, therefore, it was assumed the values listed should be extended down throughout the table. For the MDLs this assumption may not be correct.

The calculation list in Section 12 of the QAPP will be described in Appendix E of the QAPjP.

For convenience, all forms used for reporting project data are shown in Appendix D instead of within the text of the document. Within the Appendix the most current forms approved by WIPP shall have a date of issue and revision number placed in the header of the forms. This will allow for the forms to be updated without having the entire QAPjP updated.

Laboratory procedure L-4122 listed in this document is in development for the analysis of small sample volumes. The purpose for L-4122 is to back up L-4111 for the analysis of VOCs.

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GLOSSARY

Absolute Pressure	The sum of the pressure indicated on the canister pressure gauge or manifold pressure gauges and the ambient barometric pressure.
Accuracy	The degree of agreement between a measured value and an accepted reference or true value.
ALARA	As Low As Reasonably Achievable
Analyte	The element, ion, or compound an analysis seeks to determine; the element of interest.
Analytical Batch	A suite of samples of similar matrix processed as a unit. This unit must not exceed 20 samples.
Analytical Method	Defines the sample preparation and instrumentation procedure that must be performed to estimate the quantity of analyte in a sample.
Analytical Sample	Any solution or media introduced into an instrument on that an analysis is performed, excluding calibration and verification samples.
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing & Materials
Audit/ Appraisal	A planned and documented activity performed in accordance with procedures to determine, by examination and evaluation of objective evidence, the adequacy of and extent to which applicable elements of the quality assurance program have been developed, documented, and implemented in accordance with specified requirements.
BFB	Bromofluorobenzene
Bin Case	A report of all the information compiled pertinent to a bin in support of the characterization of the bin contents and its shipment to WIPP.

Calibration	Calibration: (A) The process of establishing the accuracy of a measuring device, standard, or calibration instrument. (B) The check or correction of accuracy of a measuring instrument to assure proper operational characteristics (see "counter"). (C) The comparison of a measurement standard or item of test and measuring equipment (instrument) of unknown accuracy to standard or instrument of known accuracy in order to detect, correlate, report, or eliminate by adjustment, any variation (deviation) in the accuracy of the item being compared. (D) The establishment of a curve relating instrument response to analyte amount or concentration based on analyses with analytes of known amount or concentration.
Calibration Blank	A volume of ultra-pure gas or liquid containing quantities of analytes below detection limit.
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CHTRU	Contact Handled Transuranic
CLP	Contract Laboratory Program
COC	Chain of Custody - A set of procedures established to ensure that sample and data integrity is maintained.
Comparability	A qualitative parameter expressing the confidence with that one data set can be compared to another.
Completeness	The percentage of measurements made that are judged to be valid measurements.
Container	DOT approved container, serialized white drum or metal box, for shipping radioactive or mixed waste via TRUPACT-II.
Continuing Calibration	Analytical standards run periodically to verify the calibration of the analytical system.
Control Limits	A range within which specified measurement results must fall to be compliant. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that noncompliance data be flagged.

Corrective Action	Measures taken to rectify conditions adverse to quality and where necessary to preclude repetition.
Counter	A general designation applied to radiation detection instruments or survey meters that detect and measure radiation. The signal that announces an ionization event is called a count (see "Geiger-Mueller counter").
cpm	Counts Per Minute - a radiological unit of measure.
Curie (Ci)	A unit of radioactivity equal to 3.7×10^{10} disintegrations per second. A nCi is 10^{-9}Ci or 37 disintegrations per second.
DOE	Department of Energy
DQO	Data Quality Objectives - Qualitative and quantitative statements that describe the overall level of uncertainty that a decision-maker is willing to accept in results derived from data.
EG&G	Edgerton, Germeshausen & Grier (Rocky Flats Plant Operating Contractor)
EH-1	Assistant Secretary for Environment, Safety, and Health, U.S. DOE
EM-1	Director of the Office of Environmental Restoration and Waste Management, U.S. DOE
EM-20	Director of Office of Quality Assurance and Quality Control, U.S. DOE
EM-30	Associate Director of the Office of Waste Operations, U.S. DOE
EPA, USEPA	United States Environmental Protection Agency
E-WCP	Experimental-Waste Characterization Program
E&WM	Environmental and Waste Management - the EG&G Associate General Manager's organization.
FB or Field Blanks	Field Blanks are background samples that are collected in the field in the immediate vicinity of the sample collection location. They accompany the sample containers through collection, shipment to analytical laboratory, and storage prior to analysis, and are used to identify any contamination from field conditions.

Field Duplicate	Two separate, independent samples collected from the same source, as closely to the same place and time, stored in separate containers, independently labeled and independently analyzed to document the precision of the sampling and analysis process.
FID	Flame Ionization Detector
Field Sample	A portion of material received to be analyzed that is contained in single or multiple containers and identified by a unique DOE Sample Number.
Frequency	A frequency specification during an analytical sequence specifying no more than a set number of samples between required quality control measurements.
FRS or Field Reference Sample	Standard samples of known concentrations of target analytes, introduced through the sampling equipment, to identify any bias in the sampling process.
GC	Gas Chromatography
GCMS	Gas Chromatography/Mass Spectrometer
Gieger-Mueller Counter	A radiation detection and measuring instrument, consisting of a gas filled chamber, such as a tube containing electrodes, between which there is an electrical voltage but no current flowing. When ionizing radiation interacts in the chamber, a short, intense pulse of current passes from the negative electrode to the positive electrode and is measured or counted. The number of pulse per second measures the intensity of radiation.
Generator	Any person, by site, whose act or process produces hazardous waste identified or listed 40 CFR 261 or whose act first causes a hazardous waste to become subject to regulation by the EPA or DOE order.
Hazardous Waste	A hazardous waste is a waste that exhibits the characteristics of being corrosive, ignitable, reactive, toxic, or are listed in 6CCR1007-3 sec. 261 and 40 CFR 261.24 or a hazardous waste listed in 40 CFR 261, Subpart B.
Headspace	For any volume contained by a bin, drum, 55-gallon poly bag, or innermost layer of confinement, the total contained volume minus the volume occupied by the waste material. "Headspace" is also used to refer to the VOCs and gases contained within this volume.

Holding Time	The maximum time allowed between sample collection and the time of analysis.
ICV	Initial Calibration Verification
IDC	Item Description Code - a three character numeric code that describes each waste form matrix.
IDL	Instrument Detection Limit - The minimum signal that the instrument can detect with 99% confidence that the analyte concentration is greater than zero.
Innermost Layer of Confinement	Within a waste container, a plastic bag that is closest to a waste source that may be a source of VOCs and/or hydrogen and methane and has a minimum of one liter of headspace.
Laboratory Duplicate	A second aliquot of a sample that is treated and analyzed the same as the original in order to determine the precision of the method.
LB	Laboratory Blanks - an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing and used to document contamination resulting from laboratory sample preparation and analytical process.
LCS	Laboratory Control Samples - a control sample of known composition.
LEL	Lower Explosive Limit - The lowest concentration of a fuel (flammable gas and/or VOC) in air that will propagate a flame from an ignition source. The lower explosive limit (LEL) is synonymous with the lower limit of flammability (LLF). LEL values are typically expressed as the volume of fuel per volume of air (v/v%).
LLW	Low Level Waste - Radioactive waste ≤ 100 Nci /gm
MDL	Method Detection Limit - the minimum concentration of a substance that can be measured and reported for a given method with 99% confidence that the analyte concentration is greater than zero.
MMDDYY	Month-Day-Year Format
MS	Mass Spectrometer

NDA	Nondestructive Assay - the measurement of radioactivity and/or radionuclide specific activity determined without destroying the material.
NDT	Nondestructive Testing - those group of tests, such as RTR, that evaluate an item's conformance without destroying it or modifying the physical state of the sample.
NEIC	U.S. EPA National Enforcement Information Center
NIST	National Institute of Standards and Technology
NQA-1	Quality Assurance Program Requirements for Nuclear Facilities, as specified in ASME-NQA-1-1989
NR	Characterization not required to meet objective.
NRC	Nuclear Regulatory Commission
On-Site Transportation Committee	The On-Site Transportation Committee is appointed by and reports to the Assistant General Manager of Administration and Planning. The Committee is responsible to perform the following functions as they pertain to the packaging and transportation of radioactive material, hazardous materials, hazardous substances, and hazardous waste on plant site. The Committee consist of representatives from: Traffic, Criticality Engineering, Packaging Programs, Production Control, Radiological Engineering, Site Quality Assurance, and Waste Operations.
P	Pressure
P&C	Permitting and Compliance group within Waste Programs department.
Packaging Material	Flexible containment materials, e.g., plastic bags. (Definition specific to this Program)
PADC	Passive/Active Drum Counter located in Building 371, used to measure radionuclide content and perform TRU/LLW sorting of waste drums.
PAN	Passive/Active Neutron Counting
PDCO	Project Data Control Officer
PDVO	Project Data Validation Officer

PDRCO	Project Document/Records Control Officer
PFTBA	Perfluorotributylamine
PID	Photoionization Detector
PM	Project Manager
PNCC	Passive Neutron Coincidence Counting
ppmv	Parts per million by volume
PQAO	Project Quality Assurance Officer
PQE	Procurement Quality Engineering
PRDL	Program Required Detection Limit - minimum level of analyte detection acceptable under the WIPP-QAPP.
Precision	A measurement of mutual agreement among individual measurements of the same property, made under prescribed similar condition; often expressed in terms of standard deviation.
Procedure	A written, formally approved and controlled, step-by-step sequence of detailed actions to be followed to perform a given task.
PRQL	Program Required Quantitation Limit - minimum level of analyte quantitation acceptable under the WIPP-QAPP.
PWG	Procedure Writer's Guide
QA	Quality Assurance - All those planned and systematic actions necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily and safely in service.
QAE/DO	Quality Assurance Engineer/Data Officer
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer

QAP	Quality Assurance Plan - a document that contains or references the quality assurance elements established for an activity and describes how conformance with such requirements is to be assured.
QAPjP	RFP - Site Specific Quality Assurance Project Plan
QAPP	WIPP - Quality Assurance Program Plan
QC	Quality Control - a routine application of procedures for controlling the process.
QID	Quality Instruction Directive - the document that provides acceptance testing instructions for procured materials.
QR	Quality Requirement - requirements specified by NQA-1.
RA	Radioassay - assay methods used to identify and quantify radionuclides in TRU waste.
RCRA	Resource Conservation and Recovery Act, 40 CFR 240-271.
Representativeness	The degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition.
Residual Material	Anything not characterized as a waste item or packaging material, such as cement or oil dry. (This is a Program specific definition)
RFP	Rocky Flats Plant
ROI	Range of Interest
RPD	Relative Percent Difference (See Appendix E for formula)
RPT	Radiation Protection Technologist - the job title of personnel who provide radiation protection through controls and monitoring of areas, items, and personnel.
RSD	Relative Standard Deviation (See Appendix E for formula)

RTR	Real-Time Radiography - a direct readout x-ray of waste package contents.
Sample	A portion of material to be analyzed that is contained in single or multiple containers and identified by a unique sample number.
Sample Number	A unique identification number that is designated for each sample. The number appears on all sample reports that document information or results derived from that sample.
SDG	Sample Delivery Group
SGS	Segmented Gamma Scan Counting
SMB	Sampling Manifold Blank - Samples of high purity gas used to purge the sampling equipment. They are collected after the sampling manifold has been cleaned and prior to sampling. These are useful in documenting adequate cleaning of the equipment.
SNL	Sandia National Laboratories
SOP	Standard Operating Procedure
SUMMA®	A stainless steel pressure vessel with SUMMA® passivated interior surfaces for the collection and stable storage of gas samples and many specific organic compounds.
SWB	TRUPACT-II Solid Waste Box - a container for solid radioactive waste.
t	Time
T	Temperature
TAL	Target Analyte List
TCL	Target Compound List
TCO	Transportation Certification Official - At RFP this is the Traffic Manager.
TIC	Tentatively Identified Compounds

TID	Tamper Indicating Device: A device required by Safeguards to indicate whether radioactive containers have been opened or tampered with.
TRAMPAC	TRUPACT-II Authorized Methods for Payload Control
TRU	Transuranic Waste (TRU) Waste that is contaminated with plutonium (Pu), americium (Am), or other transuranics (elements with an atomic number greater than 92) at an activity level equal to or greater than 100 Nci/g of waste material and that has no further economic value.
TRUCON	TRUPACT-II Content Codes
TRUPACT-II	**TR**ansuranic **PAC**kage Transporter - A Type-B shipping container for radioactive waste.
TSCA	Toxic Substance Control Act, 40 CFR 700-799
U.S. DOE	United States Department of Energy
U.S. DOE/AL	DOE Albuquerque Operations Office
U.S. DOE/WPO	DOE WIPP Project Office
U.S. DOE/RFO	DOE Rocky Flats Operations
U.S. DOT	United States Department of Transportation
Validate	To confirm or corroborate the data resulting from a characterization process is deemed useable.
VOC	Volatile Organic Compound
VTSR	Validated Time of Sample Receipt
WAC	WIPP Waste Acceptance Criteria
WACCC	WIPP Waste Acceptance Criteria Certification Committee
Waste	Waste material at Rocky Flats is material below economic discard level
Waste Container	The container that holds waste items

Waste Package	Individual items that are placed into waste collection boxes and drums.
Waste Stream	A material from a waste generating process that has specific chemical and physical characteristics.
Waste Type	The classification system describing the physical types of waste, solidified inorganics (Waste Type I), solid inorganics (Waste Type II), solidified organics (Waste Type III), and solid organics (Waste Type IV) as established by the TRUPACT-II Safety Analysis Report.
WCO	Waste Certification Official - the person(s) who affirms by signature that wastes meet all applicable criteria. Also see TCO, Transportation Certification Official.
WEMS	Waste and Environmental Management System - a computer software program and database, within the Waste Programs Department that manages RFP wastes.
WI	Waste Inspection - a group within the Rocky Flats Site Quality Assurance Department that ensures conformance to applicable waste acceptance and certification criteria. Waste Inspection assesses container integrity, drum or box contents conformance, and container documentation, labeling, and marking.
WIPP	Waste Isolation Pilot Plant
WIS	Waste Information Sheet - a document posted in waste generation areas that provides waste characterization information for the process(es). The document is controlled by building operations management and reviewed and approved by the appropriate Waste Guidance engineer.
WPO	WIPP Project Office
WQE	Waste Quality Engineering - the group within the Rocky Flats Quality Assurance Department that certifies wastes for shipment to WIPP.
WSRIC	The "Waste Stream and Residue Identification and Characterization" building books. These books are reference documents for operating personnel, and are used in conjunction with the WIS, to provide documented characterization of the Rocky Flats wastes.
WTD	Waste Technology Development - a group within the E&WM Department which performs waste technology development for chemical and process applications as well as NDA instrumentation development.

1.0 PROJECT DESCRIPTION

This Quality Assurance Project Plan (QAPjP) identifies the methods and procedures employed by EG&G Rocky Flats to assure the data from waste characterization tasks performed by the Rocky Flats Plant (RFP) meet the quality assurance objectives of the "Quality Assurance Program Plan (QAPP) for the Waste Isolation Pilot Plant (WIPP) Experimental-Waste Characterization Program (E-WCP)." Project tasks performed by EG&G RFP include retrieval of sample waste drums from storage, real-time radiography (RTR), nondestructive assay (NDA), headspace sampling, visual examination, gas and volatile organic compound (VOC) analysis, packaging the characterized waste in WIPP supplied test bins, flammability testing of headspace gases, leak testing the bins, loading and shipping the bins, and project specific dosimetry.

This Plan specifically:

- sets forth methods utilized by RFP organizations to satisfy those data quality objectives and program requirements that the RFP must meet in characterizing and preparing TRU wastes for shipment to the WIPP Test Phase activity;
- describes the methods and procedures used to accomplish the methods;
- describes the documentation of the data and the systems used to collect and validate the data;
- describes the certification and transmittal of the data;
- describes the certification and shipment of the loaded test bins.

This document follows the E-WCP QAPP format as recommended by the Environmental Protection Agency (EPA) in its QAMS-005 guidelines (USEPA, 1983) to facilitate correlating QAPjP elements and activity to the QAPP. Table 1-1 correlates these elements and activities with those required by DOE Order 5700.6B (USDOE, 1986), that invokes the quality elements specified by NQA-1, "Quality Assurance Requirements for Nuclear Facilities," from The American Society of Mechanical Engineers (ASME, 1989). At RFP they are further amplified by SOP 5700.6B (USDOE, RFO, 1990) and implemented by the EG&G Rocky Flats Quality Assurance Manual.

Table 1-1 Cross Reference for ASME NQA-1 Elements to Applicable Sections of the QAPjP

ASME NQA-1 Elements	Section of the QAPjP
1. Organization	*2.0 Organization and Responsibility
2. Quality Assurance Program	*1.0 Program Description 1.8 Indoctrination and Training *14.0 Quality Assurance Reports to Management
3. Design Control	*3.0 Quality Assurance Objective
4. Procurement Document Control	1.7 Procurement Document Control/Control of Subcontractors
5. Instructions, Procedures, and Drawing	*4.0 Sampling Procedures
6. Document Control	1.5 Document Review, Approval, and Control 1.9 Site Quality Assurance Project Plans
7. Control of Purchase Items and Services	1.7 Procurement Document Control/Control of Subcontractors
8. Identification and Control of Items	1.7 Procurement Document Control/Control of Subcontractors *5.0 Sample Custody
9. Control of Processes	1.7 Procurement Document Control/Control of Subcontractors *7.0 Analytical Procedures *9.0 Internal QC Checks and Frequency
10. Inspection	1.11 Analytical Laboratory Performance Demonstration Program 11 Preventive Maintenance
11. Test Control	7.2 Radioassay (software) *9.0 Internal QC Checks and Frequency *12.0 Specific and Routine Procedures to Assess Data Quality
12. Control of Measuring and Test Equipment	*6.0 Calibration Procedures and Frequencies *11.0 Preventive Maintenance
13. Handling, Storage, and Shipping	*4.0 Sampling Procedures *5.0 Sample Custody
14. Inspection, Test and Operating Status	*6.0 Calibration Procedures and Frequencies
15. Control of Nonconforming Items	*13.0 Corrective Actions
16. Corrective Action	*13.0 Corrective Actions *14.0 Quality Assurance Reports to Management
17. Quality Assurance Records	1.6 Quality Assurance Records *8.0 Data Reduction, Validation, and Reporting
18. Audits	*10.0 Performance and System Audits and Frequency

*These sections are in accordance with EPA QAMS-005 guildelines

1.1 Program Overview

The purpose of the WIPP E-WCP is the characterization of the experimental TRU wastes selected from waste inventories stored at RFP (and other sites) to obtain waste data for the WIPP Performance Assessment program. Data generated by the waste characterization tasks will be used to validate prior waste certification methods, determine the gas generating characteristics of the wastes in waste containers due to various microbial, corrosion, and radiolytic decomposition processes, validate the historical process knowledge data bases, verify the compliance with No Migration Determination (NMD) requirements (USEPA, 1990), and document compliance of waste and containers with TRUPACT-II payload requirements.

Monitoring of worker exposure while performing headspace sampling, visual inspections, and bin packaging, will be accomplished by issuing special dosimeters to be worn only in the size reduction vault while working on this project. Data from the counting of the dosimeters shall be reported to the project manager to monitor personnel exposure to radiation.

The scope of this QAPjP is RFP specific and does not address experimental activity of the Test Phase at the WIPP (USEPA, 1990). Program specific information concerning the rationale and scientific basis of WIPP experimental program activities is available in the documents listed in the QAPP.

WIPP E-WCP at RFP consist of several activities:

- waste retrieval;
- RTR;
- nondestructive assay;
- visual examination;
- headspace gas sampling and analysis;
- bin loading;
- flammability testing of headspace gases;
- data reduction and validation; and
- sludge analysis (will be addressed in future revisions).

1.1.1 Facilities At Rocky Flats

Facilities where work will be conducted as part of this project are Buildings 776, 777, 707, 564, 559, 371, 569, and 664. Building 776 and 777 contain the size reduction vault and gas mass spectrometry laboratory respectively. Building 559 contains the Production Support Laboratories (PSL) where the majority of the analytical work will be conducted. Nondestructive Assay (Radioassay) will be performed in Building 371. The Real-Time Radiography will be conducted in Building 664, as well as TRUPACT-II shipping operations.

1.2 Data Quality Objectives

The data obtained through the E-WCP will be used in efforts to ensure the WIPP project experimental waste meets regulatory requirements for repository integrity, compliance with the conditional no-migration variance, and that all wastes are properly managed during the test and operational phases. Data quality objectives have been established for the E-WCP to support these efforts and address the specific waste characterization parameters that will be evaluated. The data quality objectives are:

1.2.1 Nondestructive Assay

To determine, by NDA, the total alpha activity in terms of grams equivalent of weapons grade Plutonium in each container of waste to assess the potential of those wastes for radiolytic gas generation and to verify compliance with TRUPACT-II requirements for fissile content.

1.2.2 Real-time Radiography and Visual Examination

To identify the waste material categories and estimate to the extent possible the weights in each waste container of those material categories in each waste container that can influence gas generation potential for that waste container.

To verify process knowledge in terms of the Item Description Code (and thus the Content Code), physical waste form, and to determine that no detectable free liquids are present in the contents of each waste container. See Table 3-2 for a listing of material identified by RTR and visual examinations.

1.2.3 Headspace Gas Sampling and Analyses

To determine the concentrations of gases in the headspace of waste containers by sampling the headspace of the 55-gallon poly bag and the innermost layers of confinement. These data will be used to indicate the dominant gas generation processes occurring in the containers. Data quality objectives for sampling and analysis are designed to insure that the data generated is valid and conforms to project requirements.

1.2.3.1 Gas Analysis

To qualitatively and quantitatively determine the gas analytes, those listed in Table 3-5, present in the headspace of the waste containers. This will allow for the identification of the dominant gases generated during the waste storage process within the waste packages, drums, and bins. Gases will be analyzed using a double sector mass spectrometry. Data obtained will also be used to determine if the vapors present are flammable.

1.2.3.2 Volatile Organic Compound (VOC)

To qualitatively and quantitatively determine which VOCs listed in Tables 3-4 and 3-6 are present within the headspace gas of sample waste containers. This will allow for the determination of components present in the headspace of waste packages, drums, and bins. The components may be from the waste or decomposition of waste. VOCs will be analyzed using either GC/MS or GC techniques developed from EPA methods.

1.2.3.3 Flammability Testing

Flammability testing is conducted on samples where the laboratory analysis indicates that the concentration of VOCs within the bin headspace gas samples exceeds 500 ppmv. This is done to demonstrate that these gases do not exceed 50% of the Le Chatelier theoretical lower explosive limit in a waste container and bins to be emplaced in the WIPP. Each bin that exceeds the 500 ppmv of VOCs and flammable gases will have a flammability test conducted.

1.2.4 RCRA-Regulated Hazardous Waste Characterization

Verify existing characterization information that is based on knowledge of the materials and processes that generated the waste. (Note: This objective will be further defined in future revisions to the plan as sampling and analytical methods are developed for the analysis of sludges.)

1.3 Document Review, Approval, and Control

RFP compliance with this requirement begins with the EG&G Rocky Flats Plant "Quality Assurance Manual" (QAM), Section QR-5, "Instructions, Procedures, and Drawings" and Section QR-6, "Document Control."

Section QR-5 establishes the quality assurance requirements to assure that activities affecting quality are prescribed and performed in accordance with documented instructions, procedures, and/or drawings. These requirements shall be addressed and implemented in accordance with approved EG&G Rocky Flats Plant policies and procedures for the initiation, preparation, review, and revision control of instructions, procedures, and/or drawings for all quality related activities.

The EG&G RFP Environment and Waste Management (E&WM) "Administrative Procedures Manual," 2-20000-ADM, Section 5.0 - "Instructions, Procedures, and Drawings," Procedure 05.01, and the E&WM "Procedure Writer's Guide," 2-20000-PWG document the implementation of the QAM requirements by the E&WM organization.

Each organization supporting this project at the Rocky Flats Plant has a system for the development, distribution, and control of procedures. An example is NDT/RTR that utilizes the Technical Writing group in the Non-Plutonium Operations organization for the preparation and control of procedures.

1.3.1 Control of Changes and QAPjP

Changes to and control of the QAPjP shall be done in agreement with Quality Program Development groups Procedure WP-1000. Procedure WP-1000 defines, "Document Control Procedures for Waste Programs Quality Documents." Areas covered by this procedure are:

- Adding, changing, or deleting documents or portion thereof;

- Initiating new documents;
- Publishing, controlling, and distributing documents and revisions;
- Storage of support data pertaining to the documents.

Table 1-2 Minimum Requirements for Review, Approval, Implementation and Control of QAPjP

Responsible Party	DOE/EM-30	DOE/EM-20	DOE/WPO	WIPP/ WACCC	Sandia National Laboratories	DOE Operations Office	Site Project Manager	Site Project Quality Assurance Officer
QAPjPs								
Review			X					
Review/Approval				X		X	X	X
Implementation **							X	
Change Approval				X		X	X	X
Change Control							X	

* The WACCC implements the requirements of the QAPP by its review and approval of the site-specific QAPjPs and by auditing site activities for compliance with the Program QA/QC requirements.

** The QAPjPs shall include a description of the line management responsibilities for implementation of the Program requirements. The site Project Manager is responsible for the daily implementation of the Program requirements.

1.4 Records Management (Quality Assurance Records)

RFP compliance with this requirement is initiated by the EG&G Rocky Flats "Quality Assurance Manual" (QAM), Section QR-17, "Quality Assurance Records." QR-17 establishes the requirements that all QA/QC records that will be transferred to DOE/WPO are designated as lifetime records and shall be maintained for the active life of the WIPP facility. Each RFP organization involved in this project has the responsibility to set up a storage system for backup copies of their data generated for the project. The requirements of this document are intended to assure that required records are complete, available and retrievable when needed for their intended purpose. These functions are further defined and implemented by the RFP "Records Management Manual" and the RFP "Forms Manual." RFP organizations, Performance Document Control Records, are responsible to develop, implement, operate and maintain record management systems in compliance with these requirements. The procedure defining the control of QA Records for this project is "Waste Isolation Pilot Plant Quality Assurance Records Management." Forms developed for specific use by this project are not subject to RFP "Forms Manual."

1.4.1 Central Files

These requirements are described in Sections 2.1 through 2.25 of QR-17 and further defined and implemented by the RFP "Records Management Manual."

1.4.2 Record Retention

These requirements are described in Sections 2.9 through 2.19 of QR-17 and further defined and implemented by the RFP "Records Management Manual."

1.4.3 Waste Operations and Laboratory Files

RFP Environmental and Waste Management and Analytical Laboratories maintain record storage files in accordance with the above listed requirements. Their record keeping systems are described in the following sections.

1.4.3.1 Waste Programs Information Management (WPIM)

Records maintained by this system are described in the WPIM procedure WEMS-CP100, "Software Quality Assurance Compliance Procedure for the Waste and Environmental Management System (WEMS)."

Table 1-3 Required Types of Program Records Maintained in Central Files

1.	All field sampling data forms and records of data reduction
2.	Field and laboratory chain-of-custody forms for all samples
3.	Sampler certifications
4.	Laboratory analytical data reports for samples
5.	Sampling system design documents
6.	Analytical results of all QA/QC samples
7.	All pertinent incoming and outgoing correspondence, memoranda, and telephone records related to QA/QC
8.	Reports and data transmittals
9.	Reference materials relevant to the program
10.	Nonconformance and corrective action documentation
11.	Documentation of calculation and computer programs and associated verification
12.	Raw data and summarized results to the Performance Demonstration Program
13.	Audit plans, reports, responses, and final closure of corrective actions
14.	Quality assurance reports to management
15.	Training/qualification records **
16.	Documentation of revisions or changes to the QAPP or QAPjPs
17.	Dosimetry records
18.	Calibration records
19.	Electronic instrument data (e.g., GCMS files)
20.	Procurement records **
21.	Data reduction, validation, and reporting records

* DOE facilitites are responsible for maintaining these records until transmittal to DOE/WPO.

** These records are required in site-specific project files only and will not be transmitted to DOE/WPO.

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1.4.3.2 Analytical Laboratory Files

Analytical Laboratory records management is described in the "Analytical Laboratories Quality Assurance Plan," 1-10000-ALQAP, section 2.17, and for this project in L-4026, "Records Handling, Storage, and Retrieval for the WIPP Project File."

1.4.3.3 NDT/RTR

NDT/RTR records management for this Project is defined in the QT-1009, "RTR Operating Procedure."

1.4.3.4 Nondestructive Assay Records

Waste Assay and Shipping records management for this Project are defined by the NMS MT-004, "Nuclear Materials Safeguards Procedure Manual," Section 4. Safeguards Measurements maintains QA Records for calibration, operation, and measurement control for NDA counters as defined by "Safeguards Measurement Program Management Plan for Nondestructive Assay (NDA)."

1.4.3.5 Transportation Records

TRAMPAC shipping documents.

1.5 Procurement Document Control/Control of Subcontractors

The quality of procured items (new and replacement) is assured through the EG&G Rocky Flats "Conduct of Engineering Manual," or through Rocky Flats Plant (RFP) Standards, as described in paragraphs 1.5.1 and 1.5.2. Control of procured services is described in paragraph 1.5.3.

1.5.1 Procurement Document Control

The procurement requirements for standard items for plant usage such as DOT Type 7A waste packaging are defined in RFP Standards. Those plant standards are incorporated in purchase orders and specify all material, test, identification, and documentation requirements necessary to supply and receive these items.

1.5.2 Control of Subcontractors (Suppliers)

New items and replacement parts and components are evaluated by Procurement Engineering Support in accordance with procedure 6.5.14, "Engineering Standards for the Procurement, Receipt, and Control of Items," and 6.3.6, "DOE General Design Criteria Application and Classification of Item."

1.5.2.1 Items for environmental monitoring or restoration, or confinement, processing, packaging, and transport of radioactive/hazardous waste processing activities are designated Safety Category 3.

1.5.2.2 Items that provide confinement of hazardous materials (e.g., radioactive or hazardous materials) or detect or mitigate accidents that could lead to release in excess of the regulatory limits are designated Safety Category 1 or 2.

1.5.2.3 Safety Category 1, 2, or 3, items are procured using specifications developed by Procurement Engineering Support and reviewed by Procurement Quality Engineering that provide for acceptance in accordance with the methods specified in NQA-1 Supplements 7S-1 and 7A-1.

1.5.2.4 Records of procurement and acceptance activities are retained in accordance with RFP internal procedures for specific activities. Where specific records are required for items procured for the E-WCP (e.g., calibration standard certifications, etc.), it is the responsibility of the requisitioner to obtain and retain copies in accordance with department procedures.

1.5.3 Control of Purchased Items and Services

Services that are important to the quality of waste characterization data or integrity of transuranic waste confinement structures are accepted in accordance with NQA-1 Supplements 7S-1 para. 8.3, except as follows: (1) repair services for waste bins, standard waste boxes, or TRUPACT-II containers are not procured by RFP; such repairs are performed by the equipment owners only; (2) analytical services are only procured from laboratories approved through the Performance Demonstration Program (PDP) as described in paragraph 1.11 of the WIPP E-WCP QAPP; and (3) services consisting of RFP staff augmentation only, where personnel work to RFP procedures and under RFP supervision are not subject to any special quality requirements. As no specific RFP program exists to provide for acceptance of services, the following measures shall be taken:

1.5.3.1 The responsible manager shall confer with the project QA Officer and the Procurement Quality Engineering Manager to determine the appropriate methods of acceptance to be used for the intended service scope. This shall be documented in an Inter Office Correspondence memorandum.

1.5.3.2 Contractual requirements shall be established in a Statement of Work (SOW) written per DOE guidance document 42XA, "Guide for Writing Statement." The statement of work shall impose all applicable requirements of the WIPP E-WCP QAPP upon the vendor and his subcontractors (if any), and indicate if a pre-approval audit or program evaluation is required.

1.5.3.3 Procurement Quality Engineering shall coordinate all acceptance activities determined necessary per section 1.5.3.1 and compile all associated documentation. A copy of all procurement records shall be transmitted to the Project QA Officer. Procurement Quality Engineering shall retain the originals in accordance with internal procedures.

1.5.4 Identification and Control of Items

1.5.4.1 Item/material identification requirements are specified in Plant Standards or by Procurement Engineering Support in accordance with procedures in Section 6.5.14 of the "Conduct of Engineering Manual." These identification requirements incorporate the requirements of governing codes, standards, and regulations having specific identification/traceability requirements.

1.5.4.2 Item acceptance and subsequent release for installation is governed by procedure PQE-6100, "Procurement Document Review" and NWQA-1004, "Non-Weapons Material Acceptance and Certification."

1.5.4.3 Items for use in the E-WCP requiring maintenance of identification and traceability to procurement documentation or to certification include:

- hazardous waste containers and SWB's;
- SUMMA® canisters;
- high purity gases;
- ASTM Type II Water, D1193-77(1983);
- calibration standards whose accuracy may affect quality of data for the E-WCP, including, but not limited to:
- NDA isotopes;
- analyte standards (including primary gas, gas/liquid and liquid standards) and pure compounds used for standard preparation;
- instrumentation calibration standards;
- instrumentation and measuring equipment that may affect the quality of data for the E-WCP;

- bin backfill materials;
- any other item requiring traceability by code or regulation or where material or item attributes are essential to data quality;
- any other item where material/item attributes are critical to data quality (e.g., oil free sample pumps or Viton®/Teflon®/stainless (passivated) steel parts for sampling manifold, etc.)

1.5.4.4 It is the responsibility of the requisitioning organization to obtain required procurement documentation for such items per section 1.5.2.4 and to maintain traceability/identification of such items in accordance with internal department procedures. Where specific traceability is not required by regulation or code, traceability need only be maintained on associated documentation up to the point of installation.

1.5.5 Control of Processes

All processes and special processes shall be controlled by written procedure.

Processes are defined as those sequential waste handling activities that must be controlled to insure compliance with governing technical requirements (e.g., WIPP E-WCP QAPP sampling protocols, Sandia National Laboratories test plans, TRAMPAC loading operations, etc.), provide status indication and control, and preclude inadvertent omission of required activities or further processing of nonconforming items. Processes requiring control include sampling (see Section 4.0), calibration (see Section 6.0), laboratory analysis (see Section 7.0), chain of custody, bin loading and backfilling, and on-site and off-site transportation, as follows:

Activity*	Procedure
Tracking of waste processing and status	WP-1200, "Waste and Environmental Management System (WEMS) Requirements."

Chain of Custody and status of waste and waste samples	WO-4711, "WIPP Bin-Scale Test Sample Drum Chain of Custody Log Procedure," WO-4712, "WIPP Bin-Scale/SWB Chain of Custody Log" and L-4006, "Chain of Custody Procedure for WIPP Characterization Program Headspace Sample Canisters," L-4024, "Sample Administration - WIPP Characterization Program Headspace Sample Canisters."
Nondestructive Assay	WO-5228, "Passive Active Drum Assay System, Building 371"
Logistics of Sample extraction	WO-4701, "WIPP Bin-Scale Test Sample Drum Gas Sampling Operations," WO-4704, "WIPP Bin-Scale Test Sample Drum Hot Gas Sampling," and L-4146, "Headspace Gas Sampling of Waste Containers."
Loading of Standard Waste Boxes**	WO-4703, "WIPP Bin-Scale Test Sample Standard Waste Box Loading/Unloading Operations."
Loading of TRUPACT-II vessels	WP-1900, "Rocky Flats Compliance Plan for TRUPACT-II Authorized Methods for Payload Control (TRAMPAC)." TRU Waste Management Plan
On-Site transportation	The On-Site Transportation Manual
Off-site transportation	To Be Developed (TBD)

* Note that sampling of sludges and loading of supercompacted waste will be addressed in a future revision of this document.

** Bin loading procedures are required to meet the specific requirements of SNL test plans (SAND 90-1974 & SAND 90-2082)

Special Processes are those in which results are highly dependent on operator skill and/or control of the process, and that specified quality cannot readily be determined by inspection or test of the product. Special processes shall be qualified. "Qualified" means procedures shall be demonstrated to be adequate with specific conditions (environmental, configuration, substrate/matrix, etc.) prior to implementation. Documentation of procedure qualification shall be maintained as a quality record and shall be traceable to the approved procedure. The preferred method of documenting qualification is within the procedure or in documents referenced in the procedure. Special Process procedures also shall specify operator/examiner training and qualification requirements. Operator/examiner training and qualification also shall be conducted according to written and approved procedures.

A special process associated with the WIPP E-WCP is Real-Time Radiography (RTR). This special process is controlled as follows:

Special Process	Procedure	Operator/Examiner Qualification
RTR Examination	QT-1009, "Real-Time Radiography Testing of Transuranic and Low Level Waste"	RFQ-TC-1A, "Qualification and Certification of NDT Personnel" NDT-91-004, "Real-Time Radiography Test Plan and Process Capability Report"

1.6 Indoctrination and Training (Quality Assurance Program)

This requirement is defined by the EG&G Rocky Flats "Quality Assurance Manual" Section QR-2, "Quality Assurance Program." QR-2 establishes requirements and responsibilities for the implementation of the Quality Assurance Program Element, Quality Requirement QR-2, into implementing procedures and documents. It requires that an adequate and appropriate quality assurance program is planned, documented and effectively implemented for activities affecting quality. Section 2.4 of QR-2 further defines the requirements for indoctrination and training and assigns RFP organizations responsibility to define training requirements. These requirements apply to all personnel performing and managing activities affecting quality, to the extent consistent with their importance to safety, health, security, safeguards, transportation, environmental protection and quality.

Each group involved with this project shall submit to the Project Manager a signed letter from each member of the group performing work associated with this project. The letter will document that each person has read and understands the requirements for the project outlined within this document as it applies to the their group. The signed letter shall be maintained in a file by the Project Manager. See Figure 4 in Appendix D for an example of this letter.

1.7 Site Quality Assurance Project Plans (QAPjP)

The WIPP E-WCP QAPP requires that each Project site develop and implement a QAPjP that meets the requirements of section 1.9 of the QAPP. RFP compliance with the WIPP E-WCP requirements defined by the EG&G Rocky Flats "Quality Assurance Manual" Section QR-2, "Quality Assurance Program" as described in QAPjP Section 1.2 above.

1.8 Quality Assurance Programs

1.8.1 Analytical Laboratory

The WIPP E-WCP QAPP requires each Project site's analytical laboratory have a documented Laboratory QA plan that describes general quality assurance procedures specific to the Laboratory normal operations. The laboratory shall have and maintain an effective quality assurance program to govern all areas affecting quality during the collection, receipt, analysis, and reporting of samples and respective data. RFP compliance shall be documented by the RFP "Analytical Laboratories Quality Assurance Plan," 1-10000-ALQAP. Additional aspects of Laboratory Quality can be found in the laboratory procedures (L-procedures) associated with this plan. The Quality Assurance program must be structured to control all areas affecting quality. These areas include, but are not limited to, the following:

- sample and material identification, storage, and handling;
- chain of custody procedures;
- control of measuring and test/inspection equipment;
- training and qualification of personnel;
- document control and revision;
- control of nonconformances;
- corrective action(s);
- human factors;
- independent data validation;
- design control.

1.8.2 Safeguards Measurements

Safeguards Measurements is responsible for assuring that all measurement systems used for nuclear material accountability purposes meet the quality assurance requirements of DOE Order 5633.3. These measurement systems include NDA Counters used to determine nuclear materials in waste drums. The quality assurance program for nuclear material accountability measurement systems is documented in the "Safeguards Measurement Quality Assurance Plan" (SM-QAP). Requirements and responsibilities specific to NDA calibration, operations, and measurements control are detailed in the "Safeguards Measurements Program Management Plan for Nondestructive Assay (NDA)." The organizations responsible for performing NDA measurements must read and concur with the management plan to assure that they meet the applicable requirements. Both the SM-QAP and the NDA Management Plan are issued and controlled by Safeguards Measurements.

1.9 Analytical Laboratory Performance Demonstration Program

The QAPP requires that the RFP Analytical Laboratories participate in an independently administered Performance Demonstration Program (PDP) to demonstrate laboratory conformance to the QA objectives for the Program. The PDP plan contains the requirements of the PDP. Procedure L-5018, "Analytical Data Handling, Reporting, and Storage of Initial and Continuing Procedure Demonstration, Performance Demonstration Samples and VOCs Flammability Procedure Demonstration for the WIPP Project," is the procedure detailing laboratory compliance with the PDP.

1.10 Software Quality Assurance

Each group performing work associated with this project using computers for control of instruments or equipment, or for data reduction, and for data base management shall have an approved Software Quality Assurance Plan in place. Software Quality Assurance (SQA) Plans shall meet the requirement and approvals specified in the Quality Assurance Manual, Section QR-19.

1.11 Quality Improvement

Quality Improvement as defined in the Quality Assurance Manual section QR-20 is not applicable to this project plan.

1.12 Surveillance

Surveillance activity as defined by the Quality Assurance Manual section QR-21 will be conducted by various groups on plant site. Site Quality Engineering will be responsible for assisting in the conduct of surveillance of this program. This is further defined in Section 10.0 of this plan.

1.13 Cost of Quality

Cost of Quality as defined by the Quality Assurance Manual section QR-22 is not applicable to this project.

1.14 Waste Characterization for No-Migration Determination

In response to the DOE's No-Migration Variance Petition (Petition) for the WIPP, EPA published its notice of the final conditional NMD for the WIPP on November 14, 1990 (USEPA, 1990). As a result of this NMD, DOE may place a limited amount of untreated TRU waste subject to the land disposal restrictions under RCRA in the WIPP for the purposes of testing and experimentation. The NMD imposes several conditions on such placement and is for a maximum of ten years. This QAPjP includes the requirements for compliance with those conditions associated with the waste characterization requirements imposed by EPA. Compliance with the other conditions of the NMD (e.g., the air monitoring requirements at the WIPP) are addressed in the WIPP Part B permit application (USDOE, 1991b) and supporting WIPP documents. Table 1-5 contains a list of flammable volatile organic compounds and their lower explosive limit. If the total concentration of all flammable VOC gases exceeds 500 ppmv, then a flammability test shall be conducted on the headspace sample.

To comply with the requirements of the NMD associated with waste sampling and analysis, the following conditions must be met:

- *Headspace Sampling* - Obtain a representative headspace sample of gases and VOCs from the waste containers to be included in the WIPP test program. Within the constraints of the matrix to be sampled, samples must be collected from all layers of confinement that may contain sources of gases or VOCs.

- *Comparability* - Demonstrate, by waste type, that the composition of hazardous constituents in the headspace of containers is similar to those concentrations reported in the Petition. The headspace concentrations of the five major hazardous constituents reported by DOE must be less than or equal to the maximum allowable concentrations in the NMD (Table 1.4A).

- *No-Migration Demonstration* - Demonstrate, by waste type, that the no-migration finding by EPA remains valid by demonstrating that for each container of waste to be sent to the WIPP (drum or bin), the mean headspace concentrations of three of the hazardous constituents reported in the Petition are less than or equal to the mean headspace concentrations included in the NMD (Table 1-4B).

- *Flammability* - Demonstrate that each waste container emplaced underground at the WIPP has no layer of confinement containing flammable mixtures of gases (H_2 and CH_4) and VOCs (Table 1-5) or mixtures of gases and VOCs that could become flammable when mixed with air.

1.14.1 Headspace Sampling

Pretest waste characterization for the bin-scale tests will include sampling gases and VOCs from three areas within drums of TRU waste. These areas include (1) the drum headspace (i.e., the headspace directly under the drum lid), (2) the 55-gallon poly bag headspace, and (3) the innermost layers of confinement headspace. Drum headspace sampling will be included in Revision 2 of the QAPP to address future compliance during the alcove tests and operational phase. The 55-gallon poly bag and the innermost layers of confinement headspace sampling procedures are described in Section 4.3. In addition, bin headspace samples shall be obtained.

In order to demonstrate compliance in the future when drums could be directly emplaced in the WIPP, DOE must demonstrate to EPA's satisfaction that a drum headspace gas sample is representative of the gases and VOCs within the entire drum. Although compliance with specific conditions of the NMD during the bin-scale tests may be demonstrated based on the results of sampling and analyzing the headspace gases and VOCs in an experimental bin, samples must be obtained from all layers within the drums included in that bin. The data obtained from all the sampling locations will be evaluated by DOE to assess the need to obtain additional information on the concentrations of hazardous constituents within drums that may be emplaced in the WIPP during the alcove tests.

1.14.2 Comparability

To comply with the maximum concentration comparability condition of the NMD, headspace samples from within the 55-gallon poly bag and from the innermost layers of confinement shall be analyzed using Program-approved analytical procedures to determine the concentrations of carbon tetrachloride (CCl_4), methylene chloride (CH_2Cl_2) 1,1,1-trichloro-thane (TCA), trichloroethylene (TCE), and 1,1,2-trichloro-1,2,2-trifluroethane (Freon-113). The upper 90% confidence limit value of the highest measured concentration of each of these five major constituents found in the innermost layers of confinement shall be compared to the compliance concentrations listed in Table 1-4A.

The upper 90% confidence limit value of the measured concentration of the five major hazardous constituents within the 55-gallon poly bag headspace shall also be compared to the allowable concentrations in Table 1-4A. If this comparison and the one described above indicate that the highest concentrations of each of the five major hazardous constituents are less than the maximum allowable concentrations in Table 1-4A, then DOE may place the contents of that drum into a bin for inclusion in the WIPP test program. If drums of waste are loaded into a bin prior to receipt of results from 55-gallon poly bag and innermost layers of confinement headspace sampling and analyses, the entire bin would be rejected if the data indicated that any drum is not in compliance with regard to the comparability criteria. Drum headspace sampling shall be included in Revision 2 of the QAPP. Results of drum headspace sampling will be compared to 55-gallon poly bag and innermost layers of confinement to assess demonstration of comparability.

1.14.3 No-Migration Demonstration

To comply with this condition of the NMD during the bin-scale tests, a headspace sample from within each experimental bin shall be collected as discussed in Section 4.3. Headspace samples from the experimental bins shall be analyzed using Program-approved analytical procedures to determine the concentrations of CCl_4, CH_2Cl_2, and TCE. Once determined, the upper 90% confidence limit value of the measured headspace concentrations of each of these hazardous constituents shall be compared to the allowable concentrations specified in Table 1-4B. If this comparison indicates that the headspace concentrations of each of the three hazardous constituents are less than those specified, the bin may be emplaced in the WIPP as part of the WIPP test program.

1.14.4 Flammability

A representative sample shall be obtained from the bin headspace and analyzed for flammable VOCs (Table 1-5) using Program-approved procedures as discussed in Section 7.7.

Flammable VOCs

Bin headspace analytical results shall be evaluated to determine if significant levels of flammable VOCs are present in the bins included in the WIPP test program. Significant levels of flammable VOCs (Table 1-5) are defined as measured concentrations of 500 ppmv or greater. To perform this evaluation, the upper 90% confidence limit value of the measured concentrations of all analytes (Table 1-5) shall be summed. If the summed value exceeds 500 ppmv, a theoretical lower explosive limit (LEL) shall be calculated using the concentrations of the flammable VOCs plus hydrogen and methane. The flammability of the headspace sample shall be determined by using a modified version of ASTM Method E 681-85. For purposes of complying with the NMD, a headspace VOC mixture shall be considered flammable if, under the specified conditions of the test, the mixture propagates a flame from the ignition source to the test vessel walls.

If the headspace concentrations of flammable VOCs exceeds 500 ppmv, this bin currently may not be transported in the TRUPACT-II. Therefore, this bin must remain in storage at the generator storage site until further assessment and resolution by DOE.

Le Chatelier Formula

For bins of waste that contain headspace concentrations of flammable VOCs less than 500 ppmv, the Le Chatelier formula (Coward and Jones, 1952) shall be used to determine if a headspace gas mixture exceeds 50% of the lower explosive limit (LEL) for binary mixtures of hydrogen and methane. Calculations using the Le Chatelier Formula is explained in Appendix E.

Emplacement Time Determination

The length of time during waste handling activities in which the mixture of H_2 and CH_4 will remain below 50% of the theoretical LEL shall be determined, and the bin shall be emplaced prior to exceeding that time limit. During the course of the bin-scale tests, theoretically determined hydrogen concentrations shall be verified by sampling the headspace gases. Bin sampling and analysis allows for maximization of the amount of time prior to emplacement.

Table 1-4 Volatile Organic Compounds Headspace Concentrations

A

Maximum Allowable Volatile Organic Compound Headspace Concentrations (Volume Percent) by Waste Type (a, b) for Comparability Reported by DOE

Constituent	Type I	Type II	Type III	Type IV
Carbon tetrachloride	0.08	0.18	0.58	8.18
Methylene chloride	0.44	0.84	0.5	1.42
1,1,1-Trichloroethane	1.88	5.68	2.12	14.96
Trichloroethylene	0.08	0.34	0.28	0.28
1,1,2-Trichloro-1,2,2-trifluoroethane	0.05	1.62	5.74	20.8

(a) Waste types are identified in USDOE, 1989.
(b) Concentration values from the No-Migration Determination (USEPA, 1990). These concentrations are obtained by multiplying the maximum VOC headspace concentrations reported in the Petition by two.

B

Allowable Mean Volatile Organic Compound Headspace Concentrations (Volume Percent) by Waste Type (a, b), for No-Migration Demonstration

Constituent	Type I	Type II	Type III	Type IV
Carbon tetrachloride	0.24	0.26	0.30	6.90
Methylene chloride	0.39	0.42	0.33	0.93
Trichloroethylene	0.25	0.28	0.29	0.38

(a) Waste types are identified in USDOE, 1989.
(b) Concentration values from the No-Migration Determination (USEPA, 1990). These concentration values are obtained by multiplying the mean VOC headspace concentrations reported in the petition by ten.

Table 1-5 Flammable Volatile Organic Compounds (a) (VOCs) And Their Lower Explosive Limit (LEL) Values (b,c)

VOCs	LEL (v/v%)
Acetone	2.5
Benzene	1.3
n-Butanol	1.4
2-Butanone	1.4
Chlorobenzene	1.3
Cyclohexane	1.3
1,1-Dichloroethane	5.6
1,2-Dichloroethane	6.2
1,1-Dichloroethene	6.5
cis-1,2-Dichloroethene	5.6
Ethyl benzene	1.0
Diethyl ether	1.9
Methanol	6.0
4-Methyl-2-pentanone	1.2
Toluene	1.2
1,2,4-Trimethylbenzene	0.9
1,3,5-Trimethylbenzene	1.4
o-Xylene	1.0
m-Xylene	1.1
p-Xylene	1.1

(a) VOCs identified as flammable by EPA for the NMD.EPA determined flammability by assessing potential fire hazards under WIPP conditions on a compound by compound basis.

(b) The lower explosive limit is also referred to as the lower flammable limit (ASTM, 1989 and NFPA, 1986).

(c) Only the most conservative lower explosive limit values are reprinted (NFPA, 1986 and De Renzo, 1986).

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section describes the Rocky Flats Plant (RFP) WIPP Experimental Waste Characterization Project organizational structure, functional responsibilities, levels of authority, and lines of communication for activities associated with this project. In addition, a current listing of all key project personnel is shown in Appendix A.

2.1 RFP WIPP Experimental Waste Characterization Project Organization And Responsibilities

The WIPP Experimental Waste Characterization Project is managed by the RFP Environmental and Waste Management organization. The following section describes the RFP Experimental Waste Characterization Project functional organization and responsibilities.

2.1.1 DOE-Rocky Flats Office

The DOE Rocky Flats Office (DOE-RFO) shall review and approve this document and is responsible for ensuring that this document is in compliance with the requirements of the Quality Assurance Program Plan for the WIPP Experimental-Waste Characterization Program (QAPP) and all DOE Orders. In addition, DOE-RFO is responsible for ensuring that resources and funding are available to accomplish this project at RFP. Any revisions to this document must be approved by DOE-RFO prior to implementation of the change. The DOE-RFO is responsible for providing an interface among the operating contractor at RFP, the WIPP-WACCC, other DOE operations offices, and DOE Headquarters to resolve any problems that could affect project quality.

2.1.2 DOE-RFO Project Manager

The DOE-RFO Project Manager shall ensure that all activities are conducted in accordance with the QAPP, this document, and all appropriate EPA, OSHA, State, and DOE regulations and requirements; shall monitor the program budget and schedule; and shall ensure the availability of necessary personnel, equipment, subcontractors, and services. The Project Manager also will have primary responsibility for the technical quality of the program and the safe and successful completion of all activities necessary to complete this project. The DOE-RFO Project Manager shall provide coordination and interface with DOE Headquarters, DOE-WIPP Project Office and WACCC personnel.

2.1.3 EG&G-RFP Project Manager

The EG&G-RFP Project Manager is responsible for the oversight of the project and reports to the Manager of Environmental and Waste Programs. These responsibilities require that the EG&G-RFP Project Manager:

- provide project specific interface with DOE-RFO, Westinghouse WIPP (WHC), other DOE Contractor Operated Facilities, and regulatory agencies;
- review and have concurrence of the site QAPjP and Standard Operating Procedures specific to his project;
- annually review the site QAPjP, schedule and coordinate reviews and approve necessary revisions;
- review and verify that the bin case data package is complete;
- provide notification to the laboratory of bin case data approval;
- sign transmittal of the final bin case data package;
- review and make disposition of project nonconformances and operational variances;
- provide direction to the EG&G-RFP Project Quality Assurance Officer, Project Data Control Officer, Project Data Validation Officer, and project staff as necessary;
- prepare monthly progress reports for EG&G-RFP management and DOE-RFO.

2.1.4 EG&G-RFP Project Quality Assurance Officer

The EG&G-RFP Project Quality Assurance Officer (QAO) is responsible for ensuring that all QA requirements are met and that the site QAPjP is implemented. These responsibilities require that the EG&G-RFP Project QAO:

- develop, review, approve, issue, maintain and control the site QAPjP;

- provide day-to-day guidance on quality related matters as necessary to project staff;
- identify and report quality problems to the EG&G-RFP Project Manager, and initiate, recommend, and track corrective actions to closure;
- review and verify the bin case data package is complete;
- assure review and approval of disposition of nonconformances and operational variances;
- perform twice annually audits of the project activities;
- provide monthly quality reports to management;
- interface with the EG&G-RFP Analytical Laboratory Quality Assurance Officer.
- review standard operating procedures specific to this project for the Project Manager.

2.1.5 EG&G-RFP Project Data Control Officer

The EG&G-RFP Project Data Control Officer (PDCO) supports the EG&G-RFP Project QAO in project quality surveillance, data coordination and compilation. All original quality records will be sent to the PDCO from the data generators (e.g., Analytical Laboratories, Non-Destructive Testing, etc.). The PDCO will be responsible for compiling and verifying that all quality records for each bin case data package are complete. Once this has been accomplished the PDCO will submit the bin case data package to the Project Validation Officer. Upon completion of the project level validation, reporting and approval, the PDCO shall transmit the bin case data package to the Project Document/Records Control Officer for inclusion in the project records management system.

2.1.6 EG&G-RFP Project Data Validation Officer

The Project Data Validation Officer (PDVO) shall be responsible for all project level data validation and data reduction pertaining to the NMD, data performance verification, NMD calculation of emplacement times, and data reporting to the EG&G-RFP Project Manager and QAO. Upon completion of the data validation and approval from the EG&G-RFP Project Manager and QAO, the PDVO will transmit the bin case data package to the PDCO.

2.1.7 EG&G-RFP Project Document/Records Control Officer

The EG&G-RFP Project Document/Records Control Officer (PDRCO) shall maintain all the WIPP Waste Characterization Test Program project office controlled documents and maintain a filing system for the storage of all administrative documents. The PDRCO shall control the bin case data package upon completion of project level validation and reporting, and shall transmit the data package to DOE-RFO Project Manager upon receipt from the PDCO. The DOE-RFO Project Manager will be responsible for transmitting the bin case data package to DOE-WIPP.

2.1.8 EG&G-RFP Analytical Laboratories Project Manager

The EG&G-RFP Analytical Laboratories Project Manager has overall responsibility for laboratory technical quality, cost, control, laboratory personnel management, and adherence to schedules. Responsibilities for these functions may be delegated to Analytical Laboratories Project Manager or subordinate managers. These responsibilities require that the EG&G-RFP Analytical Laboratories comply with the following items:

- interface with the EG&G-RFP Project Manager and the EG&G-RFP Project QAO on program activities affecting cost, schedule and quality related matters;

- review, approve and release all analytical reports including the analytical data package;

- coordinate and schedule analytical work to support the project;

- ensure that implementing, preventive and corrective actions have been closed;

- review and approve all analytical laboratory standard operating procedures and reports:
- review and approve laboratory Quality Assurance Plan;
- appoint staff to the project;
- manage the implementation of the Analytical Laboratory's role and responsibilities;
- verify that all requirements of the QAPP and QAPjP have been met.

2.1.9 EG&G-RFP Analytical Laboratories WIPP Project Quality Assurance Officer

The EG&G-RFP Analytical Laboratories WIPP Project Quality Assurance Officer (LPQAO) is responsible for the direction of all the Analytical Laboratories quality assurance activities and is matrixed to the Analytical Laboratories Program Manager in fulfilling this function. The LPQAO interfaces directly with the Project QAO on analytical laboratory specific quality assurance matters related to this project. In addition, these responsibilities require that the LPQAO:

- ensures that all project laboratory personnel have a clear understanding of the laboratory's quality assurance program, as well as specific and special quality control requirements for the project;
- develop, review, and revise laboratory related portions of the site QAPjP;
- provide quality surveillance of analytical laboratory project related activities;
- track and report analytical laboratory nonconformances and operational variances for management report to the Project QAO;
- verify project quality assurance requirements implementation;

- identify and report laboratory quality deficiencies to the appropriate project personnel and the Project QAO;
- initiate, recommend and track corrective actions to closure;
- review and verify that all analytical laboratory standard operating procedures complies with QAPjP and QAPP requirements;
- review and approves all data packages before release to the PDCO;
- prepare and issue a monthly report of analytical laboratory quality assurance activities to the Analytical Laboratory Project Manager and Project QAO;
- ensure that all analytical laboratory requirements of the QAPP and QAPjP have been met.

2.1.10 EG&G-RFP Solid Waste Treatment Project Manager

The EG&G-RFP Solid Waste Treatment Project Manager (SWTPM) is responsible for all facility operational aspects of the program involving the physical characterization of the waste in the Building 770 Size Reduction Vault. These responsibilities require that the SWTPM:

- manage the bin packaging and waste characterization activities in accordance with the QAPP, QAPjP, and the Sandia National Laboratories Test Plan and all applicable OSHA, DOE, EPA, DOT, and Colorado State requirements;
- interface with the EG&G-RFP Project Manager and Project QAO on project activities affecting cost, schedule and quality related matters;
- review and approve all facility work plans, standard operating procedures, program deliverables, schedules, contract changes and manpower allocations;
- ensure that operator training is conducted according to the requirements in the QAPP;

- ensure that physical waste characterization data is obtained for all waste containers used in the WIPP Bin-Scale Test program;
- ensure that weighing systems used during physical examination are calibrated using NIST traceable standards;
- ensure that mass balances ranging from 10 g to 450 kg are recalibrated in accordance with manufacturers' specifications annually and after major maintenance;
- ensure that operational checks with a reference standard are conducted at the beginning of each work shift;
- ensure that all waste characterization activities are video/audio recorded;
- ensure that audio/video equipment are checked prior to each day's use, to include recording and observation of test patterns;
- review and approve all data forms/reports;
- ensure that all data is recorded and complete;
- verify that all applicable QAPjP and QAPP requirements are met;
- review and concur with the QAPjP;
- ensure that one copy of the physical waste characterization data forms/report are retained in the SWT files, one copy is attached to the Bin-Scale Test Chain of Custody Log, and the original data forms/reports are transmitted to the EG&G-RFP PDCO, as soon as possible after data generation;
- ensure that all the physical waste characterization video/audio tapes for each drum are transmitted to the EG&G-RFP Project Data Control Officer and one video/audio tape is retained in the SWT files;

- ensure that replicate measurements of the waste container contents are performed and that one in twenty, or at least one item, or waste material category from each drum is reweighed after all other drum contents are weighed;

- ensure all SWT personnel are trained per the requirements of the QAPjP;

- ensure that preventive and routine maintenance is conducted in accordance with ASME NQA-1.

- ensure that all non-conformances are reported and corrective actions have been completed.

2.1.11 Non-Destructive Testing Project Manager

The Non-Destructive Testing (NDT) Project Manager has overall responsibility for Real-Time Radiography (RTR) of waste containers, and leak testing activities involving the WIPP Bin-Scale Test Program bins and the TRUPACT-II. These responsibilities require that the NDT Project Manager:

- interface with the EG&G-RFP Project Manager and Project QAO on project activities affecting cost, schedule and quality related matters;

- review and approve all the RTR data reports/forms;

- ensure that all RTR data reports/forms are complete and receive an independent technical review;

- ensure that replicate scans are performed on one of every six drums for each bin to verify that the contents, as recorded on the RTR data form, have been correctly identified;

- ensure that independent observation of at least one drum scan per shift is performed;

- coordinate and schedule NDT work to support the project;

- review and approve all the NDT standard operating procedures and forms/reports;

- verify that all QAPjP and QAPP requirements are met;
- review and concur with the QAPjP;
- ensure that one copy of the RTR data forms/report is retained in the NDT files, one copy is attached to the Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports are transmitted to the EG&G-RFP PDCO, as soon as possible after data generation;
- ensure that all the RTR video/audio tapes for each drum are transmitted to the EG&G-RFP Project Data Control Officer and one video/audio tape is retained in the NDT files;
- assign project personnel;
- ensure all RTR Operators are trained and certified to existing industry standards and comply with the training and qualification requirements of ASME NQA-1;
- ensure that requalification of RTR Operators is accomplished at least every two years and at a minimum meet the training requirements identified in the QAPP;
- ensure that preventive and routine maintenance is conducted in accordance with the requirements of this QAPjP;
- ensure that all non-conformances are reported and corrective actions have been completed.

2.1.12 Nondestructive Assay Project Manager

The Nondestructive Assay (NDA) Project Manager has overall responsibility for assaying of waste containers for the WIPP Bin-Scale Test Program. These responsibilities require that the NDA Project Manager:

- interface with the EG&G-RFP Project Manager and Project QAO on project activities affecting cost, schedule and quality related matters;
- review and approve all the NDA data reports/forms;

- assure that all NDA data reports/forms are complete and receive an independent technical review;
- assure that NDA data is obtained for all the waste containers used in the program;
- coordinate and schedule NDA work to support the project;
- review and approve all the NDA standard operating procedures and forms/reports;
- verify that all QAPjP and QAPP requirements are met;
- review and concur with the QAPjP;
- assure that one copy of the NDA data forms/report are retained in the NDA files, one copy is attached to the Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports are transmitted to the EG&G-RFP PDCO, as soon as possible after data generation;
- assure that the isotopic assay systems are checked through the use of calibration and background drums as well as replicate readings;
- assure performance checks are completed at the beginning and end of each work shift;
- assure that independent replicate measurements are performed on 10 percent of the waste drums;
- assign project personnel;
- assure all NDA Operators are trained and certified to existing industry standards and comply with the training and qualification requirements of ASME NQA-1, Element 2, except for Supplement 2S-2;
- assure that requalification of NDA Operators is accomplished at least every two years and at a minimum meet the training requirements identified in the QAPP;

- assure that preventive and routine maintenance is conducted in accordance with the requirements of this QAPjP;

- assure that all non-conformances are reported and corrective actions have been completed.

2.1.13 Safeguards Measurements Project Manager

The Safeguards Measurements department reports independently of waste generator and waste assay organizations through the Technical Support department, and performs the following activities related to WIPP E-WCP.

- independent accuracy and precision assessments of segregating radioactivity counters, and calibration of counters to standard radioactive sources;

- maintains assay instruments measurement control and calibration records;

- radioactivity counter hardware and software maintenance and safeguards;

- review and resolve the discrepancies between the results from passive and active drum counts;

- assure that performance of software for controlling the measurement process and analyzing data is demonstrated and documented in accordance with ASME NQA-1, Element 11, Supplement 11S-2.

2.2 RFP Project Support Organizations And Responsibilities

The responsibilities of RFP organizations providing support to the WIPP E-WCP and related activities are described in the following sections.

2.2.1 Waste Generators

A waste generator at the Rocky Flats Plant (RFP) is defined to include any person whose act or process produces a waste, or whose act causes a waste to become subject to regulation or DOE order. A waste generator includes DOE prime contractors and EG&G subcontractors.

RCRA statutes stipulate that generators are responsible for hazardous wastes from "cradle to grave," or from the time wastes are generated continuing through and after emplacement at a RCRA disposal site. The EPA considers the RFP as a whole as a hazardous waste generator. However, specific hazardous waste management roles and responsibilities are referenced in the Hazardous Waste Requirements Manual 5-23000-WRM. Responsibilities are assigned to RFP organizations to systematically and effectively manage wastes from cradle to grave. These responsibilities require that the generator:

- Properly segregate RCRA and TSCA regulated wastes from each other and from those not regulated by RCRA or TSCA, using one or more of the following information sources: the "Waste Stream and Residue Identification and Characterization Building Books"; analytical data; Material Safety Data Sheets; or documented recommendations from plant RCRA experts in the Waste Guidance department.

- Properly segregate wastes by matrix type (IDC or WFN), hazardous or toxic material content, and radioactive contamination levels.

- Provide physical control of TRU waste containers prior to TID sealing using locking fixtures and/or enclosures.

- Handle and package all wastes generated in a safe manner and in accordance with applicable RFP procedures.

- Maintain the accuracy of the "Waste Stream and Residue Identification and Characterization" (WSRIC) building books by submitting change requests to the Waste Programs organization.

- Each organization at RFP which generates wastes shall deliver and maintain in current status of Waste Generator On-the-Job Training (OJT) for all personnel packaging wastes or residues.

- Certify, by signature on the "Waste/Residue Traveler," that all newly generated waste is properly identified, segregated, and characterized to the best of the generator's knowledge and belief according to applicable written guidance and procedures.

Each generator organization is responsible to ensure that all waste handling and packaging personnel are trained. as required by RFP policy.

2.2.2 Waste Certification Official

The waste Certification Official (WCO) is responsible to certify that TRU Waste meets all applicable Waste Acceptance Criteria. The WCO is independent of waste generation organizations and reports through Waste Quality Engineering to the Assistant General Manager for Quality Assurance. The WCO, by signing the certification statement and labels, certifies to DOE WIPP and attests to the Traffic department that the TRU waste shipment meets the DOE, EPA, DOT requirements and the WIPP-WAC waste package, transport, and acceptance criteria. The WCO signature certifies that wastes are properly segregated and packaged. This includes designation of wastes as not containing RCRA/TSCA hazardous constituents, or Land Disposal Restricted materials, as applicable, based on a thorough review of inspection, test, and surveillance information. This requires a day-to-day and shipment-by-shipment appraisal and evaluation of process controls and quality control/assurance checks, such as real-time radiography results, dock inspections, in-process inspections, surveillance program results, nonconformance conditions, and completed corrective actions. Only after a thorough review of these data is the shipment certification completed.

2.2.3 Building/Area Custodian (or RCRA Custodian)

The Building/Area Custodian is responsible to advise and assist operations personnel in proper waste handling and packaging, and in the proper use, storage, and disposal of hazardous or toxic materials. The Building/Area Custodian is appointed by building operations management, and must assure that decisions regarding hazardous wastes are in agreement with and supported by the Waste Guidance group at RFP. The Building/Area Custodian is required to understand the requirements for 90-day, satellite, and permitted waste storage areas, as specified by RCRA statutes and Hazardous Waste Requirements Manual (HWRM), and manage the waste in these areas in compliance with those requirements.

2.2.4 Waste Programs

The Waste Programs department is responsible to provide technical and systems development support to generators. Waste Programs responsibilities for TRU waste are:

- Coordination and documentation of the overall RFP waste management program.

- Procuring approved TRU waste containers.

- Preparation, issue, control, and maintenance of the TRU Waste Management Plan, the Rocky Flats Compliance Plan for TRUPACT-II Authorized Methods for Payload Control, the Quality Assurance Project Plan for the WIPP Experimental Test Program, and Waste Profile Forms.

- Preparation, issue, control, and maintenance of waste packaging procedures and waste segregation guidance documents.

- Preparation and maintenance of related training programs, such as "RCRA Custodian Training" and "Waste Generator Training."

- Shipment forecasting and preparation of purchase orders for TRU waste shipment to the WIPP.

- Develope training program qualification standards and qualification cards for job descriptions and duty areas related to waste management.

- Provide program management support to waste management related projects and processes.

- Provide program-specific interface with DOE, NTS, WIPP, and other regulatory agencies.

- Provide RCRA waste engineering guidance, regulatory interpretation, and consulting services to waste generator organizations upon request, and assessment of RCRA compliance through routine RCRA program surveillance.

- Administer and maintain the RFP waste stream sampling and analysis program.

- Generate of the semi-annual recertification report, waste stream forecasts, waste stream disposal applications and waste stream process change reports to WIPP.

- Provide technical guidance for treatment and/or disposition of wastes.

- Assess RCRA program compliance through RCRA inspections and RFP operations guidance for regulatory interpretation and compliance issues.

- Determine the need for waste management related quality assurance or process control plans.

- Assess the complexity and risk of failure of waste management related activities.

- Selectively apply quality assurance requirements that acceptably mitigate risks.

- Document the selective application of quality requirements in management plans, QA plans, or process control plans.

- Maintain the Waste and Environmental Management System (WEMS) computer database.

- Maintenance of the content and accuracy of the WSRIC building books when revision requests are received by generator organizations.

2.2.5 Technology Development (TD)

The TD organization reports to the Associate General Manager for E&WM, and performs:

- Long-range technology-related waste management planning.

- Mixed-waste treatment process development and implementation.

- Technical support to Waste Programs for waste treatment process control.

- NDA instrumentation development.

2.2.6 Quality Assurance

The Quality Assurance department reports independently to the General Manager of the RFP, and is responsible for a variety of functions, including the following relating to TRU waste processing and certification:

2.2.6.1 Product Assurance

Non-Destructive Testing, or Real-Time Radiography (RTR) of all TRU waste to verify compliance to waste acceptance criteria such as free liquids and compressed gases.

2.2.6.2 Assurance Audits

Audit of the TRU Waste Program are conducted to determine the effectiveness and implementation of quality systems, in accordance with QR-2 of the RFP QAM.

2.2.6.3 Analytical Laboratories

Material testing and sample analysis to support waste stream characterization.

2.2.6.4 Statistical Applications

Statistical support and validation for sampling plan development, and process development designed experiments.

2.2.6.5 Metrology Laboratories

Certified calibration of instruments used in the packaging and processing of waste.

2.2.6.6 Site Quality Assurance

The Site QA group has a key role in supporting the TRU Waste Program within several functional groups, as discussed in the following section.

2.2.7 Site Quality Assurance

The mission of Site QA is to interpret quality assurance requirements; provide guidance and direction to plant organizations in the implementation of quality assurance requirements, and provide oversight of plant operations to verify effective quality achievement in non-weapons programs.

Six organizations, and a Project Administration office, report to the Manager of Site QA:

- Site Quality Administrative Support (SQAS)
- Waste Quality Engineering (WQE)
- Waste Inspection (WI)
- Systems Quality Engineering (SQE)
- Materials and Facilities Quality Assurance (M&FQA)
- Procurement Quality Engineering (PQE)

The specific requirements for each of these organizations is discussed in the following sections.

2.2.7.1 Site Quality Administrative Support

Site Quality Administrative Support (SQAS) is responsible for providing administrative support to the Site QA Organization. Specific responsibilities are:

- Develop and maintain a Quality Records System compliant with the EG&G Rocky Flats Quality Assurance Manual, DOE requirements, and the Records Management Manual for QA records generated by the Site QA organization.
- Develop and maintain a Document Control System for publication and distribution of controlled documents generated by Site QA organizations.

- Provide inputs to resource management requests.
- Track and report budget performance.
- Coordinate sub-contractor contracts for submittal, tracking, and authorization of payments.
- Coordinate with Industrial Engineering on facility space requests.
- Provide database management for Deficiency Reports, Nonconformance Reports, and Corrective Action Request tracking systems. This includes data entry, publication of routine reports, and interface with Information Systems (IS) on necessary software issues.
- Provide guidance and assistance at the plant level for implementation of the CATT (TNT) system. This includes maintaining the users group, maintaining the users manual, providing training as requested, and interfacing with IS regarding software changes.
- Provide guidance to plant organizations regarding software quality assurance.
- Provide database development support to Site QA organizations as requested, in order to standardize software programs and reports, for more efficient use of Site QA resources.
- Perform compliance reviews of Site QA organizations for compliance with requirements such as document control, quality records management, safety meeting frequency and documentation, currency of training, software quality assurance requirements, and other routine items.
- Develop procedures for controlling the day-to-day operations of the SQAS organization.

2.2.7.2 Waste Quality Engineering

Waste Quality Engineering (WQE) is responsible for accomplishment of the Site QA functions as they relate specifically to Waste Management (radioactive, hazardous, mixed, and sanitary), and for interfacing, as required, with Environmental Protection/Restoration, and Transportation Programs. This includes the following specific responsibilities relative to these assigned programs:

- Provide guidance and direction to Environmental and Waste Management (E&WM), Traffic, functional, and program managers, as requested, regarding the interpretation and application of quality assurance requirements as stated in the Rocky Flats EG&G Quality Program Manual, Environmental Protection Agency (EPA) Quality Requirements (QAMS), and DOE Burial Site requirements documents.

- Review technical documentation relating to assigned programs.

- Review policies and procedures for conducting and controlling work related to waste management, Environmental Protection and Transportation to ensure that they adequately address all applicable quality assurance and regulatory requirements.

- Verify implementation and compliance of quality assurance program requirements by surveillance, compliance reviews, and technical reviews to ensure that all applicable requirements are met, and that desired results are achieved; report results to appropriate Plant Management.

- Requirements for transportation to the Traffic department and the DOE Disposal Sites.

- Track packaged waste-related nonconformances, dispositions, and corrective actions; verify that problems are analyzed, that corrective actions are planned and taken, and that desired results are achieved as a result of corrective action taken.

- Initiate Deficiency Reports and Corrective Action Requests, as appropriate, resulting from WQE and Waste Inspection (WI) activities; Track Deficiency Reports and corrective actions; verify that problems are analyzed, that corrective actions are planned and taken, and that desired results are achieved.

- Develop and maintain WI procedures.

- Evaluate WI data to identify conditions adverse to quality or opportunities for improvement.

- Provide technical assistance to WI as needed.

- Provide subject matter experts to Quality Management Systems for development of WQE and WI personnel training.

- Develop procedures for controlling day-to-day operations of the WQE Organization.

2.2.7.3 Waste Inspection

Waste Inspection (WI) is responsible for performing inspection in support of Waste Management Programs and the certification process for radioactive waste shipments. Specific responsibilities are:

- Final and loading inspection of filled waste containers in support of the certification process.

- Inspection of empty waste containers prior to use by waste generators.

- 100% In-Process inspections of subcontractor filled containers.

- In-process inspection of waste containers filled by EG&G employees, as directed by Waste Inspection Manager.

- Identification of nonconforming waste containers and initiation of appropriate Nonconformance Reports; verification of correction of nonconformances.

- Provide subject matter experts to Quality Management Systems for the development of Inspector training programs.

- Review and approve strip-out procedures.

- Coordinate problem resolutions for issues relating to waste packaging and shipping.

2.2.7.4 Systems Quality Engineering

Systems Quality Engineering (SQE) is responsible for accomplishment of the Site QA functions as they relate to plant-level QA program development, implementation, and verification of all the Quality Assurance elements except Software QA and Control of Purchased Items and Services; and accomplishment of the Site QA functions as they relate specifically to quality plans and their intended application for Health and Safety, Nuclear Safety, Safeguards, Security, Fire Protection, and Emergency Preparedness programs.

Specific responsibilities include:

- Interpret such pertinent requirements imposed by DOE as DOE Order 5700.6B (including the referenced requirements of ANSI/ASME NQA-1), and other applicable DOE Orders and Rocky Flats Office DOE directives for incorporation into the EG&G Quality Assurance Manual.

- Research and develop the EG&G QA Manual, including development of select procedures for implementing the elements of the QA Program as they relate to non-weapons applications; interpret the requirements of these procedures as necessary.

- Perform technical, administrative, and compliance reviews, and recommend acceptance or rejection of such documentation as the following:

  - Quality assurance plans;

  - Quality assurance implementing procedures;

  - Operational safety requirements and non-building specific implementing procedures;

  - Other documentation affecting the quality of items, processes, and services.

- Review policies and procedures for conducting and controlling work at the plant level, or specific to the assigned program responsibilities, to ensure that they adequately address all applicable quality assurance requirements.

- Verify implementation and compliance of quality assurance program requirements by surveillance and compliance reviews, to ensure that all applicable requirements are met, and that desired results are achieved; reports results to appropriate Plant Management.

- Provide guidance and direction to plant organizations, as requested, regarding the interpretation and application of quality assurance requirements as stated in the EG&G Quality Assurance Manual and other applicable requirements documents (except in the area of Software Quality Assurance and Control of Purchased Items).

- Initiate Deficiency Reports, Stop Work Actions, and Corrective Action Requests, as appropriate, resulting from SQE activities; follow up on Deficiency Reports, and corrective actions; verify that problems are analyzed, that corrective actions are planned and taken, and that desired results are achieved.

- Provide subject matter experts to the Quality Management Systems for development of plant-level training related to the Quality Assurance Program.

- Provide quality engineers for special projects generic to the plant QA program.

- Develop procedures for controlling the day-to-day operations of the SQE organization.

- Coordinate development of procedures for the Site QA Organization, where appropriate.

2.2.7.5 Materials and Facilities Quality Assurance

Materials and Facilities Quality Assurance (M&FQA) is responsible for accomplishment of the Site QA functions as they relate specifically to Facilities Siting, Design, Construction, Operation, Decommissioning, and receiving certification of procured items.

2.2.7.6 Procurement Quality Engineering

Procurement Quality Engineering (PQE) is responsible for accomplishment of the Site QA functions as they relate specifically to the procurement of materials, equipment, and services. Responsibilities specific to the TRU Waste Program include:

- Provide quality engineering input to the Rocky Flats Plant Standards (SX series, et al.) as they relate to waste containers, packaging hardware, and ancillary equipment.

- Quality Assurance evaluation of waste container, packaging hardware and ancillary equipment vendors, and maintenance of a certified vendors list.

- Retention of container procurement records.

- Evaluation of TRU waste container suppliers' quality assurance programs.

2.2.8 Waste Operations

The Waste Operations department reports to the Associate General Manager for Environmental and Waste Management.

2.2.8.1 Liquid Waste Treatment Operations

- Receive liquid process wastes and incidental water from secondary containments, berms, etc., from both PA and non-PA buildings.
- Treat liquid process wastes and store.
- Stabilize wastes with cement or other additives and packaging, in the appropriate shipping container.
- Perform WEMS data entry.

2.2.8.2 Solid Waste Treatment Operations

- Process and package HEPA filters.
- Receive and repack rejected waste containers to meet waste acceptance criteria
- Receive and size-reduce waste that does not fit approved containers.
- Store RCRA-regulated wastes in compliance with applicable regulations.
- Perform WEMS data entry.

2.2.8.3 Waste Assay and Shipping Operations

- Responsible for the operation of Non-Destructive Assay equipment used to determine the radionuclide content of TRU waste containers.
- Storage area for off-site shipments.
- Perform WEMS data entry.

- Send rejected waste drums back to generator, and send rejected waste containers back to generator or Solid Waste Treatment Operations for repack.

- Performance check of radionuclide counters.

- Prepare all TRU waste loads for off-site shipment.

- Prepare load lists and other documents that are used by Traffic to prepare shipping documents (EPA Hazardous Waste Manifests and Bills of Lading) after independent verification.

- Final marking and labeling of containers under the guidance of Traffic-issued procedures.

2.2.9 Radiological Operations

The Radiological Operations group reports independently of generator organizations, and performs:

- Waste container radiation protection surveys, including surface alpha, surface beta, and penetrating neutron and gamma radiation.

- Radiation surveys of TRU waste trailers before and after loading.

2.2.10 Traffic

The Traffic department is independent from waste generation, inspection, test and certification organizations, and is responsible for all issues concerning TRU waste shipments and compliance to DOT and WIPP transportation regulations and requirements. In addition, Traffic is responsible for the following:

- Generating and maintaining plant procedures specifying the marking and labeling requirements for waste packages ensuring compliance with DOT regulations.

- Personnel training for DOT Hazardous Materials Transportation, as required in 49 CFR.

- Independent verification of shipment, and preparing the Bill of Lading and the Uniform Hazardous Waste Manifest.

- Notifying the TRU waste disposal site (WIPP) of each shipment prior to departure.

- Certification that applicable requirements are met for off-site shipment.

- Interfacing with WIPP, QE/WC, and Waste Operations on transportation issues.

- Maintaining an auditable records system pertaining to shipments.

- Pre-loading and post-loading vehicle, trailer, and load inspections.

- Maintenance of Site TRANSCOM terminal.

2.2.11 Safeguards Measurements

The Safeguards Measurements department reports independently of waste generator and waste assay organizations through the Technical Support department and performs the following activities related to waste management:

- Independent accuracy and precision assessment of segregating radioactivity counters, and calibration of counters to standard radioactive sources.

- Maintains assay instrument measurement control and calibration records.

- NDA counter hardware and software maintenance and safeguards.

2.2.12 Performance Based Training

The Performance Based Training (PBT) department reports directly to the RFP General Manager and supports waste management activities. PBT activities includes the administration of classroom training, on the job training, and qualification cards. Additional activities are as follows:

- Reviews waste management procedures to assure accuracy of training programs.

- Training materials are approved and verified by PBT, Supervision, and/or OPs Manager to assure compliance with the Training User's Manual.

- Building Quality Performance Manager (BQPM) schedules employees for training and maintains training records.

- Delivers training in support of waste management programs.

2.2.13 Plant Engineering

Document control and design of waste container standards and process equipment drawings.

2.2.14 Radiation Instrumentation

Radiation Instrumentation reports through the Assistant General Manager for Health & Safety and supports waste management activities as follows:

- Calibration of portable radiometric assay equipment.

- Maintenance of radiation instrumentation calibration records.

2.2.15 Wackenhut Security, Inc.

Wackenhut Security reports to the DOE-Rocky Flats Office and has the following waste management related responsibilities:

- General security and access control of waste management units within the RFP.

- Control of waste containers and waste sample containers and related support materials into and out of the PA.

2.3 Frequency And Mechanisms Of Communications

The success of the project at the RFP is in part dependent upon communication among the EG&G-RFP organizations responsible for all aspects of the project, DOE-RFP technical and management personnel, and all key quality assurance personnel. Regular communication between the various participants of the project is critical and encouraged. The most effective way to ensure communications is through weekly project meetings. These meetings include, as required the following personnel or their designated representative:

- DOE-RFP Project Manager or representative
- EG&G-RFP Project Manager
- EG&G-RFP Project Quality Assurance Officer
- EG&G-RFP Project Data Control Officer
- EG&G-RFP Project Document/Records Control Officer
- EG&G-RFP Project Data Validation Officer
- EG&G-RFP Analytical Laboratories Project Manager
- EG&G-RFP Analytical Laboratories WIPP Project Program Quality Assurance Officer
- EG&G-RFP NDT Project Manager
- EG&G-RFP NDA Project Manager
- EG&G-RFP SWT Project Manager
- EG&G-RFP Waste Quality Engineer
- EG&G-RFP Safeguards Measurements
- EG&G-RFP Waste Assay and Shipping Representative
- EG&G-RFP Traffic Representative
- EG&G-RFP Waste Program Information Management Project Manager
- EG&G-RFP Waste Inspection

The EG&G-RFP Project Manager shall be responsible for establishing these weekly meetings. The weekly meeting summaries will be sent to the Project DCO for inclusion in the project files. In addition to these meetings, the Project QAO will prepare monthly QA status and nonconformance reports as specified in Section 14 of the QAPP.

Special occurrences also can require meetings that personnel listed above would attend. These meetings include, but are not limited to, the following occurrences:

- Program and/or project schedule changes
- QA/QC problems
- Facility problems, modifications, and schedules
- New Program or regulatory requirements
- Safety problems

3.0 QUALITY ASSURANCE OBJECTIVES

The purpose of this section is to describe RFP compliance with the quality assurance objectives for the WIPP E-WCP requirements as defined in Section 3 of the QAPP and in accordance with ASME NQA-1 Element 3, and QAMS-005. The waste characterization tests will establish the baseline values for a variety of parameters that also will be measured during the WIPP bin-scale and alcove tests.

Quantitative and qualitative data obtained during waste characterization activities shall be evaluated in terms of precision, accuracy, representativeness, comparability, and completeness. Six waste characterization techniques will be used during this project:

- Real-time radiography (RTR)
- Nondestructive Assay (NDA)
- Headspace sampling
- Visual examination
- Gas and VOC analysis
- Flammability testing

The following sections describe the quality assurance objectives for each of these techniques.

3.1 Real-Time Radiography

The RTR is a qualitative evaluation of the waste container contents. Qualitative measurements obtained from the RTR do not lend themselves to the direct application of standard statistical data validation procedures. However, RTR procedures have been standardized, to the extent possible, in order to reduce uncertainty and to ensure data quality. Experience gained from similar programs, as well as RTR Operator training programs, shall provide the foundation for quality assurance during this project.

The objectives of RTR for this project are to:

- If applicable, verify the TRUCON Content Code (Table 3-1) and site specific Item Description Codes (IDC);

Table 3-1 TRUCON Content Codes and Their Description

TRUCON* CONTENT CODE	Description
111 [211]	Solidified aqueous waste
112 [212]	Solidified organic liquids
113 [213]	Solidified organic laboratory waste
114 [214]	Cemented inorganic solids
115 [215]	Graphite waste
116 [216]	Paper, plastic, cloth
117 [217]	Metal waste
118 [218]	Glass waste
119 [219]	Filters, mostly organic
121 [221]	Other organic solid waste
122 [222]	Inorganic solid waste
123 [223]	Leaded rubber gloves and aprons
124 [224]	Pyrochemical salt waste
125 [225]	Solid organic and inorganic waste
126 [226]	Cemented organic process solids

*The distinction between a 1XX and a 2XX Content Code is based on the age of the waste.

- where applicable, provide an estimated inventory of the waste items, residual materials, and packaging materials and/or waste material categories (for a listing of material see Table 3-2);

- identify presence of free liquids (if free liquids are found the waste container will be rejected from this project);

- provide the information necessary for making an estimate of waste items' residual and packaging materials weight for selected homogeneous waste.

Operators scan the closed waste containers with the RTR equipment, observing the video image for the specified characteristics of the waste, as the output signal is simultaneously recorded on the audio/videotape and recorded on the RTR Waste Package Report, Log book, and Bin-Scale Test Report. All waste shall be examined by RTR and excluded from this project if the WIPP Waste Acceptance Criteria, TRUPACT-II payload requirements, and RFP requirements cannot be met. The specific information and action required to accomplish the data quality objectives for RTR of the waste containers is described in detail in procedure QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste." RTR Operators are trained, qualified and certified according to RFQ-TC-1A, "Qualification and Certification of NDT Personnel."

For the homogeneous IDCs, the RTR data shall be used, in conjunction with data on standard weights of waste items, packaging materials, and residual material, to estimate the weights of the waste materials. This examination shall include all waste categories except metals, plastics, wet combustibles and dry combustibles. The other categories shall only be visually inspected on an exception basis. For example, if a waste category does not appear to be consistent with the IDC then the waste shall be visually inspected.

Due to the heterogeneity of the remaining stored TRU wastes, the RTR will be used to verify only the TRUCON Content Code, IDC, and waste packaging configuration for these waste containers.

If any liquids are detected in the waste containers, the waste container will be rejected from the project per RFP requirements. RFP will not certify waste that has detectable quantities of free liquids present.

Table 3-2 Waste Material Categories for Quantification During RTR and Visual Examination

Materials
Cellulosics
Plastics
Rubber
Corroding metal/steel
Corroding metal/aluminum
Noncorroding metal
Solid inorganics
Inorganic sludges
Cements
Other organics

3.1.1 Precision and Accuracy

RTR is a qualitative technique and does not support accuracy and precision determinations. For this reason it is designated as a special process. During RTR examination, certified technicians may expect to see a certain degree of similarity among drums designated by a particular IDC. RTR Operators will undergo training in identifying and evaluating the contents of the waste containers to maximize consistency.

Precision shall be verified through video checkout and replicate scans on one of every six drums used for this project. The replicate scans will be performed by a technician other than the one who performed the original scan. A comparison of the original and replicate scans will be made by NDT supervision. In addition, an independent observation of at least one drum scan per shift shall be made by either another technician or by NDT supervision. This observation shall be indicated by signature on the RTR Waste Package Report.

Data obtained through visual examination and the weighing of individual bags will be used to evaluate the accuracy of the RTR data. Comparison of the RTR data and the visual data will be done at the RFP project level. Comparison of RTR and visual inspection data will be conducted at the project level to determine accuracy of RTR results. This comparison will be conducted by the Data Validation Officer using Procedure WO-4713, "Project Level Data Review and Validation for WIPP Experimental Waste Characterization Program."

3.1.2 Completeness

An RTR audio/videotape, Bin-Scale Test Report, and an RTR data form shall be obtained for each waste container. RTR will not be performed on the Standard Waste Box (SWB) containing the loaded bin. Any waste container that cannot comply with the WIPP WAC, TRUPACT-II payload requirements and RFP requirements shall be excluded from this project. If the results of the RTR examination are unclear or inconclusive, the waste container scan shall be either rerun by a second RTR Operator or reviewed by supervision, and the discrepancies resolved, or the container shall be excluded from the project. The data obtained from the RTR examination must be 100% complete.

3.1.3 Comparability

RTR data shall be compared to data from process knowledge and visual examination techniques to provide a qualitative verification of the information on the physical form of the waste. This comparability will be done at the Project Level. Comparability shall be ensured by the use of detailed operating procedures.

3.2 Nondestructive Assay

The assay system of choice for the waste drums selected for the experimental waste characterization project is the Rocky Flats Passive/Active Drum Counter (PADC). The PADC is a passive/active neutron (PAN) counting system. Of the NDA systems available at Rocky Flats, the PADC is the most appropriate for this project because it is the least matrix dependent and has a lower detection limit of 10 milligrams of plutonium. The counter employs a "four pi" geometry wherein the detectors surround the drum to be measured. The PADC primarily determines the plutonium content of waste drums. Uranium-235 can be measured to a lower detection limit of 15 grams. The PADC can also be used to estimate the americium content of a drum with an accuracy of ± 100%. In addition to the plutonium content of a drum, the PADC calculates and reports the total alpha activity of a waste drum, the watts per cubic feet, and the propagated uncertainty.

Measurements of waste drums on the PADC are performed by qualified NDA Operators in accordance with the approved Waste Operations Procedure WO-5228, "Passive/Active Drum Assay System, Building 371." Calibration and measurement control oversight are performed by Safeguard Measurements engineers in accordance with the Safeguards Measurements Program Management Plan for NDA" and the approved Safeguards Measurements Internal Procedure, SMIP-4012, "Calibration of NDA System 371PADCI01."

In cases where the passive and active assay results differ significantly or measurement problems are encountered, Safeguards Measurements will investigate and resolve any problems in accordance with SMIP-4003, "Procedure for Safeguards Measurements Nondestructive Assay Count Sheet Review." In some cases, specifically for those matrices involving "alpha-n" reactions, it may be necessary to assay the drum using a different counter. The counter of choice for these circumstances is the LOSAC, or Low Specific Activity Counter. The LOSAC employs a low resolution, high sensitivity gamma-ray detector and segmented scanning. The LOSAC is operated according to WO-5222, "LOSAC Drum Counter" and is calibrated according to SMIP-4010, "Safeguards Measurements Calibration of NDA System 776LOSAC01." Safeguards Measurements will report to Project Manager the results of their investigation into cases where the passive and active assay results differ significantly or measurement problems were encountered.

The PADC and LOSAC systems are capable of meeting the specified data quality objectives for precision as listed in Table 3-3. These objectives apply to wastes with homogeneous distributions, low neutron absorber and moderator content, and little self-shielding of the matrices for which standards have been constructed.

Table 3-3 Quality Assurance Objectives for Nondestructive Assay (NDA) Systems

	SGS		PAN		PNCC	
Precision*	WG**Pu (g)	Precision	WG Pu (g)	Precision	WG Pu (g)	Precision
	1	±100%	1	±40%	1	±100%
	10	±20%	10	±25%	10	±30
Accuracy*		±15%		±30%		±30%
Completeness	100%		100%		100%	

* ±2 standard deviations

** WG Pu = Weapons grade plutonium

3.2.1 Precision and Accuracy

The precision and accuracy of PADC and LOSAC measurement are determined by making replicate measurements of certified calibration standards and comparing the measured results to the certified values for the standards. Standards are prepared using Rocky Flats stream plutonium oxide which has been certified by the Metrology Laboratories using measurement systems traceable to NIST and NBL (New Brunswick Laboratory). Certified quantities of the plutonium oxide are immobilized in a silicone foam and added to drums containing matrix material similar to that encountered in the field. The quantity of plutonium oxide is traceable to NIST through the Rocky Flats Balance Calibration Program. All records of traceability are maintained by the Metrology Laboratories in accordance with S-A-00008, "Metrology Laboratories Control of Measuring and Test Equipment."

The certified standards are measured in the PADC and LOSAC counter on a weekly basis. The data are collected and statistically analyzed by Safeguards Measurements to determine precision and accuracy. Results are summarized and reported monthly. Safeguards Measurements maintains all measurements control records.

3.2.2 Completeness

NDA (i.e., radioassay) measurements shall be obtained for all the waste containers used in this project. If problems occur when measuring a container on the PADC, Safeguards Measurements shall investigate and attempt to resolve the problem. Corrective actions shall include evaluation of all data, and if necessary, remeasurement on the LOSAC. Any waste container that cannot comply with the QAPP, WIPP WAC or TRUPACT-II payload requirements shall be excluded from this project.

3.2.3 Comparability

Comparability is demonstrated by performing replicate measurements on one of every ten of the waste containers, by different operators performing the replicate measurement, as discussed in procedure WO-5228, "Passive /Active Drum Assay System, Building 371 (U)."

3.3 Headspace Sampling

3.3.1 Waste Drum and Packages

A 55-gallon drum of waste contains individual packages in several layers of plastic confinement. Samples shall be taken from the 55-gallon poly bag headspace and the innermost layers of confinement with sufficient headspace. RFP headspace sampling operations are described in Analytical Laboratories procedure L-4146, "Headspace Gas Sampling of Waste Containers." This procedure lists the specific activities and requirements to prepare and test the sampling equipment for sampling readiness and for obtaining the required field blank, field reference standard, and headspace samples. These activities and requirements are intended to provide assurance that the quality assurance objectives are met. When analytical results indicate a sampling procedure problem, the noncomplying results are reported and a corrective action activity is initiated and directed to the sampling personnel. Reporting of noncompliances shall be done using the reporting of variance form sent to the Project QAO for approval. The sampling personnel will investigate the cause and corrective action is performed and documented.

3.3.1.1 55 - Gallon Poly Bag and Innermost Layer of Confinement Headspace Sampling

Precision and accuracy of sampling operations must be assessed by analyzing field QC headspace samples, that consist of field blanks, field duplicates, manifold blanks, and field reference standards. If the quality assurance objectives described below are not met, then remedial action must be taken and documented. When sufficient headspace is available field duplicates shall be collected in accordance with the frequency specified in Section 9.

3.3.1.1.1 Precision

Precision shall be assessed by collecting field duplicates for VOCs, gases, and NO_x determination. Remedial actions shall be taken if the criteria listed below are not satisfied.

- VOCs, the RPD exceeds ± 25%;
- gases, the RPD exceeds ± 20% for concentrations greater than 5X the PRDL, or the absolute difference is greater than ± PRDL for concentrations less than 5X the PRDL;
- NO_x, the PRDL exceeds ± 40% for concentrations greater than 2.5X the PRDL, or the absolute difference is greater than ± PRDL for concentrations less than 2.5X the PRDL.

3.3.1.1.2 Accuracy

Field reference standards shall be collected using the headspace sampling manifold to assess the RPA of the 55-gallon poly bag headspace sampling and analysis operations.

Remedial actions shall be taken if the criteria listed below are not satisfied:

- VOCs, the RPA exceeds ± 30%;

- gases, the RPA exceeds ± 10% for concentrations greater than 10X the PRDL, or the absolute difference exceeds ± PRDL for concentrations less than 10X PRDL;

- NO_x, the RPA exceeds ± 50% for concentrations greater than 2.5X the PRDL, or the absolute difference exceeds ± PRDL for NO_x concentration less than 2.5 X the PRDL.

3.3.1.1.3 Representativeness

Specific steps to ensure the representativeness of sampling shall include:

- Headspace sample canisters cleaning and leak check;

- Headspace sampling manifold cleaning and leak checking;

- Use of headspace sample canisters with passivated internal surfaces;

- Use of a low internal volume headspace sampling manifold;

- Small sample volume: low sample volume to available headspace volume ratio;

- Careful pressure regulation;

- Performance audits/surveillance;

- Collection of headspace sampling manifold blanks, field reference standards, field blanks, and field duplicates.

3.3.1.1.4 Completeness

One hundred percent of the innermost layers of confinement containing a minimum of 1 liter of available headspace must be sampled. This volume is dictated by the analytical sample size requirement of 100 ml and the objective of not removing more than 10% of the available headspace. Innermost layers of confinement containing rigid material (e.g., glass, metal, and rigid plastic containers) will not be sampled. But a headspace sample will be collected from the closest non-rigid layer of confinement.

3.3.1.1.5 Comparability

Comparability is ensured by the use and application of uniform procedures and equipment between differing sampling sites. RFP sampling operating procedures shall meet the requirements for uniform procedure and equipment to ensure that headspace sampling (poly bags and innermost confinement) operations are comparable at the different headspace sampling sites.

3.3.2 Procedures For Headspace Sampling

Procedures discussed in the following sections are for sampling the headspace of drums and innermost layers of confinement within waste drums. These include procedures L-4146, "Headspace Gas Sampling of Waste Containers" and L-4138, "SUMMA® Passivated Stainless Steel Canisters Cleaning and Certification" (These procedures do not cover bin headspace sampling).

Performance surveillance by supervisory personnel and audits by Project QA personnel provide added assurance of consistent performance.

3.3.2.1 Bin Headspace Sampling

Specific requirements for sampling apparatus have not been fully finalized, therefore, only the requirements known at this time are included, others may be added later. Field QC samples collected during bin headspace sampling must include manifold blanks, reference standards, and field duplicates. No field blanks are required since the bin is sealed, thus preventing ambient air intrusion.

3.3.2.1.1 Precision

Precision for bin headspace sampling and analysis shall be assessed by collecting field duplicate samples for VOCs and gas determinations. Remedial action shall be taken if:

- VOCs, Relative Percent Difference (RPD) exceeds ± 25%

- gases, RPD exceeds ± 20% for concentrations greater than 5X the Program Required Detection Limits (PRDL), or the absolute difference is greater than ± PRDL for concentrations less than 5X the PRDL

3.3.2.1.2 Accuracy

Reference standards shall be collected in the laboratory or field prior to bin headspace sample collection, then introduced through the bin sampling manifold to assess the Relative Percent Accuracy (RPA) of the sampling and analysis operations. Remedial action shall be taken if:

- VOCs, the RPA exceeds ± 30%

- gases, RPA exceeds ± 10% for concentrations greater than 10X the PRDL, or the absolute difference exceeds ± PRDL for concentrations less than 10X the PRDL.

3.3.2.1.3 Representativeness

Specific headspace sampling steps shall be described in procedures to ensure the representativeness of bin headspace samples, including:

- recirculation of the headspace gases to achieve homogeneity prior to sampling;
- canister cleaning and leak check;
- equipment cleaning and leak checking;
- use of sample canisters with passivated internal surfaces;
- collection of small volume samples: low sample volume to available headspace volume ratio;
- careful pressure regulation and flow control;
- performance audits/surveillance;
- collection of bin headspace sampling manifold blanks, reference standards, and field duplicates.

3.3.2.1.4 Completeness

Bin headspace samples shall be collected from 100% of the bins to be used in the WIPP E-WCP.

3.3.2.1.5 Comparability

Comparability is ensured by the use and application of uniform procedures and equipment between differing sampling sites. RFP sampling operating procedures shall meet the requirements for uniform procedure and equipment to ensure that headspace sampling (poly bags and innermost confinement) operations are comparable at the different headspace sampling sites.

3.4 Visual Examination

The visual examination of the contents of waste containers, that includes describing the contents and measuring or estimating the weights of the waste items, shall provide data on the type and amount of material in each waste container and shall verify the RTR audio/videotape data. These data are necessary for the development of a mathematical model that can be used to predict gas generation behavior of the contact-handled transuranic waste during the bin-scale and alcove tests and after disposal in the WIPP. The visual examination activities are detailed in procedure WO-4702, "WIPP Bin-Scale Waste Characterization and Bin Loading Operation."

3.4.1 Precision and Accuracy

The precision and accuracy of weights obtained from visual examination are unknown at this time. These estimated weights shall be assigned after assessment of previously weighed items. However, the quality of the visual examination data shall be enhanced by use of standard operating procedures and operator qualifications. The precision and accuracy of weights that are measured during visual examination shall be determined by industry standards for balances and shall be reported with the weight data. All waste items actually weighed shall be weighed on a high accuracy analytical scale with a range from 0 to 60 kg, with an accuracy of ± 1 gram. Replicate measurements shall be performed as a measure of precision of the visual examination process. One in twenty, or at least one item, material (residual or packaging), or waste material category from each drum, shall be reweighed after all other drum contents are weighed as specified in procedure WO-4702, "WIPP Bin-Scale Waste Characterization and Bin Loading Operation." The precision and accuracy of weight estimates shall be evaluated and reported.

In addition, a specific waste recognition training program shall be used to assess operator performance before actual waste characterization by visual examination. The training program employs exercises such as evaluation of simulated waste (not radioactive materials), review of audio/videotapes of previous waste handling operations, including RTR, and familiarization with estimating and weighing techniques.

3.4.2 Completeness

An audio/videotape of the visual examination and a visual examination data form/report, validated according to the requirements in Section 8 of the QAPP and this document, shall be obtained for 100% of the waste containers used in this project and for a representative portion (to be determined by Sandia National Laboratories) of the waste containers used during the WIPP alcove tests.

3.4.3 Comparability

Visual examination data shall be compared to RTR data to verify the RTR findings and process knowledge. This comparability will be done at the Project Level. Comparability shall be ensured by the use of detailed operating procedures.

3.5 Gas and VOC Analysis

The DQOs for this Project characterization task are defined as data quality assurance tasks and are listed in Tables 3-4, 3-5, and 3-6. Program required limits such as the PRDL associated with gas analysis and the Program Required Quantitation Limit (PRQL) associated with VOC analysis, are specified by the program to ensure that the data collected satisfy the requirements of all data users. Data quality indicators (accuracy, precision, completeness, method detection limit, comparability, and representativeness) for laboratory measurements are defined in Section 3.5 of the Program QAPP. The methods to quantitatively and qualitatively assess them are discussed in Section 12.0.

3.5.1 Precision

Precision is a measure of the mutual agreement among individual measurement of analyte concentrations. Precision will be expressed as the RPD between duplicate measurements or as the percent relative standard deviation (%RSD) between replicate measurements. Precision will be assessed through the analysis of laboratory and field duplicates and replicate analyses of laboratory control samples and EPA blind samples. Results from these measurements shall satisfy the criteria listed in Tables 3-5 and 3-6. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective actions when control limits are exceeded.

3.5.2 Accuracy

Accuracy is the degree of agreement between a measured analyte concentration (or the average of replicate measurements of a single analyte concentration) and the true or known analyte concentration. Accuracy will be expressed as percent recovery. Percent recovery is the ratio of the measured analyte concentration to the known analyte concentration expressed as a percentage. Accuracy will be assessed for the laboratory operations through the analysis of EPA blind samples and laboratory control samples. Results from these measurements shall satisfy the criteria listed in Tables 3-5 and 3-6. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective actions when control limits are exceeded.

3.5.3 Completeness

Completeness is a measure of the amount of valid data (meets all QA/QC requirements) obtained from the overall measurement system compared to the amount of data collected and submitted for analysis. Laboratory completeness will be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. This will be calculated and tracked by the Laboratory Program Quality Assurance Officer.

3.5.4 Method Detection Limit (MDL)

The MDL is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater then zero. Laboratories shall determine MDLs by performing replicate measurements of samples containing the analytes listed in Table 3-5, the MDL in Table 3-4, and the PRQL in Table 3-6. MDLs must be less than or equal to the PRDL listed in Table 3-5. Procedures for determination of MDLs must be described in the laboratory SOPs.

3.5.5 Comparability

Comparability is the degree to which one data set can be compared to another. Comparability is demonstrated by the analysis of the laboratory control sample within each analytical batch of samples being analyzed.

3.5.6 Representativeness

Representativeness is a quality characteristic which expresses the degree to which a sample or group of samples represent the population being studied. Representativeness will be demonstrated by the analysis of field, laboratory duplicates and blank samples as specified in the Laboratory Quality Assurance Plan or laboratory procedures.

3.5.7 RFP Analysis Characterization Objectives Compliance

3.5.7.1 Gas Analysis Procedure

RFP will analyze for headspace inorganic gases using Analytical Laboratories procedure L-2421, "Precision Gas Mass Spectrometry Operation and Analysis (VG 30-38)," which describes the analytical method for gas analysis. This procedure, together with its internally referenced procedures, document compliance with the gas quality assurance data objectives specified above and in the WIPP E-WCP QAPP.

3.5.7.2 RFP VOCs Analysis Procedures

RFP will analyze for VOCs using Procedures L-4147, "Direct Injection GC Analysis of Volatile Organic Components in Waste Samples" for alcohols and ketones, low sample volume analysis of VOCs is accomplished by using Procedure L-4122, "GC/MS Determination of Volatile Organics Direct Injection of Waste Gas Samples," or Procedure L-4111, "GC/MS Determination of Volatile Organics for Waste Characterization." These procedures and their internally referenced procedures document compliance with the objective requirements listed above and in the QAPP.

Table 3-4 VOC Quality Assurance Objectives

Compound	Precision (a) (%RSD or RPD)	Accuracy (a) (%R)	MDL (ng)	Completeness (%)
Benzene	± 25%	70-130%	8	90%
Bromoform	± 25%	70-130%	8	90%
Carbon Tetrachloride	± 25%	70-130%	8	90%
Chlorobenzene	± 25%	70-130%	8	90%
Chloroform	± 25%	70-130%	8	90%
Cyclohexane	± 25%	70-130%	8	90%
1,1-Dichloroethane	± 25%	70-130%	8	90%
1,2-Dichloroethane	± 25%	70-130%	8	90%
1,1-Dichloroethene	± 25%	70-130%	8	90%
cis-1,2-Dichloroethene	± 25%	70-130%	8	90%
Ethyl Benzene	± 25%	70-130%	8	90%
Ethyl Ether	± 25%	70-130%	8	90%
Methylene Chloride	± 25%	70-130%	8	90%
1,1,2,2-Tetrachloroethane	± 25%	70-130%	8	90%
Tetrachloroethene	± 25%	70-130%	8	90%
Toluene	± 25%	70-130%	8	90%
1,1,1-Trichloroethane	± 25%	70-130%	8	90%
Trichloroethene	± 25%	70-130%	8	90%
1,1,2-Trichloro-1,2,2-	± 25%	70-130%	8	90%
Trifluoroethane	± 25%	70-130%	8	90%
1,3,5-Trimethylbenzene	± 25%	70-130%	8	90%
1,2,4-Trimethylbenzene	± 25%	70-130%	8	90%
m-Xylene	± 25%	70-130%	8	90%
o-Xylene	± 25%	70-130%	8	90%
p-Xylene	± 25%	70-130%	8	90%
Acetone	± 25%	70-130%	50 (b)	90%
1-Butanol	± 25%	70-130%	50 (b)	90%
2-Butanone	± 25%	70-130%	50 (b)	90%
Methanol	± 25%	70-130%	50 (b)	90%
4-Methyl-2-pentanone	± 25%	70-130%	50 (b)	90%

%RSD = Percent relative standard deviation
RPD = Relative percent difference
%R = Percent Recovery
MDL = Method detection limit (maximum permissible value, total number of nanograms delivered to the analytical system per sample)

(a) Criteria apply to concentrations listed in Table 3-6
(b) Estimate, to be determined

Table 3-5 Gas Analysis Quality Assurance Objectives

Analyte Gases	CAS Number	Precision (%RSD or RPD)	Accuracy (%R)	PRDL (vol%)	Completeness (%)
Argon	7440-37-1	± 10%	90-110%	0.1	90%
Carbon Monoxide	630-08-0	± 10%	90-110%	0.01	90%
Carbon Dioxide	124-38-9	± 10%	90-110%	0.1	90%
Hydrogen	1333-74-0	± 10%	90-110%	0.1	90%
Nitrogen	7727-37-9	± 10%	90-110%	1.0	90%
Oxygen	7782-44-7	± 10%	90-110%	0.1	90%
Methane	74-82-8	± 10%	90-110%	0.1	90%
Ethane	74-84-0	± 10%	90-110%	0.1	90%
Propane	74-98-6	± 10%	90-110%	0.1	90%
Nitrogen Oxides (combined)		± 20%	50-150%	0.01	90%
a. Nitric Oxide	10102-43-9				
b. Nitrogen Dioxide	10102-44-0				

%RSD = Percent relative standard deviation
RPD = Relative percent difference
%R = Percent recovery
PRDL = Program required detection limit

Table 3-6 VOC Headspace Target Compound List (TCL) and Program Required Quantitation Limit (PRQL)

	Volatiles	CAS Number	PRQL (a) (ppmv)
1.	Acetone	67-64-1	100
2.	Benezene	71-43-2	1
3.	Bromoform	75-25-2	1
4.	1-Butanol	71-36-3	100
5.	2-Butanone	78-93-3	100
6.	Carbon Tetrachloride	56-23-5	1
7.	Chlorobenzene	108-90-7	1
8.	Chloroform	67-66-3	1
9.	Cyclohexane	110-82-7	1
10.	1,1-Dichloroethane	75-34-3	1
11.	1,2-Dichloroethane	107-06-2	1
12.	1,2-Dichloroethene	75-35-4	1
13.	cis-1,2-Dichloroethene	156-59-2	1
14.	Ethyl Benzene	100-41-4	1
15.	Ethyl Ether	60-29-7	1
16.	Methanol	67-56-1	100
17.	Methylene Chloride	75-09-2	1
18.	4-Methyl-2-pentanone	108-10-1	100
19.	1,1,2,2-Tetrachloroethane	79-34-5	1
20.	Tetrachloroethene	127-18-4	1
21.	Toluene	108-88-3	1
22.	1,1,1-Trichloroethane	71-55-6	1
23.	Trichloroethene	79-01-6	1
24.	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1
25.	1,3,5-Trimethylbenzene	108-67-8	1
26.	1,2,4-Trimethylbenzene	95-63-6	1
27.	m-Xylene (b)	108-38-3	1
28.	o-Xylene	95-47-6	1
29.	p-Xylene (b)	106-42-3	1

(a) Values based on delivering 10 mL to the analytical system.
(b) These xylene isomers cannot be resolved by the analytical methods employed in this program.

Table 3-7 QC Headspace Samples Required for Innermost Layer of Confinement

FIRST TWO BINS PREPARED AT EACH SITE

Two Bins	All Program Required Analytes, Except NOx
Field Blanks	1/day
Equipment Blanks (a)	1/day, prior to work
Field Reference Standards (b)	1/bin
Field Duplicates	1/bin or 1/20 samples collected, whichever is more frequent

ROUTINE (AFTER FIRST TWO BINS)

Routine	All Program Required Analytes, Except NOx
Field Blanks	1/day
Equipment Blanks (a)	1/day prior to work
Field Reference Standards (b)	1/quarter annum
Field Duplicates	1/bin or 1/20 samples collected, whichever is more frequent

(a) One instrument layer of confinement sampling equipment blank should be collected, analyzed, and demonstrated clean prior to first use (all analytes except NOx), then at the specified frequency thereafter.

(b) One field reference standard must be collected, analyzed, and demonstrated to meet the QAOs specified in Tables 3-5 and 3-6 prior to first use, then at the specified frequency thereafter.

3.6 Flammability Testing

Flammability testing will be in accordance with a modified version of ASTM Method E 681 - 85, as defined within the WIPP Bin Scale Test Guidance Manual Procedure 810.1, that is used as a flammable/nonflammable test to evaluate the flammability of bin headspace gas samples.

3.6.1 Precision and Accuracy

Flammability test results are considered qualitative. Duplicate samples shall be collected for flame testing when sufficient bin headspace is available. Accuracy of the laboratory's flame test apparatus is assessed and qualified prior to the evaluation of samples and annually thereafter. A flame test apparatus is qualified when it successfully evaluates the flammability of each test mixture listed in Table 6-3. The flame test equipment shall have an accuracy of 100 %.

The test shall meet the following Quality Assurance Requirements.

Accuracy (%) = 100	Is defined as the number of test mixtures whose flammability is correctly evaluated divided by the total number of test mixtures evaluated by flammability testing times 100.
Completeness (%)= 100	Is defined as the number of bin headspace samples evaluated with valid data divided by the number of bin headspace samples requiring flammability testing times 100.

3.6.2 Completeness

Flammability testing apparatus shall have a completeness of 100%. Samples from all bins with headspace concentration of flammable VOCs above 500 ppmv (total of all VOCs) shall be analyzed using a qualified flame test apparatus.

3.6.3 Comparability

On a sample basis, flame test results should be comparable to the theoretical flammability evaluation made using the Le Chatelier formula. Laboratory procedures shall include the comparison between test results and calculated results using the Le Chatelier formula. This comparison shall be reported to the DOE/WIPP Project Integration Office in the bin case report.

3.6.4 Representativeness

Representativeness of flammability testing shall be achieved by using clean headspace sampling equipment that will not introduce sample bias and by the proper sampling techniques.

4.0 SAMPLING PROCEDURES

This section addresses the specific procedures for waste container selection and headspace sampling of both 55-gallon poly bag and innermost layers of confinement.

The identification of specific types and quantities of waste to be retrieved for the WIPP Bin-Scale and Alcove Test Program is the responsibility of Sandia National Laboratories. Sandia National Laboratories has determined the types and quantities of waste required to represent the total waste inventory in terms of the parameters that may affect the rate and potential for gas generation. Sandia National Laboratories also will specify the types of waste, from the TRUCON Content Code, that must be included in the WIPP E-WCP.

The requirements for the types of waste required in the WIPP E-WCP are defined in Test Plan: WIPP Bin-Scale Test CH TRU Waste Tests and in Test Plan Addendum #1 (Revision 2): WIPP Bin-Scale TEST CH TRU Waste Tests. These requirements are subject to change as the program progresses.

Sample size requirements have been established by Sandia National Laboratories. Justification for the sample sizes of the various waste types is contained in Rationale for Revised WIPP Bin-Scale Gas Generation Tests with CH TRU Wastes.

4.1 Waste Selection

Waste selection consists of randomly selecting waste containers from specified TRUCON content codes and assembling these containers into groups that will meet bin loading, WIPP WAC, and TRUPACT-II Payload requirements. The RFP Waste Programs Information Management System (WPIM) organization maintains an inventory of waste containers at RFP utilizing the Waste and Environmental Management System (WEMS). The operation and use of WEMS is detailed in procedure WP-1200, "WEMS Requirements" and WP-1201, "WEMS Waste Inventory Tracking and Controlling." The WPIM organization shall provide an inventory list of TRU waste containers available to support the WIPP E-WCP, by TRUCON Content Code, to the EG&G-RFP Project Manager who will transmit this information to the Sandia National Laboratories. The Sandia National Laboratories will randomly select the waste containers from this inventory list utilizing their sampling program. A listing of the selected waste containers for each bin to be loaded at RFP will be sent back to the EG&G-RFP Project Manager.

The EG&G-RFP Project Manager will forward this information to the WPIM Project Manager. The WPIM Project Manager, will provide to the waste container custodian, by Interoffice Correspondence, the list of drums to be selected from the inventory for each bin to be loaded at RFP. The WPIM Project Manager also will initiate the Bin-Scale Test Sample Drum Chain of Custody Log and forward this log to the waste container custodian. The custodian will locate the waste container and verify the container identity against the RFP WIPP Bin-Scale Test Sample Drum Chain of Custody Log, and attach the log to the waste container. The waste selection and chain-of-custody activities are detailed in procedure WO-4711, "WIPP Bin-Scale Sample Drum Chain of Custody Log." Following selection and verification, the waste containers shall be prepared and routed for the waste characterization process.

Containers that do not meet the WIPP WAC, TRUPACT-II payload requirements, and RFP requirements, or their identity cannot be verified shall be rejected from the test program and returned to storage.

4.2 Sampling Manifold Requirements

The sampling manifold is the apparatus used to sample the 55-gallon poly bag and the innermost layers of confinement located in the waste drums. Attached to this manifold are sampling canisters, Photoionization Detector (PID), pressure and vacuum gauges, sampling line and needle, purge gas, and a vacuum pump.

4.2.1 Description of the Sampling Manifold

The sampling manifold consists of an evacuated and pressurized sides. The evacuated side is connected via a valve to the pressurized side to allow for the cleaning of the apparatus, and collection of manifold blanks and field reference standards. The sampling manifold description, calibration ranges of sensors, and manifold diagram can be found in the laboratory procedure L-4146, "Headspace Gas Sampling of Waste Containers."

4.2.1.1 Major Components and Requirements of the Evacuated Side

Needle, filter, and flexible hose assembly are used to collect waste container headspace gas (needle and filter must be cleaned or replaced after collection of sample, field reference standard, and field blanks if collected through the manifold).

The headspace sampling manifold pressure sensor(s) is pneumatically connected to the headspace sampling manifold. The headspace sampling manifold pressure sensor(s) must be able to measure absolute pressure in the range from 0.05 to 1000 mm Hg. Its resolution must be ± 0.005 mm Hg at 0.05 mm Hg.. The pressure sensor(s) must have an operating range from approximately 15° to 40°C.

The number of ports for attaching headspace sample canisters shall be sufficient to allow simultaneous collection of headspace samples and duplicates for NO_x, gas, and VOC analyses.

A dry vacuum pump shall be used to reduce the pressure in the headspace sampling manifold to 0.05 mm Hg. If a vacuum pump is used that requires oil, precautions shall be taken to prevent backstreaming from occurring. This may entail the use of a cryogenic trap or molecular sieve.

All components that come into contact with headspace sample gases must be constructed of relatively inert materials such as stainless steel or Teflon®. A passivated interior surface on the stainless steel components is recommended. The system shall be designed to minimize the dead volume.

4.2.1.2 Major Component and Requirements of the Pressurized Side

A cylinder of compressed zero air, helium, nitrogen, or argon is used to clean and provide gas for manifold blanks. These gases are used to clean the sampling manifold and shall be done between each headspace sample and provide gas for the collection of sampling manifold blanks. Gas quality shall be of ultra-high purity grade, and metered by a two- stage stainless steel regulators.

Field reference standard gases are used for evaluating the accuracy of the headspace sampling process. Field reference standard gas must be delivered through a two-stage stainless steel regulator. The field reference standard gas must be certified by the manufacturer to contain known analytes as defined in Table 3-5 and 3-6 at known concentrations.

A humidifier filled with ASTM D1193-77(1983), Type II water, shall be connected to the pressurized side of the headspace sampling manifold between the compressed gas cylinders and the purge assembly. This is used to assist in the cleaning of the manifold between sample collection.

A purge assembly to allow the needle assembly to be connected to the pressurized side of the sampling manifold. This is required for two reasons, for system cleaning and to transfer compressed gas from the cylinder to the canisters.

4.2.1.3 Other Requirements

(**NOTE:** Ambient pressure and temperature readings shall be recorded at sampling.)

Ambient pressure sensor must have a full range of 500 to 800 mm Hg and must be kept in the sampling area during sampling operations. Resolution must be within 1.5 mm Hg and calibration shall be based on standards traceable to NIST.

Temperature sensor should have a range from approximately -30° to 50° C. The temperature sensor calibration must be traceable to NIST standards.

4.2.2 Prior to Sampling

Prior to collection of samples the manifold shall be evacuated to 0.05 mm Hg. The cleaned and evacuated headspace sample canisters will be attached to the evacuated manifold before sampling. On the sampling manifold inlet side there must be a changeable needle capable of puncturing the poly bags. A filter shall be in-line to control potential radioactive contamination. The manifold shall be equipped with a purge assembly that will allow sampling manifold blanks, field reference standards, and duplicates to be collected through the entire sampling manifold. This will allow samples to be collected from the needle tip through all the same sampling manifold components that the headspace gas passes through. Field blanks are to be collected in a clean, evacuated canister either through the manifold or directly into the canister in the sample area prior to the removal of the drum lid.

4.2.3 Headspace Sampling Manifold Cleaning and Certification

The following is a listing of requirements for cleaning and certification of the sampling manifold. The procedure defining the cleaning and certification operations is L-4146, "Headspace Gas Sampling of Waste Containers."

Prior to use for the first time the manifold shall be purged with zero air or nitrogen and be leak-checked after construction.

Headspace sampling manifold shall be cleaned prior to sampling.

Prior to sampling a sample manifold blank shall be collected.

Sampling manifold shall be cleaned and checked for leaks after the collection of field blanks if collected through the manifold.

After sample and duplicate samples have been collected the manifold shall be cleaned and leak checked.

After the collection of a field reference standard the manifold shall be cleaned and leak checked.

Inner surfaces are cleaned by passing zero air or nitrogen through the manifold and monitoring with a PID to measure the amount of VOCs present in the apparatus.

The manifold is assumed to be clean when 50 % or less of PRQL of the analytes listed in Table 3-6 are removed from the inner surface as determined by the analysis of a sampling manifold blank. If a PID is used to monitor the manifold cleanliness, a reading of 0.5 ppm or less will be used. Calibration and use of the PID is defined in procedure L-4146, "Headspace Gas Sampling of Waste Containers." When these limits are exceeded sampling shall be suspended and corrective action shall be taken to correct the problem.

4.3 Headspace Sampling

Headspace gas sampling of sample waste drums (55-gallon poly bag and innermost layer of confinement bags) at RFP shall be conducted as specified by Analytical Laboratories procedures. Sampling operations are defined in procedures, L-4138, "SUMMA® Passivated Stainless Steel Canisters Cleaning and Certification," L-4146, "Headspace Gas Sampling of Waste Containers," and L-4148, "Preparation of Samples and Calibration Standards for Determination of Gases in Waste Containers." The sampling manifold shall be attached to a changeable needle/ filter capable of puncturing the poly bag. These procedures specify the methods, personnel protective safety equipment, processes, activities, reporting of non-standard operating conditions, and necessary records (field notebooks, sample information tag, sample tags number).

4.3.1 Sampling Logbook

At the time of sampling the following information shall be recorded in a bound sampling logbook. The information required is:

- date;
- time;
- sample Tag number;
- ambient temperature;
- ambient pressure;
- innermost confinement layer;
- sampler name;
- sample type (VOC, Gas, Flammable, Blank, Duplicate, etc.)
- drum number;
- canister number;
- bin movement log (COC) number;
- Radiation Protection Technician (RPT) survey measurement;
- in line filter measurement for gross alpha; and
- comments.

4.3.2 Scope and Application

The RFP procedures for headspace gas sampling comply with the guidelines contained in EPA Method TO-14 (USEPA,1988). The procedures are used for both gases and specific VOCs that exist as vapors at room temperature and pressure. These samples are collected in specially cleaned and certified SUMMA® canisters.

4.3.3 Headspace Gas Sampling Procedures

Procedure L-4146, "Headspace Gas Sampling of Waste Containers" describes the sampling methods and equipment used to perform headspace gas sampling. This procedure includes descriptions of the headspace sampling manifold, provides step-by-step instructions for sampling, manifold cleaning, maintenance, and certification or calibration of monitoring devices.

Once a sample is collected a Chain of Custody (COC) form shall be initiated and will continue with the sample until the sample is destroyed and removed from the program. Procedure and requirements for COC are defined in Section 5.

The innermost layer of confinement is defined as a waste containment closest to the waste contents. It must have an estimated minimum volume of 1 liter headspace from which a representative 100 ml sample can be withdrawn. A 250 ml sample must be collected if there is an estimated minimum volume of 2.5 liters of available headspace gas. The sampling process should not remove more than an estimated 10% of the available headspace from any layer of confinement.

Headspace contained within innermost rigid layers of confinement (e.g., glass, metal, fiberboard, and rigid plastic containers) shall not be sampled, but the poly bag closest to the rigid container must be sampled if a minimum of 1 liter of headspace is available, as described above.

If a bag containing innermost waste packages is not sampled, the reason for not sampling shall be recorded in the sampling log book.

4.3.3.1 Bin Headspace

4.3.3.1.1 Bin Headspace Sampling Protocol

Described within this section are the requirements for sampling headspace gases from Bins containing TRU waste. This section will provide information to ensure that representative samples, including quality control samples, are consistently collected. Samples collected from bins shall be headspace samples from within the bin, field duplicates, sampling manifold blanks, and field reference standards.

4.3.3.1.2 Experiment Design

DOE as part of WIPP Test Phase plans to conduct bin scale experiments to assess the rates and potential for gas generation that may influence the long term integrity of the repository. Loading of bins with waste shall not be done until all drum data has been validated as defined in Section 8 and approved by DOE/WIPP Project Integration Office. The bin headspace sample must be collected within 20 working days prior to the TRUPACT-II loading.

4.3.3.1.3 Method Summary

Bin headspace sampling is accomplished by recirculating the bin headspace gas at a preset flow rate for a predetermined length of time, thereby making a collection of a representative headspace sample possible. Flow rate and time are a function of the waste type and packaging configuration as prescribed by SNL. (when identified these requirements will be added to this document).

Sample size collection will be six liters collected in an evacuated (0.05 mm Hg) SUMMA® passivated canister(s) after the required recirculation time has elapsed. The bin sampling system also must pressurize the sample canister(s) to a final pressure of approximately 15 psig. Sample storage and hold times are those listed in Sections 4.4.1 and 4.4.2. Field duplicate sample collection will require a total volume of 24 liters to be withdrawn from the bin into two SUMMA® canisters six (6) liter in size and by pressurizing the canisters to 15 psig. During recirculation and duplicate sample collection, redundant pressure/vacuum relief controls must be provided to ensure that the internal bin pressure does not exceed 0.9 psig or fall below minus 0.8 psig.

4.3.3.1.4 Sampling Apparatus Requirement

Requirements for bin headspace sampling apparatus consist of a timer, ambient pressure and temperature sensors, pump, flow controller device(s) (if needed), flow indicating device, valves, pneumatic recirculation loop, sample (six liters) canister(s), and pressure regulating equipment. Components specifications requirements for bin sampling are:

- Flow indicating device(s) connected on the inlet side of the sample canister(s) must be capable of monitoring the flow rate of gases through the recirculation loop.

- Pneumatic recirculation loop and valves must be constructed of relatively inert materials such as stainless steel, Viton® or Teflon®. A passivated interior surface on the stainless steel components is recommended.

- An oil free pump must be capable of circulating bin headspace at a minimum rate of approximately 500 ml/min and capable of pressurizing the sample canister(s) to a pressure of 15 psig.

- Flow controlling devices must be capable of regulating pump flow rate.

- Bin pressure regulating equipment must be redundant and must be capable of maintaining the internal bin pressure between a minimum of minus 0.8 psig and a maximum of 0.9 psig.

- SUMMA® sample canisters with passivated inner surfaces.

- Vacuum/pressure gauge(s) capable of measuring sample canister pressure between 0.05 mm Hg and 1000 mm Hg.

- Ambient pressure and temperature sensors.

- Timer capable of controlling, manually or automatically, the recirculation duration.

- RFP bin sampling procedures shall contain information on the calibration range and frequencies of sensors, flow monitoring and controlling device, and timer.

4.3.3.1.5 Quality Control Measures

Part of the quality control measures include the cleaning and leak checking of the bin sampling system. Cleaning of the system shall be accomplished by purging with humidified zero air or zero nitrogen. After purging, a sample of zero air or zero nitrogen shall be collected through the system and analyzed for program required analytes defined in Table 3-6.

Cleanliness may also be verified by purging with zero air and monitoring the zero air with a photoionization detector. Leak checks of the system shall be performed after cleaning and prior to use. Leak checks shall be performed in accordance with Procedure L-4146, by pressurizing the system with zero air or zero nitrogen and monitoring the internal pressure.

Minimum requirements for frequency of collection of blanks, reference standards, and field duplicates are shown in Table 9-1. Reference standards are collected by using a pressurized cylinder gas containing known analytes at known concentrations and shall be collected through the bin headspace sampling apparatus. Results from this sampling indicate the efficiency of sampling and analytical recovery. Bin differential pressure shall not exceed a minimum of minus 0.8 psig and a maximum of 0.9 psig, if field duplicates are collected.

4.3.4 Sample Canister Cleaning

The headspace sample canisters (SUMMA® canisters) shall be cleaned and certified in a batch process that complies with the requirements specified in Section 7.4.1 of the WIPP-E-WCP QAPP. RFP procedure L-4138, "SUMMA® Passivated Stainless Steel Canisters Cleaning and Certification," defines and describes the method for cleaning and certification of sample canisters prior to being used for headspace sampling.

4.3.5 Chain of Custody

Chain of Custody (COC) is described in L-4006, "Chain of Custody Procedure for Headspace Gas Samples," and defines the procedures used to control, secure, and prevent tampering with the samples prior to completion of the analysis. Further information is provided in Section 5.2.

4.3.6 Waste Characterization Sample Administration Procedure

L-4024, "Sample Administration - WIPP Characterization Program Headspace Sample Canisters," describes the method by which the sample is introduced into the laboratory operations. This includes the generation of laboratory identification numbers, transportation, and documentation of information on canisters within the laboratory.

4.3.7 Quality Control Samples

Quality Control samples shall be taken during the headspace sampling operations. These QC samples include sampling manifold blanks, field reference standards, field duplicates, and field blanks. Field reference standards and field duplicates must be submitted blind to the laboratories for analysis to assess the relative percent accuracy and precision of the sampling and analysis operations. Frequency of collection is defined in Table 9-1.

4.3.7.1 Sampling Manifold Blanks. The sampling manifold blanks are samples of high purity gas used to purge sampling equipment. Samples shall be collected after cleaning and prior to sampling. This sample is used to document that adequate cleaning of the sampling equipment has been performed.

4.3.7.2 Field Reference Standards. Field reference standards containing known concentrations of target analytes introduced through the sampling manifold.

4.3.7.3 Field Duplicates. Field duplicates are separate and independent samples collected from the same source and analyzed independently.

4.3.7.4 Field Blanks. Field blanks shall be samples of the room air collected in the headspace sampling area prior to the removal of the drum lid. These samples are used to identify any contamination present within the sampling area.

4.4 Headspace Sample Canister Hold Times and Storage Conditions

COC shall accompany the canister during movement from the sampling area to the laboratory for analysis including storage of samples. Storage of samples shall be in a secured area to prevent tampering. Hold times and storage conditions are listed in Table 4-1.

Table 4-1 Headspace Sample Canisters and Holding Times

Parameter	Container	Headspace Sample Minimum Volume	Storage Conditions (a)	Field Holding Time (b)	Shipping Hold Time	Laboratory Holding Time(c)
Gases	SUMMA® Canister	100 milliliters	Ambient	4 days	2 days	28 days
VOCs	SUMMA® Canister	250 milliliters(d)	0°-40°C	4 days	2 days	28 days
NOx(e)	SUMMA® Canister	100 milliliters	Ambient	4 days	2 days	28 days

(a) Storage conditions do not refer to transportation conditions.
(b) From time of headspace sample collection to shipment.
(c) This is a programmatic-based maximum holding time. Holding time begins at VTSR.
(d) Alternatively, if available headspace is limited, 100 ml samples may be collected for determination of volatiles.
(e) A separate headspace sample will not be required if mass spectrometry is used for inorganic gas analysis.

4.4.1 Hold Times

Headspace sample canister hold times for this project are divided into segments covering sampling, transportation, and analysis. Hold time in the sampling area is four (4) days. Transportation hold time is two (2) days. Analysis hold time is 28 days for the laboratory. If the total hold time of 34 days is exceeded, or if any of others are exceeded, it shall be documented in the case narrative and the EG&G RFP Project Manager shall be notified by the Laboratory Program Quality Assurance Officer.

4.4.2 Storage Conditions

Headspace sampling storage conditions for gases and NO_x are at ambient conditions once the samples are received by the Laboratory. Storage conditions for VOC samples are 0° to 40° C once the samples are received by the laboratory. All storage areas which have temperature requirements shall be monitored by a calibrated temperature monitoring and recording device. Storage of samples shall be in a secured area to prevent tampering.

4.5 Headspace Sample Size

Minimum volume for SUMMA® headspace and Inner Layer of confinement sample canister sizes for the collection and storage of samples are:

- Gases 100 milliliters
- VOCs 250 milliliters
- NO_x 100 milliliters

Additional information sample size requirements if volume of headspace is limited, are listed in Table 4-1.

4.6 Record Variance

A completed Record of Variance form shall accompany the sample tag and canister if any changes occur during sampling that are not part of the standard operating procedures. The completed Record of Variance form shall be sent to the site Project QA Officer, who has the responsibility of evaluating the impact of the variance and notify the appropriate personnel. Refer to Section 13.0 for requirements and reporting form.

5.0 CHAIN OF CUSTODY

In accordance with ASME NQA-1, Elements 8 and 13, this section provides identification and control of samples, waste containers, and bins to assure that only accepted items are used and that identification is maintained on the items or in documentation traceable to the items, and that the items are controlled to prevent damage or loss and to minimize deterioration.

In order to ensure that the data generated under this project shall meet accepted standards for legal admissibility and defensibility, chain-of-custody (COC) shall be maintained and documented for all waste containers, samples, and bins throughout the waste characterization process. COC practices shall be documented in operating procedures, as discussed further within in this section. COC practices for Laboratory samples shall be in accordance with EPA guidelines as prescribed in National Enforcement Investigations Center (NEIC) Polices and Procedures, NEIC, Denver, Colorado (revised May 1986).

The key to effective chain-of-custody procedures is the absolute requirement that no movement of a waste container or analytical sample be permitted without custody control. The QAPP requires that the EG&G RFP Project Manager have access to the physical location and operational status of each container.

Each COC form shall include provisions for each of the following:

- Signature of individual initiating custody control, along with date and time;
- Documentation of waste container numbers for each waste container under custody;
- Signatures of custodians relinquishing and receiving custody, along with the date and time of transfer;
- Description of final waste container disposition, along with signature of individual removing waste container from custody, and;
- Comment section.

5.1 Drum and Bin Chain of Custody

5.1.1 Drum Chain of Custody

The drum COC will be initiated following the identification and selection of waste containers to support this project as discussed in Section 4.1 of this document.

The WPIM Project Manager, will provide to the drum custodian, by Interoffice Correspondence, the list of drums to be selected from the inventory for each bin to be loaded at RFP. The WPIM Project Manager will also initiate the Bin-Scale Test Sample Drum Chain of Custody Log (see Appendix D) by filling out the waste container information and forwarding the COC log to the drum custodian.

The custodian will locate the drum and verify the drum identity against the Sample Drum Chain of Custody Log and WEMS, and attach the COC log to the drum. The custodian shall check for any discrepancies or errors on the COC log provided by WPIM and contact the WEMS coordinator if any problems are noted. The custodian also shall ensure that the tamper indicating devices (TID) have not been broken and that the drum is in good physical condition. If any problems are noted they shall be reported immediately to the Project Manager.

Following selection and verification, the custodian shall prepare to route the drums for the waste characterization process (NDA, RTR, gas sampling, and visual characterization). The chain of custody activities are detailed in operating procedure WO-4711, "WIPP Bin-Scale Sample Drum Chain of Custody Log," and are briefly discussed below.

Whenever the drum is relocated or processed, the COC log shall be signed by the relinquishing custodian and receiving custodian, and the date and time recorded. A transfer also must be made by the custodian in the WEMS that will track the movement of the drums through the waste characterization process. The RFP WPIM organization maintains WEMS .

The operation and use of WEMS is detailed in procedure WP-1200, "WEMS Requirements" and WP-1201, "WEMS Waste Inventory Tracking and Controlling." Nuclear Material Control will complete a Nuclear Material and Drum Transfer Report (NMDTR) and also will track the movement of the drums in the Safeguards and Accountability Network (SAN) computer system.

The Trucking organization shall be responsible for movement of all waste containers between buildings on plant site. Nuclear Material Control coordinates and approves all shipments on plant site according to procedure NMS MT-004 and NMS MC-005. Upon notification from the drum custodian, trucking will pick up the drum from the custodian and verify that the drum they are receiving matches the COC log and the drum identification numbers. Trucking personnel shall then sign the COC log receiving the drum and the custodian will sign the COC relinquishing the drum. The Trucking personnel transferring the drums on plant site shall maintain the COC log until the drums are released and signed for on the COC log by the receiving facility.

Waste Characterization Project data forms/reports (NDA, RTR, visual examination) shall be produced for each drum, one copy of the data forms/reports shall be retained in the originators files, one copy shall be attached to the Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports shall be transmitted to the EG&G-RFP PDCO, as soon as possible after data generation.

If the drums selected for the project are in storage within the Protected Area (PA), the drum custodian upon completion and verification of the COC log, will route the drums to Building 371 for NDA and then to Building 664 for RTR. If the drums are in Building 664, RTR will be performed prior to transfer of the drums to Building 371 for NDA. Following completion of the NDA and RTR, the drums will be transferred to Building 776, Solid Waste Treatment (SWT), for gas sampling and visual examination.

NDA personnel shall be responsible for maintaining custody of the drums while in their possession, correctly filling out the COC log, and performing all required nondestructive assays. NDA personnel shall enter the results of the NDA into the WEMS system when the data has been collected and approved by NDA supervision. NDA personnel shall verify that the assay has been performed and that a copy of all the data forms/reports generated have been attached to the COC log. This shall require a signature by the NDA Operator and NDA supervision on the NDA Recount section of the COC log.

Waste Assay and Shipping personnel shall be responsible for maintaining custody of the drums while in their possession in Building 664, and correctly filling out the COC log and verifying that all data forms/reports generated in Building 664 are attached. The NDT personnel shall be responsible for performing an RTR of all drums selected for this project in Building 664. NDT personnel shall verify that the RTR has been performed and that a copy of all data forms/reports generated by RTR personnel have been attached to the COC log. This shall require a signature by the RTR Operator and NDT supervision on the RTR Examination section of the COC log. Waste Quality Engineering (WQE) personnel will enter verification of the RTR findings into the WEMS, and then the drum will be released for movement to the next waste characterization activity.

SWT personnel shall be responsible for maintaining custody of the drums while in their possession in Building 776, and correctly filling out the COC log and performing the visual examination. SWT personnel shall verify that waste examination has been performed and that a copy of all data forms/reports generated in Building 776 have been attached to the COC log. This shall require a signature by SWT Supervision and Waste Inspection on the Physical Examination section of the COC log. The Headspace Sampling section of the COC log will require a signature from SWT supervision and Production Support Laboratory personnel verifying the gas sampling has been performed. The EG&G RFP Project Manager signature is also required verifying that the analysis performed on the drum are acceptable as per the requirements in Section 8 of this document.

A process flow describing the movement of the drums on plant site is provided in Appendix C.

5.1.2 Bin/SWB Chain of Custody

The custody of the bins/SWB will be controlled and tracked in the same manner as the drums. The activities associated with the Bin/SWB COC are detailed in operating procedure, WO-4712, "WIPP Bin-Scale Bin/SWB Chain of Custody Log," and are briefly discussed below.

The bin will be unloaded from the SWB in Building 776 Advanced Size Reduction Vault Manual Disassembly Area, at that time the bin will be inspected by Waste Inspection to ensure it is in good physical condition.

The bin will remain in the custody of SWT personnel until packaged, gas sampled and loaded into the SWB and transferred out of the building.

The WPIM organization will assign a bin number and Waste Assay and Shipping will initiate the bin COC log (see Appendix D). Waste Inspection will then apply a barcode label to the bin in Building 776 and an entry will be created in WEMS and SAN for the bin.

Following bin loading, closure, radiation monitoring, gas sampling, leak testing, and loading into the SWB, entries shall be made by SWT and PSL personnel on the Bin Packing, Headspace Gas Sampling, and Transfer to SWB sections of the Bin/SWB COC log as detailed in operating procedure WO-4712, "WIPP Bin-Scale Bin/SWB Chain of Custody Log."

Whenever the Bin/SWB is relocated or processed, the COC log shall be signed by the relinquishing custodian and receiving custodian, and the date and time recorded. A transfer also must be made by the custodian in WEMS and SAN that will track the movement of the Bin/SWB. NMC also will complete a NMDTR that will be attached to the Bin/SWB.

After the completion of all activities in Building 776 the Bin/SWB will be transferred to Building 664, TRUPACT-II Loading Facility. Building 664 personnel shall be responsible for maintaining custody of the Bin/SWB while in their possession. The Bin/SWB will be inspected, certified and prepared for shipment. When approval to ship the Bin/SWB is received from DOE WIPP, the Bin/SWB shall be loaded into the TRUPACT-II shipping container, thus completing the COC.

5.2 Chain of Custody for the Analytical Laboratories

Chain of Custody (COC) practices shall be carried out in accordance with guidelines prescribed in the EPA National Enforcement Investigation Center (NEIC) Policies and Procedures, NEIC, Denver, Colorado (revised May 1986). Analytical Laboratory procedures L-4006, "Chain of Custody for WIPP Characterization Program Headspace Sample Canisters" and L-4024 "Sample Administration - WIPP Characterization Program Headspace Sample Canisters," defines compliance to the requirements of the QAPjP.

A sample is considered to be under effective custody control if the following apply:

- It is in your possession;

- It is within your view, after you assumed possession;
- It is in your possession, and you control access by locking it up;

A single document will be used to track the sample canister throughout the entire process from cleaning through analysis, storage, and release to cleaning. This document will contain on one side the Chain of Custody (COC) information and on the reverse side the Sample Canister Information Document. The Sample Canister Information Document will be initiated and a sample canister tag with a unique Laboratory Identification Number will be attached to each individual canister that is certified clean. At the time of sampling, the sample taken (including QC sample) will be identified by the unique Laboratory Identification Number that is indicated on the Sample Canister Tag. The sampling portion of the Sample Canister Information Document will be completed and a Chain of Custody initiated for each sample taken. The Chain of Custody shall demonstrate sample control from sampling through sample disposal and will document sample integrity. Samplers will generate a Field QC Sample Record at the time of sampling. The Field QC Sample Record Form must be completed at the time samples are collected and shall be submitted to the Laboratory Project Quality Assurance Officer, the Sample Custodian, and the Project QA Officer on completion. Access to this information by Laboratory Personnel is restricted as described in Procedure L-5010. Sample canisters will be externally smeared by Radiation Protection Technologists (RPT), and in-line filters on sampling manifold shall be utilized to survey the internal contents of the canisters immediately after sampling.

Samples must be properly relinquished when sample custody is transferred. The Project Sample Coordinator will ensure that all samples received by sample receiving personnel are submitted with properly completed Sample Canister Information / COC documents. The Project Sample Coordinator will verify sample information from the SmartLab Log-In Report with information from samples received prior to relinquishing the sample to the laboratory for analysis.

Responsible laboratories will ensure that samples are stored in an appropriate locked cabinet. Upon completion of analysis, responsible laboratories shall submit reduced and raw data to data support personnel for preliminary and final report data packages. Completed samples will be relinquished to sample receiving personnel for temporary storage. Once data package verification and approval by the QAO, and the Project Manager has been completed, corresponding sample canisters will be submitted to canister cleaning laboratory. At this time the COC / Sample Canister Information Document will be removed from the canisters and placed in the project file and a copy sent to the Project Manager.

5.2.1 Canister Identification Number

Each canister shall be inscribed with a five-digit Canister Identification Number. The five digit number consists of two alpha (α) characters and three numeric characters. The first alpha character is used to designate the site. The second alpha (ß) character will be used to identify the canister volume. The alpha characters will be followed by three numeric characters that increase sequentially with each canister purchased.

α	ß	XXX
(Site)	(Volume)	(Sequential Number: 001 through 099)

A = 100 ml
B = 250 ml
C = 500 ml
D = 2.8 liter
E = 6.0 liter

5.2.2 WIPP Sample Identification Number

Each sample will be assigned a unique thirteen digit WIPP Sample Identification Number at sampling with the following format:

ZZ	MMDDYY	ααßXX
(Sampling Site ID)	(Date)	(Canister ID)

ZZ will be the two-digit alpha character designating the sampling site (RF for Rocky Flats), and MMDDYY will be numeric characters indicating the sampling date (month-day-year). The alpha characters (αα) designates the analysis area within the Laboratory performing analysis of the sample. The beta (ß) character is the canister volume identifier. The XX characters are the last two numerical digits of the canister identification.

5.2.3 Canister Sample Tags

Removable Canister Sample Tags shall be attached by canister cleaning personnel to each clean sample canister. Each Canister Sample Tag will represent a unique seven-digit Lab Sample Identification Number generated by the Laboratory. Canister Sample Tags will be removed from completed samples by the Project Sample Coordinator for entry into project file, prior to canister cleaning.

5.2.3.1 Sample Identification Number

Each sample will be assigned a unique seven-digit Sample Identification Number with the following format:

YY	A	1XXX
(Year)	(Project Designation)	(Sequential Number)

YY will be the two-digit numeric character designating the SmartLab sample identification number assignment year. " A " will be the alpha character designating the project code (W for WIPP). 1XXX will be numeric characters that represents a unique sequential sample number.

5.2.4 COC and Sample Canister Information Documents

The Laboratory Sample Coordinator will ensure that proper COC for each sample is maintained at the facility and that all Lab personnel responsible for COC are trained and understand responsibilities of the COC.

A Chain of Custody document (see Appendix D) and Sample Canister Information document shall accompany each sample canister immediately after sample canister cleaning. Sample custody will be initiated at the time of sampling and maintained until sample analyses are completed and data has been validated at the site level.

When sample custody transfer takes place, both the relinquishing and receiving parties shall sign and date the COC document. The party accepting sample custody will inspect the COC documents, sample tags, sample canister information documents, shipping forms, and any other accompanying documentation to ensure the information is accurate and complete. Discrepancies in information or signs of damage to sample canisters shall be documented by receiving custodian within the comment section on COC document.

Original COC and sample information documents shall be returned to the Project Sample Coordinator once sample analysis is completed for submission to the project file.

5.3 Innermost Layer of Confinement Identification Number

Each waste container within a drum is considered the innermost layer of confinement. When a container is removed for sampling it shall be marked with an identification number to designate the sequence it was removed from the drum. The first waste container removed from the drum shall be designated as " 1 " with the container labeled and recorded on the "Field QC Sample Record." The last waste container shall be designated as " n ," where "n" is the total number of containers removed from the drum. The number sequence starts with 1 and increasing (e.g., 1,2,3,4,...,n) to "n" the last waste container (if there were 9 waste containers in a drum "n" would equal 9). The Field QC Sample Record Form will allow field sample identification numbers to be correlated with both the innermost layer of confinement identification numbers and the waste container.

5.4 QC Sample Record

A field QC Sample Record Form shall be initiated at the time of sampling to allow for documenting the correlation of field QC samples with their associated field samples. This record also will serve as a method for controlling this information in such a manner that field duplicates and field reference standards are submitted blind to the analytical laboratory. The record form shall provide a method for the designation of sample types and for the layer of confinement from which the sample was collected. The following is additional information that is required:

- sample identification numbers of each sample collected from each waste container or bin, where waste containers or bins are identified by waste container or bin number;
- date and time of collection for each field and field QC sample;
- signature of individual completing the form;
- IDC Code (for drums samples only);
- comment section.

The Field QC sample Record Form must be completed at the time samples are collected and shall be submitted to the Project QA Officer with the completed data package.

Refer to Appendix D for Forms

6.0 CALIBRATION PROCEDURES AND FREQUENCY

6.1 RFP Calibration Program

All test and measurement equipment used in support of this project are controlled and calibrated in accordance with requirements specified in ASME NQA-1, Section 12, as documented in the Rocky Flats Plant "Quality Assurance Manual," section QR-12, "Control of Test and Measuring Equipment." Requirements for control and calibration of test and measuring equipment are implemented through SOP-12, "Control of Test and Measuring Equipment." Calibration of test and measuring equipment may be performed either internally, using in-house reference standards, or externally by national certifying agencies (e.g., NIST) or manufacturers. All reference standards have valid relationships to nationally recognized standards. If national standards do not exist, the basis for calibration is documented. All test and measuring equipment are uniquely identified.

Several Rocky Flats organizations, including the Metrology Laboratories, Analytical Laboratories, and Safeguards Measurements, have responsibilities for controlling and calibrating test and measuring equipment. SOP-12 establishes the Metrology Laboratories is responsible for approving all other calibrating organizations through an active surveillance program. In addition, the Metrology Laboratories is responsible for performing calibrations on a variety of physical, dimensional, chemical, and NDA measurements. Procedure S-A-00008, "Metrology Laboratories Control of Measuring and Test Equipment," describes the recall system which establishes the traceability of all standards and test and measuring equipment under the purview of the Metrology Laboratories.

As part of its surveillance program, the Metrology Laboratories assures that all Rocky Flats calibrating organizations comply with SOP-12. All calibrating organizations must establish a control system for the equipment under their purview which includes unique identification of test and measuring equipment. All calibrating organizations must also use approved procedures for performing calibrations of test and measuring equipment. Reference standards must either be certified by the Metrology Laboratories or be obtained from a nationally recognized source. Calibrating organizations must establish calibration frequencies and a mechanism for ensuring that only calibrated equipment is used for this project. Calibrating organizations must also maintain calibration records as appropriate.

6.2 Real-Time Radiography

A verification of the RTR video system performance is performed at the beginning of each work shift or whenever the system is started up to RTR waste drums. A test pattern is used on the camera and observed on the video screen to verify the video quality. Imaging system controls are adjusted to obtain the desired screen contrast levels and line pair resolution as defined by the QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste."

6.3 Nondestructive Assay

Safeguards Measurements is an approved Rocky Flats calibrating organization responsible for the control and calibration of all NDA equipment used for nuclear material accountability purposes. The Safeguards Measurements calibration program is described in the "Safeguards Measurements Program Management Plan for Nondestructive Assay." The PADC and LOSAC systems are defined as "Calibrate Before Use" equipment. The calibration of each counter is verified daily before the counter is used to make measurements. Measurements of calibration standards are performed by NDA Operators according to approved WO procedures. The calibration data are collected and analyzed by Safeguards Measurements. Safeguards Measurements establishes the calibration function and modifies the equipment software to incorporate the current calibration parameters in accordance with approved Safeguards Measurements Internal Procedures: SMIP-4012 for the PADC and SMIP-4010 for LOSAC. Safeguards Measurements also determines the acceptance criteria for calibration verification measurements and incorporates these into the operating software. NDA Operators must measure calibration standards each time the equipment is used. If the calibration verification measurements fail the acceptance criteria, Safeguards Measurements investigates to determine the cause and correct the apparent problem. Corrective actions usually includes recalibration of the system.

Calibration standards for the PADC and LOSAC are prepared and certified by the Metrology Laboratories in accordance with procedures S-C-00013, "Synthetic and NDA Standards Calibration." The Metrology Laboratories certifies Rocky Flats stream plutonium oxide which has been characterized using measurement systems traceable to NIST and NBL. Balances traceable to NIST are used to weigh quantities of the certified plutonium oxide which are immobilized in an RTV silicone foam modules and added to standard drums containing matrix material representative of actual waste matrices. Standard drums are prepared to cover the range of the measurement system. All records of preparation and traceability are maintained by the Metrology Laboratories.

6.4 Visual Examination

The weighing system used during the visual examination shall be calibrated using NIST traceable standards. Mass balances, spanning a range of weights from 10 g to 450 kg, shall be recalibrated in accordance with manufactures' written procedures annually and after major maintenance. Operational checks with a reference standard shall be conducted prior to weighing the waste and immediately after the QC check.

Other equipment used during the visual examination includes audio/video equipment. Checks of this equipment shall include observation of test patterns, prior to each days use, to ensure adequate video quality.

The calibration requirements for equipment used during the visual examination are detailed in procedure WO-4702, "WIPP Bin-Scale Waste Characterization and Bin Loading Operation." Weighing systems are calibrated and controlled by the RFP Metrology Laboratories as detailed in procedure S-P-11002, "Balance Calibration Procedure."

6.5 Headspace Sampling

Calibration requirements of headspace sampling equipment are listed in the procedure L-4146, "Headspace Gas Sampling of Waste Containers." The calibration requirements for the equipment used to document the sampling environment conditions is contained within this procedure. The photoionization detector (PID) calibration and operational instructions are also contained in this procedure. The PID shall be calibrated once per day, prior to use, or as necessary according to the manufacturer's specifications. Calibration frequencies and limits shall be specified within the laboratory procedure defining the use of the PID.

6.5.1 Determination of Headspace Gases

6.5.1.1 Analysis of Sample Headspace Gases by Mass Spectrometry (MS)

The MS instrumentation used must be calibrated in accordance with the equipment manufacturers' recommendations and ASTM Method 2650. The MS instrument must be capable of resolving the analytes listed in Table 3-5. Analytes and PRDL are listed in Table 3-5. In addition to the above requirements the instrument shall be capable of resolving triplets at mass 28, $N_2^+/CO^+/C_2H_4^+$, and at mass 44, $N_2O^+/CO_2^+/C_3H_8^+$, and a doublet at mass 30, $NO^+/C_2H_6^+$.

The calibration requirements for this method include an initial instrument calibration to establish a mass pattern and sensitivity for each gas component. Thereafter, calibrations shall be verified at the beginning and end of an analytical sequence with a certified standard. Operating procedures must document the requirements in Section 6.7, "Calibration and Operation Records."

6.5.1.1.1 Mass Spectrometry

A mass spectrometer is an instrument which produces a beam of gaseous ions from a sample, sorts out the resulting mixture of ions according to their mass-to-charge ratios, and provides output signals which are measures of the relative abundance of each ionic species present. A mass spectrometer can be described as an ion optical device which separates ions according to their mass-to-charge ratios by utilizing electric and/or magnetic fields. The knowledge of the mass-to-charge ratios of the ions enables one to determine <u>what</u> is present, while the measured ion intensities is proportional to <u>how much</u> is present.

6.5.1.1.2 Mass Spectrometry Operation

The analysis of waste drum headspace gases will be accomplished as specified by Analytical Laboratories procedure L-2421, "Precision Gas Mass Spectrometry Operations and Analysis (VG 30-38)." The calibration requirements for this equipment are listed in this procedure.

6.5.1.1.3 Preparation of Standards and Samples

Samples are prepared as specified by Analytical Laboratories procedure L-2421. Primary gas standards should be purchased from the best available source for the analytes being analyzed, and must be certified by the manufacturer.

6.5.1.1.4 Instrument Calibration

The mass spectrometry calibration requirements for this method include an initial instrument calibration to establish a mass pattern and sensitivity for each gas component. Thereafter, calibration shall be verified at the beginning and end of an analytical batch with a continuing check standard, analyzed as the Laboratory Control Sample (LCS). The procedure for calibration and standardization of the MS is defined in L-2421, "Precision Gas Mass Spectrometry Operations and Analysis (VG 30-38)."

If calibration of the instrument fails to meet the DQO/QAO requirements, a variance is noted, requiring notification, assessment of program quality impact and appropriate corrective action by Lab personnel. A record of variance is forwarded to the Analytical Laboratories WIPP QAO, Project QAO and the Project Manager for assessment of quality impact. Laboratories shall maintain calibration and instrument operations logs to document compliance to Section 6.7 Calibration Records.

6.5.1.1.5 Initial Calibration Requirements

Masses and sensitivity calibration are done for each of the analytes measured. Additional calibrations should be performed as specified by the manufacturer or when standard recoveries fail to meet the acceptance criteria of ± 10 % or closures fail to meet ± 3 %.

6.5.1.1.6 Continuing Calibration

Continuing calibration will be done using a separate source of gas different from the calibration gas. If the RPD between this sensitivity and the most recent calibration is greater than 10% (50 % for NO_x), the instrument must be re-calibrated. Sensitivity calibration also must be verified for each reported sample by showing that the sum of partial pressure of the components analyzed equals the total pressure of the introduced sample (± 3 %). If the partial pressure sum differs from the total sample pressure, the difference must be assessed.

6.5.2 Volatile Organic Gases

Calibration procedures for analytical instruments used to analyze Project VOC samples are developed from EPA Compendium Method TO-14 (USEPA, 1988b) and the third edition of EPA SW-846, Method 8240/8260 (USEPA, 1986b). The gas chromatography/mass spectrometry (GC/MS) and gas chromatography (GC) calibration requirements are summarized in Table 6-1. Laboratories shall maintain calibration and instrument operation logs to document compliance to Section 6.7, "Calibration and Operation Records."

6.5.2.1 Volatile Organic Gases Analytical Procedures

VOCs are analyzed using two different analytical methods that are Gas Chromatography/Mass Spectrometry (GC/MS) and Gas Chromatography (GC).

6.5.2.1.1 Description of Gas Chromatography/Mass Spectrometry (GC/MS) and Gas Chromatography (GC)

A. The following is a description of a GC instrument, that consists of a temperature controlled oven containing a column where the sample is separated. The column can be of various types such as capillary, wide-bore capillary, and packed columns.

This project requires the use of a wide-bore capillary column. The sample is injected into the column and is transported through the column by the use of a carrier gas. The transfer rate through the column for different components of the sample varies as a function of the components interaction with the coating or packing within the column. Different components may then be retained or "eluted" from the column with corresponding different "retention times." Individual components are identified by the use of known standards to determine their retention time. The amount of time the individual components are retained by the column is defined as retention time.

Retention time is one method of identifying components within a mixture, if no co-eluting compounds are present within the sample. Unknown samples with analytes eluting at a specific retention time are assumed to contain the same compound as the standard with the same retention time. Positive identification is presumed when two different types of columns identify the compounds. Quantitation of the analytes present is done using only one of the columns.

B. A flame ionization detector operates on the principle that the electrical conductivity of a gas is directly proportional to the concentration of charged particles within that gas. Effluent gas from the GC column is mixed with hydrogen and air and burned, ionizing some of the molecules eluting from the column. The ionized gas stream then passes through an electrode gap causing a current to flow across the gap through a measuring resistor. The resulting voltage drop is amplified and measured as proportional to concentration.

C. The MS used for detection in the GC/MS instrument uses a quadrapole analyzer for ion mass separation. An electron beam is used to ionize and fragment the compounds leaving the GC. The MS analyzer is composed of four metal rods of a specific geometry with a controllable RF frequency that results in an electric field being applied to the rods. The RF frequency of this electric field applied to the rods determines which masses are allowed to pass through and be detected by the detector. By ramping the RF frequency of the field a spectrum of the different ion masses representative of a specific analyte can be detected. This provides a mass spectrum for a given component. This spectrum is compared with a library of known compounds spectra using computer programs to identify the unknown compound.

6.5.2.2 Gas Chromatography / Mass Spectrometry (GC/MS)

The analysis procedure for VOC analytes other than alcohol and ketones is L-4111, "GC/MS Determination of Volatile Organics Waste Characterization." For low sample volumes, a procedure is being developed; L-4122, "GC/MS Determination of Volatile Organics Direct Injection of Waste Gas Samples."

6.5.2.2.1 Standard and Sample Preparation

Preparation of standards and samples for use on the GC/MS are described in L-4111 and L-4122. Additional methods for standard preparation are described in L-4148, "Preparation of Samples and Calibration Standards for Determination Of Gases in Waste Containers." Primary gas standards should be purchased from the best available source for the analytes being analyzed, standards shall be certified by the manufacturer. Secondary standards containing internal standards shall be prepared from dilutions of primary standards.

Reference standards must be traceable to EPA, and primary standards should be checked against EPA air audit cylinders to verify the accuracy of their concentrations.

6.5.2.2.2 Calibration and Tuning Requirements

Instructions for calibration and tuning of the instrument are listed in L-4111 and L-4122.

A. Tuning

Tuning is done on the GC/MS to optimize the detection of certain masses of ions. Requirements for the tuning are listed in Table 6-2. Also required is the completion of the form for the instrument performance criteria. Tuning shall be done before the analysis of any analytical batch of samples and every twelve hours. The twelve hour tuning check involves the use of a 50 ng sample of 4-Bromofluorobenzene (BFB) check standard.

B. Calibration

Calibration is performed after tuning has been completed and prior to starting the analysis of an analytical batch. Initial calibration consists of generating a multipoint calibration curve using at least five standards to encompass the linear range for the analytes. One of the standards must be at an amount (nanograms) equivalent to the PRQLs specified in Table 3-6. Every twelve hours of operation a midpoint concentration calibration standard shall be analyzed as a continuing calibration verification. Prior to this analysis, a sample of 50 ng of BFB shall be analyzed to verify the instrument tune.

6.5.2.2.3 Calibration Requirements

The instrument shall meet the performance criteria requirements set in Table 6-2 prior to the analysis of samples and at the beginning of each 12 hours of operation. Relative response factors from either the internal or external calibration shall be generated for each specified target analyte. For the initial five-point calibration curve to be valid, the percent relative standard deviation (%RSD) of each relative response factor must be less than 35 %. If it is not, then the GC/MS data system may be used to generate a second or third order regression calibration curve. For continuing calibration, if the percent difference (%D) between the average response factor for the most recent initial calibration and continuing calibration midpoint response factor is less than 30 %, the system is considered to be calibrated. For higher order curves, the continuing calibration point must fall within 30% of the curve value from initial calibration.

6.5.2.3 Direct Injection Gas Chromatography

Organic gases are analyzed for alcohols and ketones listed in Tables 3-4 and 3-6, using Analytical Laboratories procedure L-4147, "Direct Injection GC Analysis of Volatile Organic Components in Waste Samples." This procedure contains the calibration requirements of the instrument and ancillary equipment. Reference standards must be traceable and primary standards must be checked against EPA air audit cylinders to verify the accuracy of their concentration.

6.5.2.3.1 Preparation of Standards

Procedure L-4147, defines the preparation of standards and samples used for calibration and check samples. Additional methods for standard and sample preparation are described in L-4148, "Preparation of Samples and Calibration Standards for Determination of Gases in Waste Containers." Primary gas standards should be purchased from the best available source for the analytes being analyzed, and must be certified by the manufacturer.

6.5.2.3.2 Calibration

Initial calibration consists of a multipoint calibration curve with at least three standards and one blank that defines the linear range of the instrument, which shall be generated for each analyte using gas standards. Initial calibration is followed by daily verification with a calibration check standard. One of the standards must be at an amount (nanogram) equivalent to the PRQLs specified in Table 3-6. The response factor for each analyte shall be generated. For the curve to be valid, the %RSD of each analyte must be less than 30 %. Higher order calibration curves may be used, if the method of quantitation must be reported with the results. Continuing calibration checks are performed at the beginning of each 12 hours of operation, using a midpoint concentration calibration standard. Retention time windows shall be established for all analytes. Retention time windows are determined by injecting a minimum of three standards over a period of 72 hours. Retention time windows shall be calculated as the mean plus or minus three times the standard deviation of the individual retention time for each calibration standard analyzed in the 72 hour period. Retention time windows must be determined for all analytes on each GC column prior to the analysis of any samples and whenever a new GC column is installed.

6.5.2.3.3 Continuing Calibration Requirements

Response factors from the continuing calibration standard shall be compared to the corresponding average response factor from the most recent valid initial calibration curve. For continuing calibration to be valid the %D between the initial and continuing calibration response factors must be less than 30 %. For high order calibration curves the %D shall be less than 30 %. The retention time for each analyte must fall within the retention time window. If the continuing calibration standard does not meet these requirements, a new initial calibration curve must be generated. If calibration check fails to meet requirements, a Record of Variance will be issued to determine what corrective actions shall be taken for the samples analyzed. Sample analysis cannot proceed until the GC system has satisfied the calibration linearity and retention time requirements.

6.6 Flammability Testing

Flammability testing is a program required procedure for evaluating the flammability of bin headspace samples that contain a summed concentration of flammable VOCs exceeding 500 ppmv. The procedure used for flammability shall conform with calibration and maintenance procedures described in the WIPP Bin Scale Test Guidance Manual Procedure 810.1. Laboratories shall maintain calibration and instrument operations logs to document compliance to Section 6.7, "Calibration and Operation Records."

6.6.1 Operational Checks

In addition to the calibration procedure operational checks shall be performed daily, at the beginning of each working day prior to the testing of standards and samples. Operational checks shall include:

- examination of the structural integrity of the flame test vessel (no cracks or deformations);
- examination of cleanliness of the flame test vessel (no residual material or soot from previous testing);

- inspection of the ignition source power output, as demonstrated by a clearly visible spark produced between the electrodes;

- verification of the pressure stability of the test vessel and connecting lines, demonstrated by the apparatus capable of maintaining a vacuum of 30 ± 1.5 mm Hg for five minutes.

Operational checks containing the requirements listed above shall be described in the procedure for conducting flammability testing, as well as the corrective actions performed when these conditions are not satisfied.

6.6.2 Standards Preparation

Standards used by the flammability testing shall be pure compounds (minimum of American Chemical Society (ACS) reagent grade) and shall be prepared according to the requirements contained within the Guidance Manual. The procedure for flammability testing shall describe the standards to be used and the preparation of standards.

6.6.3 Calibration

Calibration of flammability test equipment shall be done initially and then at the beginning of each working day, and after every 20 samples. Initial calibration shall be performed by testing the flammability of 8.0% (v/v) methanol, 15.0% (v/v) methanol, and 1.0% (v/v) diethyl ether. Daily calibration shall be done using 8.0% (v/v) methanol. Calibration is achieved when the 8.0% (v/v) methanol and 15.0% methanol standards are evaluated as **flammable**, and the 1.0% (v/v) diethyl ether standard is evaluated as **nonflammable**. Calibration frequency and performance criteria are summarized in Table 6-3.

6.7 Calibration and Operation Records

Calibration and operation records shall be prepared and maintained for each calibrated measurement and test equipment used in support of this program. Records shall contain the following information as minimum:

- Equipment identification and serial number;

- Name of the equipment or device;

- Calibration and/or maintenance schedule/procedure(s);

- Date and results of last calibration with signature of person or persons performing the calibration;
- Date for next schedule calibration;
- Calibration procedures and revision numbers;
- Nonconforming conditions related to the equipment.

Table 6-1, VOCs Summary Table - GC/MS and GC Calibration Requirements

Technique	Procedure	Frequency of Procedure	Acceptance Criteria
GCMS	BFB Tune	Every 12 hours	Table 6-2
GCMS	5-pt initial calibration	Initally and as needed	%RSD all compounds <35%
GCMS	Continuing calibration	Every 12 hours	%D for all compounds within 30% of initial calibration
GC	3-pt initial calibration	Initially and as needed	%RSD all compounds <30%
GC	Continuing calibration	Every 12 hours	%D for all compounds within 30% of initial calibration, RRTs within 3 standard deviations of initial calibration

Table 6-2. 4-Bromofluorobenzene Key Ions and Abundance Criteria

Mass	Ion Abundance Criteria
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	Base peak, 100% relative abundance
96	5 to 9% of mass 95
173	Less than 2% of mass 174
174	Greater than 50% of mass 95
175	5 to 9% of mass 174
176	Greater than 95% but less than 101% of mass 174
177	5 to 9% of mass 176

Table 6-3. Calibration Frequency and Performance Criteria for Flammability Testing

Technique	Procedure	Frequency of Procedure	Acceptance Criteria
Flame Test	3 pt. initial calibration	Initially and after every 20 samples	8.0% Methanol - Flammable 15% Methanol - Flammable 1.0% Diethyl ether - Not Flammable
Flame Test	Continuing calibration	Beginning of each working day	8.0% Methanol-Flammable

7.0 OPERATING AND ANALYTICAL PROCEDURES

This section describes the operating and analytical procedures used in support of the WIPP E-WCP. In accordance with ASME NQA-1, Element 9, these procedures shall be controlled, and special processes such as those used in nondestructive examination shall be performed by qualified personnel using qualified procedures in accordance with specified requirements.

7.1 Waste Selection and Handling

Waste selection consists of randomly selecting waste containers from specified TRUCON content codes and assembling these containers into groups that will meet bin loading, WIPP WAC, and TRUPACT-II Payload requirements. The RFP Waste Programs Information Management System (WPIM) organization maintains an inventory of all waste containers at RFP utilizing the Waste and Environmental Management System (WEMS). The operation and use of WEMS is detailed in procedure WP-1200, "WEMS Requirements" and WP-1201, "WEMS Waste Inventory Tracking and Controlling." The WPIM organization shall provide an inventory list of TRU waste containers available to support the WIPP Bin-Scale Test Program, by TRUCON Content Code, to the EG&G-RFP Project Manager who will transmit this information to the Sandia National Laboratories. The Sandia National Laboratories will randomly select the waste containers from this inventory list utilizing their sampling program. A listing of the selected waste containers for each bin to be loaded at RFP will be sent back to the EG&G-RFP Project Manager. The EG&G-RFP Project Manager will forward this information to the WPIM Project Manager. The WPIM Project Manager, will provide to the waste container custodian, by Interoffice Correspondence, the list of drums to be selected from the inventory for each bin to be loaded at RFP. The WPIM Project Manager also will initiate the Bin-Scale Test Sample Drum Chain of Custody Log and forward this log to the waste container custodian. The custodian will locate the waste container and verify the container identity against the Sample Drum Chain of Custody Log, and attach the log to the waste container. If nonconforming conditions are identified on the Log or drum, supervision and a Waste Inspector shall be notified to assess the nonconformance. The waste selection and chain of custody activities are detailed in procedure WO-4711, "WIPP Bin-Scale Sample Drum Chain of Custody Log." Following selection and verification the waste containers shall be prepared and routed for the waste characterization process. An operational process flow diagram for these activities shown in Appendix C.

Project-specific COC requirements, for the waste drums and Bin/SWB are discussed in Section 5 of this document and detailed in operating procedure WO-4711, "WIPP Bin-Scale Sample Drum Chain of Custody Log." and WO-4712, "WIPP Bin-Scale Bin/SWB Chain of Custody Log."
Transfer of waste containers on-site is provided by Plant Services (Trucking) and is subject to the requirements specified in the "EG&G Traffic Department Transportation Manual," "On-Site Transportation Manual," and the "Labeling and Marking Procedures for Radioactive Material Containers."

Requirements for dock inspections, final, and loading inspections of waste containers are detailed in the "EG&G Site Quality Assurance - Waste Inspection Procedures Manual."

Containers that do not meet the WIPP WAC, TRUPACT-II payload requirements, and RFP requirements, or their identity cannot be verified shall be rejected from this project and returned to storage.

7.2 Real-Time Radiography

The RTR system shall be used to nondestructively examine the contents of waste containers and will be used to investigate the following waste characteristics:

- Waste TRUCON Content Code and site-specific Item Description Code (IDC), as applicable;
- Waste items, residual materials, packaging materials, and/or waste material categories inventory, as applicable;
- Quantity of free liquids (no free liquids are acceptable).

The overall programmatic approach to visual characterization of waste utilizing RTR is shown in Appendix D.

The RTR system to be used in support of this project is located in Building 664 and contains the following components:

- X-ray producing device;
- imaging system;
- enclosure for radiation protection;
- waste container handling system;
- operator control and data acquisition system.

The system combines X-ray radiography and fluoroscopy, that allows the image of an object under examination to be displayed on a video screen at the same time as the examination takes place. The system has the capability to generate a videotape of the examination as a quality assurance record, that will subsequently be reviewed and compared against the visual examination.

The RTR system is operated from a control console that provides Closed Circuit Television monitoring of the examination process. The control console includes all the necessary instruments and controls required to monitor and control the examination activity being performed in the RTR enclosure. Operators scan the closed waste containers with the RTR equipment, observing the video image for the specified characteristics of the waste, as the output signal is simultaneously recorded on the audio/videotape and recorded on RTR Waste Package Report, Log book, and Bin-Scale Test Report. The x-ray producing device has controls that allow the RTR operator to vary the voltage, thereby controlling image quality. It should be possible to vary the voltage, typically between 150 and 400 kV, to provide an optimum degree of penetration through the waste container. Low density material is usually examined at lower voltage settings to improve contrast and image definition.

Project data forms/reports will be produced for each waste container , one copy of the NDT data forms/reports shall be retained in the NDT files, one copy shall be attached to the RFP WIPP Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports and audio/videotape record shall be transmitted to the EG&G-RFP PDCO, as soon as possible after data generation.

All waste shall be examined by RTR and excluded from this project if the WIPP Waste Acceptance Criteria, TRUPACT-II payload requirements, and RFP requirements cannot be met. Nonconformance reports shall be generated documenting the nonconformance, cause, corrective action, and disposition actions taken as specified in Section 13 of this document.

The specific information and action required to accomplish the data quality objectives for RTR of the waste containers is described in detail in procedure QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste." RTR Operators are trained, qualified and certified according to RFQ-TC-1A, "Qualification and Certification of NDT Personnel." Only a RTR Level IIL certified operator or a RT Level II certified operator under the direction of a certified RTR Level IIL or RT Level III operator is allowed to perform the operations described in this procedure.

7.3 Nondestructive Assay

NDA Operators perform measurements of waste drums on the PADC and LOSAC in accordance with approved, written procedures: WO-5228 and WO-5222, respectively. The procedures are written and controlled by Waste Operations in accordance with established Rocky Flats procedure control guidelines. Safeguards Measurements reviews and concurs on all NDA procedures used for assay of nuclear materials.

The operation of the PADC and LOSAC counters is controlled by each systems' controlling software. The systems are interactive and guide the operator through the performance of calibration verification. If the calibration verification measurements meet the established acceptance criteria, the operators are allowed to proceed and perform assays of waste containers. The controlling software directs the assay process and computes the assay results and measurements uncertainties. If the calibration verification measurements fail acceptance criteria, the operators are instructed to contact Safeguards Measurements for resolution of the apparent problem. If there is a problem with the assay on the PADC; if, for example the passive and active assays disagree, the PADC system will print a warning on the count sheet. The NDA Operator must contact a Safeguards Measurements engineer who will resolve the problem in accordance with the approved Safeguards Measurements Internal Procedure SMIP-4003, "Procedure for Safeguards Measurements Nondestructive Assay Count Sheet Review." Safeguards Measurements will report to Project Manager the results of their investigation into cases where the passive and active assay results differ significantly or measurement problems were encountered.

Evaluation of calibration and measurement control data is performed by Safeguards Measurements engineers in accordance with approved Safeguards Measurements Internal Procedures (SMIPs). The controlling software for each NDA system is developed and controlled by Safeguards Measurements. The controlling software is validated by measuring standards and comparing the measurements results to the established values for the standards as described in Safeguards Measurement Internal Procedures (SMIP-4012 for the PADC and SMIP-4010 for the LOSAC).

7.4 Visual Examination

The objective of the visual waste characterization is to determine the waste materials and their weights for those materials that may influence the potential for gas generation and to verify process knowledge in terms of TRUCON Content Code, IDC, physical waste form, and verify the quantity of estimated free liquids. All TRU waste selected to support this project will be characterized through visual examination of the waste contents. This process shall be recorded on audio/videotape and documented.

The gas sampling and visual examination process will be conducted in Building 776, Size Reduction Facility shown in Appendix D. Headspace gas sampling will be performed in Room 146B, Airlock, of the Size Reduction Facility that is the south airlock into the Size Reduction Vault, Room 146. Personnel performing operations in the airlock are required to wear full face respiratory protection; Tyvex coveralls over standard coveralls; a paper hood; three pairs of surgeon gloves; and plastic shoe covers over standard shoe covers. The Size Reduction Vault, Room 146 is an enclosed room in which contaminated waste material is manually sized reduced by personnel in supplied breathing air suits; one half mask respirator worn around the neck; standard white coveralls; three pairs of surgeon gloves; and plastic shoe covers over standard shoe covers. Operations in this room are limited to two personnel in the vault for a maximum of two hour increments. Negative pressure inside the Size Reduction Vault establishes airflow from outside the Size Reduction Facility, through the airlock and into the vault.

Prior to beginning the visual examination process, data from the RTR data forms/reports and videotape shall be reviewed. All drums shall require a 72 hour equilibration time prior to initiation of this operation. This is detailed in operating procedure WO-4700, "WIPP Bin-Scale Test Sample Drum Staging Operation."

As discussed previously, the waste characterization activities shall be performed in the Building 776, Size Reduction Facility. This operation is complex and involves a high degree of risk and safety to the personnel performing these operations. Extreme safety precautions shall be maintained and under no circumstances shall unnecessary risks be taken by personnel during this project. All activities within this facility are performed manually, there are no remote or mechanically controlled operations.

The waste drums will initially be moved into Room 146B, Airlock, of the Size Reduction Facility (see Figure 2) according to operating procedure WO-4702, "WIPP Bin-Scale Test Sample Drum Staging Operation." Once the waste drums are in the airlock, gas sampling will take place according to operating procedure WO-4701, "WIPP Bin-Scale Test Sample Drum Cold Gas Sampling Operations," and Analytical Laboratory operating procedure L-4146, "Headspace Gas Sampling of Waste Containers." There is a potential that the bags inside of the waste drum may be breached and contamination may be present, if this situation occurs gas sampling shall stop. This will eliminate the possibility of contaminating the airlock and personnel. This operation is then moved to Room 146 (Vault) of the Size Reduction Facility. This operation is detailed in operating procedure WO-4704, "WIPP Bin-Scale Test Sample Drum Hot Gas Sampling Operation."

Following gas sampling the bin will be removed from the Standard Waste Box (SWB) in the Manual Disassembly Area of the Advanced Size Reduction Facility located in Building 776, and moved into the Size Reduction Facility as detailed in operating procedure WO-4703, "WIPP Bin-Scale Test Standard Waste Box Unloading/Loading Operations," and WO-4702, "WIPP Bin-Scale Test Waste Characterization and Bin Loading Operation." The waste drum will then be moved into the Size Reduction Facility, the contents shall be physically characterized in Room 146 (Vault). The contents of each waste container shall be removed and characterized and recorded on the data forms/reports and loaded into the bin. The visual examination in the vault shall be performed by two Waste Technicians. Each technician shall verify the waste form, and the required information shall be recorded on the data form/report (WIPP Drum Gas Sampling and Waste Characterization Log) by the designated data recorder. A description of the waste items in the drum shall be recorded on a data form/report, as described in Section 8 of this document. The description shall identify all discernable waste items and residual materials so that these can be classified according to the waste material categories listed in Table 3-2. Estimated or measured weights also shall include process knowledge estimates of absorbed liquids, lead in leaded rubber, etc for composite materials as required by the QAPP.

The waste characterization activities are detailed in operating procedure WO-4702, "WIPP Bin-Scale Test Waste Characterization and Bin Loading Operation."

In no case shall any item or inner package from a drum containing an item that does not meet the WIPP WAC, TRUPACT-II payload requirements and RFP requirements be placed into a bin. If at any time during the drum unpacking and waste examination operation, a nonconforming item is identified, the entire contents of the drum shall be removed from the project.

All operations being performed in the Size Reduction Facility shall be documented by an audio/video recording and a descriptive narrative shall be made of the opening and unpacking of each drum.

Project data forms/reports will be produced for each waste container, one copy of the visual examination data forms/reports shall be retained in the SWT files, one copy shall be attached to the Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports and audio/videotape record shall be transmitted to the EG&G-RFP PPDCO, as soon as possible after data generation. Once the bin is completely loaded and sealed, a copy of all data compiled for each drum in the bin shall be attached to the RFP Bin-Scale Test Chain of Custody Log for a Bin/SWB, as detailed in operating procedure WO-4712, "RFP WIPP Bin-Scale Test Chain of Custody Log for a Bin/SWB."

Following loading and sealing of the bin, a qualitative leak check shall be performed in the Room 146B (Airlock) of the Size Reduction Facility. NDT personnel will perform a pressure drop test using the Volumetric Mini Integrated Leak Testing unit. The parameters for this test are to overpressure the bin to 0.5 psi and hold for two hours while monitoring for a pressure drop. A pressure drop of less than 0.05 psi will be considered acceptable for shipping the bin. A pressure drop of 0.05 psi or greater will require WIPP approval prior to shipping.

The leak test is required to be performed in Room 146B (Airlock), due to radiological requirements.

Detailed operating procedures will be developed by NDT in concert with SWT personnel to ensure all controls are in place prior to performing this operation. The leak test data produced for each bin shall be recorded on a data form/report and one copy shall be retained in the NDT files; one copy will be attached to the RFP Bin-Scale Test Chain of Custody Log for a Bin/SWB; and the original will be forwarded to the PDCO, as soon as possible after data generation.

7.5 Determination of Headspace Gases

Analytical methods for the analysis of headspace gases are derived from ASTM Methods 1946, 2650 and EPA Methods. Detailed procedures for the analysis of analytes in Tables 3-5 and 3-6 are provided in the QAPP Guidance Manual. RFP Analytical Laboratory procedures shall address the detailed requirements for implementing these methods. All analytical procedures will contain a section addressing the reporting of a variance to standard operating procedures, specific requirements are listed in Section 7.8. Samples shall be retained by the laboratory until the data package is approved by the EG&G RFP Project Manager, who will then notify the laboratory that the canisters may be cleaned. This is defined within Analytical Laboratory procedure L-4024, "Sample Administration - WIPP Characterization Program Headspace Sample Canisters," and L-4006, "Chain of Custody Procedure for WIPP Characterization Program Headspace Canisters."

7.5.1 SUMMA® Canister Preparation Requirements

SUMMA® canisters require cleaning and certification prior to use for Project purposes. Guidance for the development of site specific procedures for the cleaning and certification is in the Guidance Manual. A 24 hour leak test (pressure change < ± 2 psig/time[24 hours]) shall be performed on all canisters prior to cleaning. Canisters must be cleaned and certified on a batch basis. For certification of cleanliness one canister from a batch will be filled with humid zero air or humid ultra pure N_2 and analyzed for VOCs. This canister shall be tested for VOCs contamination above 50% of the PRQLs in Table 3-4. If the limit is not exceeded the batch is certified clean. After certification against leaks and contamination the canisters shall be evacuated to (≤ 0.05 mm Hg) for storage. Cleaning and certification records must be maintained.

7.5.1.1 RFP SUMMA® Canister Preparation Procedure

SUMMA® canisters are cleaned and certified for use as specified by RFP Analytical Laboratories procedure L-4138, "SUMMA® Passivated Stainless Steel Canisters Cleaning and Certification."

7.5.1.2 SUMMA® Canister Control and Handling

SUMMA® canisters are controlled and handling is documented and defined in two major procedures L-4006, "Chain of Custody Procedure for Headspace Gas Samples," and L-4024, "Sample Administration - WIPP Characterization Program Headspace Sample Canisters." L-4006 defines how custody of the canister is maintained and transferred from sample collection through analysis. L-4024, defines how the canisters are introduced, handled, and retained until after the data file is released.

7.6 Analytical Gas Methods

The methods listed and described below shall comply with the detection requirements of Table 3-5, and the WIPP Performance Demonstration Program (Section 10.2).

7.6.1 Mass Spectrometry

The RFP Analytical Laboratories methods based on ASTM Method 2650 for the analysis of headspace gases is described in procedure L-2421, "Precision Gas Mass Spectrometry Operations and Analysis (VG 30-38)." This procedure documents the analytical methods and steps required for analysis of headspace samples that will meet the inorganic gas analysis data quality assurance objectives listed in Table 3-5.

7.6.1.1 Requirements

Gas from the SUMMA® canisters must be expanded into a known volume and temperature, at a measured pressure, for introduction into the mass spectrometer. The spectrum obtained must be resolved into individual constituents. The resultant mixture mass specral data must be quantitatively reduced into the individual gas constituents by means of simultaneous equations or other computer generated algorithms.

7.6.2 Organic Gases

The Analytical Laboratories procedures listed below are based on EPA SW-846 Method 8240/8260 (USEPA, 1986) and the requirements listed in Table 3-6. Samples and calibration standards must be analyzed within ± 2° C of the same temperature. All GCs shall be equipped with wide-bore capillary columns and have sub-ambient capabilities.

7.6.2.1 GC/MS Methods Requirements

The VOC analytical methods listed below comply with the requirements of Table 3-6 (m-Xylene and p-Xylene cannot be separated by GC/MS procedures), and the WIPP Performance Demonstration Program (Section 10-2). The procedure used for the analysis of samples is; L-4111, "GC/MS Determination of Volatile Organics Waste Characterization." This procedure details the method for trapping and thermal desorption of headspace samples. A backup procedure is under development for low sample volumes where purge and trap is not feasible, the procedure is L-4122, "GC/MS Determination of Volatile Organics Direct Injection of Waste Gas Samples." The GC/MS shall be operated in a full scan mode. These methods will allow the detection and quantitation of all compounds listed in Table 3-6 and identification of compounds not listed in the Table 3-6. Analysis will be conducted using wide-bore capillary columns with sub-ambient capabilities. Non-target listed compounds shall be reported as tentatively identified compounds (TICs). The reported concentrations of TICs will have a higher uncertainty associated with them than the reported target analyte concentrations. For unknown peaks with total ion current peaks greater than 10% of the nearest (retention time) internal standard, a forward search of the latest NIST mass spectral library shall be performed. With external standards quantitation, unknown components with total ion current peak areas greater than 10% of the largest target analyte identified or ten times greater than the standard deviation of the background, whichever is less, must be searched.

7.6.2.2 GC Analysis for Alcohol and Ketones Methods Requirements

Analytical Laboratories procedure L-4147, "Direct Injection GC Analysis of Volatile Organic Components in Waste Samples" shall be used for the analysis of waste samples for alcohols and ketones. Sample introduction shall be by thermostated gas injection valves with sample loops. This method requires the use of two dissimilar wide-bore capillary columns. Positive identification shall be made by retention times confirmation of both columns. Quantitation shall be done using one of the two columns that has no interference in the retention window for the analyte.

7.7 Flammability Testing

The Laboratory procedure used for this test will be a modified version of ASTM Method E 681-85, that is provided in the Guidance Manual as Procedure 810.1. The laboratory procedure defining flammability testing is L-4149, "Flammability Determination of WIPP Experimental Waste Characterization Program Headspace Gas Samples." Included within this procedure are required inspections that shall be made prior to testing that include:

- examination of the structural integrity of the flame test vessel (no cracks or deformations);
- examination of the cleanliness of the flame test vessel (no residual material or soot from previous testing);
- inspection of the ignition source power output (clearly visible spark produced between the electrodes);
- verification of the pressure stability of the test vessel and all connecting lines (apparatus capable of maintaining a vacuum of 30 ± 1.5 mm Hg for five minutes).

The flame test vessel and all connecting lines shall be capable of being evacuated to less than 30 Torr. A 2.63 L sample of the gas to be tested will be introduced into the test vessel. Prior to ignition, the final temperature shall be ambient and the final pressure not less than 400 Torr. Temperature measurement of ambient air immediately surrounding the flame test vessel shall be measured with an accuracy of ± 4° C. Temperature measurement within the test vessel shall be accurate to ± 1° C. Pressure measurements within the flame test vessel shall be accurate to ± 0.2 %. The laboratory procedure shall specify calibration requirements for temperature and pressure monitoring devices.

7.7.1 Flammability Testing Training Requirements

Operator Certification and Training is addressed within the laboratory procedure covering the performance of the flame testing as defined within

L-4949, "Flammability Determination of WIPP Experimental Waste Characterization Program Headspace Gas Sample," and included the following:

- Custody Transfer training shall include the methods of how custody of the samples are received and transferred as described in L-4006;

- Operator training to OSA requirements that defines the safety requirements for this operation;

- On the Job Training (OJT), entails first hand training of the operator on the equipment, this shall include the following items:

  - how to operate the specific equipment involved with the apparatus;

  - how to check out the instrument prior to performing of the test, this involves checking the apparatus condition;

  - how to calculate the amounts of standards required to calibrate the instrument;

  - method of introducing standards and samples through the operations of the vacuum and valving system;

  - shutdown of the equipment;

- how to interpret the results;
- reporting of results.

7.8 Reporting of Variances to Standard Operating Procedures

All laboratory procedures concerning the sampling and analysis of waste samples associated with WIPP E-WCP shall address the reporting of variances to standard operating procedures. The information that will be required when a variance to a standard operating procedure occurs during sampling, transport and analysis is described below. The responsible person observing the variance shall fill out the variance report and send a copy to the Analytical Laboratory WIPP Program QAO for transmittal to the Project Manager and Project QAO. A copy will also be indicated with the data package addressing the occurrence. The Site Project QAO has the responsibility of evaluating the impact of the variance and notifying the appropriate personnel. The form shall address the following items:

- Date of the occurrence;
- Time of the occurrence;
- Location of the occurrence;
- Procedure and revision of the procedure affected;
- Sample number(s) in process when the occurrence happened;
- Analyst performing the procedure when the occurrence happened;
- Responsible Chemist;
- A description of the occurrence;
- Results from the investigation of the occurrence (cause);
- Discussion of quality impact on the data being generated at the time of the occurrence;
- Corrective action(s) taken (including recurrence control).

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 Data Reduction Objectives

Project data is safeguarded from loss, misinterpretation, and error by preventative actions taken. These actions are both general and specific to address the characteristics of the data and the process or system generating them. The general requirements are:

- All data entries shall be legibly made, dated and signed in permanent black ink.
- All data must be recorded clearly and accurately in logbooks and/or data record formats specified by Project SOPs and subsidiary documents.
- Any changes to original data require the affected data be lined out, dated and signed by the individual making the change, with reason for the change in the comments section of the data form or on the Record of Variance form.
- All data transferred and/or reduced from one data format to another must be performed completely and accurately.
- Data is organized in standard reporting formats as described in the following subsections.
- All electronic and videotaped data must be stored in a readily retrievable system and protected from environmental damage.
- An analytical batch, for laboratory purposes, is defined as a group of samples from a similar matrix processed as a unit. This unit is limited to 20 samples.
- All raw data shall be signed and dated in ink.

8.2 Data Validation

The data is validated at three levels, the first occurring at the characterization tests for each drum or each analytical batch in the Analytical Laboratories. The second is accomplished at the Project level by reviewing the bin case data. The third level is accomplished by DOE/WPO program level, that is not covered by this document.

A 100% review of all data by qualified individuals is assured by the detailed requirements for data review and documentation in the operating procedures for the characterization tests and the laboratory analysis. These procedures and forms are listed and illustrated in succeeding subsections.

8.2.1 Data Validation - Data Generation Level

The first level of review ensures that the data have been reviewed by a qualified person independent of the data generator and a signature release from the supervisory personnel.

For the Laboratories the Laboratory Program QA Officer will serve as the first level of independent review for laboratory data. Procedures describing Lab PQAO review and validation activity are L-5016, "Data Review and Validation for WIPP Experimental Waste Characterization Program for Inorganic Gases" and L-5017, "Data Review and Validation for WIPP Experimental Waste Characterization Program for Volatile Organic Compounds."

8.2.1.1 Independent Technical Review

Independent technical review requires that 100% of the data receives independent technical review. The reviewer is a qualified person other than the data generator. The reviewer's signature releases the data indicating that:

- the data were properly reduced and reported in the specified units;
- data generation and reduction were accomplished in a technically proper manner consistent with the techniques used;
- all calculation requirements have been met;

- all calculations have been verified by a valid calculation program, spot checks of verified calculation programs, and/or a 100% check of all hand calculations;

- all variances from the methods specified have been documented to include the rationale for the variation;

- the data have been reviewed for transcription errors;

- QC sample results are within established control limits, and if not the data have been properly qualified; RTR and Visual tapes have been reviewed, on a periodic basis, and compared to the reported data to ensure the reported data is complete and correct;

- analytical sample holding times have been met and any exceptions documented;

- the data are complete and include raw data, calculation records, and copies of COC forms.

8.2.1.2 Technical Supervisory Signature Release

All data must have a technical supervisory signature release on a per analytical batch or waste container basis. This release must ensure that:

- the data are technically reasonable;

- all data have received an independent technical review;

- the data package (analytical batch or per waste container data) is complete and includes raw data, data forms, calculation records, QC summaries, narrative, copies of COCs;

- analytical sampling holding times were met or exceptions documented.

8.2.1.3 QA Signature Release

All data must receive a QA signature release. The signature release must ensure the:

- verification that the analytical sample holding times were met, or exceptions documented;
  - the data package is complete as required for the data generation point, i.e., analytical laboratory, visual examination, RTR, and RA;
  - QC practices were documented and all QC criteria are met;
  - validation is complete and documented.

8.2.2 Data Validation - Project Level

The second level of data review shall occur at the project level on a per bin basis with each bin case report.

8.2.2.1 RFP Project Data Control Officer

The Project Data Control Officer (PDCO) will receive the data reports and packages from the individual groups associated with the project. PDCO responsibility is to verify that all required data forms and raw data is present and is complete and legible. The procedure used by the PDCO is WO-4710, "WIPP Bin-Scale Test, Waste Characterization Data, Quality Assurance Records Transmittal to the Project Data Control Officer." After this review has been completed the data is transmitted to the PDCO. Once the data package has been signed off by the Project QAO and Project Manager, the PDCO has the responsibility to transmit the final data package to the Project Document/Records Control Officer for coping, storage, and transmittal to the DOE/RFO who will transmit the package to the WIPP Project Integration Office.

8.2.2.2 RFP Project Data Validation Officer

The Project Data Validation Officer (PDVO) has the responsibility of reviewing calculations performed by the individual groups, performing a comparison of RTR data to visual inspection results, and performing the NMD calculation for determining emplacement time. These function are defined in procedure WO-4713, "Project Level Data Review and Validation for WIPP Experimental Waste Characterization Program." Once the PDVO has completed his review the data package is sent to the Project QAO for review and signature.

8.2.2.3 RFP Project QA Officer

One hundred percent of the bin case data must receive signature release from the RFP Project QAO. This signature release at a minimum must ensure that the data have been reviewed for:

- field QC checks to include field blank, field duplicate, and field reference standard compliance to Section 9.0;
- evaluation of compliance of the data with data quality objectives (DQOs);
- evaluation of compliance with applicable regulatory criteria;
- validation has occurred and is documented.

Once this review is complete the data package is sent to the Project Manager for review and signature.

8.2.2.4 RFP Project Manager

One hundred percent of the bin cases (characterization data generated in support of waste packed in a bin) must have the signature release of the RFP Project Manager. At the Project level a comparison of RTR data with the results from visual examination will be performed to determine the accuracy of RTR results. This signature release ensures the following:

- the bin case documentation is complete:
- analytical sample holding time criteria have been met, or exceptions documented.
- verification that data generation level, supervisory, and QA validation and signature releases are present. Project level verification should include some repetition of the previous level's validation process.
- field QC samples have been reviewed for compliance with the criteria set forth in the Section 9.0. Blank contamination must be noted, duplicate precision reported, and reference samples evaluated for analyte recoveries.

When the bin case data have been validated at the Project level and the data are considered acceptable, the RFP Project Manager must ensure that the laboratory is notified. Sample canisters that have been held pending this release, may then be released from storage and processed for re-use. The sample tags and Sample Information Tags from these canisters must be delivered to the Project Manager (or his designate) for inclusion in the bin case records.

Once the final data package is completed, it is returned to the PDCO for transmission to the Project Document/Records Control Officer.

8.3 Data Reporting

The reporting requirements, methods, and reporting forms are specified by the Analytical Laboratory Procedure, L-5010, "Waste Characterization Data Handling and Reporting Procedures" for each characterization test as listed and illustrated in subsequent subsections.

8.3.1 Data Reporting - Data Generation Level

RFP Analytical Laboratories shall submit an analytical batch report/package to the RFP Project Manager within 40 days of the Validated Time of Sample Receipt (VTSR) in an analytical batch. In addition to the data forms, the Analytical Laboratory Report consists of:

- a cover page with the laboratory name, Project identification, and the approval/release signatures of the Laboratory Manager and the Laboratory Program QA Officer. The cover page shall list in tabular form, the field sample numbers, associated laboratory sample numbers, laboratory QC samples analyzed related to the field samples, and the analytical method(s) used. The cover page form is illustrated in Appendix D.

- a case narrative describing any problems encountered during the sample analysis.

Table 8-1 Q-Test for Rejection of a Suspect Result

No. Of Results	Rejection Quotient $Q_{0.90}$
3	0.94
4	0.76
5	0.64
6	0.56
7	0.51
8	0.47
9	0.44
10	0.41

8.3.2 Data Reporting - Project Level

The RFP Project Manager is responsible to ensure the compilation of a comprehensive bin report that contains the appropriate analytical and waste container data on a per bin package basis. The RFP Project Manager shall then submit a validated bin case report to DOE/WPO within two weeks of the receipt of all necessary bin case data. The completed bin case report, as submitted to DOE/WPO must contain the following:

- a cover page identifying the RFP, the project identification, and the approval release signatures of the RFP Project Manager and the RFP Project QA Officer;
- a tabular listing of the field sample numbers, associated laboratory sample numbers, waste container numbers, and the identity of the bin;
- a narrative describing any problems encountered throughout the entire scope of the tests and analyses performed for the Project, including any deviations from the specified methods;
- a result summary for each characterization technique;
- all raw data.

The RFP Project Manager must maintain a record of the transmittal for the submission of the bin case report to the DOE/WPO.

8.4 Real-Time-Radiography

Information from RTR shall be obtained from a videotaped scan, that contains an audio narrative provided by certified RTR Operators. Results shall be recorded on the data forms/records shown in Appendix D. This process is detailed in operating procedure QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste."

All RTR data shall be documented as required for WIPP WAC certification and the data shall be available for each drum, specifically with respect to IDC, presence of free liquids, content inventory, residual materials, packaging materials, and presence of compressed gas containers. Data entry/verifications shall be performed for video tape number, IDC, liner type, percent volume utilization, liquid quantities and locations, metal containers, bags, fiber paks, cartons, and bottles.

The identities of the waste items documented on the RTR data forms/reports (see Appendix D) shall be used in combination with process knowledge to estimate each item's weight for the selected homogeneous waste forms identified in Section 3.1.

8.4.1 Data Reduction

The RTR audio/videotape record is not amenable to data reduction techniques as the RTR Operator findings are recorded during the RTR examination. The RTR audio/videotapes are reviewed by independent operators and supervision as detailed in operating procedure QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste."

8.4.2 Data Validation

The RTR supervision reviews all RTR data forms/reports for technical data completion and accuracy, equipment calibration data, waste drum identities, RTR audio/videotape identities, IDCs, waste packaging materials inventories, and legibility of the entries as specified in operating procedure QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste." Completion of these reviews will be indicated by a signature on the data forms/reports.

The Waste Quality Engineering organization reviews all data forms for completeness and compliance with the WIPP WAC, TRUPACT-II payload requirements and RFP requirements as specified in operating procedure WQE-4018, "Certification of Transuranic Waste for Off-Site Shipment."

8.4.3 Data Reporting

Data reporting requirements for RTR are specified on the RTR data forms/reports (see Appendix D). These forms shall be completed and signed by the RTR Operator and RTR Supervision as specified in QT-1009, "Real-Time Radiography Testing of Transuranic and Low-Level Waste." Project data forms/reports will be produced for each waste container, one copy of the NDT data forms/reports shall be retained in the NDT files, one copy shall be attached to the RFP WIPP Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports and audio/videotape record shall be transmitted to the EG&G-RFP PDCO, as soon as possible after data generation. The data reporting forms are shown in Appendix D.

8.5 Nondestructive Assay

The results of NDA for each waste container shall be documented and available to the data user. The NDA results are documented and handled as discussed below.

8.5.1 Data Reduction

Data reduction functions shall be accomplished using Building 371 PAN Counting system's computer software. This software carries the identifier "NEUT, 04.05."

8.5.2 Data Validation

The NDA supervision reviews all NDA data forms/reports for technical data completion as specified in operating procedure WO-5228, "Passive/Active Drum Assay System Building 371 (U)." Completion of these reviews will be indicated by a signature on the data form/report.

The WEMS system operated by WPIM, calculates the Pu-239 fissile gram equivalent, total error, decay heat for each payload container and assembled TRUPACT-II payload using data obtained for the PAN Counting system. This is detailed in operating procedure WP-1202, "Waste and Environmental Management System (WEMS) Certification and Off-site Shipment."

As part of the WIPP WAC certification process, data verifications shall be performed for fissile mass, Pu-239 equivalent curies, alpha activity, thermal power, TRU activity, and system error; this verification process is performed by Waste Quality Engineering and documented in operating procedure WQE-4018, "Certification of Transuranic Waste for Off-Site Shipment."

8.5.3 Data Reporting

NDA data reporting and recording requirements are specified in operating procedure WO-5228, "Passive/Active Drum Assay System Building 371 (U)," and on the NDA data forms/reports shown in Appendix D.

Project data forms/reports will be produced for each waste container, one copy of the NDA data forms/reports shall be retained in the NDA files, one copy shall be attached to the RFP WIPP Bin-Scale Test Sample Drum Chain of Custody Log, and the original data forms/reports shall be transmitted to the EG&G-RFP PDCO, as soon as possible after data generation.

8.6 Visual Examination

The results of visual examination shall be documented and available for each waste container. The results of the visual examination shall be audio/videotaped and documented on the data forms/reports shown in Appendix D.

8.6.1 Data Reduction

The identity of waste items, residual materials, and packaging materials documented on the data forms/reports shown in Appendix D, shall be used in conjunction with site specific data on standard weights to classify the waste items, residual materials, and packaging materials into the material categories listed in Table 3-2, and to estimate the total weight of waste materials in each of these categories.

8.6.2 Data Validation

The SWT supervision and SWT WIPP Program Manager shall review all SWT data forms/reports for technical data completion and accuracy as specified in operating procedure WO-4702, "WIPP Bin-Scale Test Waste Characterization and Bin Loading Operation." Completion of these reviews will be indicated by a signature on the data forms/reports.

8.6.3 Data Reporting

Data reporting requirements for the visual examination are specified on the data forms/reports and in operating procedure WO-4702, "WIPP Bin-Scale Test Waste Characterization and Bin Loading Operation." In addition, visual examination results shall be recorded on audio/videotape.

Project data forms/reports shall be produced for each waste container, one copy of the SWT data forms/reports shall be retained in the SWT files, one copy shall be attached to the RFP WIPP Bin-Scale Test Sample Drum Chain of Custody Log and Bin/SWB Chain of Custody Log, and the original data forms/reports and audio/videotape record shall be transmitted to the EG&G-RFP PDCO, as soon as possible after data generation.

8.7 Laboratory Analysis of Headspace Gas Samples

Each laboratory analyzing samples will be required to submit data reports for each analytical batch, an analytical batch is defined as no more than 20 samples.

Data reporting forms are shown in Appendix D.

The flag qualifiers that are to be used are as follows:

B - Analyte detected in blank
E - Analyte exceeds the calibration curve
J - Analyte less than the PRDL or PRQL and greater than or equal to the MDL
U - Analyte was undetected

The method qualifier (M) are:

MS - Mass Spectrometry
GC - Gas Chromatography
GCMS - Gas Chromatography/Mass Spectrometry

8.7.1 Gas Mass Spectrometry

RFP procedures for data reduction and reporting of gas analysis results are listed in this section. Results are validated against requirements set in Table 3-5 for program-required Quality Assurance objectives.

8.7.1.1 Data Reduction

The analytical instrument used for gas analysis will be calibrated as specified by the RFP Analytical Laboratories Procedure L-2421, "Precision Gas Mass Spectrometry Operations and Analysis (VG 30-38)." Data reduction is accomplished using instrument software to develop calibration of the mass spectrometer is accomplished by the introduction of pure gas of each analyte into the instrument. A sensitivity factor is calculated and this value is used to calculate the concentration of the analyte in a sample, the factor is updated in the data reduction program, when new values are determined.

8.7.1.2 Data Validation and Reporting

RFP data validation and reporting will be conducted as specified in the Analytical Laboratories Procedure L-5016, "Data Review and Validation for WIPP Experimental Waste Characterization Program for Inorganic Gases." Data handling is accomplished in accordance with procedure L-5010, "Waste Characterization Data Handling and Reporting Procedure."

For forms refer to Appendix D

8.7.2 Organic Gas Analysis

The RFP procedures for data reduction and data reporting of organic gas samples are listed in this section. Results are validated against requirements set in Table 3-4 and 3-6 for program required Quality Assurance objectives.

8.7.2.1 Data Reduction

The RFP analytical instruments used for organic gas and VOC analysis will be calibrated as specified by the RFP Analytical Laboratories Procedures L-4147, "Direct Injection GC Analysis of Volatile Organic Compounds in Waste Samples," L-4122, "GC/MS Determination of Volatile Organic Direct Injection of Waste Gas Samples," or L-4111, "GC/MS Determination of Volatile Organics Waste Characterization." Calibration standards for these instruments consist of the various analytes listed in Table 3-4 and 3-6. Multi-point calibration curves consisting of various concentrations of the analytes shall be run on the instruments using the exact methodologies that will be used to analyze the Project samples. From this calibration curve, the response factors for each analyte will be determined using the integrated software for the control and calibration of the instruments. The relative response factors for each analyte will then be used to calculate the concentration for each compound detected within the project samples.

8.7.2.2 Data Validation and Reporting

RFP data validation and reporting of organic gases and VOCs will be accomplished as specified by the Analytical Laboratories Procedure "L-5017, Data Review and Validation for WIPP Experimental Waste Characterization Program for Volatile Organic Compounds." Data handling is accomplished in accordance with Procedure L-5010, "Waste Characterization Data Handling and Reporting Procedure."

For forms refer to Appendix D

9.0 INTERNAL QC CHECKS AND FREQUENCY

This section describes RFP internal quality controls for this Project for field and laboratory activities. The control of these activities complies with ASME NQA-1, Elements 9 (Control of Processes) and Element 11 (Test Control). RFP quality generating processes are controlled by operator training with review of performance. Tests are controlled by such QC practices as the routine evaluation of performance standards, replicates and blanks.

9.1 Field Operations

The QC checks for RFP field operations are described in the following sections.

9.1.1 Real-Time Radiography

The RFP quality control of the RTR process includes technician training, equipment operating standards (performance tests), controlled operating procedures, replicate scans, independent observations, and data reporting requirements for the subsequent comparison review of visual examination results as related to the RTR estimation of contents. Training of technicians shall includes the use of a training drum to certify the technicians.

9.1.1.1 RTR Technician Training

RFQ-TC-1A specifies RTR technician training requirements. RTR personnel are recertified bi-annually to RFQ-TC-1A (ASNT) Level II Radiography requirements. Additional RTR technician certification requirements consist of:

- a minimum of one month of training with an experienced and current Level II certified RTR technician;
- successfully completing a practical examination by performing the scanning operation in accordance with operating and safety procedures;
- correctly completing standard data reporting forms.

9.1.1.2 Quality Assurance Officer (QAO) Review

The RFP Project QAO is responsible to ensure the RTR data is monitored for compliance to these requirements, reviewed in comparison to the related visual examination results, and initiate appropriate corrective action as necessary. Part of this function includes the routine examination of video tapes and results for replicate drum examinations.

9.1.2 Nondestructive Assay

The RFP quality control of the NDA operation includes personnel training, equipment operating standards (calibrations and performance tests), controlled operating procedures, replicate assays, and data reporting and review requirements. The calibrations and performance test are performed as specified in Section 6.3.2. The NDA Procedure WO-5228, "Passive/Active Drum Assay System, Building 371, (U)" details the operating sequence of activity required of the NDA operators, the replicate drum assay requirements, and the data reporting requirements.

9.1.2.1 NDA Operator Training

NDA operator training is conducted as specified by the EG&G RFP "Training User's Manual" and the training is documented as specified by the EG&G RFP "E&WM Administrative Manual," 2-20000-ADM. Procedure 02.01, "Development and Control of Qualification Standards and Qualification Cards." Re-qualification is required every two years.

9.1.2.2 RFP Project QAO Review

The RFP Project QAO is responsible to ensure the RA data is monitored for compliance to these requirements and initiate appropriate corrective action as necessary.

9.1.3 Visual Examination

The visual examination operation consists of both a visual estimation of an inner waste bag's contents and an estimation of their weight; a visual sorting and description of all contents, and a weighing the bag contents; and recording the results. The operating requirements for these activities, the training requirements for the Waste Technicians and Solid Waste Chemical Operators, the requirements for replicate weighing of drum and data reporting are specified in operating procedure WO-4702, "WIPP Bin-Scale Test Waste Characterization and Bin Loading Operation." For results to be valid, two inspectors shall agree on the results from each container.

9.1.3.1 Solid Waste Treatment (SWT) Waste Technicians and Solid Waste Operators Training

SWT Waste Technicians and Solid Waste Operators training is conducted as specified by the EG&G RFP "Training User's Manual" and the training is documented as specified by the EG&G RFP "E&WM Administrative Manual," 2-20000-ADM. Procedure 02.01, "Development and Control of Qualification Standards and Qualification Cards." Requalification is required every two years.

9.2 Laboratory Operations

QC checks performed by the labs shall meet the minimum requirements set forth in the Table 9-1 of QAPjP. The individual Analytical Laboratories procedures specify the QC checks to be performed and their frequency. Laboratory SOPs specify qualitative and quantitative acceptance criteria for QC checks and corrective actions if criteria are not met. Laboratories project procedures shall obtain the concurrence of the Project Manager prior to starting work on this project.

9.2.1 Headspace Sampling

The requirements for taking RFP field QC check samples for analysis during headspace sampling operations, their frequencies, and reporting requirements shall be specified in the Analytical Laboratories Procedure, L-4146, "Headspace Gas Sampling of Waste Containers." Requirements for field QC sample frequencies are listed in Table 9-1 for initial and routine samples. The results of the analysis of these samples shall be reported to the RFP Project Manager and/or the RFP Project QAO as specified in Section 8.

Table 9-1 Summary of the Number and Type of Field QC Headspace Samples

First Two Bins	Volatile Organic Compounds	Gases	NOx*
Field blanks	1/drum	2/bin	2/bin
Sampling manifold blanks **	1/day prior to work	1/day prior to work	1/day prior to work
Field reference standards	1/bin	1/bin	1/bin
Field duplicate samples	1/bin	1/bin	1/bin

	After First Two Bins		
	Volatile Organic Compounds	Gases	NOx*
Field blanks	1/day	1/week	1/week
Sampling manifold blanks **	1/day prior to work	1/day prior to work	1/day prior to work
Field reference standards	1/bin	1/bin	1/bin
Field duplicate samples	1/bin	1/bin	1/bin

* For Gas Mass Spectrometry analysis, a separate sample for NOx determination is not required to be collected in addition to the gas sample.

** One manifold blank sample must be collected, analyzed, and demonstrated clean prior to first use (all analytes), then at the specified frequency thereafter.

9.2.1.1 Reporting and Review Requirements

Results shall be reviewed for compliance with the criteria specified in Tables 3-5 and 3-6, and results will be documented. Copies of analytical results for field reference standards, field sample duplicates, field blanks and sampling manifold blanks shall be reported to the Project Manager and QAO when the Data Quality Objectives in Section 3.0 are not met. When the criteria are not met corrective action shall be initiated in accordance with laboratory's corrective action procedure. The completed Record of Variance Form shall be sent to the Project Manager and Project QAO for review of the impact of the variance on the sample data. The Project Manager and Project QAO may require additional action as necessary.

9.2.2 Laboratory Operations

For laboratory operations a Laboratory Quality Assurance Plan (QAP) shall assure that data of known and documented quality will be generated. Laboratory procedures shall define the qualitative and quantitative acceptance criteria for QC Checks and document procedures for corrective action when the criteria are not satisfied. QC check the laboratory shall perform are:

- laboratory duplicates;
- laboratory control samples;
- field reference samples;
- blanks (field and laboratory);
  - sampling manifold blanks;
  - field;
  - laboratory.

9.2.3 Gas Analysis

The quality of the analytical data generated by the RFP laboratories is assured by QC checks performed as specified by the Analytical Laboratories Procedures, L-2421, "Precision Gas Mass Spectrometry Operation and Analysis (VG 30-38)," and L-5016, "Data Review and Validation for WIPP Experimental Waste Characterization Program for Inorganic Gases." The Analytical Laboratories shall demonstrate and document acceptable methods performance prior to analysis of samples for the E-WCP project. Acceptable criteria are defined as the separation, identification, quantitation of the analytes required at the PRDL and the requirements listed in Section 3.5 of the QAPjP.

9.2.3.1 RFP Compliance

RFP compliance with QAPP requirements for initial and continuing method capability is documented in the above documents. Capability is further assured by participation in the Performance Demonstration Program. The control samples include field reference standards, laboratory duplicate samples, sampling manifold blanks, laboratory blanks, and duplicate analysis of field samples. If non-standard operating conditions occur during the performance of an operation defined by an approved procedure, the responsible person in charge of the operation shall complete the form as defined in Section 7.8 of the QAPjP. The Analytical Laboratory WIPP Project QAO is responsible to monitor the analytical operations for compliance with the above procedures and the analytical results for compliance with Table 3-5. The Analytical Laboratory WIPP Project QAO is responsible to identify nonconformances and assure adequate corrective action is completed. The Analytical Laboratory WIPP Project QAO documents the above results and actions taken, and forwards copies of the documentation to the Project level for review. The completed Record of Variance form shall be sent to the Project QAO, who has the responsibility of evaluating the impact of the variance and notifying the appropriate personnel. Refer to Section 13.0 for requirements and reporting form. The Project QAO shall be notified of any unfavorable trends and may request additional samples or other corrective action. The Project Manager must be notified if satisfactory actions are not obtained promptly.

9.2.4 Organic Gases

The quality of the analytical data generated by the RFP laboratories is assured by QC checks performed as specified by the Analytical Laboratories Procedures, L-4111, "GC/MS Determination of Volatile Organics Waste Characterization," L-4122, "GC/MS Determination of Volatile Organics Direct Injection of Waste Gas Samples," L-4147, "Direct Injection GC Analysis of Volatile Organic Components in Waste Samples," and L-5017, "Data Review and Validation for WIPP Experimental Waste Characterization Program for Volatile Organic Compounds." Analytical Laboratories shall demonstrate and document acceptable methods performance prior to analysis of samples for the E-WCP project. Acceptable criteria are defined as the separation, identification, quantitation of the analytes required at the PRQL and the requirements listed in Section 3.5 of the QAPjP.

9.2.4.1 RFP Compliance

RFP compliance with QAPP requirements for initial and continuing method capability is documented in the above document. Capability is further demonstrated by participation in the Performance Demonstration Program. The control samples include field reference standards, laboratory control samples, sampling manifold blanks, laboratory blanks, laboratory duplicates, and field duplicate samples. If non-standard operating conditions occur during the performance of an operation defined by a Laboratory procedure, the person responsible for the operation shall complete the form as defined in Section 7.8 of the QAPjP. The Analytical Laboratory WIPP Project QAO is responsible to monitor the analytical operations for compliance with the above procedures and the analytical results for compliance with Tables 3-6. The Analytical Laboratory WIPP Project QAO is responsible to identify nonconformances and assure adequate corrective action is completed. The Analytical Laboratory WIPP Project QAO documents the above results and actions taken, and forwards copies of the documentation to the Project level for review. The completed Record of Variance form shall be sent to the Project QAO, who has the responsibility of evaluating the impact of the variance and notifying the appropriate personnel. Refer to Section 13.0 for requirements and reporting form. The Project QAO shall be notified of any unfavorable trends and may request additional samples or other corrective action. The Project Manager must be notified if satisfactory actions are not obtained promptly.

9.2.4.2 Internal Standards

Internal standards area counts must be monitored for all samples by the Laboratory Program QA Officer. For the GC/MS to demonstrate control the area counts for continuing calibration standards shall be between 50 % to 200 % of the average internal standard area counts from the most recent five - point calibration. Sample area counts shall be within 50 % to 200 % of the latest continuing calibration standards for the GC/MS to be considered under control. Control of the instruments shall be demonstrated by the maintenance of control charts to monitor internal area counts.

9.2.5 Definitions of QC Checks

Calibration Check Standards:

Are standards used to check the calibration of the instrument.

Laboratory Control Samples (LCS):

Are samples of standards from a different source than the gases used for calibration. LCS shall be analyzed at a frequency of one per analytical batch. The results from the analysis is used to create a control chart to track the instrument performance with time.

Field Blanks (FB):

Are used to evaluate background levels around the sampling area. They are taken prior to the removal of the drum lid.

Sample Manifold Blanks (SMB):

Are used to assess the cleanliness of the sampling manifold used to collect samples. A clean canister shall be filled with ultra high purity nitrogen or helium (99.999%) though the manifold. Then analyzed as a routine sample, if the sample exceeds the value of 50% of PRQL levels set in Table 3-6. If analytes are detected at levels exceeding the 50% level of PRQL the Project Manager shall be notified, and is responsible to ensure that corrective action measures are taken.

****** NOTE ******

("Equipment Blanks" for bin sampling is equivalent to sample manifold blanks for drum and bag sampling.)

Field Reference Standards (FRS):

Are used to assess the accuracy with which the sampling manifold can collect VOC, gas, and NO_x samples into SUMMA®. FRS are commercially purchased gas standards independent from standards used for calibration purposes. They shall contain at least five of the target analyte compounds.

Field Samples Duplicates:

Duplicate samples will be collected to assess the precision with which the sampling procedure can collect samples into the cleaned canisters.

Laboratory Blanks (LB):

Are SUMMA® canisters filled with high purity nitrogen (99.999%). Laboratory procedures shall define how LB are prepared. LB shall be analyzed daily during analytical operations.

Laboratory Duplicate:

The laboratory must analyze individual field samples in duplicate. Field canisters shall be analyzed in duplicate at a frequency of 5 % of all field samples or one per analytical batch, whichever is greater.

9.2.6 Duplicate Analysis

Field canisters analyzed in duplicate shall be used to assess sampling precision. Duplicate results shall be acceptable if RPD is less than ± 25 %. It shall be the responsibility of the Laboratory Program QA Officer to monitor and document the results of duplicate analysis.

9.3 Flammability Testing

QC requirements for flammability testing are designed to provide qualitative evaluation if the bin headspace samples are flammable. Only trained personnel shall operate the flame test apparatus. The operator or analyst who performed the initial calibrations and continuing calibrations must analyze the associated analytical batch. All field duplicates samples shall be analyzed. Laboratory duplicates shall be analyzed at a frequency of one per analytical batch, with a batch being defined as ≤ 20 samples. A functional blank is 1.0 % (v/v) of diethyl ether initial calibration standard, no additional blanks are required.

10.0 PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

Audits of RFP waste operations are conducted regularly by internal organizations and external agencies as described in succeeding sections.

10.1 Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria Certification Committee (WACCC) Audits

The RFP facilities, operations and quality functions for the Project covered by this QAPjP require audit by a WIPP-WACCC Audit Team prior to the shipment of waste from the site and annually thereafter. WIPP-WACCC Audit Teams will also conduct audits of the RFP TRU Waste Management Plan with the WIPP-WAC and the TRUPACT-II Payload Compliance (TRAMPAC) documents.

10.2 RFP Project Quality Assurance Officer (QAO) Audit/Surveillance

The RFP Project QAO shall assure a minimum of two performance audits/surveillance occur each year. These audits/surveillances will be conducted in accordance with RFP Site Quality Assurance (SQA) audit program requirements. RFP Site Quality Assurance will be requested by Project Level Management (Project Manager and Quality Assurance Officer) for assistance in the conduction of the required audits.

Quality assurance audits of the program aspects of Waste Operations are performed on an annual basis by the Assurance Audits group.

11.0 PREVENTATIVE MAINTENANCE

Instrumentation performance is verified by using standards on a daily or analytical batch frequency. Results from the evaluation of these standards are used to determine if the instrument is operating within the required parameters. If the instrument is found not to be operating within the required parameters, maintenance or recalibration is performed to bring the instrument performance back to within compliance. In addition repair/maintenance histories for the instruments are maintained within the instrument logbook. Each organization is required to develop a listing and inventory of spare parts. It is the responsibility of user organizations to obtain required spare parts in accordance with Section 1.5.

11.1 RTR Equipment Maintenance

RTR equipment is regularly serviced and maintained as specified by Plant Maintenance Order 281-058.

11.2 NDA Equipment Maintenance

NDA equipment performance is reviewed daily by the use of performance standard requirements by Safeguards Measurements and documented on their "Weekly NDA System Measurement Control Review form.

11.3 Laboratory Instrument Maintenance

Laboratory instrument and equipment repair and maintenance is described in L-1006, "Maintenance Records for Analytical Instruments." Equipment and instrument accountability and control is defined in RFPM ENS-9-210, "Equipment Accountability and Control." Routine trouble shooting and repair is conducted by the chemist responsible for the specific area. Additional resources are provided by Laboratory Technical Support (LTS) organization for set up, trouble shooting, and maintenance of instruments and equipment.

Laboratory/field equipment (sampling and analysis) requiring routine maintenance has an individual instrument logbook indicating the frequency of required maintenance, maintenance history, spare parts maintained by the laboratory, directions for maintenance, and any external service contracts.

The following preventive maintenance items will be accomplished before sampling begins:

1. Equipment calibration and operability will be checked.

2. All sample containers will be prepared in advance.

3. Spare monitoring equipment also will be provided, as often as possible, to minimize downtime due to equipment failure.

4. Analytical laboratory preventive maintenance will be the responsibility of the Laboratory Manager.

12.0 MEASURES TO ASSESS DATA QUALITY

Equations used for the calculation of the various factors listed within the QAPjP are found within Appendix E.

12.1 Real-Time Radiography and Visual Examination

Data generated by RTR and visual examination are not suited to analysis by the methods described in this section of the QAPP. The comparisons of the data obtained from the RTR and visual examination that are of similar nature will serve to assess the accuracy of each other.

Previous sections (6.0, 7.0, 8.0, and 9.0) have addressed the calibration of equipment, operational definition and controls, data review and validation, and the quality checks performed to assure data quality.

12.2 Laboratory Analysis

The data obtained from Laboratory operations is derived from instruments that are driven by computer software which generates the data. Requirements for the precision, accuracy, completeness, comparability, and detection capabilities were defined in Section 3.0. The equipment calibrations have been established as required and documented in section 6.0. Replicate measurements have been established and supervisory and QA personnel assigned responsibilities for review and analysis.

12.3 Nondestructive Assay

The quality of the data generated by the PADC and LOSAC is strictly controlled by the system operating software. Operators must measure calibration verification standards and the measurements must pass established acceptance criteria before the system can be used to measure actual waste containers. Measurement results must pass additional criteria before they can be reported. If they fail this criteria, Safeguards Measurements must be contacted to review the assay and determine if additional measures are required to resolve the problem assay. Measurement control data (i.e., the results of the calibration verification measurements) are collected by Safeguards Measurements and statistically analyzed to evaluate the accuracy and precision of the measurement system. Requirements for the accuracy, precision, completeness, and comparability are defined ins Section 3.0. Section 6.0 describes equipment calibration and measurement control.

13.0 CORRECTIVE ACTIONS

All EG&G RFP personnel are responsible for the prompt reporting of any nonconformance condition identified as adverse to quality to their manager. The quality requirements established for corrective action for these conditions, their reporting, documentation, tracking, assessment of cause, action assigned, completed, and evaluation for recurrence control are defined by the QAM, Program and Project Management Plans, and related documents. EG&G RFP QAN Section QR-16, "Corrective Action" and 1-50000 ADM, Section 16.16 "Corrective Action" define policies for identify, initiating, and track corrective action(s) to a satisfactory conclusion.

13.1 Nonconformances

Nonconforming items and activities are those that do not meet the requirements of the Project QA program or the approved work procedures. They require identification, control, and disposition to prevent their inadvertent use, installation, or operation. EG&G RFP QAM, Section QR-15 defines requirements, responsibilities, and action required of all RFP personnel for the identification of nonconforming items or activities and notification of management of the existence of such conditions. When a nonconformance related to the project is observed or detected, the Project Manager and Project QAO shall be notified. Project level management will assist and coordinate with Waste Quality Engineering in resolving the nonconformance. Waste Quality Engineering (WQE) has the responsibility for reviewing all nonconformance reports. After their review, copies will be sent to the Project Manager and Project QAO.

Procedure 1-50000 ADM, Section 15.01 describes the methods for nonconforming item identification, control, and disposition for non-weapon applications at RFP. It assigns responsibilities to RFP organizations and personnel for actions to identify, report, control, evaluate the nonconformances, obtain and document a disposition, determine root cause, define corrective action, and establish recurrence control for reported nonconforming items.

Procedure 1-50000 ADM, Section 15.02 describes the method (and its applicability) to stop an on-going activity of work or service when it is observed to be in noncompliance or component nonconformance with governing quality requirements and if uncorrected could have a serious effect on the safety or operability of a system, structure, or component. It assigns responsibilities to RFP organizations and personnel for reporting such conditions to Quality Performance Assessment Management, who will evaluate the identified condition and if warranted issue (subject to specified pre-conditions) a "Stop Work Order"(SWO). Under specified emergency conditions first line supervision may issue such orders. Requirements for the resolution and release of SWOs are also defined.

13.1.1 Nonconformance Report

Each nonconformance shall be documented and summarized in a report issued by the Project QAO. This report should include, when appropriate, results of laboratory analysis, quality control tests, audit reports, and internal memoranda or letters. The report and a copy of Nonconformance Reporting form shall be included within the project file. The report shall provide the following information:

- Identification of the individual(s) identifying or observing the nonconformance
- Description of the nonconformance
- Method(s) for correcting the nonconformance (corrective action) or description of the variance granted
- Schedule for completing the corrective action
- Any required approval signatures.

13.1.2 Identification and Tracking of Nonconformance

The Project QAO will develop a plan to identify and track all nonconformances and report this information to the DOE Operations Office. Project QAO will consult with the Project Manager on disposition and corrective actions required to respond to a nonconformances. The Project Manager is responsible for notifying project personnel of the nonconformance. Completion of corrective action for nonconformances must be verified by the Project QAO and, if applicable, the WIPP WACCC Audit and Surveillance personnel during scheduled audits.

13.2 Variances

Variances from approved, established administrative and operational procedures are those changes that are caused by occurrences beyond the planned scope of project activity.

The Record of Variance form (Appendix D) is completed by the person responsible for the affected activity, and forwarded to the Project QAO for review and approval. The Project QAO has the responsibility of evaluating the impact of the variance and notifying the appropriate personnel. If additional corrective action is required the Project QAO will consult with the Project Manager to determine what actions are required to meet the project requirements. A copy of the signed form from the Project QAO will then be sent with the data package. Copies are retained by the Project QAO and reported in the Monthly Management Report. RFO Management will then report any variances to the project to DOE for transmission to WIPP.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The Project Manager in conjunction with the Project QAO shall, as a minimum, provide to management a monthly summary report of relevant data concerning QA/QC activity for the reporting period. The Project Manager is responsible for reporting to the DOE Operations Office relevant information on the QA/QC activities during the reporting period. Typically, the report will include information concerning:

- Changes required to the QAPjP,
- Significant QA/QC problems, causes, resolution options, action taken, and follow-up evaluations,
- Status of the QA objectives for compliance, a discussion of any issues requiring action, and any project related impacts,
- Data problems and action required,
- Nonconformance Report (NCR) summary,
- Deficiency Reports (DR) summary.

The Project QAO reports to the Project Manager significant data trends and nonconformances that may impact the reliability and integrity of operations or data. The Project QAO is responsible for the review and evaluation of nonconformances, their causes, corrective action review, and follow-up.

This information is developed and compiled by the Project QAO from reports provided by the Analytical Laboratories WIPP QAO and from other groups involved in the project. The information provided in these reports include the number of sample waste drums examined, sampled, analyzed, characterized, and certified for packing into a test bin including the pass/fail disposition of the sample drums at each step. The same kinds of applicable information from the packing, closing, testing, monitoring, sampling and shipping of the test bins. These reports shall also address variances, nonconformances, corrective actions, procedural changes, additional radiation exposures to persons working on the project, and results of project audits/surveillance or other activities involved in the project.

APPENDIX A

EG&G Rocky Flats Plant Listing of Key Personnel

DOE RFO Project Manager	T.E. Lukow	(303)-966-4561 (FTS)-345-4561
EG&G RFP Project Manager	G.A. O'Leary	(303)-966-3268 (FTS)-345-3268
EG&G RFP Project Quality Assurance Officer	A.W. McLaurin	(303)-966-3889 (FTS)-345-3889
EG&G RFP Project Data Control Officer	W.E. Wendell	(303)-966-2441 (FTS)-345-2441
EG&G RFP Project Validation Officer	D.L. Ziegler	(303)-966-4224 (FTS)-345-4224
EG&G RFP Project Document/ Records Control Officer	S.L. Bennett	(303)-966-6271 (FTS)-345-6271
EG&G RFP Analytical Laboratories Manager	J. Zarret	(303)-966-4600 (FTS)-345-4600
EG&G RFP Analytical Laboratories Program Quality Assurance Officer	J.N. Jennings	(303)-966-4161 (FTS)-345-4161
EG&G RFP Solid Waste Treatment, Project Manager	V.J. Medina	(303)-966-6528 (FTS)-345-6528

EG&G RFP Waster Program Information Management, Project Manager	B.C. Barrett	(303)-966-5382 (FTS)-345-5382
EG&G RFP Non Destructive Testing, Project Manager	H.L. Draper	(303)-966-2352 (FTS)-345-2352
EG&G RFP Nondestructive Assay, Project Manager	T.A. Putney	(303)-966-6649 (FTS)-345-6649
EG&G RFP Waste Inspection	R.S. Veitel	(303)-966-2089 (FTS)-345-2089
EG&G RFP Safeguards Measurements	N.J. Roberts	(303)-966-5341 (FTS)-345-5341
EG&G RFP Traffic	D.M. Krieg	(303)-966-2397 (FTS)-345-2397

APPENDIX B

LISTING OF PROCEDURES

L-2421	Precision Gas Mass Spectrometry Operations and Analysis (VG 30-38)
L-4006	Chain of Custody Procedure for WIPP Characterization Program Headspace Samples Canisters
L-4024	Sample Administration - WIPP Characterization Program Headspace Sample Canister
L-4026	Records Handling, Storage, and Retrieval for the WIPP Project File
L-4111	GS/MS Determination of Volatile Organics Waste Characterization
L-4122	GC/MS Determination of Volatile Organics Direct Injection of Waste Gas Samples
L-4138	SUMMA® Passivated Stainless Steel Canister Cleaning and Certification
L-4146	Headspace Gas Sampling of Waste Containers
L-4147	Direct Injection GC Analysis of Volatile Organic Components in Waste Samples
L-4148	Preparation of Samples and Calibration Standards for Determination of Gases in Waste Canisters
L-4149	Flammability Determination of WIPP Experimental Waste Characterization Program Headspace Gas Samples
L-5010	Waste Characterization Data Handling and Reporting Procedures
L-5016	Data Review and Validation for WIPP Experimental Waste Characterization Program for Inorganic Gases

L-5017	Data Review and Validation for WIPP Experimental Waste Characterization Program for Volatile Organic Compounds
L-5018	Analytical Data Handling, Reporting, and Storage of Initial and Continuing Procedure Demonstration, Performance Demonstration Program and VOCs Flammability Procedure Demonstration for the WIPP Project
NMS MT-004	Nuclear Materials Safeguards Procedure Manual
QT-1009	Real-Time Radiography Testing of Transuranic and Low Level Waste
S-A-00008	Metrology Laboratories Control of Measuring and Test Equipment
S-C-00013	Synthetic and NDA Standard Calibration
S-C-00048	Certification/Calibration of NDA Standards
S-C-00105	Gamma Spectroscopy
S-P-11002	Balance Calibration Procedure
WEMS-CP1000	Software Quality Assurance Compliance Procedure for the Waste and Environmental Management System (WEMS)
WO-4600	Test Bin-Scale Contact Handled (CH) TRU Waste Tests, Building 776
WO-4700	WIPP Bin-Scale Test Sample Drum Staging Operation
WO-4701	WIPP Bin-Scale Test Sample Drums Gas Sampling Operations
WO-4702	WIPP Bin-Scale Test Sample Waste Characterization and Bin Loading Operation
WO-4703	WIPP Bin-Scale Test Sample Standard Waste Box Loading/Unloading Operations

WO-4704	WIPP Bin-Scale Sample Drum Hot Gas Sampling
WO-4710	WIPP Bin-Scale Test, Waste Characterization Data, Quality Assurance Records Transmittal to the Project Data Control Officer
WO-4711	WIPP Bin-Scale Test Sample Drum Chain of Custody Log Procedure
WO-4712	WIPP Bin-Scale BIN/SWB Chain of Custody Log
WO-4713	Project Level Data Review and Validation for WIPP Experimental Waste Characterization Program
WO-5228	Passive/Active Drum Assay System, Building 371, (U)
WP-1200	Waste and Environmental Management System (WEMS) Requirements
WP-1201	WEMS Waste Inventory Tracking and Controlling
WP-1202	Waste and Environmental Management System (WEMS) Certification and Off-site Shipment
WP-1900	Rocky Flats Compliance Plan for TRUPACT-II Authorized Methods for Payload Control (TRAMPAC)
WQE-4018	Certification of Transuranic Waste for Off-Site Shipment
TBD	Waste Isolation Pilot Plant Quality Assurance Records Management

APPENDIX C

BIN-SCALE TEST SAMPLE DRUM AND BIN LOG
SEQUENCE OF OPERATIONS

	ACTION	RESPONSIBILITY
1.	Receive list of Bin-Scale Test Sample Drums.	Program Manager / WPIM
2.	Locate Bin-Scale Test Sample Drums in storage areas.	WPIM
3.	Prepare list of Bin-Scale Test Sample Drums and dates to be moved, and update as needed.	WPIM / Program Manager
4.	Prepare Bin-Scale Test Sample Drum Chain of Custody (COC) Log.	WPIM
5.	Custodian receives list of Bin-Scale Test Sample Drums. **(specific procedures for using Sample Drum COC Log are described in WO-4711):**	WPIM / Custodian / Material Transporter
	a. Locate Bin-Scale Test Sample Drums.	WPIM / Custodian / Material Transporter
	b. Identify dates Bin-Scale Test Sample Drums need to be moved.	WPIM / Custodian / Material Transporter
	c. Enter Bin-Scale Test Sample Drum Label data on the Bin-Scale Test Sample Drum COC Log. Attach COC Log and Nuclear Material Drum Transfer Report (NMDTR) to Test Sample Drum.	NMC Custodian / Custodian / Material Transporter
6.	NMC Custodian and material transporter compare Bin-Scale Drum Log data to SAN and WEMS:	NMC Custodian / NDA / Trucking/ Material Transporter
	a. Resolve errors or omissions.	NMC Custodian / WPIM / Program Manager / Custodian /

b.	NMC Custodian coordinates transfer of Bin-Scale Test Sample Drum to appropriate building for assay and material transporter performs physical movement. **If Bin-Scale Test Sample Drum resides in Building 664, RTR prior to shipping for assay per procedure QT-1009.** (Perform Steps 11a through 11g prior to shipping for assay).	NMC Custodian / Material Transporter
c.	Complete COC documentation in the Bin-Scale Test Sample Drum COC Log per WO-4711 and NMDTR (Trucking signs to accept and material transporter signs to release Bin-Scale Test Sample Drum; Verify paper work). NMC contacts receiving building prior to shipment.	Trucking / NMC Custodian / Material Transporter
d.	Transfer to appropriate building for assay. NMC must be present at loading docks when drums are loaded.	Trucking
e.	Complete COC document in the Bin-Scale Test Sample Drum Log per WO-4711 (NDA signs to accept and Trucking signs to release Bin-Scale Test Sample Drum; Verify paper work). NMC must be present at dock for receipt.	Trucking / NDA
7.	Assay Bin-Scale Test Sample Drum per WO-5228.	NDA
a.	Record NDA data on NDA forms per WO-5228 and fill in required information on the Bin-Scale Test Sample Drum COC Log per WO-4711. Attach a copy of the NDA data forms to Bin-Scale Test Sample Drum COC Log. Forward an original of all NDA data forms to Project Data Control Officer and retain copy in NDA file.	NDA

	b. NDA management reviews assay results and signs Bin-Scale Test Sample Drum COC Log per WO-4711.	NDA
	c. Prepare Bin-Scale Test Sample Drum and NMDTR for transfer to RTR. (If already RTRed as a result of Step 6b go to Step 12).	NDA / NMC Custodian / Material Transporter
8.	Prepare to transfer Bin-Scale Test Sample Drum to RTR:	WPIM / Trucking / WA&S / NMC Custodian / Material Transporter
	a. Prepare COC Documentation in the Bin-Scale Test Sample Drum Log per WO-4711 and NMDTR.	NMC Custodian / Material Transporter
	b. If nonconformances identified record WRR number on the Bin-Scale Test Sample Drum COC Log.	WI
	c. Transfer via SAN and WEMS.	NMC Custodian / NDA
	d. NMC coordinates transfer with receiving Custodian and trucking, and prepares NMDTR.	NMC Custodian / Custodian / Trucking
9.	Transfer Bin-Scale Test Sample Drum to Building 664:	Trucking / NMC Custodian / NDA / Material Transporter
	a. Complete COC documentation in the Bin-Scale Test Sample Drum COC Log per WO-4711 and NMDTR. (Trucking signs to accept and NDA signs to release Bin-Scale Test Sample Drum; Verify paper work). Contact receiving Building prior to shipment.	Trucking / NMC Custodian / NDA / Material Transporter
10.	Receive Bin-Scale Test Sample Drum in Building 664:	WA&S / Trucking / NMC Custodian

a.	Complete COC Documentation in the Bin-Scale Test Sample Drum Log per WO-4711 (WA&S signs to accept and Trucking signs to release Bin-Scale Test Sample Drum; Verify paper work). NMC must be present at docks when drums are received.	WA&S / Trucking
b.	Store Bin-Scale Test Sample Drum in Building 664.	WA&S
c.	Complete the Transfer in SAN and WEMS.	WA&S / NMC
11.	RTR Bin-Scale Test Sample Drum per QT-1009:	NDT / WQE / WA&S
a.	RTR Bin-Scale Test Sample Drum per QT-1009 and produce audio and video tape record.	NDT
b.	Record RTR results onto RTR data forms per QT-1009 and fill in information required on the Bin-Scale Test Sample Drum COC Log per WO-4711. Attach a copy of the RTR data forms and Waste Characterization Data Form to the Bin-Scale Test Sample Drum COC Log. Forward the original of all RTR data forms and audio/video tapes records to the Project Data Control Officer and retain a copy in NDT file.	NDT
c.	NDT management reviews and approves RTR results and signs Bin-Scale Test Sample Drum COC Log per WO-4711.	NDT
d.	If rejected remove from population and WQE fills out WRR per QT-1009 and WQE-4018. **Notify Program Manager that Bin-Scale Test Sample Drum has been rejected.**	NDT / WQE
e.	WQE enters RTR data into WEMS.	WQE

	f. WQE approves Bin-Scale Test Sample Drum for use per WQE-4018.	WQE
	g. Store Bin-Scale Test Sample Drum in Building 664.	WA&S
12.	Prepare to transfer Bin-Scale Test Sample Drum to Building 776:	WA&S
	a. Prepare Bin-Scale Test Sample Drum for shipment.	WA&S
	b. Prepare the COC Documentation and the NMDTR in the Bin-Scale Test Sample Drum Log per WO-4711.	WA&S
	c. Transfer in SAN and WEMS.	WA&S / NMC
	d. NMC coordinates transfer with receiving Custodian and trucking.	NMC Custodian / Custodian / Trucking / Material Transporter
13.	Transfer Bin-Scale Test Sample Drum to Building 776:	Trucking / WA&S / NMC Custodian
	a. Complete COC Documentation in the Bin-Scale Test Sample Drum Log per WO-4711 and NMDTR (Trucking signs to accept and WA&S signs to release Bin-Scale Test Sample Drum; Verify paper work). Contact SWT prior to shipment.	Trucking / WA&S / NMC Custodian
	b. Transfer Bin-Scale Test Sample Drum to Building 776.	Trucking
14.	Receive Bin-Scale Test Sample Drum in Building 776:	Trucking / SWT / NMC Custodian
	a. Complete COC Documentation in the Bin-Scale Test Sample Drum Log per WO-4711 (SWT signs to accept and Trucking signs to release Bin-Scale	Trucking / SWT / NMC Custodian

	Test Sample Drum; Verify paper work). NMC must be present at docks when drums are received.	
	b. Stage and Store Bin-Scale Test Sample Drum in Building 776 per WO-4700.	SWT / NMC Custodian
	c. Complete the Transfer in SAN and WEMS.	SWT / NMC Custodian
	d. Hold in Staging Area; 72 hours equilibration time required on Bin-Scale Test Sample Drums. Record t=0 on Gas Sampling Data Sheet for Solid Waste Treatment per WO-4700.	SWT / PSL
15.	Prepare Bin-Scale Test Sample Drums for gas sampling per WO-4701 or WO-4704 and L-4146.	SWT / PSL / RPT / WI
16.	Perform headspace gas sampling per WO-4701 or WO-4704 and L-4146, and perform analyses per the following Procedures: L-1006 L-2421 L-4006 L-4024 L-4111 L-4122 L-4138 L-4146 L-4147 L-4148 L-4149 L-5010 L-5016 L-5017 L-5018 L-5019 WCDMS-VTP100 WCDMS-IP100 WCDMS-SQACP100 WCDMS-BU100	PSL / SWT
17.	Receive gas sample analysis results and approval.	Program Manager / PSL / SWT / WIPP / DOE-RFO

a.	If gas sample analysis results are not approved, identify as nonconforming and segregate until an approved disposition for the disapproved Bin-Scale Test Sample Drum is obtained from Program Manager.	Program Manager / PSL / SWT /WIPP / DOE-RFO
b.	Record gas sampling results/approval/disapproval on Bin-Scale Test Sample Drum Log per WO-4711. Signature required from PSL, Program Manager, and SWT Program Manager on Bin-Scale Test Sample Drum COC Log. Attach a copy of the SWT data forms and audio/video tapes to Bin-Scale Test Sample Drum COC Log. Forward an original of all SWT data forms to the Project Data Control Officer and retain copy in SWT file.	Program Manager / SWT / PSL
c.	If the disposition is to exclude the Bin-Scale Test Sample Drum from the program, make adjustment entries in the WEMS record for that drum. Return rejected drum to storage for corrective action for future shipment. **REJECTED DRUM CANNOT BE USED FOR WIPP BIN-SCALE TEST PROGRAM.**	SWT / Program Manager / WPIM
18.	Perform Physical Characterization of Waste in Bin-Scale Test Sample Drum in Building 776 Size Reduction Vault per WO-4702.	SWT
19.	Bin preparation:	SWT
a.	Building 664 receives SWB with Bin from WIPP.	WA&S
b.	Inspect SWB and Bin for damage and emptiness.	WA&S / WSI / WI
c.	Apply Barcode number on SWB and Bin if possible, otherwise apply bin barcode	WI

	label when bin is removed from SWB in Building 776.	
d.	Replace lids on Bin and SWB per WIPP requirements.	WA&S
e.	Install fiberglass lid on SWB.	WA&S
f.	Install chain lock and seal on SWB.	WA&S
g.	Prepare to transfer SWB with Bin to Building 776. Contact SWT prior to shipment.	WA&S / WSI / Trucking
h.	Request Building 664, WA&S to transfer bin in SWB, and packing materials to Building 776, SWT. MBA Custodian coordinates transfer with receiving NMC Custodian.	SWT / MBA Custodian / NMC Custodian
i.	Create in SAN and WEMS.	Custodian / NMC Custodian / MBA Custodian
j.	WPIM initiates Bin/SWB COC Log per WO-4712.	WPIM
k.	Fill out NMDTR and Bin/SWB COC Log to imitate chain of custody, ship bin in SWB and packaging material to Building 776, SWT.	WPIM / Trucking
l.	Complete COC documentation (MTR) and Bin/SWB COC Log per WO-4712 (Trucking signs to accept and WA&S signs to release Bin; Verify paper work).	Trucking / WA&S
m.	Building 776, SWT receives Bin in SWB, and packaging material and inspects SWB. NMC Custodian must be present at the docks to receive drums.	SWT / NMC Custodian
n.	Complete Bin/SWB COC Log per WO-4712 and MTR (SWT signs	Trucking / SWT

to accept and Trucking signs to release Bin; Verify paper work).

o.	Transfer in SAN and WEMS.	SWT / NMC Custodian
p.	Transfer the SWB with Bin to Manual Disassembly Area (MDA) in Building 776 for Bin unloading per WO-4703.	SWT
q.	Transfer Bin to the Size Reduction Vault per WO-4703.	SWT

20.	Package waste in to bin per WO-4702. NMC Custodian must be present when Waste Packaging is loading wastes into the Bin.	SWT / NMC Custodian
21.	Perform qualitative Bin leak test per NDT procedure QT-(TBD). Attach a copy of the results to Bin/SWB COC Log. Forward an original of all leak test data forms to the Project Data Control Officer and retain copy in NDT file.	NDT / SWT
22.	Perform bin sampling per procedure L- (TBD) and perform analyses per the following procedures:	PSL / SWT

L-1006
L-2421
L-4006
L-4024
L-4111
L-4122
L-4138
L-4146
L-4147
L-4148
L-4149
L-5010
L-5016
L-5017
L-5018
L-5019
WCDMS-VTP100
WCDMS-IP100
WCDMS-SQACP100
WCDMS-BU100

23.	Receive bin gas sample analyses results/approval/disapproval.	PSL / Program Manager / SWT / WIPP/ DOE-RFO
	a. If bin gas sample analysis results are not approved, identify as nonconforming and segregate until an approved disposition for the disapproved bin is obtained. Contact Program Manager. Complete Bin/SWB COC Log per WO-4712.	Program Manager / PSL / QA Officer
	b. If the deposition is to exclude the bin from the program, make adjustment entries in the WEMS record for the bin. Return rejected bin to storage for corrective action for future shipment. **REJECTED BIN CANNOT BE USED FOR THE BIN-SCALE TEST PROGRAM.**	SWT / Program Manager / WPIM
24.	Bin loading into SWB per WO-4703.	SWT
25.	Prepare to transfer SWB with bin to Building 569 for assay.	SWT / NDA / WPIM / WI / Trucking
	a. Prepare COC documentation in Bin/SWB COC Log.	SWT
	b. WI performs dock inspection and attaches inspection report.	WI
	c. If nonconformances identified fill out WRR and record number on Bin/SWB COC Log per WO-4712.	WI
	d. If SWB is damaged move to MDA for inspection of the SWB and Bin. If SWB is damaged repack into a new SWB according to WO-4703 and record new SWB number on to the Bin/SWB COC Log. Make appropriate entries in SAN and WEMS.	SWT / WPIM / NMC

e.	If physical damage can be seen to the bin by visual examination HOLD-CONTACT PROGRAM MANAGER, PROGRAM MANAGER WILL CONTACT WIPP FOR GUIDANCE.	SWT / Program Manager
f.	If no nonconformances identified, or nonconformances have been corrected, SWB is ready for transfer.	SWT
26.	Prepare to transfer bin to Building 664.	NDA / Trucking / WPIM / WI / NMC Custodian
a.	Prepare COC documentation in Bin/SWB COC Log per WO-4712 and NMDTR.	NDA / NMC Custodian
b.	WI performs dock inspection if nonconformances identified fill out WRR and record number on Bin/SWB COC Log per WO-4712. NMC Custodian must be present at dock to transfer Bin/SWB. NMC Custodian coordinates transfer with receiving Custodian and trucking, and prepares NMDTR.	WI / NMC Custodian
c.	If SWB is damaged move to MDA Building 776 for inspection of the SWB and bin. If SWB is damaged repack into a new SWB according to WO-4703 and record new SWB number on to the Bin/SWB COC Log. Make appropriate entries in SAN and WEMS.	SWT / WPIM / NMC Custodian
d.	If physical damage can be seen to the bin by visual examination **HOLD-CONTACT PROGRAM MANAGER, PROGRAM MANAGER WILL CONTACT WIPP FOR GUIDANCE.**	SWT / Program Manager
e.	If no nonconformances identified, or nonconformances have been	Custodian

	corrected, SWB with Bin is ready for transfer.	
	f. Complete transfer in SAN and WEMS.	NMC Custodian / WPIM / NDA
27.	Transfer bin to Building 664.	Trucking / Custodian
	a. Complete COC documentation in the Bin Log (Trucking signs to accept and Custodian signs to release bin; Verify paper work). Contact receiving building prior to shipment.	Trucking / Custodian
28.	Receive Bin in Building 664	Trucking / WA&S
	a. Complete COC documentation in the Bin/SWB COC Log per WO-4712 (WA&S signs to accept and Trucking signs to release bin; Verify paper work).	Trucking / Custodian
	b. WI performs dock inspection if nonconformances identified fill out WRR and record number on Bin/SWB COC Log per WO-4712. NMC Custodian must be present at docks when Bin/SWB are received.	WI
	c. If SWB is damaged move to MDA Building 776 for inspection of the SWB and bin. If SWB is damaged repack into a new SWB according to WO-4703 and record new SWB number on to the Bin/SWB COC Log. Make appropriate entries in SAN and WEMS. NMC Custodians must be present if bin is repackaged into a new SWB.	WI / WPIM / WA&S / NMC Custodian
	d. If physical damage can be seen to the bin by visual examination **HOLD-CONTACT PROGRAM MANAGER, PROGRAM**	WI / Program Manager

	MANAGER WILL CONTACT WIPP FOR GUIDANCE.	
e.	If no nonconformances identified, or nonconformances have been corrected, SWB with Bin is ready for transfer.	WA&S
f.	Weigh SWB with Bin and make appropriate entry for the weight on the Bin/SWB COC Log per WO-4712.	WA&S
g.	Complete transfer in SAN and WEMS.	WA&S / WPIM / NMC Custodian
h.	Store SWB with bin until ready for shipment.	WA&S
29.	Bin certification for shipment per WQE-4018.	WQE
a.	WQE approves bins readiness for shipment and signs Bin Log/SWB Log per WO-4712 and attaches certification statement. Enter certification data into WEMS.	WQE
b.	Complete COC documentation (i.e. Bin/SWB COC Log). Attach all waste characterization supporting documentation to the Bin/SWB COC Log. Forward the original of all Bin/SWB COC Log and data forms to the Project Data Control Officer and retain a copy in WA&S file.	WA&S / WPIM / WQE / PSL / Program Manager
c.	Store Bin in Building 664 until ready for shipment (mark and label per DOT and Traffic requirements).	WA&S / Traffic
30.	Select and stage SWB-Bin Packages for Loading into TRUPACT-II per shipping procedure WO-5008.4.	WPIM / WA&S / WQE / Traffic / Program Manager / NMA Custodian

	a. Create Load List in WEMS.	WPIM
	b. Complete shipping data in SAN and WEMS.	WA&S / NMA Custodian
	c. Verification of containers loaded to the load list.	WQE
31.	Load bin into TRUPACT-II per WA&S, WPIM and Traffic procedures and prepare TRUPACT-II for shipment in accordance with NMS Procedure Manual.	WA&S / Traffic / WQE / WI

APPENDIX D

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Figure 1 - Revision - A, Revision Date 12-09-1991

Overall Programmatic Approach to Visual Characterization of the Waste

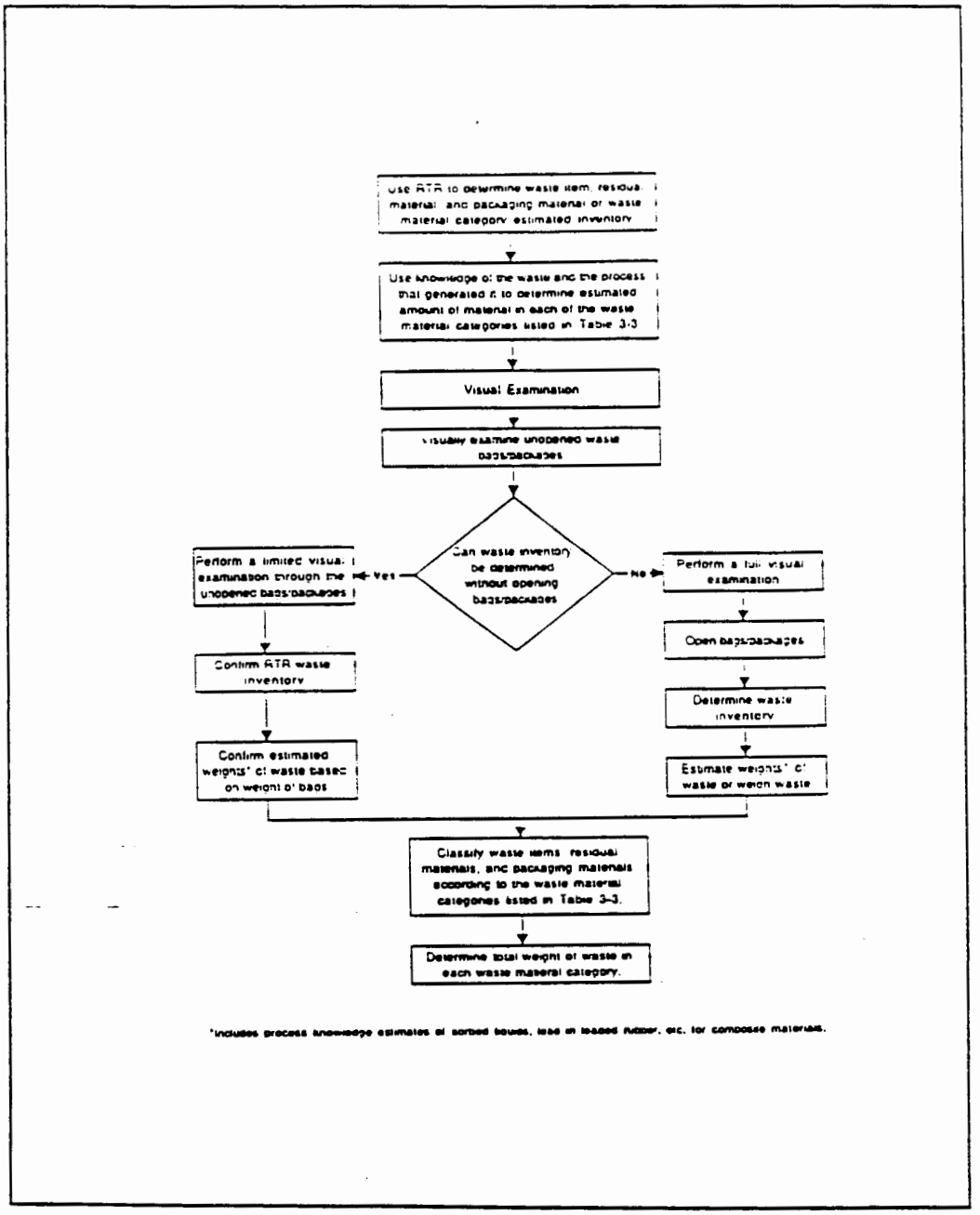

Figure 2 - Revision - A, Revision Date 12-09-1991

Size Reduction Vault Facility

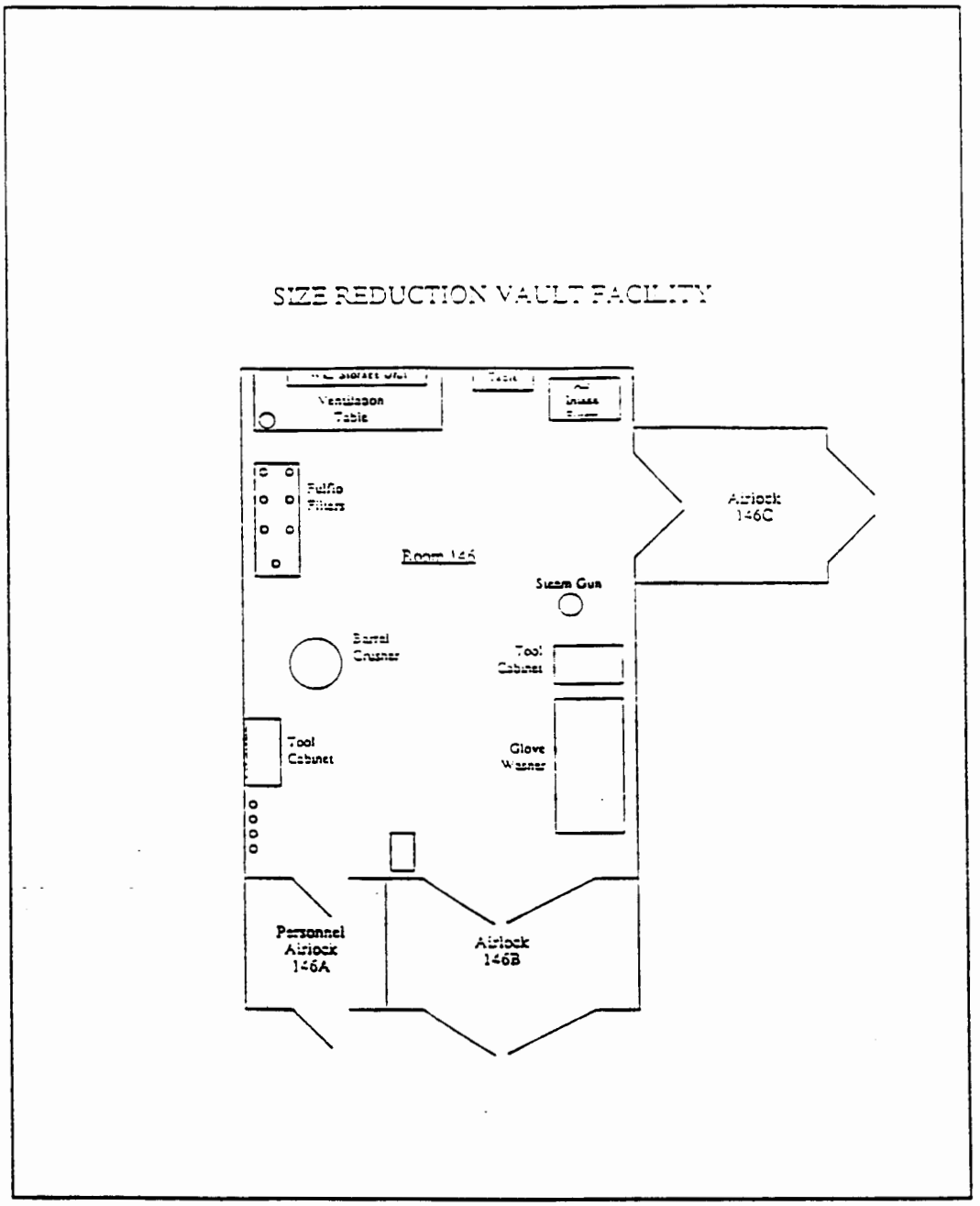

Figure 3 - Revision - A, Revision Date 12-09-1991

Advance Size Reduction Facility

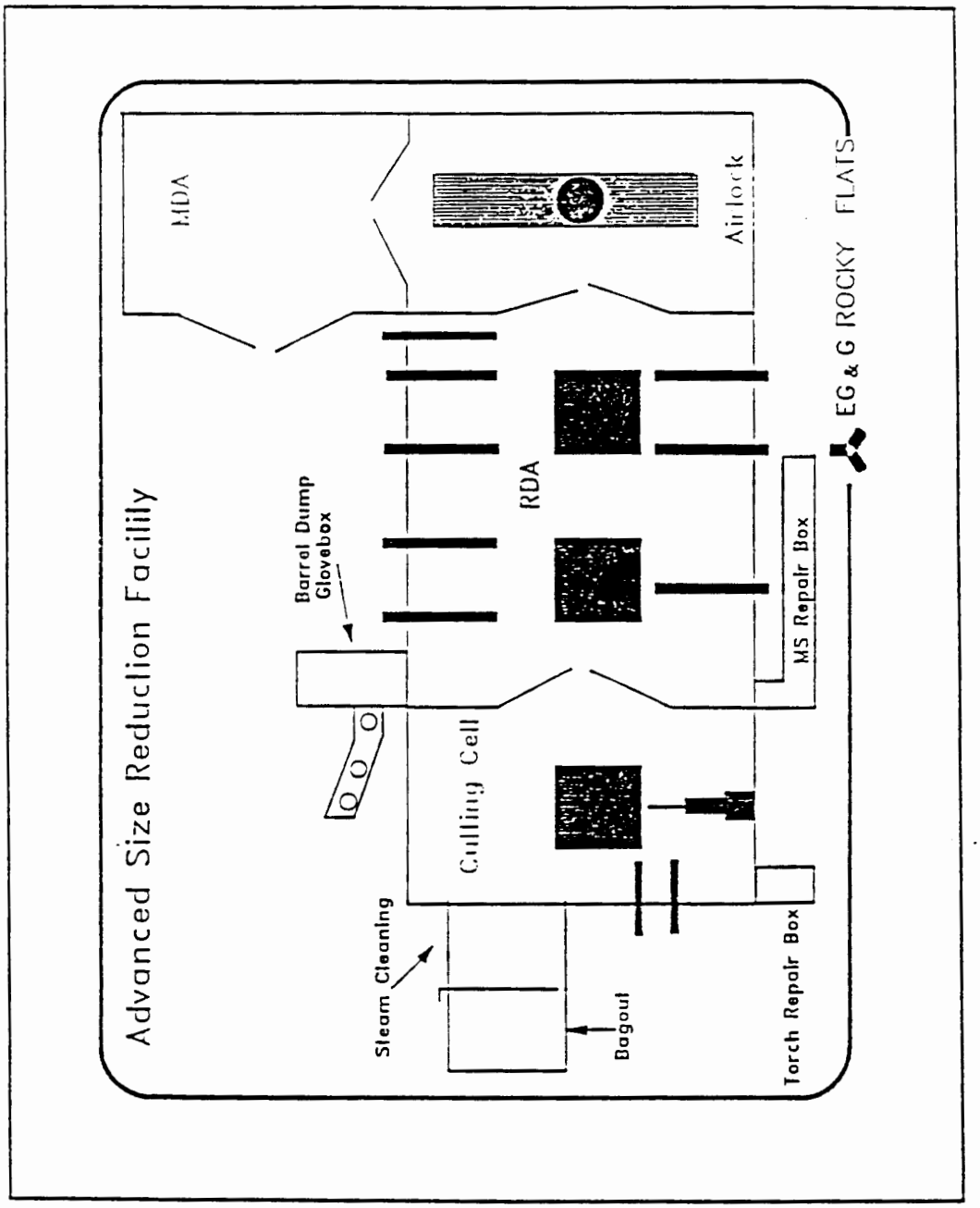

Figure 4 - Revision - A, Revision Date 12-09-1991

Example of Documentation of Indoctrination and Training Requirements

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE: _____

TO: G.A. O'Leary, Project Manager WIPP, T130C, x3268

FROM: The Undersigned

SUBJECT: DOCUMENTATION OF INDOCTRINATION AND TRAINING REQUIREMENTS

I the signee understand that my signature documents that I have read and understood the requirements of the QAPjP (1-10000-EWQA Section 1.2.1) for the Waste Isolation Pilot Plant Experimental-Waste Characterization Program that apply to my groups involvement in support of this project.

PRINTED NAME	NAME OF THE ORGANIZATION
SIGNATURE OF THE EMPLOYEE	DATE
EMPLOYEE NUMBER	TITLE OF THE EMPLOYEE

EG&G ROCKY FLATS, INC., ROCKY FLATS PLANT, P.O. BOX 464, GOLDEN, COLORADO 80402-0464 (303) 966-7000

Form 1 - Revision - A, Revision Date 12-09-1991

Variance Reporting Form

VARIANCE REPORTING FORM

Sample Identification Number:	
Variation from QAPjP Requirement: Field or Analytical Procedure:	
Corrective Action:	
Special Equipment or Personnel Required:	
Initiator's Name:	Date:
Organization QA Officer or Supervisors:	Date:
Project QA Officer/Reviewer	Date:
Approved __ Rejected __	
Comments:	
Project Manager: (Required for additional corrective action)	Date:

Form 2 - Revision - A, Revision Date 12-09-1991

Sample Drum Movement Log Page 1

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST SAMPLE DRUM CHAIN OF CUSTODY LOG

Page 1 of 3 ROCKY FLATS PLANT Date:

Section 1 DRUM INFORMATION (To be Completed By WPIM)

Container ID Building Room

RCRA Unit Locale TRUCON CC

TRU Mixed TRU Compatibility Code

Generation Bldg. Line Generated (Y/N) Date Filled

TID Number TID Number (To be Completed By Waste Container Custodian if blank)

Note: Waste Container Custodian Complete Missing Information

Section 2 DRUM INFORMATION VERIFICATION (To be Completed By Waste Container Custodian)

Drum Label information matches WEMS container information: (Contact WPIM if corrections required) Yes No

Custodian Signature Employee Number Date

Section 3 CHAIN OF CUSTODY

Location		Released By: Signature Employee No. Organization	Date and Time	Received By: Signature Employee No. Organization	WRR No. if required	NMDTR No.
From	To					

Form 3 - Revision - A, Revision Date 12-09-1991

Sample Drum Movement Log Page 2

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST SAMPLE DRUM CHAIN OF CUSTODY LOG
ROCKY FLATS PLANT
DATE:
Page 2 of 3
Container ID No.

Section 4 NONDESTRUCTIVE ASSAY RECOUNT VERIFICATION (To Be completed by NDA)

NDA Count Performed ☐ Count Sheet and Radioassay Data Form Attached ☐ Data entered in WEMS ☐

NDA Supervision Signature | Employee Number | Date

Comments

Section 5 REAL TIME RADIOGRAPHY VERIFICATION (To Be completed by NDT and WQE)

RTR Performed ☐ Waste Package Report (RF-47001) and RTR Data Form (RF-47571) Attached ☐ Data entered in WEMS (To be completed by WQE) ☐ RTR Tape No.

Waste Container Acceptance: Yes ☐ No ☐ WRR No. (If rejected contact WIPP EWCP Project Manager)

NDT Supervision Signature | Employee Number | Date

WQE Signature | Employee Number | Date

Comments

Section 6 HEADSPACE GAS SAMPLING VERIFICATION (To Be completed by PSL and WIPP EWCP Project Manager)

Headspace gas sampling performed ☐ PSL Chemist Signature | Employee Number | Date

Headspace Gas Sampling Results Accepted: Yes ☐ No ☐

WIPP EWCP Project Manager | Employee Number | Date

Comments

Form 4 - Revision - A, Revision Date 12-09-1991

Sample Drum Movement Log Page 3

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST SAMPLE DRUM CHAIN OF CUSTODY LOG
ROCKY FLATS PLANT Date: [ ]

Page 3 of 3 Container ID No. [ ]

Section 7 PHYSICAL EXAMINATION AND WASTE TRANSFER VERIFICATION
(To be completed by SWT and WI)

Physical Examination Performed [ ] WIPP Gas Sampling and Waste Characterization Log Attached [ ] Data entered in WEMS [ ] Bin No. [ ]

Tape No. [ ]

SWT Supervision Signature [ ] Employee Number [ ] Date [ ]

Waste Container Acceptance: Yes [ ] No [ ] NCR No. [ ] (If rejected contact WIPP EWCP Project Manager)

Waste Inspector Signature [ ] Employee Number [ ] Date [ ]

Comments: _____

Section 8 ADDITIONAL COMMENTS

Comments:	Date/Time	Signature	Employee No.

Form 5 - Revision - A, Revision Date 12-09-1991

BIN/SWB Movement Log Page 1

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST BIN/SWB CHAIN OF CUSTODY LOG

Page 1 of 4 ROCKY FLATS PLANT Date: ____

Section 1 CONTAINER INFORMATION (To be completed by Waste Assay and Shipping and Solid Waste Treatment)

SWB Number: ____ Extended Number: ____

Bin Number: ____ Extended Number: ____

Section 2 CHAIN OF CUSTODY

Location		Released By: Signature Employee No. Organization	Date and Time	Received By: Signature Employee No. Organization	WRR No.	NMDTR No.
From	To					

Section 3 BIN LOADING VERIFICATION (To be completed by Solid Waste Treatment)

Bin Loading Complete: ☐

Drum Number		Drum Number	
Drum Number		Drum Number	
Drum Number		Drum Number	
Drum Number		Drum Number	
Drum Number		Drum Number	

Form 6 - Revision - A, Revision Date 12-09-1991

BIN/SWB Movement Log Page 2

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST BIN/SWB CHAIN OF CUSTODY LOG

Date: ROCKY FLATS PLANT SWB No.

Page 2 of 4 Bin No.

Section 3 BIN LOADING VERIFICATION Cont (To be completed by Solid Waste Treatment)

Bin TID Number Bin TID Number

All Bin-Scale Test Sample Drum Chain-of-Custody Logs Attached:

Data Entered in WEMS: Data Entered in SAN:

Bin Leak Check Completed and Results Attached:

SWT Supervision Signature Employee Number Date

Comments:

Section 4 BIN HEADSPACE GAS SAMPLING VERIFICATION
(To be completed by PSL and WIPP EWCP Project Manager)

Headspace gas sampling performed PSL PersonnelSignature Employee Number Date

Headspace Gas Sampling Results Accepted: Yes No

WIPP EWCP Project Manager Signature Employee Number Date

Comments:

Section 5 BIN RADIATION MONITORING (To be completed by Radiation Protection)

Alpha <20 D/M/100 CM^2 outside Beta <5000 DPM/100 CM^2 outside

Gamma mrem/hr @ Surface mrem/hr @ 1 meter

Neutron mrem/hr @ Surface mrem/hr @ 1 meter

Total mrem/hr @ Surface mrem/hr @ 1 meter

Radiation Protection Personnel Signature Employee Number Date

Comments:

Form 7 - Revision - A, Revision Date 12-09-1991

BIN/SWB Movement Log Page 3

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST BIN/SWBCHAIN OF CUSTODY LOG

Date: ROCKY FLATS PLANT SWB No.

Page 3 of 4 Bin No.

Section 6 BIN TRANSFER TO SWB VERIFICATION
(To be completed by Solid Waste Treatment and Waste Inspection)

Bin Transfered to SWB SWB No. Data entered in WEMS

Bin No. Data entered in SAN

SWB TID Number SWB TID Number

SWT Supervision Signature Employee Number Date

Comments:

Section 7 SWB RADIATION MONITORING (To be completed by Radiation Protection)

Alpha <20 D/M/100 CM^2 outside Beta <5000 DPM/100 CM^2 outside

Gamma mrem/hr @ Surface mrem/hr @ 1 meter

Neutron mrem/hr @ Surface mrem/hr @ 1 meter

Total mrem/hr @ Surface mrem/hr @ 1 meter

Radiation Protection Personnel Signature Employee Number Date

Comments:

Additional Comments

Form 8 - Revision - A, Revision Date 12-09-1991

BIN/SWB Movement Log Page 4

WIPP EXPERIMENTAL TEST PROGRAM
BIN-SCALE TEST BIN/SWBCHAIN OF CUSTODY LOG

Date: _____ ROCKY FLATS PLANT SWB No. _____

Page 4 of 4 Bin No. _____

Additional Comments

Form 9 - Revision - A, Revision Date 12-09-1991

Analytical Laboratory Chain of Custody Form

CHAIN-OF-CUSTODY

LABORATORY SAMPLE IDENTIFICATION NUMBER | WIPP SAMPLE IDENTIFICATION NUMBER

CUSTODY INITIATED BY: (Name and Signature) | DATE: (MMDDYY) | TIME: (24 Hour Clock)

RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	LOCATION	RECEIVED BY:

COMMENTS (note any discrepancies): _____

Form 10 - Revision - A, Revision Date 12-09-1991

Sample Canister Information Tag

SAMPLE CANISTER INFORMATION DOCUMENT

Section I (Canister Cleaning):

Canister Identification Number: __ __ __ __ __
SmartLab Identification Number (Sample Tag): __ __ __ __ __ __ __
Canister Pressure Test Result: [ ] Pass [ ] Fail
Canister Used to Certify Batch Clean: __ __ __ __ __
(Canister Identification Number)
__ __ __ __ __ __ __
(SmartLab Identification Number)
Canister Certified Clean By: _____
(Name and Signature)
Date and Time Canister Certified Clean: _____
Comments: _____

Section II (Sampling):

SmartLab Identification Number: __ __ __ __ __ __ __
Drum and/or Bag Number: _____
Blank Sample: [ ] Yes [ ] No
Sampled By: _____
(Name and Signature)
Date and Time Sampling Conducted: _____
(Date: MM/DD/YY; Time: 24 Hour Clock)
Ambient Temperature and Pressure Before Sampling: _____
Ambient Temperature and Pressure After Sampling: _____
Sample Canister Pressure After Sampling: _____

Time, Date, and Initials of Individual Conducting Ambient Temperature/Pressure and Canister Pressure Measurements: _____
(Date: MM/DD/YY; Time: 24 Hour Clock; Initials)
Requested Analysis: GasMS [ ] GCMS [ ] GC [ ] Flammability [ ]
WIPP Sample ID: __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __
(Sampling Site) (Date: Month, Day, Year) (Canister ID)
Comments: _____

Section III (Sample Analysis):

Laboratory Analysis: GasMS [ ] GCMS [ ] GC [ ] Flammability [ ]
Date Sample Received: _____ Date Sample Analyzed: _____
(Date: MM/DD/YY) (Date: MM/DD/YY)
Sample Canister Pressure before Analysis: _____
Sample Canister Pressure After Analysis: _____
Sample Analyzed By (Name and Signature): _____
Dilution Canister Identification Number: _____
Dilution Factor: _____
Comments: _____

Laboratory Analysis: GasMS [ ] GCMS [ ] GC [ ] Flammability [ ]
Date Sample Received: _____ Date Sample Analyzed: _____
(Date: MM/DD/YY) (Date: MM/DD/YY)
Sample Canister Pressure Before Analysis: _____
Sample Canister Pressure After Analysis: _____
Sampled Analyzed By (Name and Signature): _____
Dilution Canister Identification Number: _____
Dilution Factor: _____
Comments: _____

Form 11 - Revision - A, Revision Date 12-09-1991

QC Sample Record Form

Date: _____ Bin No.: _____

Sampler Name(s): _____

DRUM/BIN NO. _____ IDC CODE: _____

SAMPLE TYPE	CANISTER NO.	LABORATORY SAMPLE NO.	FIELD SAMPLE NO. [1]	TIME

Comments (note any discrepancies): _____

_____

Legend:

Sx - samples
Dx - duplicate samples
EBx - equipment blanks
FBx - field blanks
FSx - field standards

ISxn - innermost layer of confinement samples
IDxn - innermost layer of confinement field duplicates

Where x = O for Organic; I for Inorganic/Oxides of nitrogen
n = innermost layer of confinement number; 1, 2, 3...

[1]assigned at log-in

Form 12 - Revision - A, Revision Date 12-09-1991

RTR Waste Package Report

RTR WASTE PACKAGE REPORT Building #_____

Container Type: _____ Control No.: _____ IDC.: _____

TRU/LLW: _____ Content Code: _____ Pkg. Date: _____

Tape Footage Start: _____ End: _____

Liner(s): • Present? Yes _____ No _____
• Type(s) _____ _____ _____
• Correct Yes _____ No _____

IDC Correct Yes _____ No _____

Liquid Present? Yes _____ No _____ Total Amt.: _____

If Yes, Description, location, etc.

_____

_____

_____

RTR Content Description/Comments/Conformances:

_____

_____

_____

Accept/Reject: _____

Tech Signature _____ Empl. No. _____ Date: _____

Reject Verification Signature _____ Empl. No. _____ Date: _____

Calibration: Test Pattern Resolution 500? Yes ____ No ____ Tape Number _____

Test Drum Items Identifiable Yes ____ No ____ Tape Number _____

Tech Signature _____ Empl. No. _____ Date _____

Supervisor Signature _____ Empl.No. _____ Date _____

REAL-TIME RADIOGRAPHY TESTING OF TRANSURANIC
AND LOW-LEVEL WASTE

Form 13 - Revision - A, Revision Date 12-09-1991

RTR BIN/Alcove Report Page 1

BIN/ALCOVE REPORT

RTR Data Form 1 of 2

Examining Site: _____
WastePackage Identification Number _____
TRUCON Content Code: _____
IDC: _____
Date of Examination: _____

1. Is this a single component waste form? _____Yes _____No

2. Brief description of waste package contents:

_____

_____

3. Do you recommend the TRUCON Content Code or the IDC be changed? _____Yes _____No

If yes, what is the recommended TRUCON Content Code? _____

4. Have liquids been detected? _____Yes _____ No

If yes, describe the container type, location, etc. where liquids were detected and estimate the volume of liquid.

_____

_____

_____

Estimate volume of liquids _____(ml)

5. Waste package fill percentage: _____%.

6. Waste package liner present? _____ Yes _____ No

_____

7. QC replicate? _____ Yes _____ No

If yes, brief description of comparison results:

_____

_____

_____

8. Comments

_____

_____

_____

_____

RF-17571 (6/91)

Form 14 - Revision - A, Revision Date 12-09-1991

RTR BIN/Alcove Report Page 2

Inventory of Waste Container Contents 2 of 2

Waste Container Identification Number: _____

9.

WASTE TYPE	WASTE ITEMS AND RESIDUAL MATERIALS Quantity	Est. Weight*	PACKAGING MATERIAL Description	Quantity	Est. Weight*
CELLULOSICS Paper, plywood, wood, cloth, HEPA Filters					
Other organics Resins, oils, solvents, organic sludges					
Plastics Bags, liners, waste, benches, Plexiglass					
Rubber Gloves, aprons					
Corroding metal - steel Drums, wastes, including stainless					
Corroding metal - aluminum Wastes					
Noncorroding metal Lead, tantalum, copper, etc.					
Solid inorganic wastes Glass, ceramics, graphite, etc.					
Inorganic sludges					
Cements					
Others					
Total					

Comments (note and discrepancies) _____

10. Operator Name(s)/Date _____ Operator Employee Number _____

11. Data Recorder Name(s)/Date (if applicable) _____ Recorder Employee Number _____

12. Reviewer/Supervisor Name/Date _____ Reviewer/Supervisor Employee number _____

*Estimated weights will be determined using the RTR derived waste inventory along with manufacturers' information and process knowledge.

Form 15 - Revision - A, Revision Date 12-09-1991

Radioassay (NDA) Data Form

EG&G ROCKY FLATS PLANT
RADIOASSAY DATA FORM

PASSIVE ACTIVE NEUTRON COINCIDENCE COUNTER
BUILDING 371 PADC ID1

1. WASTE CONTAINER IDENTIFICATION NUMBER:_____
2. TRUCON CONTENT CODE:_____
3. IDC:_____
4. COUNT DATE:_____

5. COUNTER CALIBRATION CURRENT: YES___ NO___
6. STANDARD CALIBRATION CURRENT: YES___ NO___
7. ERROR ANALYSIS PERFORMED: YES___ NO___
8. DAILY WORKING STANDARD WITHIN ESTABLISHED RANGE: YES___ NO___
9. WEEKLY MEASUREMENT CONTROL STANDARDS WITHIN ESTABLISHED RANGE: YES___ NO___
10. TOTAL PU-239 FISSILE GRAM EQUIVALENTS:_____G ± ERROR_____G
11. TOTAL ALPHA ACTIVITY:_____Ci ± ERROR_____Ci

(TO BE COMPLETED BY SAFEGUARDS MEASUREMENTS)

12. QC REPLICATE: _____YES _____NO

IF YES, BRIEF DESCRIPTION OF COMPARISON RESULTS:_____

COMMENTS: _____

OPERATOR NAME_____EMPLOYEE NO._____DATE_____
OPERATOR SIGNATURE_____

DATA RECORDER NAME_____EMPLOYEE NO._____DATE_____
DATA RECORDER SIGNATURE_____

SUPERVISOR NAME_____EMPLOYEE NO._____DATE_____
SUPERVISOR SIGNATURE_____

SAFEGUARDS REVIEW NAME_____EMPLOYEE NO._____DATE_____
SAFEGUARDS REVIEW SIGNATURE_____

Form 16 - Revision - A, Revision Date 12-09-1991

WIPP Drum Gas Sampling and Waste Characterization Log Page 1

WIPP DRUM GAS SAMPLING AND WASTE CHARACTERIZATION LOG
SOLID WASTE TREATMENT
ROCKY FLATS PLANT

Page 1 of 6

1. DRUM INFORMATION Drum / Control No.
TRUCON Content Code IDC Date of Examination

2. EQUILIBRATION VERIFICATION (72 HR) Yes / No
Date Received (mm/dd/yy) Time Received (24 hours)
Supervisor's Signature

3. HAZARDOUS WASTE Yes / No
If drum contains hazardous waste, then NMC must be present during waste operation to approve exemption of drum counting

4. DRUM GAS SAMPLING Video Tape No.
Examination Facility (SRV A/L, ASRF A/L):
Date of Examination (mm/dd/yy)
Drum Filter (Yes/No/N/A) Rigid Liner (Yes, No, or N/A)
Test Equipment No. Test Equipment Cal. Exp. Date

Levels of Containment
First Level Containment (PE/PVC)
Second Level Containment (N/A, PE, or PVC)
Third Level Containment (N/A, PE, or PVC)
Fourth Level Containment (N/A, PE, or PVC)

5. INDIVIDUAL CONTAINMENT INFORMATION

Containment No.	Gas Sample No.	Package Configuration	Comments *

* Liquids Present, Volume, Disposition/Hot Bags, Sampling to be completed in Vault, Breather Bags, etc! Reverse side:

Form 17 - Revision - A, Revision Date 12-09-1991

WIPP Drum Gas Sampling and Waste Characterization Log Page 2

WIPP DRUM GAS SAMPLING AND WASTE CHARACTERIZATION LOG
SOLID WASTE TREATMENT
ROCKY FLATS PLANT

Page 2 of 6

6. DRUM GAS SIGNATURES / DATE

Work Performed By
Camera Operator
NMC
Data Recorded By
Supervisor

7. DRUM GAS RESULTS APPROVED Yes / No

Approval Signature

8. SCALE CALIBRATION Scale Within Tolerance (Yes / No)

Scale No. 1 ID No.		Scale No. 1 Check Weight No.		kg
Cal. Expiration		Scale No. 1 Check Weight		kg
		Scale No. 1 Check Weight		kg
Scale No. 2 ID No.		Scale No. 2 Check Weight		kg
Cal. Expiration		Scale No. 2 Check Weight		kg
		Scale No. 2 Check Weight		kg

9. DRUM TID INFORMATION

Date	TID No.	Apply or Remove	1st Signature	2nd Signature	Comments

10. EXTENT OF VISUAL EXAM Full Limited

11. RATIONALE FOR LIMITED VISUAL EXAMINATION

Authorized Signature

Homogeneous Waste Form
High Confidence in RTR
Other (requires comment)

Comment

12. VALIDATED TRUCON CODE AND IDC Yes/No

If no, NCR Number?
Comments
Authorized Signature

13. FREE LIQUIDS

Are free liquids present? (Yes/No)
Estimated volume of liquids mil

Describe the container type and location of liquids present

Form 18 - Revision - A, Revision Date 12-09-1991

WIPP Drum Gas Sampling and Waste Characterization Log Page 3

WIPP DRUM GAS SAMPLING AND WASTE CHARACTERIZATION LOG
SOLID WASTE TREATMENT
ROCKY FLATS PLANT

Page 3 of 6

14. WASTE INSPECTION Satisfactory _____ Unsatisfactory _____

NCR No. _____ Waste Inspector Signature _____

Reason for Non-Conformance

15. WASTE INFORMATION

A) Estimated drum fill percentage				%
B) Drum gross weight	Measured	kg	Measured	kg
C) Empty drum and rigid liner weight	Est Tare	kg	Measured	kg
D) Drum Net Weight	Calculated	kg	Measured	kg

16. CONTAINMENT (BAGS, CANS, CONTAINERS)

A) Is there any containment (Yes/No) _____ B) How many types _____

C) Containment Types	Number of Containments	Estimated Weight	Measured Weight
		kg	kg
		kg	kg
		kg	kg
		kg	kg

17. DRUM CONTENTS (INDIVIDUAL CONTAINMENT)

Individual Containment ID No.	Contents	Category	Estimated Weight(kg)	Measured Weight(kg)

Rev. 9/09/91

Form 19 - Revision - A, Revision Date 12-09-1991

WIPP Drum Gas Sampling and Waste Characterization Log Page 4

WIPP DRUM GAS SAMPLING AND WASTE CHARACTERIZATION LOG
SOLID WASTE TREATMENT
ROCKY FLATS PLANT

Page 4 of 6

17. DRUM CONTENTS (INDIVIDUAL CONTAINMENT) Continued

Individual Containment ID No.	Contents	Category	Estimated Weight(kg)	Measured Weight(kg)

18. DRUM CONTENTS (WITHOUT CONTAINMENT)

Contents	Category	Estimated Weight(kg)	Measured Weight(kg)

19. QUALITY CONTROL DUPLICATE Yes/No

If yes, give a brief description of comparison results

Rev. 9/09/91

Form 20 - Revision - A, Revision Date 12-09-1991

WIPP Drum Gas Sampling and Waste Characterization Log Page 5

WIPP DRUM GAS SAMPLING AND WASTE CHARACTERIZATION LOG
SOLID WASTE TREATMENT
ROCKY FLATS PLANT

Page 5 of 6

20. WASTE INVENTORY CATEGORIES

	Estimated	Measured	Comments
Number of Inner Containments			
Cellulosics (paper, wood, cloth)	kg	kg	
Other Organics (resins, oils, solvents, organic sludges)	kg	kg	
Plastics (bags liners waste, benelex, plexiglass)	kg	kg	
Rubber (gloves, aprons)	kg	kg	
Corroding Metal - Steel (drums, stainless steel)	kg	kg	
Corroding Metal - Aluminum (wastes)	kg	kg	
Non-Corroding Metal (Lead, Tantalum, Copper)	kg	kg	
Solid Inorganics Wastes (glass, ceramics, graphite)	kg	kg	
Inorganic Sludges	kg	kg	
Cements (Estimated Water content)	kg	kg	
Leaded Rubber (Note any discrepancies)	kg	kg	
HEPA (Complete)	kg	kg	
HEPA (Media & Separator)	kg	kg	
HEPA (Media & Cement)	kg	kg	
Booties	kg	kg	
Unknown Composites	kg	kg	
Totals (Note any discrepancies)	kg	kg	

Comments Continued

Rev. 6/09/91

Form 21 - Revision - A, Revision Date 12-09-1991

WIPP Drum Gas Sampling and Waste Characterization Log Page 6

WIPP DRUM GAS SAMPLING AND WASTE CHARACTERIZATION LOG
SOLID WASTE TREATMENT
ROCKY FLATS PLANT

Page 6 of 6

21. WASTE CHARACTERIZATION SIGNATURES / DATE

Examining Tech		Employee Number	
Examining Tech		Employee Number	
Examining Tech		Employee Number	
Examining Tech		Employee Number	
Data Recorder		Employee Number	

22. LOAD BIN INTO SWB

Leak Test Approval Signature

BIN No. SWB No. TID No.

SWT Operator Signature SWT Operator Signature

23. NOTES (discrepancies, problems, NCRs, etc...)

24. SUPERVISOR'S REVIEW

Signature / Date		Employee No.	
Signature / Date		Employee No.	

25. APPROVAL SIGNATURES / DATE

Waste Inspector		WIPP Project Mgr.	
NMC		WQE	
SWT WIPP Pgrm. Mgr.		Data Recorded By	

Rev. 9/09/91

Form 22 - Revision - A, Revision Date 12-09-1991

Cover Page for Gas MS Analysis

DOE-WIPP
COVER PAGE

Lab Name: Analytical Batch No.

Lab Code: Bin No:

Field Sample No.	Lab Sample ID	Method

Comments:

Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: _____
Date: _____ Title: _____

QA OFFICER CONCURRENCE:

Signature: _____ Name: _____
Date: _____ Title: _____

ID#:LT364001-AA/00, LT364002-AA/00, LT364003-AA/00, LT364004-AA/00, Rev. 1.0, 7/91

Form 23 - Revision - A, Revision Date 12-09-1991

Gas Analysis Data Sheet

DOE - WIPP
FORM 1
GAS ANALYSIS DATA SHEET

FIELD SAMPLE NO. _____

Lab Name: _____

Lab Code: _____

Analytical Batch No.: _____ Drum No.: _____

Lab Sample ID: _____ Bin No.: _____

Date Received: _____ Analysis Date: _____

Concentration Units (Vol%)

ANALYTE	Concentration	Flag	Method
Argon			
Carbon Dioxide			
Carbon Moncxide			
Hydrogen			
Nitrogen			
Nitrogen Oxides			
Oxygen			
Methane			
Ethane			
Propane			

ID#:LT364001-AA/00, Rev, 1.0, 7/91

Form 24 - Revision - A, Revision Date 12-09-1991

Calibration Verification Form

DOE - WIPP
FORM 2
CALIBRATION VERIFICATION

Lab Name: _____

Lab Code: _____ Analytical Batch No.: _____

ICV Source: _____ Analysis Date: _____

CCV Source: _____

Analyte	M	ICV			CCV		
		True	Found	%R	True	Found	%R
Argon	MS						
Carbon Dioxide	MS						
Carbon Monoxide	MS						
Hydrogen	MS						
Nitrogen	MS						
Nitrogen Oxides	MS						
Oxygen	MS						
Methane	MS						
Ethane	MS						
Propane	MS						

ID#:LT364001-AA/00, Rev. 1.0, 7/91

Form 25 - Revision - A, Revision Date 12-09-1991

Laboratory Blanks Form

DOE - WIPP
FORM 3
BLANKS

Lab Name: _____ Analytical Batch No. _____

Lab Code: _____ Analysis Date: _____

Lab No: _____

Concentration Units (Vol%)

Analyte	Laboratory Blanks	
	CCB	C
Argon		
Carbon Dioxide		
Carbon Monoxide		
Hydrogen		
Nitrogen		
Nitrogen Oxides		
Oxygen		
Methane		
Ethane		
Propane		

ID#:LT364001-AA/00, Rev. 1.0, 7/91

Form 26 - Revision - A, Revision Date 12-09-1991

Laboratory Duplicates Form

DOE - WIPP
FORM 4
DUPLICATES

FIELD SAMPLE NO.

Lab Name: _____

Lab Code: _____

Analytical Batch No.: _____

Analysis Date: _____

Concentration Units (Vol%)

Analyte	Sample	Duplicate	RPD	Q
Argon				
Carbon Dioxide				
Carbon Monoxide				
Hydrogen				
Nitrogen				
Nitrogen Oxides				
Oxygen				
Methane				
Ethane				
Propane				

ID#:LT364001-AA/00, Rev. 1.0, 7/91

Form 27 - Revision - A, Revision Date 12-09-1991

Cover Page for GC/MS Analysis

DOE-WIPP
COVER PAGE

Lab Name: Analytical Batch No.

Lab Code: Bin No:

Field Sample No.	Lab Sample ID	Method

Comments:

Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: _____
Date: _____ Title: _____

QA OFFICER CONCURRENCE:

Signature: _____ Name: _____
Date: _____ Title: _____

ID#:LT364001-AA/00, LT364002-AA/00, LT364003-AA/00, LT364004-AA/00, Rev. 1.0, 7/91

Form 28 - Revision - A, Revision Date 12-09-1991

Volatile Organic Analysis Data Sheet

DOE-WIPP
FORM 1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE NO. _____

Lab Name: _____

Lab Code: _____

Analytical Batch No.: _____ Method ID: _____

Date Received: _____ Lab Sample ID: _____

Drum No.: _____ Date Analyzed: _____

Dilution Factor: _____ Bin No.: _____

Concentration Units (ppmv)

CAS No.	Compound	ppmv	Q
71-43-2	Benzene		
75-25-2	Bromoform		
56-23-5	Carbon Tetrachloride		
108-90-7	Chlorobenzene		
67-66-3	Chloroform		
110-82-7	Cyclohexane		
75-34-3	1,1-Dichloroethane		
107-06-2	1,2-Dichloroethane		
75-35-4	1,1-Dichloroethene		
156-59-2	cis-1,1-Dichloroethene		
100-41-4	Ethyl Benzene		
60-29-7	Ethyl Ether		
75-09-2	Methylene Chloride		
79-34-5	1,1,2,2-Tetrachloroethane		
127-18-4	Tetrachloroethene		
108-88-3	Toluene		
71-55-6	1,1,1-Trichloroethane		
79-01-6	Trichloroethene		
76-13-1	1,1,2-Trichloro-1,2,2		
108-67-8	1,3,5-Trimethylbenzene		
95-63-6	1,2,4-Trimethylbenzene		
108-38-3	m&p-Xylenes		
95-47-6	o-Xylene		

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 29 - Revision - A, Revision Date 12-09-1991

VOC Tentatively Identified Compounds

DOE-WIPP
FORM 1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

FIELD SAMPLE NO.

Lab Name: _____

Lab Code: _____

Analytical Batch No.: _____ Method ID: _____

Date Received: _____ Lab Sample ID: _____

Drum No.: _____ Date Analyzed: _____

Dilution Factor: _____ Bin No.: _____

Concentration Units (ppmv)

CAS No.	Compound	ppmv	Q

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 30 - Revision - A, Revision Date 12-09-1991

Laboratory Blank Summary (GC/MS)

DOE-WIPP
FORM 4A
HEADSPACE VOC
LABORATORY BLANKS

Lab Name: Method ID:

Lab Code: Lab Sample ID:

Date Analyzed: Time Analyzed:

Bin No:

THIS LABORATORY BLANK APPLIES TO THE FOLLOWING SAMPLES

	Field Sample No.	Lab Sample ID	Lab File ID	Time Analyzed
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Form 31 - Revision - A, Revision Date 12-09-1991

Instrument Tuning and Calibration

DOE - WIPP
FORM 5A
VOLATILE ORGANIC GC/MS TUNING AND MASS
CALIBRATION - BROMOFLUOROBENZENE (BFB)

Lab Name: Method ID:

Lab Code: BFB Injection Date:

Lab File ID: BFB Injection Time:

Instrument ID:

Bin No.:

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0-40.0% of mass 95	
75	30.0-60.0% of mass 95	
95	Base Peak, 100% relative abundance	
96	5.0-9.0% of mass 95	
173	Less than 2.0% of mass 174	
174	Greater than 50.0% of mass 95	
175	5.0-9.0% of mass 174	
176	Greater than 95.0%, but less than 101.0% of mass 174	
177	5.0-9.0% of mass 176	

1-value is %mass 174 2-value is %mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS

	FIELD SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
1					
2					
3					
4					
5					
6					
7					
8					
9					

ID#: [illegible], Rev. [illegible], 7/91

Form 32 - Revision - A, Revision Date 12-09-1991

Initial Calibration Data

DOE - WIPP
FORM 6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name:

Lab Code: Method ID:

Instrument ID: Calibration Date(s):

Bin No.:

LAB FILE ID: RRF 1- RRF5- RRF10- RRF15- RRF20-

COMPOUND	RRF1	RRF5	RRF10	RRF15	RRF20	$\overline{RRF}$	% RSD
Benzene							
Bromoform							
Carbon Tetrachloride							
Chlorobenzene							
Chloroform							
Cyclohexane							
1,1-Dichloroethane							
1,2-Dichloroethane							
1,1-Dichloroethene							
cis-1,2-Dichloroethene							
Ethyl Benzene							
Ethyl Ether							
Methylene Chloride							
1,1,2,2-Tetrachloroethane							
Tetrachloroethene							
Toluene							
1,1,1-Trichloroethane							
Trichloroethene							
1,1,2-Trichloro-1,2,2 trifluor.							
1,3,5-Trimethylbenzene							
1,2,4-Trimethylbenzene							
m&p-Xylene							
o-Xylene							

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 33 - Revision - A, Revision Date 12-09-1991

Continuing Calibration Check

DOE - WIPP
FORM 7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name:

Lab Code: Method ID:

Instrument ID: Calibration Date(s): Time:

Lab File ID: Init. Calib. Date(s):

Bin No.:

COMPOUND	$\overline{RRF}$	RRF10	%D
Benzene			
Bromoform			
Carbon Tetrachloride			
Chlorobenzene			
Chloroform			
Cyclohexane			
1,1-Dichloroethane			
1,2-Dichloroethane			
1,1-Dichloroethene			
cis-1,2-Dichloroethene			
Ethyl Benzene			
Ethyl Ether			
Methylene Chloride			
1,1,2,2-Tetrachloroethane			
Tetrachloroethene			
Toluene			
1,1,1-Trichloroethane			
Trichloroethene			
1,1,2-Trichloro-1,2,2 trifluor.			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
m&p-Xylene			
o-Xylene			

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 34 - Revision - A, Revision Date 12-09-1991

Internal Standards Form

DOE - WIPP
FORM 8A
VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Date Analyzed:

Lab Code: Time Analyzed:

Lab File ID: Bin No.:

Instrument ID:

		IS1(DFB) AREA#	IS2(CBZ) AREA#
	12 HOUR STD		
	UPPER LIMIT		
	LOWER LIMIT		
	FIELD SAMP NO		
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

IS1(DFB) - Fluorobenzene
IS2(CBZ) - Chlorobenzene-d5

UPPER LIMIT- +200%
of internal standard area
LOWER LIMIT- -50%
of internal standard area

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 35 - Revision - A, Revision Date 12-09-1991

Laboratory Control Sample Form

DOE - WIPP
FORM 9
HEADSPACE VOC LABORATORY CONTROL SAMPLE

Lab Name: Lab Sample ID:

Lab Code: Date Analyzed:

Lab File ID: Time Analyzed:

Method ID: Bin No.:

Compound	Concentration (ppmv)		% Recovery
	Measured	Known	

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 36 - Revision - A, Revision Date 12-09-1991

Laboratory Duplicate Form

DOE - WIPP
FORM 10
HEADSPACE VOC LABORATORY DUPLICATE

Lab Name: Method ID: Bin No.:

Lab Code: Field Sample No.:

Lab File ID: Date Analyzed: Time:

Lab Duplicate File ID: Date Analyzed: Time:

COMPOUND	Concentration (ppmv)		RPD
	Sample	Duplicate	
Benzene			
Bromoform			
Carbon Tetrachloride			
Chlorobenzene			
Chloroform			
Cyclohexane			
1,1-Dichloroethane			
1,2-Dichloroethane			
1,1-Dichloroethene			
cis-1,2-Dichloroethene			
Ethyl Benzene			
Ethyl Ether			
Methylene Chloride			
1,1,2,2-Tetrachloroethane			
Tetrachloroethene			
Toluene			
1,1,1-Trichloroethane			
Trichloroethene			
1,1,2-Trichloro-1,2,2 trifluor.			
1,3,5-Trimethylbenzene			
1,2,4-Trimethylbenzene			
m&p-Xylene			
o-Xylene			

ID#:LT364002-AA/00, Rev. 1.0, 7/91

Form 37 - Revision - A, Revision Date 12-09-1991

Cover Page for GC Analysis

DOE-WIPP
COVER PAGE

Lab Name: Analytical Batch No.

Lab Code: Bin No:

Field Sample No.	Lab Sample ID	Method

Comments:

Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Name:
Date: Title:

QA OFFICER CONCURRENCE:

Signature: Name:
Date: Title:

ID#:LT364001-AA/00, LT364002-AA/00, LT364003-AA/00, LT364004-AA/00, Rev. 1. 7/91

Form 38 - Revision - A, Revision Date 12-09-1991

Analysis Data Sheet (GC)

DOE-WIPP
FORM 1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE NO. _____

Lab Name: _____

Lab Code: _____

Analytical Batch No.: _____ Method ID: _____

Date Received: _____ Lab Sample ID: _____

Drum No.: _____ Date Analyzed: _____

Dilution Factor: _____ Bin No.: _____

Concentration Units (ppmv)

CAS No.	Compound	ppmv	Q
67-64-1	Acetone		
71-36-3	1-Butanol		
78-93-3	2-Butanone		
67-56-1	Methanol		
108-10-1	4-Methyl-2-pentanone		

ID#:LT364003-AA/00, Rev. 1.0, 7/91

Form 39 - Revision - A, Revision Date 12-09-1991

Laboratory Blank Summary

DOE-WIPP
FORM 4A
HEADSPACE VOC
LABORATORY BLANKS

Lab Name: Method ID:

Lab Code: Lab Sample ID:

Date Analyzed: Time Analyzed:

Bin No:

THIS LABORATORY BLANK APPLIES TO THE FOLLOWING SAMPLES

	Field Sample No.	Lab Sample ID	Lab File ID	Time Analyzed
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

ID#:LT364003-AA/00, Rev. 1.0, 7/91

Form 40 - Revision - A, Revision Date 12-09-1991

Initial Calibration Data

DOE-WIPP
FORM 6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name:

Lab Code: Method ID:

Instrument ID: Calibration Date(s):

Bin No.:

LAB FILE ID: RRF 25- RRF100- RRF200- RRF300- RRF400-

COMPOUND	RRF25	RRF100	RRF200	RRF300	RRF400	$\overline{RRF}$	% RSD
Acetone							
1-Butanol							
2-Butanone							
Methanol							
4-Methyl-2-pentanone							

ID#:LT364003-AA/00, Rev. 1.0, 7/91

Form 41 - Revision - A, Revision Date 12-09-1991

Continuing Calibration Check

DOE - WIPP
FORM 7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name:

Lab Code: Method ID:

Instrument ID: Calibration Date(s): Time:

Lab File ID: Init. Calib. Date(s):

Bin No.:

COMPOUND	$\overline{RRF}$	RRF20	ID
Acetone			
1-Butanol			
2-Butanone			
Methanol			
4-Methyl-2-pentanone			

ID#:LT364003-AA/00, Rev. 1.0, 7/91

Form 42 - Revision - A, Revision Date 12-09-1991

Analyte Identification Form

DOE - WIPP
FORM 11
ALCOHOLS AND KETONES ANALYTE IDENTIFICATION FORM

FIELD SAMPLE NO. _____

Lab Name: _____

Lab Code: _____ Method ID: _____

Analytical Batch No.: _____ Lab Sample ID: _____

Date Received: _____ Date Analyzed: _____

Data File ID: _____ Drum No: _____ Bin No. _____

Instrument ID: _____ Column 1 ID: _____ Column 2 ID: _____

Column 1 S/N: _____ Column 2 S/N: _____

ANALYTE	COL	RT	RT WINDOW FROM	RT WINDOW TO	QUANT. COLUMN
Acetone	1				
	2				
1-Butanol	1				
	2				
2-Butanone	1				
	2				
Methanol	1				
	2				
4-Methyl-2-pentanone	1				
	2				

ID#:LT364003-AA/00, Rev. 1.0, 7/91

Form 43 - Revision - A, Revision Date 12-09-1991

Laboratory Control Sample Form

DOE - WIPP
FORM 9
HEADSPACE VOC LABORATORY CONTROL SAMPLE

Lab Name: Lab Sample ID:

Lab Code: Date Analyzed:

Lab File ID: Time Analyzed:

Method ID: Bin No.:

Compound	Concentration (ppmv)		% Recovery
	Measured	Known	

ID#:LT364003-AA/00, Rev. 1.0, 7/91

Form 44 - Revision - A, Revision Date 12-09-1991

Laboratory Duplicate Form

DOE - WIPP
FORM 10
HEADSPACE VOC
LABORATORY DUPLICATE

Lab Name: Method ID: Bin No.:
Lab Code: Field Sample No.:
Lab File ID: Date Analyzed: Time:
Lab Duplicate File ID: Date Analyzed Time:

Compound	Concentration (ppmv)		RPD
	Sample	Duplicate	
Acetone			
1-Butanol			
2-Butanone			
Methanol			
4-Methyl-2-pentanone			

ID#: LT364003-AA/00, Rev. 1.0, 7/91

Form 45 - Revision A Revision Date 12-09-1991

Flammability Testing Reporting Form

DOE - WIPP
FLAMMABILITY TESTING

Bin ID Number:_____ Flammable:_____Yes_____No
Laboratory Name:_____
Laboratory Code:_____

Initial Calibration Information:[a]

Standard	Date	Time	Flammability Evaluation[b]
8.0% Methanol			
15.0% Methanol			
1.0% Diethyl ether			

Continuing Calibration Data:[c]

Standard	Date	Time	Flammability Evaluation
8.0% Methanol			

Sample Data

Field Sample ID#	Date	Time	Flammability Evaluation

[a]Valid initial calibration data
[b]Yes/No
[c]If applicable

ID#:LT364004-AA/00, Rev. 1.0, 8/91

Form 46 - Revision A Revision Date 12-09-1991

Comparability Compliance Reporting Form

DOE - WIPP
COMPARABILITY COMPLIANCE

Bin ID Number: _____

Waste Type[a]: _____

Waste Container ID Number: _____

Comparability Criteria Met:

_____Yes_____No

Constituent	Carbon Tetrachloride	Methylene Chloride	1,1,1-Trichloroethane	Trichloro-ethylene	1,1,2-Trichloro-1,2,2-Trifluoroethane
Field Sample ID[b]	Sample Data[c] (X_{UL})				
Regulatory Limit[d]					
Highest Constituent Concentration (X_{UL})					
Pass/Fail[e]					

[a]Waste types are identified in USDOE, 198[illegible].
[b]To include 55-gallon poly bag (first entry on form) and all innermost layer of confinement samples.
[c]Sample constituent concentrations (volume %) at the upper confidence limit (X_{UL}).
[d]Maximum allowable VOC headspace concentrations (volume %) as appropriate for the waste type (Table 1-3).
[e]Pass if constituent concentration (X_{UL}) is less than the regulatory limit.
Fail if constituent concentration (X_{UL}) is greater than the regulatory limit.

ID#:LT364004-AA/00, Rev. 1.0, 8/91

Form 47 - Revision A Revision Date 12-09-1991

No-Migration Demonstration Reporting Form

DOE - WIPP
NO-MIGRATION
DEMONSTRATION COMPLIANCE

Bin ID Number:_____ Flammable:_____Yes_____No

Bin Sample ID Number:_____

Waste Type[a]:_____

Constituent	Regulatory Limit[b]	Bin Sample Data[c] (X_{UL})	Pass/Fail[d]
Carbon Tetrachloride			
Methylene Chloride			
Trichloroethylene			

[a]Waste types are identified in USDOE, 1989
[b]Allowable mean volatile organic headspace concentrations (volume %) as appropriate for the waste type (Table 1-4).
[c]Bin sample constituent concentrations (X_{UL}) in volume %.
[d]Pass if constituent concentration (X_{UL}) is less than the regulatory limit.
Fail if constituent concentration (X_{UL}) is greater than the regulatory limit.

ID#:LT364004-AA/00, Rev. 1.0, 8/91

Form 48 - Revision A Revision Date 12-09-1991

Flammability Compliance Reporting Form

DOE - WIPP
FLAMMABILITY COMPLIANCE
PAGE 1

Bin ID Number:_____ Flammability Criteria Met:_____Yes_____No
Bin Sample ID Number:_____
Waste Type*:_____
Date Bin Loaded:_____

Flammable VOCs	ppmv*
Acetone	
Benzene	
n-Butanol	
2-Butanone	
Chlorobenzene	
Cyclohexane	
1,1-Dichloroethane	
1,2-Dichloroethane	
1,2-Dichloroethene	
cis-1,2-Dichloroethane	
Ethyl benzene	
Diethyl ether	
Methanol	
4-Methyl-2-pentanone	
Toluene	
1,2,4-Trimethylbenzene	
m&p-Xylene	
o-Xylene	
Total	
Total (X_m)	

ID#:LT364004-AA/00, Rev. 1.0, 8/91

Form 49 - Revision A Revision Date 12-09-1991

Flammability Compliance Reporting Form

DOE - WIPP
FLAMMABILITY COMPLIANCE
PAGE 2

Gases	X_{UL} (Vol. %)
H_2	
CH_4	

Le Chatelier Calculation[c]	Result
H_2/CH_4	

Regulatory Criteria	Pass/Fail[d]
≥500 ppmv Flammable VOCs	
Flame test	

50% of the LEL Evaluation for H_2/CH_4	Emplacement Time (Days)[e]	Emplacement Date[f]
Sampled[g]		
Not Sampled[h]		

[a]Waste types are identified in USDOE, 1989
[b]A value of one-half the MDL must be used when a flammable VOC is not detected.
[c]If over 0.5 of the LEL, this bin may be shipped but will require purging at the WIPP prior to emplacement.
[d]Pass/Fail
[e]If the bin is not emplaced within this designated time frame, it must be purged prior to emplacement.
[f]Date by which the bin must be emplaced at the WIPP without sampling and/or purging.
[g]Value from Tables 12-3 through 12-7, Section 12.6.
[h]Value from Table 12-2, Section 12.6.

ID#:LT364004-AA/00, Rev. 1.0, 8/91

Form 50 - Revision A Revision Date 12-09-1991

VOC Flammability Quality Assurance Objective Reporting Form

DOE - WIPP
VOC FLAMMABILITY
QUALITY ASSURANCE OBJECTIVES

VOC Flammability Quality Assurance Objectives[a]

Total Measured VOCs	Value (ppmv)
T_1 T_2 T_3 T_4 T_5 . . . . . T_{30}	
Average of Total VOCs ($\bar{T}$)[b]	
Total of the known VOCs (KT)[b]	
Standard Deviation (S_T)	
Bias[c] ($\bar{T}/KT$)	
Precision[d] ($S_T/\bar{T}$)	

[a]As described in QAPP Section 12.6.2.5 and updated semiannually.
[b]Expressed in ppmv.
[c]$\leq 0.90 \leq$ Bias ≤ 1.10.
[d]Precision ≤ 0.10.

ID#:LT364004-AA/00, Rev. 1.0, 8/91

Form 51 - Revision A Revision Date 12-09-1991

Laboratory Record of Sampling or Analysis Variance Form

Record of Sampling or Analysis Variance

Bin No.: _____ Drum No.: _____ Batch No.: _____

Field Sample Number: _____ Lab Log Book ID: _____

Variance from field sampling: Date: _____ Time: _____

Operator: _____ Proc. Affected: _____ Location: _____

Describe Observed Variance: _____

Variance from lab analysis: Date: _____ Time: _____

Operator: _____ Proc. Affected: _____ Location: _____

Describe Observed Variance: _____

Explain Cause Of The Variance: _____

Corrective Action Implemented: _____

Field Initiator: _____ Date: _____

Lab Initiator: _____ Date: _____

Lab QA Officer: _____ Date: _____

APPENDIX E

1.0 Precision

Precision is expressed as RPD for duplicates measurements or as RSD for three or more replicate measurements

1.1 For duplicate measurements, **RPD** is calculated using the equation shown below:

Equation # 1

$$RPD = \frac{C_1 - C_2}{\frac{(C_1 + C_2)}{2}} * 100$$

Where C_1 and C_2 are the two values obtained by analyzing the duplicate samples. C_1 is the larger of the two values.

1.2 For three or more replicate measurements, the precision is expressed as the **RSD** calculated using the equation shown below:

Equation # 2

$$RSD = \frac{s}{\bar{y}} * 100$$

Where "s" is standard deviation and " $\bar{y}$ " is the mean for the replicate measurements.

1.3 Standard deviation "s", is calculated using the following expression:

Equation # 3

$$s=\sqrt{\sum_{i=1}^{n}\frac{(y_i-\bar{y})^2}{n-1}}$$

Where y_i is the measured value of the ith replicate sample analysis measurement, and "**n**" is equal the number of replicate analyses.

2.0 ACCURACY

Accuracy is expressed as the percent recovery (**% R**). When reference standard are used the equation used to calculate " **% R** " is shown below:

Equation # 4

$$\%RECOVERY(R)=\frac{C_m}{C_{srm}}*100$$

Where C_m is the measured concentration value obtained by analyzing the sample and C_{srm} is the "**true**" or certified concentration of the analyte in the sample.

When matrix spikes are used, the **% R** is calculated using the equation shown below:

Equation # 5

$$\%RECOVERY(R)=\frac{S-U}{C_{sa}}*100$$

Where S is measured concentration in the spiked aliquot, U is the measured concentration in the unspiked aliquot, and C_{sa} is the actual concentration of the spike added.

3.0 COMPLETENESS

Laboratory completeness is expressed as the percent complete (%C) and is calculated using the equation shown below:

Equation # 6

$$\%COMPLETENESS(C) = \frac{V}{n} * 100$$

Where "V" is the number of valid analytical results obtained and "n" is the total number of determinations required for the actual number of samples collected.

4.0 Comparability

Comparability is expressed as percent correlation. The formula for comparability is as follows:

Equation # 7

$$Comparability = \frac{CC}{TD} * 100$$

where:

CC is total number of drums with correctly identified waste items

TD is total number of drums inspected by both procedures

5.0 Method Detection Limits (MDL)

MDL for all measurements is defined as follows:

Equation # 8

$$MDL = t_{(\eta-1,\,1-\alpha=0.99)} * s$$

where:

$t_{(\eta-1,\ 1-\alpha=0.99)}$ is the distribution value appropriate to 99% confidence level and a standard deviation estimate with $\eta-1$ degrees of freedom

s is the standard deviation of replicate measurements

6.0 Procedures for Assessing Compliance with Data Quality Objectives and Regulatory Compliance Limits

Statistical procedures are needed to assess compliance with NMD requirements for potential headspace gas flammability, waste comparability, and no-migration finding. The procedures must be applied to laboratory analytical data prior to comparing this data with regulatory limits specified in Section 1.15.

6.1 Statistical Procedures for Assessing Compliance with NMD Requirements

Statistical procedures used to assess the compliance with regulatory limits established in the NMD requirements are as follows:

- Laboratory precision and accuracy data resulting from performance demonstration program (PDP)
- Normal distribution of laboratory performance demonstration program samples data (population standard deviation (σ) is approximately equivalent to the sample standard deviation (s) for 30 laboratory performance demonstration program samples)
- Homogeneous nature of sample matrix
- Majority of the quantifiable sampling and measurement error due to laboratory error.

Upper confidence limit values (concentration or LEL) are calculated using the following equations:

6.1.1 Calculating the Standard Deviation of Compound i

Equation # 9

$$X_{ci} = \frac{100 X_{mci}}{\%R_i}$$

where

X_{ci} = Measured concentration of compound i, corrected for recovery

X_{mci} = Experimentally measured concentration of compound i

$\%R_i$ = Percent recovery of compound i (obtained from laboratory performance demonstration program samples data)

6.1.2 Calculating the Concentration of compound i

Equation # 10

$$S_i = \frac{(\%RSD_i)\,X_{mci}}{\%R_i}$$

where

S_i = Standard deviation of compound i

$\%RSD_i$ = Percent relative standard deviation of compound i (obtained from laboratory performance demonstration program samples data)

X_{mci} = Experimentally measured concentration of compound i

$\%R_i$ = Percent recovery of compound i (obtained from laboratory performance demonstration program samples data)

6.1.3 Calculation the Upper Confidence Limit

The following equation must be used to determine compliance with the NMD waste characterization requirements. The equation will calculate the upper confidence limit values which will be compared to the regulatory limits as defined in Section 1.15. When flammable VOCs are not detected, a value of one-half of the MDL value shall be used to calculate X_{UL}.

Equation # 11

$$X_{UL} = \sum a_i X_{ci} + \sum a_i S_i Z_{\alpha=0.1}$$

where

X_{UL} = 90 % upper confidence limit value of the measured concentrations

α_1 = Independent variable (for flammability calculations, this is the reciprocal of the LEL; for comparability and no-migration finding, the variable is one)

X_{ci} = Measured concentration of compound i, corrected for recovery

S_i = Standard deviation of compound i

$Z_{\alpha=0.1}$ = Standard normal deviate (Z-value) at 90 % confidence level (one-tail) is 1.29

6.2 Procedure for Obtaining Precision and Accuracy Data for the Determination of X_{UL}

Initial precision and accuracy shall be assessed using data from the performance demonstration program (PDP) which involves the analysis of 30 laboratory reference standards. The precision and accuracy data obtained from this initial data set shall be used to determine X_{UL}. Precision and accuracy data for all procedures shall be continuously monitored by the analysis of seven replicates every six months.

The precision and accuracy obtained from the continuing data set must be compared with the initial procedure performance data set. Comparison of the initial and continuing data sets must be made at the 95 % confidence level using procedures established in the WIPP QAPP. If no statistical difference exist between the initial and continuing date sets, the two sets of precision

and accuracy data shall be pooled. Then the pooled data for precision and accuracy shall then be used to determine X_{UL}. Subsequent continuing data sets must be statistically compared to the most recent pooled data set and the two sets combined to form a new pooled data set if no statistical difference exists.

If significant statistical difference does exist at the 95 % confidence level between the initial or pooled and the continuing data sets, another set of seven replicates must be analyzed. If no statistical difference exists at the 95 % confidence level between the two sets of seven replicates, the precision and accuracy of these two seven-replicate sets shall be pooled and shall be used to determine X_{UL}. If the two sets of consecutive data is not statistically equivalent, corrective action shall be taken to correct the problem.

The process of analyzing seven replicate and comparing the resulting precision and accuracy data to the most recent pooled data must be repeated semiannually. If the resulting pooled data set has less than 30 samples, the impact on calculating X_{UL} values must be evaluated. Procedures should be implemented to ensure that the pooled data set contains only data generated within a two year period.

6.2.1 Analysis of Precision

The F-test shall be used to determine if the precisions obtained from different data sets are statistically equivalent. Comparison of data sets shall be done at the 95 % confidence level (two tailed). A calculated F-value is determined by taking the ratio of the two data sets variances:

Equation # 12

$$F_{v1,v2} = \frac{s_1^2}{s_2^2}$$

where;

v_1 = number of degrees of freedom for data set 1

v_2 = number of degrees of freedom for data set 2

s_1 = standard deviation of data set 1

s_2 = standard deviation of data set 2

When calculating F values, s_1 and s_2 must be chosen so that s_1 is greater than s_2, and therefore, s^2_1/s^2_2 is always greater than one. This calculated F value is then compared to the critical F_c value found in tables of critical F values in **Abramowitz, 1972.** The F_c value must be obtained at the 95 % confidence level with the degrees of freedom of the denominator. The precision obtained from two data sets is statically equivalent if the calculated F value is less than the critical F_c value.

6.2.2 Analysis of Accuracy

The accuracy obtained from two data sets shall be evaluated at the 95 % confidence level (two tailed) by comparing the data set average using the t-statistic. If the standard deviations of two data sets are statistically equivalent by the F-test, a pooled estimate of the standard deviation can be calculated as follows:

Equation # 13

$$s^2 = \frac{[(n_1-1)s_1^2+(n_2-1)s_2^2]}{(n_1+n_2-2)}$$

where;

n_1 = number of samples in data set 1
n_2 = number of samples in data set 2

The t value is given by:

Equation # 14

$$t_v = \frac{(\overline{X_1} - \overline{X_2})}{[s(\frac{1}{n_1} + \frac{1}{n_2})^{1/2}]}$$

where;

v = number of degrees of freedom ($n_1 + n_2 - 2$)

$\bar{X}_1$ = mean concentration of data set 1

$\bar{X}_2$ = mean concentration of data set 2

If the standard deviations of the two data sets are significantly different, the t value is given by:

Equation # 15

$$t_v = \frac{(\overline{X_1} - \overline{X_2})}{\left[\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right]^{1/2}}$$

With the degrees of freedom, v, given as:

Equation # 16

$$v = \left[\frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{(s_1^2/n_1)^2}{n_1+1} + \frac{(s_2^2/n_2)^2}{n_2+1}} \right] - 2$$

For either case, the mean concentrations of the two data sets are not significantly different if the t value obtained is less than the critical value of t_c obtain from the tables. If the mean concentrations do not differ significantly, then the accuracies for the two data sets do not differ.

6.2.3 Procedures to Obtained Pooled Data Sets

Estimates of the standard deviation shall be pooled using the following equation:

Equation # 17

$$s_{spooled} = \left[\frac{v_1 s_1^2 + v_2 s_2^2}{v_1 + v_2} \right]^{1/2}$$

Mean values shall be pooled using the following equation:

Equation # 18

$$\overline{X}_{spooled} = \frac{n_1 \overline{X_1} + n_2 \overline{X_2}}{n_1 + n_2}$$

6.2.4 Procedures for Determining Data Outliers

The statistical Q-test shall be used for rejection of suspect results from a set of replicate measurements on a sample from a single source. The Q-test involves calculating a quotient, Q, by dividing the difference between the suspect results and its nearest neighbor by the range of all values exclusive of the suspect results.

$$Q = \frac{|\text{suspect value} - \text{nearest value}|}{(\text{largest value} - \text{smallest value})}$$

The suspect result shall be rejected if the calculated Q value is greater than the established rejection Q value for the number of replicates involved. The Q-test shall be performed at the 90 % confidence level. Specific rejection criteria are given in Table 8-1.

6.2.5 Procedures for Evaluating NMD Flammability Quality Assurance Objectives

The procedures that must be used to demonstrate compliance with the NMD requirement that all flammability testing meets the quality assurance objectives (QAOs) of ± 10 % precision and accuracy. This requirements must be met to demonstrate compliance with QAOs for flammable VOCs as a class.

The requirements for the procedure to demonstrate compliance shall be as follows:

1. Obtain 30 sets of analytical data for flammable VOCs.

2. Sum the measured concentrations of each of the flammable VOCs to yield 30 values for the sum of flammable VOCs.

3. Average the results of the 30 summations from step 2.

4. Sum the concentrations of the flammable VOC standards that are obtained for the same set of flammable VOC samples.

5. To determine the accuracy, divide the average sum of measured flammable VOCs by the sum of the standard or known concentrations of flammable VOCs.

6. To determine the precision, calculate the relative standard deviation of the 30 values for the sum of flammable VOCs using Equation # 22.

7. This procedure must be applied to the seven sets of analytical data collected semiannually.

Reporting of results shall be done in a method similar to Figure 12-2 of the QAPP.

The following sets of equations are used to calculate the required information related to the performance data using the 30 replicates for each flammable VOC.

Equation # 19

$$T_i = \sum_{j=1}^{m} X_{ij}$$

Equation # 20

$$\overline{T} = \frac{\sum_{i}^{n} T^i}{n}$$

Equation # 21

$$KT = \sum_{j=1}^{m} K_j$$

Equation # 22

$$S_T=\sqrt{\frac{\sum_{i=1}^{n}(T_i-\overline{T})^2}{n-1}}$$

where:

X_{ij} = Measured concentration (ppmv) of the ith determination of flammable VOC "j"

T_i = Total measured flammable VOC concentration (ppmv) of the ith determination

$\overline{T}$ = Average of the total measured flammable VOC concentration (ppmv) for all determinations

K_j = Known concentration of flammable VOC "j"

KT = Total of the known flammable VOC concentrations (ppmv)

S_T = Standard deviations of the total measured flammable VOC concentrations for all "i" determinations

Assume there are "m" different, flammable VOCs and there a total of "n" analyses performed of each standard.

To meet accuracy QAO, the following must be demonstrated:

Equation # 23

$$0.90\leq\frac{\overline{T}}{KT}\leq1.10$$