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DEC 1 2 2012

Mr. John E. Kieling, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Subject: Notification of Class 2 Permit Modification Request to the Waste Isolation Pilot Plant Hazardous Waste Facility Permit Number: NM4890139088-TSDF

Dear Mr. Kieling:

Enclosed is the following Class 2 Permit Modification Request:

- Revise Waste Analysis Plan Waste Characterization Methods

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

If you have any questions, please contact Mr. George T. Basabilvazo at (575) 234-7488.

Sincerely,

Original Signatures on File

José R. Franco, Manager
Carlsbad Field Office

M. F. Sharif, Project Manager
Nuclear Waste Partnership LLC

Enclosure

cc: w/enclosure

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Class 2 Permit Modification Request

Revise Waste Analysis Plan Waste Characterization Methods

Waste Isolation Pilot Plant
Carlsbad, New Mexico

WIPP Permit Number - NM4890139088-TSDF

December 2012

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Acronyms and Abbreviations

AMWTP	Advanced Mixed Waste Treatment Project
AK	acceptable knowledge
ATWIR	Annual Transuranic Waste Inventory Report
BDR	batch data report
CBFO	Carlsbad Field Office
CCP	Central Characterization Project
CFR	Code of Federal Regulations
CH	contact-handled
COC	chain-of-custody
DAC	drum age criteria
Determination Request	Acceptable Knowledge Sufficiency Determination
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FR	Federal Register
FTIRS	Fourier Transform Infrared Spectroscopy
HSGSA	headspace gas sampling and analysis
HWN	Hazardous Waste Number
LANL	Los Alamos National Laboratory
MDL	method detection limit
NDE	non-destructive examination
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
NRC	Nuclear Regulatory Commission
NWP	Nuclear Waste Partnership LLC
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl
Permit	Hazardous Waste Facility Permit
Permittees	Carlsbad Field Office and Nuclear Waste Partnership LLC
PMR	Permit Modification Request
PRQL	program required quantitation limits
QA	quality assurance
QAO	quality assurance objective
QAPjP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act

RH	remote-handled
SSA	solids sampling and analysis
SVOC	semivolatile organic compound
TIC	tentatively identified compound
TRU	transuranic
TSDF	Treatment, Storage, and Disposal Facility
VE	visual examination
VOC	volatile organic compound
WAP	Waste Analysis Plan
WIPP	Waste Isolation Pilot Plant
WSPF	Waste Stream Profile Form
WWIS	WIPP Waste Information System

Overview of the Permit Modification Request

This document contains one Class 2 Permit Modification Request (**PMR**) for the Waste Isolation Pilot Plant (**WIPP**) Hazardous Waste Facility Permit (**Permit**) Number NM4890139088-TSDF.

This PMR is being submitted by the U.S. Department of Energy (**DOE**) Carlsbad Field Office (**CBFO**) and Nuclear Waste Partnership LLC (**NWP**), collectively referred to as the **Permittees**, in accordance with the WIPP Permit, Condition 1.3.1 (20.4.1.900 New Mexico Administrative Code (**NMAC**) incorporating Title 40 Code of Federal Regulations (**CFR**) 270.42(b)). The modification provides for the following change:

- Revise the waste characterization methods so that waste characterization is accomplished using acceptable knowledge (**AK**), radiography, and visual examination (**VE**) and generator/storage sites are no longer required to perform waste characterization through the use of chemical sampling and analysis as prescribed in Permit Part 2, Permit Attachment C, Waste Analysis Plan (**WAP**) and associated Permit attachments. Specifically, these chemical sampling and analysis characterization requirements include headspace gas sampling/analysis and homogenous solids and soil/gravel sampling/analysis.

This change does not reduce the ability of the Permittees to provide continued protection to human health and the environment.

The requested modification to the WIPP Permit and related supporting documents are provided in this PMR. The proposed modification to the text of the WIPP Permit has been identified using red text and a double underline and a ~~strikeout~~ font for deleted information. All direct quotations are indicated by italicized text. The following information specifically addresses how compliance has been achieved with the WIPP Permit Part 1, Section 1.3.1, for submission of this Class 2 PMR.

1. 20.4.1.900 NMAC (incorporating 40 CFR 270.42(b)(1)(i)) requires the applicant to describe the exact change to be made to the permit conditions and supporting documents referenced by the Permit.

This PMR proposes to revise the waste characterization methods so that waste characterization is accomplished using AK, radiography, and VE and generator/storage sites are no longer required to characterize their wastes using chemical sampling and associated analysis (chemical sampling/analysis) methods as specified in the Permit.

The proposed changes are in the following parts and attachments of the Permit:

- Part 2, “General Facility Conditions”
- Attachment C, “Waste Analysis Plan”
- Attachment C1, “Waste Characterization Sampling Methods”
- Attachment C2, “Statistical Methods Used in Sampling and Analysis”
- Attachment C3, “Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Sampling and Analytical Methods”

- Attachment C4, “TRU Mixed Waste Characterization Using Acceptable Knowledge”
- Attachment C5, “Quality Assurance Project Plan Requirements”
- Attachment C6, “Audit and Surveillance Program”
- Attachment C7, “TRU Waste Confirmation”

The Table of Changes (Appendix A) and the redline strikeout in this modification (Appendix B) describe each change that is being proposed.

2. 20.4.1.900 NMAC (incorporating 40 CFR 270.42(b)(1)(ii)), requires the applicant to identify that the modification is a Class 2 modification.

The proposed modification is classified as a Class 2 permit modification for the reasons indicated below:

> 20 4.1.900 NMAC (incorporating 40 CFR 270.42, Appendix I, Item B) “*General Facility Standards…1. Changes to waste sampling or analysis methods:…d. Other changes…2*”
>
> The regulations at 20.4.1.500 NMAC (incorporating 40 CFR 264.13(b)) require a written WAP that specifies parameters for measurement and the sampling methods and analytical methods that will be used to determine the parameters. According to the Environmental Protection Agency (**EPA**) guidance document, Office of Solid Waste and Emergency Response (**OSWER**) 9938.4-03, “Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste,” methods are specified that are appropriate for each parameter. Only one method is needed for each parameter. One of the parameters identified in the Permit is the identification of hazardous waste number (**HWNs**). The Permit currently requires AK to be used for the identification of HWNs for a waste stream, but also requires that chemical sampling/analysis be used to resolve the assignment of HWNs identified using AK. Thus the Permit requires the use of more than one method for determining this parameter: 1) AK and 2) chemical sampling/analysis.
>
> The requested modification proposes “changes to waste sampling and analysis methods” by utilizing solely AK, radiography, and VE, which are described in detail in the WAP, to provide the necessary detailed physical and chemical analysis of the waste. These methods are conducted on all waste within a waste stream and do not involve representative sampling followed by laboratory analysis. As such, the references to “sampling” and associated “analysis” are proposed to be removed from the text of the Permit. For the purpose of this PMR, the term “waste analysis” refers to the requirements of 40 CFR 264.13. Additionally, “characterization” refers to activities performed by the generator/storage sites to identify the chemical and physical properties of the waste. The term “testing” is used to refer specifically to the use of radiography and/or VE for waste analysis purposes.
>
> A position paper on the classification of the modification is included as Appendix E and provides further information regarding classification as a Class 2 PMR.

3. **20.4.1.900 NMAC (incorporating 40 CFR 270.42(b)(1)(iii)), requires the applicant to explain why the modification is needed.**

This proposed Permit modification is necessary to eliminate redundancy in waste characterization by removing the requirement for generator/storage sites to characterize their wastes using chemical sampling/analysis, thereby reducing waste characterization complexity, cost, and personnel radiation exposure. The information gained from chemical sampling/analysis activities is not used to make decisions regarding the storage and disposal of transuranic (**TRU**) mixed waste at the WIPP facility and is not required to meet the Resource Conservation and Recovery Act (**RCRA**) regulations. Therefore, continued and ongoing characterization using chemical sampling/analysis is not warranted.

The Permittees propose that the RCRA standards for general waste analysis that are applicable to treatment, storage, and disposal facilities (**TSDFs**) such as the WIPP facility are those found in 20.4.1.500 NMAC (incorporating 40 CFR 264.13). This PMR proposes to require the generator/storage sites to characterize their waste using solely methods of AK, radiography, and VE, as currently specified in the Permit. This PMR proposes to remove the activities associated with chemical sampling/analysis from the WAP, specifically the requirements associated with headspace gas sampling/analysis and homogeneous solids and soil/gravel waste sampling/analysis. The Permittees propose to meet these standards by requiring the generator/storage sites to use: 1) AK to classify TRU mixed waste as hazardous by assigning the appropriate HWNs and 2) non-destructive examination (**NDE**) (i.e., radiography and/or VE) to ensure that the waste is within established parameters.

The RCRA regulations and published EPA guidance documents allow the use of AK to characterize hazardous waste. As a basis for the development of the existing WAP, the Permittees utilized the EPA guidance outlined in OSWER 9938.4-03. Although OSWER 9938.4-03, Section 1.5, states on Page 1-11 that "[w]herever feasible, the preferred method to meet the waste analysis requirements is to conduct sampling and laboratory analysis," the document further states in the next paragraph that "generators and TSDFs also can meet waste analysis requirements by applying acceptable knowledge. Acceptable knowledge can be used to meet all or part of the waste analysis requirements." In addition, the EPA and Nuclear Regulatory Commission (**NRC**) have jointly issued guidance which encourages the use of AK for radioactive mixed waste due to the inherent health and safety risks associated with its sampling and analysis. The citation specifically states that "[t]he use of waste knowledge by a generator and/or a TSDF to characterize mixed waste is recommended throughout this document to eliminate unnecessary or redundant waste testing." This guidance is provided in Federal Register (**FR**) citation 62 FR 62079, "Joint NRC/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste," and is included in Appendix C of this PMR. The following discussion, in addition to the summary provided in Table 1, "WAP Implementation of General Waste Analysis Requirements," describes how compliance with the waste analysis standards of 20.4.1.500 NMAC (incorporating 40 CFR 264.13) will be achieved without the use of chemical sampling/analysis, thereby meeting the intent of the NRC/EPA guidance to minimize risk to workers.

In accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.13(a)(1)), waste analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with 40 CFR Parts 264 and 268. The regulations in 40 CFR Part 268, which pertain exclusively to treatment standards and land disposal prohibitions, are not applicable to waste designated by the Secretary of Energy for disposal at the WIPP facility. Typically, TSDFs must develop WAPs to obtain a detailed chemical and physical analysis of the waste to ensure that the treatment standards specified in 40 CFR Part 268 are met prior to land disposal. However, Section 9(a)(1)(H) of the Land Withdrawal Act Amendment (Public Law 104-201) exempted waste designated by the Secretary of Energy for disposal at the WIPP facility from the treatment standards and associated prohibitions. Applicable portions of 20.4.1.500 NMAC (incorporating 40 CFR Part 264) are the standards set forth in the following subparts:

- 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart I), "Use and Management of Containers"
    - 20.4.1.500 NMAC (incorporating 40 CFR 264.172), "Compatibility of waste with containers"
    - 20.4.1.500 NMAC (incorporating 40 CFR 264.176), "Special requirements for ignitable or reactive waste"
    - 20.4.1.500 NMAC (incorporating 40 CFR 264.177), "Special requirements for incompatible wastes"
- 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart X), "Miscellaneous Units"
    - 20.4.1.500 NMAC (incorporating 40 CFR 264.601), "Environmental Performance Standards"

As specified in 20.4.1.500 NMAC (incorporating 40 CFR 264.13(a)(2)), the waste analysis may include data developed under 20.4.1.500 NMAC (incorporating 40 CFR Part 261) and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes. 20.4.1.500 NMAC (incorporating 40 CFR 262.11) assigns the responsibility of determining if waste is hazardous as defined in 20.4.1.500 NMAC (incorporating 40 CFR Part 261) to the waste generator. In making hazardous waste determinations, the generator may use testing (including chemical sampling/analysis) of the waste <u>or</u> "knowledge of the hazard characteristic of the waste in light of the materials or the processes used" per 20.4.1.500 NMAC (incorporating 40 CFR 262.11(c)(2)).

As described in OSWER 9938.4-04, Section 1.5, Pages 1-11 and 1-12, AK consists of "process knowledge" and may also include chemical sampling/analysis data obtained by the waste generator. This proposed Permit modification does not restrict generator/storage sites from utilizing chemical sampling/analysis as a means for characterizing TRU mixed waste streams. For instance, generator/storage sites may need to conduct chemical sampling/analysis of some waste streams to resolve discrepancies in AK information and complete a hazardous waste determination as required by 40 CFR 262.11. In such cases, the chemical sampling/analysis information and data would be incorporated into the AK record for those waste streams.

This proposed modification to the Permit allows the Permittees to use the AK obtained from the generator sites to satisfy 20.4.1.500 NMAC (incorporating 40 CFR 264.13(a)(1) and 264.13(a)(2)) in lieu of chemical sampling/analysis. Once EPA HWNs have been applied, there is no regulatory requirement to "resolve" this application as a result of chemical sampling/analysis as is currently required by the WAP. Furthermore, because the treatment standards and land disposal prohibitions do not apply to the waste designated by the Secretary of Energy for disposal at the WIPP facility, HWN assignment does not affect the management and disposal of waste. The Permittees need only be concerned whether or not the assigned HWNs are allowed by the Permit.

Per the current WAP, there are two opportunities for HWNs to be assigned to waste streams: 1) during initial waste stream profiling and 2) during subsequent chemical sampling/analysis. To illustrate the accuracy of assigning HWNs, an evaluation was conducted on 251 Waste Stream Profile Forms (**WSPFs**) that were approved from April 8, 1999, to March 15, 2012 (Appendix D). Of these 251 WSPFs, 19 (or 7.6%) had HWNs added due to resolving EPA HWN assignment using chemical sampling/analysis as required by the Permit. All of the added HWNs were authorized by the Permit, and none affected the management, storage, and disposal of the waste at the WIPP facility. Additionally, a revision to a WSPF may occur if EPA HWNs were added to a waste stream due to subsequent chemical sampling/analysis to resolve EPA HWN assignment as specified in the WAP. Ten (10) WSPFs were revised from April 8, 1999 to March 15, 2012. As discussed in Appendix D, none of these revisions resulted from chemical sampling/analysis to resolve assignment of EPA HWNs.

With regard to future waste streams, the Permittees examined the 2012 Annual Transuranic Waste Inventory Report (**ATWIR**), which was issued in October, 2012[1]. There are about 60 future waste streams identified in the ATWIR as either WIPP-bound waste (ATWIR Appendix A) or as potential waste (ATWIR Appendix B). This inventory represents a final-form volume of about 9,800 cubic meters of TRU waste. Of this total, no HWNs are specified for approximately 6,900 cubic meters. For the most part, this is because the AK record has not yet been compiled for this waste. Because the descriptions of these waste streams indicate they are generated by processes that generated waste already shipped to the WIPP facility, the Permittees have no reason to anticipate that these waste streams will require chemical sampling/analysis in order to complete the characterization process. For example, 68 percent of the future waste is listed as solidified organics. These wastes are typically the result of controlled processes that have excellent AK information associated with them. Another 30 percent is heterogeneous debris waste that must rely on AK information for characterization. Only one future waste stream, IN-W350 representing 0.2 cubic meters from Idaho, has no information provided in the ATWIR. Similar to the other waste streams, this waste stream will have to meet the AK requirements of the Permit. These requirements include the identification of HWNs before they can be shipped to the WIPP facility for disposal. Based on the descriptions that are in the ATWIR, future inventories do not significantly vary from past experience and the current inventory. Therefore, the conclusions regarding the need for chemical sampling/analysis based on past experience is expected to hold for future waste streams.

A listed waste is identified by comparing the specific process that generates the waste to those processes described in 20.4.1.500 NMAC (incorporating 40 CFR Part 261, Subpart D). Determining whether a waste is a listed waste is a knowledge-based evaluation. The use of chemical sampling/analysis, as required by Permit Attachment C4, Section C4-3e, is not consistent with 20.4.1.500 NMAC (incorporating 40 CFR Part 261, Subpart D), in determining a listed waste. Using chemical sampling/analysis to resolve the application of HWNs has not proven to be necessary or useful since no HWNs that are unacceptable at the WIPP facility have been applied to waste streams as a result of chemical sampling/analysis. Consequently, the use of AK is appropriate for listed waste determinations because the physical/chemical makeup of the listed waste is generally well known and consistent from facility to facility (OSWER 9938.4-03, Section 1.5, Page 1-12).

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[1] Annual Transuranic Waste Inventory Report - 2012 DOE/TRU-12-3425, Effective date 10/12. http://www.wipp.energy.gov/library/TRUwaste/ATWIR-2012.pdf.

20.4.1.500 NMAC (incorporating 40 CFR 264.13(b)(1)) states, in effect, that the owner or operator of a TSDF must develop and follow a WAP. This plan, among other things, must specify the parameters for which each hazardous waste or non-hazardous waste, if applicable, will be analyzed and the rationale for the selection of these parameters (i.e., how analysis for these parameters will provide sufficient information on the properties of the waste to comply with paragraph (a) of this section). The applicable standards from 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subparts I and X), as well as applicable requirements specified in the Permit (i.e., waste acceptance criteria given in Permit Part 2 Section 2.3.3 and allowed HWNs given in Permit Part 2 Section 2.3.4), are included in Table 2, "Summarized WAP Basis for Selection of Waste Parameters for TRU Mixed Waste." The identification of waste parameters, rationale for selection, and proposed characterization methods were developed utilizing guidance from OSWER 9938.4-03, Section 2.2, Pages 2-8 through 2-19.

In order to meet the requirements of 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subparts I and X), it must be demonstrated that the chemical constituents associated with HWNs authorized by the Permit are compatible with the waste, waste containers, and disposal system. The HWNs authorized by the Permit have been evaluated for chemical compatibility using the most current EPA method available (EPA-600/2-80-076, "A Method for Determining the Compatibility of Hazardous Waste") and have been determined to meet the compatibility requirements of the Permit Part 2.3.3.4. This compatibility study is documented in Appendix C1 of the WIPP RCRA Part B Permit Application. This study evaluated chemical compatibility associated with all of the toxicity-characteristic and listed HWNs currently authorized by the Permit. The study is comprehensive in that the only HWNs not evaluated are listed HWNs and toxicity-characteristic HWNs associated with pesticides, fungicides, and herbicides, which are known not to be in the waste destined for disposal at the WIPP facility. In addition to chemical compatibility, waste material parameter weights must be estimated, and it must be determined that no ignitable, reactive, or corrosive wastes (D001, D002, and D003) are stored or disposed at the WIPP facility. These assurances are provided through the use of AK and radiography and/or VE to verify the absence of prohibited items.

Because the Permittees are operating a TSDF that accepts waste from off-site facilities, and rely on the information developed by the generators sending the waste, the Permittees are still responsible for obtaining accurate waste analysis information. In order to accomplish this, the Permittees require the generator/storage site to produce waste information that is consistent with the requirements in the Permit. This is accomplished as follows:

- Generator/storage sites are required to develop a Quality Assurance Project Plan (**QAPjP**) that mirrors the requirements in the WIPP Permit and must provide a list of the procedures that implement the requirements in the QAPjP. The Permittees must approve the QAPjP prior to generator/storage sites performing characterization of waste for shipment to the WIPP facility.
- The audit and surveillance program, as described in Attachment C6 of the Permit, provides the assurance that the generator/storage site waste characterization program produces information that will allow the Permittees to meet their obligation for accurate waste analysis information.
- Generator/storage sites provide radiography and VE results in batch data reports (**BDRs**) that must pass through three levels of data review before data are considered complete and released for waste analysis purposes. The three levels of review are: 1) data generation level review, 2) independent technical review and 3) project level review.

- Once a waste stream has been characterized, the Site Project Manager will also submit a WSPF and Characterization Information Summary, which will be used as the basis for acceptance of waste characterization information by the Permittees.

OSWER 9938.4-03, Section 1.5.2, Page 1-14, specifically states that TSDFs may use AK alone in situations where “health and safety risks for personnel would not justify sampling and analysis (e.g., radioactive mixed waste).” The joint NRC/EPA guidance found in 62 FR 62079 reinforces this statement in that it specifically “emphasizes the use of process knowledge, whenever possible, to determine if a waste is hazardous as a way to avoid unnecessary exposures to radioactivity.” Although chemical sampling/analysis of TRU mixed waste for disposal at the WIPP facility has been historically performed, the process of obtaining samples and performing subsequent analyses poses incremental and increased radiation exposure to the individuals conducting such activities. In addition, these activities remain difficult, complex and costly to execute. They require significant expenditure in additional equipment and controls to adequately protect personnel from radiological contamination and exposure. The process of coring to obtain samples of homogeneous solids and soil/gravel waste generates additional waste that must then be disposed of. For remote-handled TRU mixed waste, high radiation levels typically require remote-controlled and shielded equipment/facilities just to handle and move containers, much less to intrusively open and sample these containers. Special equipment/facilities are generally required to transport and analyze collected remote-handled (**RH**) TRU mixed waste samples as well. There is currently only one coring facility available to perform homogeneous solids and soil/gravel sampling. Therefore, sampling of packaged homogeneous solids and soil/gravel waste requires transportation of containers selected for sampling to and from the coring facility. This results in additional transportation and handling risk. It is currently estimated that approximately $5,000,000 per year in chemical sampling/analysis costs could be saved by the Central Characterization Project (**CCP**) and the Advance Mixed Waste Treatment Project (**AMWTP**) combined with the approval of this PMR. From Fiscal Year 2007 through 2012, approximately $36,000,000 was incurred to perform chemical sampling/analysis that ultimately had no effect on how TRU mixed waste was managed, stored, or disposed of at the WIPP facility.

The changes proposed in this PMR benefit from a systematic study of waste characterization activities performed by the Permittees in 2006. At that time, as part of a Notice of Deficiency (**NOD**) for the Class 3 Permit modification request to implement the Section 311 changes mandated by Congress, the New Mexico Environment Department (**NMED**) referred to a recommendation by the National Research Council[2] for a systematic analysis to support waste characterization reductions. The NMED narrowed the focus of the scope of the National Research Council request to the Permit and the requested modification. The Permittees provided the requested information in the response to the NOD identified as “Appendix I, Response to NOD Comments 3.2.t and 3.2.u.” The conclusion from that study for headspace gas sampling and analysis (**HSGSA**) was: “Generally, AK information is sufficient to assign HWNs. There may be situations, however, when the AK information is not sufficient to resolve the HWN assignment for debris waste. In these cases, the generator/storage site will use HSGSA in accordance with the sampling approach in the revised PMR to sample and test a representative portion of the waste stream.” Data collected since then and discussed above have shown that even this reduced amount of HSGSA is not needed. Similarly, the conclusion regarding solids sampling and analysis (**SSA**) was: “Eliminating SSA for every container does

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[2] National Research Council, 2004, “Improving the characterization Program for contact-Handled Transuranic Waste Bound for the Waste Isolation Pilot Plant”, Washington, D.C.

not reduce the reliability of the HWN assignment made by the generator/storage site because, generally, AK information is sufficient to assign HWNs. There may be situations, however, when the AK information is not sufficient to resolve the HWN assignment for homogeneous solids waste." Data collected since then and discussed above have shown that even this reduced amount of SSA is not needed.

20.4.1.500 NMAC (incorporating 40 CFR 264.13(a)(4) and (c)) states that off-site TSDFs must inspect and, if necessary, analyze each hazardous waste movement received at the facility to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper. These activities are often referred to as "fingerprint analysis" and are aimed at corroborating information about the waste collected by the generators. For the purposes of fingerprint analyses, redundant testing (radiography and/or VE) for waste parameters is appropriate to verify that the waste generated, and received by the Permittees at the WIPP facility, matches the expected characteristics of the waste. It should be noted that OSWER 9938.4-03, Section 1.5.2, Page 1-14, clarifies that "[a]cceptable knowledge is not an appropriate substitute for fingerprint or spot check procedures." Chemical sampling/analysis conducted in accordance with the current WAP is not considered fingerprinting. The NMED considered the Audit and Surveillance Program fingerprinting in their 1999 Direct Testimony Regarding Regulatory Process and Imposed Conditions. However, since that time waste confirmation requirements were added to the Permit in October 2006. Fingerprint analysis is now accomplished through the waste confirmation program (Attachment C7 of the Permit) which does not involve chemical sampling/analysis and remains unaffected by this proposed modification to the Permit.

Chemical sampling/analysis, as currently required by the WAP, is not used to identify any of the parameters specified on Table 2. These methods are currently required by the WAP only to "resolve" the assignment of HWNs by the generator site. Waste analysis for this purpose is not required by RCRA, and the use of these methods does not affect the management and disposal of TRU mixed waste at the WIPP facility. The Permittees propose that the use of AK, radiography, and/or VE is adequate to meet the waste analysis requirements of 40 CFR 264.13.

If this proposed PMR to revise the WAP waste characterization methods is approved, there is no longer any difference between the characterization requirements for the three broad Summary Category Groups: S3000, S4000, and S5000. Therefore, this PMR also proposes changes in the Permit, Attachment C, Section C-0a, to reflect that characterization requirements are not specified separately by Summary Category Group and that the categorization of waste is based on the Summary Category Group constituting the greatest volume of waste for a waste stream. Likewise, the removal of chemical sampling/analysis eliminated the need to distinguish between retrievable stored and newly generated waste in Permit Attachment C, Section C-3d since, if the proposal is accepted, the characterization techniques are the same for both types of waste.

The Permit currently allows generator/storage sites to request an Acceptable Knowledge Sufficiency Determination (**Determination Request**), in the form of one of three scenarios, to exempt a waste stream from certain characterization requirements, including chemical sampling/analysis. Processing of a Determination Request imposes specific requirements that result in a lengthy review and approval process. The use of the Determination Request process for large numbers of waste streams is inefficient and inappropriate for the following reasons: 1) a list of waste streams for which a Determination Request may potentially be submitted for the upcoming federal fiscal year must be submitted by July 1 of each year; 2) the NMED cannot evaluate more than one Determination Request at a time; and 3) the Permit does not prescribe a time frame by which the NMED must provide its concurrence with a Determination Request. To date, eight Scenario 3 (where chemical sampling/analysis is not required) Determination Requests have taken, on average, approximately 20 months to be approved through the entire process. As stated previously, waste characterization can be accomplished solely through the use of AK, radiography, and/or VE because no waste management decisions are based on the results of chemical sampling/analysis and it is not necessary to ensure the safe storage and disposal of waste at the WIPP facility. Therefore, two of the three scenarios currently described in the Permit are no longer applicable, and this PMR proposes to modify the description of the Determination Request process to address the one remaining scenario where AK is sufficient such that radiography and/or VE of a waste stream is not required.

Table 1. WAP Implementation of General Waste Analysis Requirements

Applicable Regulatory Requirement	Implementation Per Revised WAP
40 CFR §264.13(a)(1): *Before an owner or operator treats, stores, or disposes of any hazardous wastes…he must obtain a detailed chemical and physical analysis of a representative sample of the waste. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with this part and part 268 of this chapter.*	All the information which must be known to store and dispose of the waste in a manner protective of human health and the environment is obtained through: 1) AK and 2) radiography or VE. This is described and implemented in Permit Attachment C. All TRU waste (mixed and non-mixed) will be characterized in the same manner, regardless of its physical form or time of generation. Table 2, “Summarized WAP Basis for Selection of Waste Parameters for TRU Mixed Waste,” lists the required parameters to be obtained through use of AK, radiography, and VE per 40 CFR §264.13(b)(1).
40 CFR §264.13(a)(2): *The analysis may include data developed under part 261 of this chapter, and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes*	The data includes generator/storage site information compiled in accordance with Permit Attachment C4. AK is used to delineate waste into discrete hazardous waste streams and apply HWNs, as appropriate.
40 CFR §264.13(a)(3): *The analysis must be repeated as necessary to ensure that it is accurate and up to date. At a minimum, the analysis must be repeated:*	Permit Attachment C4 requires the generator/storage sites to establish procedures for reevaluating AK and addressing discrepancies identified during characterization subsequent to approval of a WSPF.
40 CFR §264.13(a)(3)(i): *When the owner or operator is notified, or has reason to believe, that the process or operation generating the hazardous wastes…has changed; and*	AK will be reevaluated if data obtained from radiography or VE indicate that the waste does not match the approved WSPF as specified in Permit Attachment C4.
40 CFR §264.13(a)(3)(ii): *For off-site facilities, when the results of the inspection required in paragraph (a)(4) of this section indicate that the hazardous waste received at the facility does not match the waste designated on the accompanying manifest or shipping paper.*	AK will be reevaluated if the results of TRU Waste Confirmation indicate that the waste to be shipped does not match the approved WSPF. Requirements for execution of waste confirmation are provided in Permit Attachment C7.

Applicable Regulatory Requirement	Implementation Per Revised WAP
40 CFR §264.13(a)(4): *The owner or operator of an off-site facility must inspect and, if necessary, analyze each hazardous waste movement received at the facility to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper.*	The TRU Waste Confirmation Program ensures that, after waste shipments have been configured but prior to shipment, the assigned HWNs are allowed by the Permit and that the waste contains no ignitable, reactive, or corrosive waste. This program fulfills the requirement of the Permittees to conduct "fingerprint" analysis to verify the results of waste characterization performed at the generator/storage sites. Requirements for execution of waste confirmation are provided in Permit Attachment C7. Permit Attachment C, Section C-5b(3), Verification, requires the Permittees to make a determination of TRU mixed waste shipment irregularities. The determination includes a check that compares the data on the WIPP Waste Information System (**WWIS**) Shipment Summary Report for the shipment to the actual shipping papers (including the EPA Hazardous Waste Manifest).
40 CFR §264.13(b): *The owner or operator must develop and follow a written waste analysis plan which describes the procedures which he will carry out to comply with paragraph (a) of this section. He must keep this plan at the facility. At a minimum, the plan must specify:*	The WAP is specified in Permit Attachment C.
40 CFR §264.13(b)(1): *The parameters for which each hazardous waste…will be analyzed and the rationale for the selection of these parameters (i.e., how analysis for these parameters will provide sufficient information on the waste's properties to comply with paragraph (a) of this section);*	Parameters are selected based on the requirements of the applicable portions of 40 CFR Part 264 (Subpart X, "Miscellaneous Units," and Subpart I, "Use and Management of Containers"). These parameters are specified in Table 2" and described in Permit Attachment C.
40 CFR §264.13(b)(2): *The test methods which will be used to test for these parameters;*	The required test methods are radiography and VE, as specified in Permit Attachment C1.
40 CFR §264.13(b)(3): *The sampling method which will be used to obtain a representative sample of the waste to be analyzed…*	This section of the regulations is not applicable to the WAP because the methods used to test the waste for the selected parameters do not involve chemical sampling/analysis and because Permit Attachment C requires that radiography or VE be performed on 100 percent of contact-handled (**CH**) TRU mixed waste containers in waste streams except for those waste streams with an approved AK Sufficiency Determination Request. The required test methods are radiography and VE. No RH TRU mixed waste will be shipped to the WIPP facility without documentation of radiography or VE of 100 percent of the containers.

Applicable Regulatory Requirement	Implementation Per Revised WAP
40 CFR §264.13(b)(4): *The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date; and*	The Permit requires ongoing characterization and Permit Attachment C requires that radiography or VE be performed on 100 percent of CH TRU mixed waste containers in waste streams except for those waste streams with an approved AK Sufficiency Determination Request; therefore, the frequency of waste testing is continuous for each waste stream. As described in Permit Attachment C, waste testing data are validated and verified at both the data-generation level and the project level before the data are transmitted to the Permittees. The ongoing characterization process also requires the data transferred via the WWIS to be compared against the approved WSPF prior to shipment through internal edit/limit checks. In addition, the generator/storage sites are audited by the DOE on an annual basis to ensure that generator/storage site procedures adequately implement the requirements of the WAP. The Audit and Surveillance Program is specified in Permit Attachment C6.
40 CFR §264.13(b)(5): *For off-site facilities, the waste analyses that hazardous waste generators have agreed to supply.*	The generator/storage sites are required to provide radiography and VE in BDRs that must pass through three levels of review before data are considered complete and released for waste analysis purposes. The three levels of review are: 1) data generation level review, 2) independent technical review and 3) project level review. Once a waste stream has been characterized, the Site Project Manager will also submit a WSPF and Characterization Information Summary, which will be used as the basis for acceptance of waste characterization information by the Permittees. These requirements are specified in Permit Attachments C, C1 and C3.
40 CFR §264.13(b)(6): *Where applicable, the methods that will be used to meet the additional waste analysis requirements for specific waste management methods as specified in §§264.17, 264.314, 264.341. 264.1034(d), 264.1063(d), 264.1083, and 268.7 of this chapter.*	This section of the regulations is not applicable to the WAP because these specific waste management methods are not used at the WIPP facility.
40 CFR §264.13(b)(7): *For surface impoundments exempted from the land disposal restrictions under §268.4(a), the procedures and schedules for:…*	This section of the regulations is not applicable to the WAP because the WIPP facility is not a surface impoundment.
40 CFR §264.13(b)(8): *For owners and operators seeking an exemption to the air emission standards of subpart CC in accordance with §264.1082 –*	This section of the regulations is not applicable to the WAP because the WIPP facility is not subject to the regulations under 40 CFR Part 264, Subpart CC.

Applicable Regulatory Requirement	Implementation Per Revised WAP
40 CFR §264.13(c): *For off-site facilities, the waste analysis plan required in paragraph (b) of this section must also specify the procedures which will be used to inspect and, if necessary, analyze each movement of hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest or shipping paper. At a minimum, the plan must describe:*	The TRU Waste Confirmation Program ensures that, after waste shipments have been configured but prior to shipment, the assigned HWNs are allowed by the Permit and that the waste contains no ignitable, reactive, or corrosive waste. This program fulfills the requirement of the Permittees to conduct “fingerprint” analysis to verify the results of waste characterization performed at the generator/storage sites. Requirements for execution of waste confirmation are provided in Permit Attachment C7. Permit Attachment C, Section C-5b(3), Verification, requires the Permittees to make a determination of TRU mixed waste shipment irregularities. The determination includes a check that compares the data on the WWIS Shipment Summary Report for the shipment to the actual shipping papers (including the EPA Hazardous Waste Manifest).
40 CFR §264.13(c)(1): *The procedures which will be used to determine the identity of each movement of waste managed at the facility;*	TRU Waste Confirmation is conducted through the use of radiography or VE on a representative subpopulation of the waste. Implementation of TRU Waste Confirmation is described in Permit Attachment C7. Permit Attachment C, Section C-5b(3), Verification, requires the Permittees to make a determination of TRU mixed waste shipment irregularities. The determination includes a check that compares the data on the WWIS Shipment Summary Report for the shipment to the actual shipping papers (including the EPA Hazardous Waste Manifest). Permit Attachment A1 implements procedures used to determine the identity of each movement of waste upon receipt at the facility.
40 CFR §264.13(c)(2): *The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling.*	Permit Attachment C7 requires the Permittees to randomly select at least 7 percent of the containers in each waste stream shipment for waste confirmation. The container selection method is described in Permit Attachment C7, Section C7-1a, Confirmation of a Representative Subpopulation of the Waste.
40 CFR §264.13(c)(3): *The procedures that the owner or operator of an off-site landfill receiving containerized hazardous waste will use to determine whether a hazardous waste generator or treater has added a biodegradable sorbent to the waste in the container.*	This section of the regulations is not applicable to the WAP because the WIPP facility is not a landfill.

Table 2. Summarized WAP Basis for Selection of Waste Parameters for TRU Mixed Waste

	Regulatory Reference(s)	Waste Parameters	Rationale for Selection	Characterization Method (s)
1	• Permit Part 2, Section 2.3.3 • Permit Attachment C, Section C-1c	• Liquid waste • Non-radionuclide pyrophoric materials • Hazardous waste not occurring as co-contaminants with TRU mixed wastes • Wastes containing explosives or compressed gases • Waste with polychlorinated biphenyls (**PCBs**) not authorized under an EPA PCB waste disposal authorization • Excluded waste	Prohibited from acceptance at WIPP. Characterization methods needed to establish absence of these prohibited parameters.	AK and radiography or VE, if no approved AK Sufficiency Determination Request applies
2	• Permit Part 2, Section 2.3.3 • Permit Attachment C, Section C-1c • 40 CFR §264.176	Waste exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA HWNs D001, D002, D003)	Prohibited from acceptance at WIPP. Characterization methods needed to establish absence of these prohibited parameters.	AK and radiography or VE, if no approved AK Sufficiency Determination Request applies
3	• Permit Part 2, Section 2.3.3 • Permit Part 2, Section 2.3.4 • 40 CFR §264.177 • 40 CFR §264.172	• Identification of EPA HWNs • Waste compatibility with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes	All identified EPA HWNs assigned to TRU mixed waste must be allowed by the WIPP Permit. EPA HWNs allowed in the WIPP Permit are compatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes based on a documented compatibility evaluation.	AK (incorporating generator site hazardous waste determinations) and radiography or VE, if no approved AK Sufficiency Determination Request applies
4	40 CFR §264.601	• Waste material parameter weight estimates • Identification of EPA HWNs, including D001, D002 and D003(addressed previously in Items 2 and 3 of this table) • Waste compatibility (addressed previously in Item 3 of this table)	Physical and chemical characteristics of the waste are needed for compliance with environmental performance standards as demonstrated by the Performance Assessment provided in the original Part B Permit Application.	AK (incorporating generator site hazardous waste determinations) and radiography or VE, if no approved AK Sufficiency Determination Request applies.

4. 20.4.1.900 NMAC (incorporating 40 CFR 270.42 (b)(1)(iv)), requires the applicant to provide the applicable information required by 40 CFR 270.13 through 270.21, 270.62 and 270.63.

The regulatory crosswalk describes the portions of the Permit that are affected by this PMR. Where applicable, regulatory citations in this modification reference 20.4.1 NMAC, revised March 1, 2009, which incorporates 40 CFR (40 CFR Parts 264 and 270). Title 40 CFR 270.16 through 270.21, 270.62, and 270.63 are not applicable at the WIPP. Consequently, they are not listed in the regulatory crosswalk.

5. 20.4.1.900 NMAC (incorporating 40 CFR 270.11(d)(1) and 40 CFR 270.30(k)), requires that any person signing under paragraph a and b must certify the document in accordance with 20.4.1.900 NMAC.

The transmittal letter for this PMR contains the signed certification statement in accordance with Part 1.9 of the Permit.

Regulatory Crosswalk

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes No	
§270.13		Contents of Part A permit application	Attachment B Part A		✓
§270.14(b)(1)		General facility description	Attachment A		✓
§270.14(b)(2)	§264.13(a)	Chemical and physical analyses	Part 2.3.1 Attachment C	✓	
§270.14(b)(3)	§264.13(b)	Development and implementation of waste analysis plan	Part 2.3.1.1 Attachment C	✓	
	§264.13(c)	Off-site waste analysis requirements	Part 2.2.1 Attachment C	✓	
§270.14(b)(5)	§264.15(a-d)	General inspection requirements	Part 2.7 Attachment E-1a		✓
	§264.174	Container inspections	Attachment E-1b(1)		✓
§270.23(a)(2)	§264.602	Miscellaneous units inspections	Attachment E-1b Attachment E-1b(1)		✓
§270.14(b)(6)		Request for waiver from preparedness and prevention requirements of Part 264 Subpart C	NA		✓
§270.14(b)(7)	264 Subpart D	Contingency plan requirements	Part 2.12 Attachment D		✓
	§264.51	Contingency plan design and implementation	Part 2.12.1 Attachment D		✓
	§264.52 (a) & (c-f)	Contingency plan content	Attachment D		✓
	§264.53	Contingency plan copies	Part 2.12.2 Attachment D		✓
	§264.54	Contingency plan amendment	Part 2.12.3 Attachment D		✓
	§264.55	Emergency coordinator	Part 2.12.4 Attachment D-4a(1)		✓
	§264.56	Emergency procedures	Attachment D-4		✓
§270.14(b)(8)		Description of procedures, structures or equipment for:	Attachment A Part 2.11		✓
§270.14(b)(8)(i)		Prevention of hazards in unloading operations (e.g., ramps and special forklifts)	Part 2.11		✓
§270.14(b)(8)(ii)		Runoff or flood prevention (e.g., berms, trenches, and d kes)	Attachment A1-1c(1) Part 2.11		✓
§270.14(b)(8)(iii)		Prevention of contamination of water supplies	Part 2.11		✓
§270.14(b)(8)(iv)		Mitigation of effects of equipment failure and power outages	Part 2.11		✓
§270.14(b)(8)(v)		Prevention of undue exposure of personnel (e.g., personal protective equipment)	Part 2.11		✓
§270.14(b)(8)(vi) §270.23(a)(2)	§264.601	Prevention of releases to the atmosphere	Part 2.11 Part 4.4 Attachment D-4e Attachment G-1a		✓
	264 Subpart C	Preparedness and Prevention	Part 2.10		✓
	§264.31	Design and operation of facility	Part 2.1		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes No	
	§264.32	Required equipment	Part 2.10.1 Attachment D		✓
	§264.33	Testing and maintenance of equipment	Part 2.10.2 Attachment E-1a		✓
	§264.34	Access to communication/alarm system	Attachment E-1a Part 2.10.3		✓
	§264.35	Required aisle space	Part 2.10.4		✓
	§264.37	Arrangements with local authorities	Attachment D-4a(3)		✓
§270.14(b)(9)	§264.17(a-c)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes	Part 2.9		✓
§270.14(b)(10)		Traffic pattern, volume, and controls, for example: Identification of turn lanes Identification of traffic/stacking lanes, if appropriate Description of access road surface Description of access road load-bearing capacity Identification of traffic controls	Attachment A4		✓
§270.14(b) (11)(i) and (ii)	§264.18(a)	Seismic standard applicability and requirements	Attachment G2-2.2 Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(11)(iii-v)	§264.18(b)	100-year floodplain standard	Attachment A1-1c(1) Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b) (12)	§264.16(a-e)	Personnel training program	Part 2.8 Attachment F		✓
§270.14(b)(13)	264 Subpart G	Closure and post-closure plans	Part 6 & 7 Attachment G & H		✓
§270.14(b)(13)	§264.111	Closure performance standard	Attachment G-1a		✓
§270.14(b)(13)	§264.112(a), (b)	Written content of closure plan	Attachment G-1		✓
§270.14(b)(13)	§264.112(c)	Amendment of closure plan	Part 6.3 Attachment G-1d(4)		✓
§270.14(b)(13)	§264.112(d)	Notification of partial and final closure	Attachment G-2a		✓
§270.14(b)(13)	§264.112(e)	Removal of wastes and decontamination/dismantling of equipment	Attachment G-1e(2)		✓
§270.14(b)(13)	§264.113	Time allowed for closure	Part 6.5 Attachment G-1d		✓
§270.14(b)(13)	§264.114	Disposal/decontamination	Part 6.6 Attachment G-1e(2)		✓
§270.14(b)(13)	§264.115	Certification of closure	Part 6.7 Attachment G-2a		✓
§270.14(b)(13)	§264.116	Survey plat	Part 6.8 Attachment G-2b		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes No	
§270.14(b)(13)	§264.117	Post-closure care and use of property	Part 7.3 Attachment H-1a		✓
§270.14(b)(13)	§264.118	Post-closure plan; amendment of plan	Part 7.5 Attachment H-1a (1)		✓
§270.14(b)(13)	§264.178	Closure/containers	Part 6.9 Attachment A1-1h Attachment G-1		✓
§270.14(b)(13)	§264.601	Environmental performance standards-miscellaneous units	Attachment A-4 Attachment D-1 Attachment G-1a		✓
§270.14(b)(13)	§264.603	Post-closure care	Part 7.3 Attachment G-1a(3)		✓
§270.14(b)(14)	§264.119	Post-closure notices	Part 7.4 Attachment H-2		✓
§270.14(b)(15)	§264.142	Closure cost estimate	NA		✓
	§264.143	Financial assurance	NA		✓
§270.14(b)(16)	§264.144	Post-closure cost estimate	NA		✓
	§264.145	Post-closure care financial assurance	NA		✓
§270.14(b)(17)	§264.147	Liability insurance	NA		✓
§270.14(b)(18)	§264.149-150	Proof of financial coverage	NA		✓
§270.14(b)(19)(i), (vi), (vii), and (x)		Topographic map requirements Map scale and date Map orientation Legal boundaries Buildings Treatment, storage, and disposal operations Run-on/run-off control systems Fire control facilities	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(ii)	§264.18(b)	100-year floodplain	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(iii)		Surface waters	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(iv)		Surrounding land use	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes No	
§270.14(b)(19)(v)		Wind rose	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(viii)	§264.14(b)	Access controls	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(ix)		Injection and withdrawal wells	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(xi)		Drainage on flood control barriers	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(19)(xii)		Location of operational units	Attachment B2 Part A Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.14(b)(20)		Other federal laws Wild and Scenic Rivers Act National Historic Preservation Act Endangered Species Act Coastal Zone Management Act Fish and Wildlife Coordination Act Executive Orders	Attachment B Renewal App. Sep. 2009, 270.14 Contents of Part B: General Requirements		✓
§270.15	§264 Subpart I	Containers	Part 3 Part 4.3 Attachment A1		✓
	§264.171	Condition of containers	Part 3.3 Attachment A1		✓
	§264.172	Compatibility of waste with containers	Part 3.4 Attachment A1		✓
	§264.173	Management of containers	Part 3.5 Attachment A1		✓
	§264.174	Inspections	Part 3.7 Attachment E-1 Attachment A1-1e		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes No	
§270.15(a)	§264.175	Containment systems	Part 3.6 Attachment A1		✓
§270.15(c)	§264.176	Special requirements for ignitable or reactive waste	Attachment A1-1g Permit Part 2.1		✓
§270.15(d)	§264.177	Special requirements for incompatible wastes	Attachment A1-1g Permit Part 2.3.3.4		✓
	§264.178	Closure	Part 6 Attachment G		✓
§270.15(e)	§264.179	Air emission standards	Part 4.4.2 Attachment N		✓
§270.23	264 Subpart X	Miscellaneous units	Part 1.3.1 Attachment A2-1 Attachment G1.3.1		✓
§270.23(a)	§264.601	Detailed unit description	Part 4 Part 5 Attachment A2 Attachment L		✓
§270.23(b)	§264.601	Hydrologic, geologic, and meteorologic assessments	Part 4 Part 5 Attachment A2 Attachment L		✓
§270.23(c)	§264.601	Potential exposure pathways	Part 4 Part 5 Attachment A2 Attachment N Attachment L		✓
§270.23(d)		Demonstration of treatment effectiveness	Part 4 Attachment A2 Attachment N		✓
	§264.602	Monitoring, analysis, inspection, response, reporting, and corrective action	Part 4 Part 5 Attachment A2 Attachment E-1 Attachment N Attachment L		✓
	§264.603	Post-closure care	Attachment H Attachment H1		✓
	264 Subpart E	Manifest system, record keeping, and reporting	Permit Part 1 Permit Part 2.13 & 2.14 Permit Part 4 Attachment C		✓
§270.30(j)(2)	§264.73(b)	Ground-water records	Part 1		✓
	264 Subpart F	Releases from solid waste management units	Part 5 & 7 Attachment G2 & L		✓
	§264.90	Applicability	Part 5 Attachment L		✓
	§264.91	Required programs	Attachment L		✓
	§264.92	Ground-water protection standard	Attachment L		✓
	§264.93	Hazardous constituents	Attachment L		✓

Regulatory Citation(s) 20.4.1.900 NMAC (incorporating 40 CFR Part 270)	Regulatory Citation(s) 20.4.1.500 NMAC (incorporating 40 CFR Part 264)	Description of Requirement	Added or Clarified Information		
			Section of the WIPP Permit Application	Yes No	
	§264.94	Concentration limits	Part 5 Attachment L		✓
	§264.95	Point of compliance	Part 5 Attachment L		✓
	§264.96	Compliance period	Attachment L		✓
	§264.97	General ground-water monitoring requirements	Part 5 Attachment L		✓
	§264.98	Detection monitoring program	Part 5 Attachment L		✓
	§264.99	Compliance monitoring program	Part 5 Attachment L		✓
	§264.100	Corrective action program	Part 5 Attachment L		✓
	§264.101	Corrective action for solid waste management units	Part 8 Attachment L		✓
	264 Appendix IX	Ground-water Monitoring List	Part 5 Attachment L		✓

Appendix A
Table of Changes

Table of Changes

Affected Permit Section	Explanation of Change
General	Updated all cross references throughout the Permit, including WAP Attachments C through C7, as a result of the changes being proposed in this PMR due to deletion of sections, figures and tables.
Part 2, Section 2.3.1.2	Replaced “Sampling and Analytical” with “Testing” in the section title. Deleted one reference to DOE approved laboratories and last three sentences in the section pertaining to analytical methods for waste analysis not otherwise specified in Permit Attachment C1. Revised the title of Permit Attachment C1 to “Waste Characterization Testing Methods.”
Part 2, Section 2.3.1.3	Deleted section in its entirety as it pertains to statistical methods used in chemical sampling/analysis, which is no longer applicable based on the changes being proposed as part of this PMR.
Part 2, Section 2.3.1.4	Replaced two instances of analytical with testing. Deleted one reference to DOE approved laboratories; deleted one instance of sampling and analytical methods.
Part 2, Section 2.3.1.6	Deleted one reference to DOE approved laboratory.
Part 2, PERMIT ATTACHMENTS	Deleted the reference to Permit Attachment C2.
Attachment C, Section C-0	Deleted one reference to waste sampling in the first paragraph of this section. Deleted the sentence “Waste characterization requirements for newly generated and retrievably-stored TRU mixed wastes differ, as discussed in Sections C-3d(1) and C-3d(2)” because with the removal of chemical sampling/analysis as proposed in this PMR, there is no difference between the characterization requirements for newly generated and retrievably-stored waste and, as such, Sections C-3d(1) and C-3d(2) are being deleted as part of this PMR. Replaced four instances of sampling and analysis to radiography and VE in the last paragraph of the section.
Attachment C, Section C-0a	Added a new sentence to the second paragraph to clarify that categorization of a waste stream is based upon the Summary Category Group constituting the greatest volume of waste in the waste stream Deleted the word “separately” in one instance and deleted the discussion pertaining to characterization be performed using the waste characterization process required for the category constituting the greatest volume of waste since there is no longer any difference in characterization processes with the adoption of this proposed PMR. Replaced one instance of sampling and analysis with radiography or VE in association with an approved AK Sufficiency Determination and deleted one reference to Permit Attachment C2 since this attachment is being proposed for deletion in this PMR. Deleted one reference to DOE approved laboratories and a reference to a statement that not all these techniques will be used on each container since by deleting chemical sampling/analysis debris and homogeneous solids will have the same characterization requirements. Deleted two bullets, one associated with headspace gas sampling and one associated with sampling and analysis of waste forms that are homogeneous.
Attachment C, Section C-0b	Deleted references to all Scenarios with respect to AK Sufficiency Determination since only one case will be applicable with removal of chemical sampling/analysis. Reworded first paragraph to clarify changes for the case when radiography or VE of the waste stream is not required.
Attachment C, Section C-0c	Replaced one instance of “representative sampling and analysis” with “testing.” Deleted a reference to Attachment C2 and deleted in one instance the word “analytical.”
Attachment C, Section C-1a	Deleted the second paragraph of the section that references Attachment C2.

Affected Permit Section	Explanation of Change
Attachment C, Section C-2	Deleted one bullet that pertains to drum age criteria (**DAC**) since DAC only pertains to headspace gas sampling which is being deleted as part of the PMR. Replaced one instance of analytical with testing.
Attachment C, Section C-3	Deleted one reference to headspace gas sampling and analysis and one reference to homogeneous waste sampling and analysis
Attachment C, Section C-3a	Deleted this section (and all subsections to this section) in its entirety since it pertains only to sampling and analytical methods associated with headspace gas sampling and analysis, homogeneous and soil/gravel waste sampling and analysis and laboratory qualification.
Attachment C, Section C-3c	Deleted reference to “Scenario 1 or Scenario 2” Determination Request. Revised wording to indicate that radiography and/or VE will be used to verify that the physical form of the waste matches its waste stream description as determined by AK to make it consistent with wording changes elsewhere in the Permit as proposed by this PMR.
Attachment C, Section C-3d	Deleted this section (and all subsections to this section) in its entirety since there is no difference in the characterization requirements between newly generated and retrievably-stored waste with the deletion of chemical sampling/analysis as proposed in this PMR.
Attachment C, Section C-4a(1)	Deleted two bullets, one associated with headspace gas sampling and analysis, and one associated with homogeneous waste sampling and analysis. Deleted one bullet associated with VE and combined it with the bullet for radiography. Modified the revised bullet for radiography and VE to indicate that radiography or VE will be used to verify the physical form of the waste matches its waste stream description as determined by AK to make it consistent with wording changes elsewhere in the Permit as proposed by this PMR. Deleted one reference to DOE approved laboratories.
Attachment C, Section C-4a(2)	Deleted three references to DOE approved laboratories, as applicable. Deleted a reference to mathematical representation for quality assurance objectives (**QAOs**) since these calculations only apply to chemical sampling/analysis and will no longer be necessary as part of this proposed PMR. Replaced one reference to method of sampling and analysis with testing method.
Attachment C, Section C-4a(3)	Deleted this section in its entirety since it pertains to sample control.
Attachment C, Section C-4a(4)	Deleted text and references associated with DOE approved laboratories.
Attachment C, Section C-4a(5)	Deleted one reference to sampling and analytical results.
Attachment C, Section C-4a(7)	Deleted text associated with sampling or analytical facilities and DOE approved laboratories. Inserted a sentence to clarify that historical sampling/analysis records generated through implementation of previous requirements in the WAP are to continue to be maintained even though performance of chemical sampling/analysis is no longer required. Deleted two references to sampling and analysis.
Attachment C, Section C-5a	Deleted one reference to headspace gas, one reference to solid sampling/analysis and one reference to sampling/analysis.
Attachment C, Section C-5a(1)	Deleted one sentence pertaining to totals analysis data.
Attachment C, Section C-5a(2)	Deleted one reference to results of waste analysis and one sentence pertaining to comparison of an analytical method to those listed in Tables C-2, C-3 and C-4.
Attachment C, Section C-5a(3)	Replaced one instance of waste sampling and analysis with testing. Deleted one reference to DOE approved laboratory and one sentence associated with an annual audit of DOE approved laboratories performing waste sampling and/or analysis.

Affected Permit Section	Explanation of Change
Attachment C, Section C-9	Deleted one reference to Performance Demonstration Program Plan for Analysis of Simulated Headspace Gases, one reference to Performance Demonstration Program Plans for RCRA Constituent Analysis of Solidified Wastes and one reference to SW-846. These references are no longer applicable with the removal of chemical sampling/analysis as proposed in this PMR.
Attachment C, Table C-1	Consolidated information in Tables C-1 and C-5 into Table C-5 and then changed Table C-5 to be identified as Table C-1.
Attachment C, Table C-2	Deleted the table in its entirety since it pertains to headspace target analyte list and methods.
Attachment C, Table C-3	Deleted the table in its entirety since it pertains to required organic analyses and test methods organized by organic analytical groups.
Attachment C, Table C-4	Deleted the table in its entirety since it pertains to a summary of sample preparation and analytical methods for metals.
Attachment C, Table C-5	Consolidated information in Tables C-1 and C-5 into Table C-5 and then changed Table C-5 to be identified as Table C-1.
Attachment C, Table C-7	Deleted 20 items associated with either headspace gas sampling or analysis and homogeneous solids sampling or analysis. Replaced one instance of analyte with waste material parameter in footnote d.
Attachment C, Figure C-2	Replaced one instance of “Requested Scenario” with “AK Sufficiency Determination Request” and deleted references to Scenario 1, Scenario 2, and Scenario 3 Determination Requests and deleted note 2 and note 3 and renumbered note 4.
Attachment C1	Changed the title for Attachment C1 to Waste Characterization Testing Methods to better reflect the contents within Attachment C1 based on the changes proposed in this PMR.
Attachment C1, Introduction	Deleted one reference to headspeace gas and homogeneous solids and soil/gravel sampling; deleted one reference to sample custody and sample packing and shipping requirements.
Attachment C1, Section C1-1	Deleted this section (and all subsections to this section) in its entirety since it pertains only to sampling of debris waste which is being proposed for deletion as part of this PMR.
Attachment C1, Section C1-2	Deleted this section (and all subsections to this section) in its entirety since it pertains only to sampling of homogeneous solids and soil/gravel which is being proposed for deletion as part of this PMR.
Attachment C1, Section C1-5	Deleted this section in its entirety since it pertains only to custody of samples.
Attachment C1, Section C1-6	Deleted this section in its entirety since it pertains only to sample packing and shipping.
Attachment C1-Section C1-7	Deleted this section in its entirety since all references were associated with chemical sampling/analysis, which is being proposed for deletion in this PMR.
Attachment C1, Table C1-1 through Table C1-9	Deleted these tables in their entirety since they are all associated with either headspace gas sampling or homogeneous solids or soil/gravel sampling.
Attachment C1, Figure C1-1 through Figure C1-6	Deleted these figures in their entirety since they are all associated with either headspace gas sampling or homogeneous solids or soil/gravel sampling.
Attachment C2	Deleted this attachment in its entirety as it pertains to statistical methods used in chemical sampling/analysis which will no longer be applicable based on the deletion of chemical sampling/analysis being proposed in this PMR.
Attachment C3	Changed the title for Attachment C3 to Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Methods to better reflect the contents within Attachment C3 based on the changes proposed in this PMR.

Affected Permit Section	Explanation of Change
Attachment C3, Section C3-1	Deleted text to quantitative determinations for quality assurance objectives since these determinations only pertain to chemical analysis data. Deleted all text associated with Precision, Accuracy, Completeness, Comparability and Representativeness except to one sentence definitions for each. Deleted in its entirety the text associated with Method Detection Limit and Identification of Tentatively Identified Compounds (**TIC**) since these only pertain to chemical analysis, which is being deleted as proposed by this PMR.
Attachment C3, Section C3-2	Deleted this section in its entirety because it pertains only to headspace gas sampling, which is being proposed for deletion in this PMR.
Attachment C3, Section C3-3	Deleted this section in its entirety because it pertains only to sampling of homogeneous solids and soils/gravel, which is being proposed for deletion in this PMR.
Attachment C3, Section C3-4	Deleted one reference to MDL and deleted one reference to additional waste characterization techniques that may be used on Summary Category Groups. Revised wording to indicate that the objective of NDE includes to verify that the physical form of the waste matches its waste stream description as determined by AK to make it consistent with wording changes elsewhere in the Permit as proposed by this PMR.
Attachment C3, Section C3-5	Deleted this section in its entirety because it pertains only to gas volatile organic compound (**VOC**) analysis, which is being proposed for deletion in this PMR.
Attachment C3, Section C3-6	Deleted this section in its entirety because it pertains only to total volatile organic compound analysis, which is being proposed for deletion in this PMR.
Attachment C3, Section C3-7	Deleted this section in its entirety because it pertains only to total semivolatile organic compound (**SVOC**) analysis, which is being proposed for deletion in this PMR.
Attachment C3, Section C3-8	Deleted this section in its entirety because it pertains only to total metal analysis, which is being proposed for deletion in this PMR.
Attachment C3, Section C3-9	Replaced one instance of analytical with quantitative. Deleted reference to QAOs for analytical results and a reference that analytical results may be used to augment characterization based on AK. Replaced two instances of sampling and analysis with testing and deleted one reference to headspace gas analyses, and solidified waste analyses. Deleted the first sentence from each of the discussions pertaining to Precision, Accuracy, Completeness, Comparability and Representativeness since these sentences only repeat the definition which is now clearly stated in Section C3-1.
Attachment C3, Section C3-10	Replaced one instance of sampling and analysis with testing. Deleted text associated with discussion of a sampling batch data report, an analytical batch data report and an on-line batch data report.
Attachment C3, Section C3-10a	Deleted three references to laboratory records that include bench sheets, logbooks and applicable sample identification numbers for sampling and analytical labs. Deleted one reference to sample. Deleted reference to checklists showing results of sampling, analytical or on-line batch quality control (**QC**) samples. Deleted one sentence specifying that checklists must reflect review of all QC samples and quality assurance (**QA**) objective categories in accordance with Tables C3-2 through C3-9. Deleted one reference to analytical raw data.

Affected Permit Section	Explanation of Change
Attachment C3, Section 10a(1)	Replaced one instance of sampling or analytical with testing. Deleted text pertaining to data obtained from waste sampling and analysis and reference to Attachment C2. Deleted one reference to sampling or analytical data, one reference to DAC and equilibrium calculations, one reference to chain-of-custody forms, one reference to QC sample results and one reference to copies or original of gas canister sample tags. Deleted text pertaining to QC sample results, reporting flags, sample holding time and preservation requirements and field sampling records.
Attachment C3, Section C3-10b(1)	Deleted text pertaining to data being obtained from waste sampling and analysis and reference to Attachment C2. Deleted one reference to validity of DAC assignment, one reference to sampling batch QC checks, one reference to analytical batch QC checks, one reference to on-line batch QC checks, one reference to proper procedures being followed for headspace gas and homogeneous solids and soil/gravel, and one reference to qualifying flags.
Attachment C3, Section C3-10b(2)	Deleted one reference to sample and deleted text pertaining to retaining samples and removal of sample tags by the laboratory.
Attachment C3, Section C3-10c	Deleted one reference to DOE approved laboratories, one reference to sampling and analytical batch numbers, one reference to analytical batch data report case narratives and one reference to summarized qualitative and quantitative data with data flags and qualifiers.
Attachment C3, Section C3-11	Deleted one reference to analysis.
Attachment C3, Section C3-11a	Deleted text pertaining to the Site Project Manager responsibilities associated with evaluation of sampling analysis data (i.e., determination of variability and whether sufficient samples and data points have been determined and documentation of random sampling of containers). Deleted one reference to mean concentrations, UCL_{90}, standard deviations and number of samples pertaining to VOCs in headspace gas data, one reference to mean concentrations, UCL_{90}, standard deviations and number of samples pertaining to VOCs, SVOCs and metals in the waste stream, one reference to whether an appropriate packaging configuration and DAC were applied, one reference to whether all TICs were appropriately identified and reported, one reference to analytical procedures, and one reference to whether the program required quantitation limits (**PRQLs**) for analyses were met. Deleted text pertaining to the statistical procedure used and applied to laboratory analytical data and comparison of data to regulatory threshold limits.
Attachment C3, Section C3-12a	Deleted one reference to sampling and analytical techniques, one reference to sampling or analytical batch number, one reference to sampling and analytical facility files and one reference to DOE approved laboratories.
Attachment C3, Section C3-12b	Deleted one reference to analytical batch reports, and one reference to sampling and analytical data.
Attachment C3, Section C3-12b(2)	Deleted one reference to headspace gas summary data, one reference to total metal, VOC and SVOC analytical results for homogeneous solids and soil/gravel, one reference to TIC listing and evaluation, and one reference to certification through analysis. Editorial correction to change and/or/VE to and/or VE. Revised wording to indicate that radiography and/or VE are used to verify the physical form of the waste matches its waste stream description as determined by AK to make it consistent with wording changes elsewhere in the Permit as proposed by this PMR.
Attachment C3, Section C3-12b(3)	Replaced one instance of analytical data with testing data.
Attachment C3, Section C3-12b(4)	Deleted sentence pertaining to composite headspace gas sample.

Affected Permit Section	Explanation of Change
Attachment C3, Section C3-13	Replaced one instance of Laboratory staff with Testing Facility staff. Deleted one instance of laboratory testing, one instance of laboratory data review, and one instance of laboratory analysis.
Attachment C3, Section C3-14	Deleted one reference to analytical laboratory line management.
Attachment C3, Section C3-16	Deleted one reference to Performance Demonstration Program Plan for Analysis of Simulated Headspace Gases, one reference to Performance Demonstration Program Plans for RCRA Constituent Analysis of Solidified Wastes, one reference to SW-846 and one reference to Least Squares Analysis and Minimum Detection Levels Applied to Multi-Component Alpha Emitting Samples. These references are no longer applicable with the removal of chemical sampling/analysis as proposed in this PMR.
Attachment C3, Tables C3-2 through C3-9	Deleted these tables in their entirety because they pertain to chemical sampling/analysis, which is being proposed for deletion in this PMR.
Attachment C3, Table C3-10	Deleted information pertaining to technical supervisors and operators for Fourier Transform Infrared Spectroscopy (**FTIRS**), gas chromatography, gas chromatography/mass spectrometry, mass spectrometry, atomic absorption spectroscopy, atomic mass spectrometry, atomic emission spectroscopy, and footnotes a and b.
Attachment C3, Table C3-12, Table C3-13 and Table C3-14	Deleted these three tables in their entirety as they pertain to sampling batch data report contents, analytical batch data report contents, and data reporting flags.
Attachment C3, Figure C3-1	Deleted this figure in its entirety since it pertains to the overall headspace gas sampling scheme illustrating manifold sampling.
Attachment C4, Section C4-1	Deleted one reference to headspace gas sampling and analysis, and homogeneous waste sampling and analysis. Replaced one instance of sampling and analysis with radiography and/or VE. Deleted sentence stating that sampling and analysis consists of radiography, VE, headspace gas, and homogeneous waste sampling and analysis. Testing is now used to refer to radiography and/or VE.
Attachment C4, Section C4-2b	Deleted one reference to headspace gas sampling and analysis and one reference to homogeneous waste sampling and analysis.
Attachment C4, Section C4-2c	Deleted information pertaining to waste containers that belong to Los Alamos National Laboratory (**LANL**) sealed sources waste streams. The removal of chemical sampling/analysis proposed in this PMR would render the characterization requirements for LANL sealed sources identical to any other waste stream and so distinguishing LANL sealed sources from other waste streams is no longer necessary.
Attachment C4, Section C4-3d	Deleted bullet for identification of the scenario for which approval is sought. Deletion of Scenarios 1, 2, and 3 with respect to AK Sufficiency Determination made for Permit Attachment C, Section C-0b make identification of the scenario unnecessary since there is only one case for which a Determination Request can be sought.
Attachment C4, Section C4-3e	Replaced two instances of sampling and analysis with testing. Deleted one reference to headspace gas sampling and analysis, and homogeneous waste sampling and analysis. Deleted all paragraphs with respect to re-evaluating AK information using WAP specified chemical sampling/analysis methods.
Attachment C4, Section C4-3f	Replaced one instance of sampling and analysis with testing and replaced in one instance analytical with testing.
Attachment C4, Figure C4-2	Replaced in one instance the text *examination during packaging, and headspace sampling and analysis* with *or visual examination*.
Attachment C5, Section C5-2	Deleted one reference to sample handling and custody requirements and deleted one reference to sample acceptance criteria. Replaced in one instance sampling and analytical with testing.

Affected Permit Section	Explanation of Change
Attachment C6, Section C6-1	Deleted four references to DOE approved laboratory and replaced in one instance sampling and analysis with testing.
Attachment C6, Section C6-2	Deleted one reference to DOE approved laboratories.
Attachment C6, Section C6-3	Replaced one instance of analysis with testing and one instance of sampling areas and equipment, analytical laboratories with waste testing facilities. Deleted three references to DOE approved laboratory. Deleted one reference to analysts.
Attachment C6, Section C6-4	Deleted nineteen references to DOE approved laboratory or DOE approved laboratories. Replaced the text "headspace gas sampling and analysis is not used because debris waste is not being analyzed by the site" with "approved AK sufficiency determination request for one or more waste streams at a site."

Affected Permit Section	Explanation of Change
Attachment C6, Table C6-1	• In row 4b, deleted reference to chemical sampling and analysis using headspace gas sampling and analysis or solids sampling and analysis and the reference to Attachment C2. • Deleted rows 5, 17, 18, 19, 20, 22, 23, 24, 27, 27a, 46, 47, 51a, and 65 in their entirety. • In row 10, deleted one reference to headspace gas sampling and analysis and one reference to homogeneous waste sampling and analysis. • In row 28, deleted one reference to retrievably stored waste; one reference to headspace gas analysis; one reference to total VOC, SVOC, and metals analyses; and one reference to TICs found in headspace gas and totals analyses. • In row 30, deleted one bullet pertaining to headspace gas sampling and analysis and one bullet pertaining to totals analyses of homogeneous solids and soils/gravel. Revised the bullet for radiography and VE to indicate that radiography or VE will be used to verify the physical form of the waste matches its waste stream description as determined by AK and deleted the reference to additional waste characterization techniques may be used based on Summary Category Groups. • In row 32, replaced one instance of analytical with testing and replaced one instance of analyst with operator. • In row 35, deleted one reference to analytical and one reference to sampling batch reports. • In row 36, deleted three references to laboratory records, one reference to applicable sample identification numbers and one other reference to sample data. • In row 37, deleted one reference to sampling or analytical QA documentation, one reference to DAC and equilibrium calculations, one reference to chain-of-custody forms, one reference to QC sample results, and one reference to copies or original of gas canister sample tags. Deleted text pertaining to QC sample results, reporting flags, sample holding time and preservation requirements and field sampling records. • In row 40, deleted one reference to validity of DAC assignment, one reference to sampling batch QC checks, one reference to analytical batch QC checks, one reference to on-line batch QC checks, and one reference to proper procedures being followed for headspace gas and homogeneous solids and soil/gravel. • In row 56a, deleted one reference to headspace gas summary data; one reference to total metal, VOC and SVOC analytical results for homogeneous solids and soil/gravel; one reference to TIC listing and evaluation; and one reference to certification through analysis. Revised wording to indicate that radiography or VE are used to verify that the physical form of the waste matches its waste stream description as determined by AK. • In row 63, replaced in one instance sampling and analysis with testing. Deleted one reference to sampling or analytical facilities. • In row 68, deleted one bullet pertaining to field sampling data forms, one bullet pertaining to chain-of-custody (**COC**) forms and one bullet pertaining to sampling plans. Deleted one reference to laboratory Batch Data Reports. • In row 69, deleted 5 bullets pertaining to chemical sampling/analysis records.
Attachment C6, Table C6-2	This table was deleted in its entirety since it only pertains to solids and soils/gravel sampling/analysis, which is being proposed for deletion in this PMR.

Affected Permit Section	Explanation of Change
Attachment C6, Table C6-3	• In row 144, deleted one reference to headspace gas sampling and analysis and one reference to homogeneous waste sampling and analysis. • Deleted row 145a in its entirety since it pertains only to waste containers that belong to LANL sealed sources waste streams and the removal of chemical sampling/analysis proposed in this PMR would rendered the characterization requirements for LANL sealed sources identical to any other waste stream. • In row 151, deleted one reference to identification of the scenario for which approval is sought. Deletion of Scenarios 1, 2, and 3 with respect to AK Sufficiency Determination made for Permit Attachment C, Section C-0b make identification of the scenario unnecessary since there is only one case for which a Determination Request may be sought. • In row 152, deleted references to Scenarios 1, 2, and 3 with respect to AK Sufficiency Determination since only one case will be applicable with deletion of chemical sampling/analysis. Replaced in three instances sampling and analysis with testing and deleted one reference to headspace gas and homogeneous waste sampling and analysis. • In row 158, replace in one instance a reference to Section C3-b with Section C4-3b to agree with text in Section C4-3e from which the information in row 158 is derived. Replaced in one instance sampling and analysis with testing. • Deleted rows 145a, 161, 162, 164, 165 and 167 in their entirety since they pertain to re-evaluating AK information using WAP specified chemical sampling/analysis methods. • In row 168 and 168a, deleted the first sentence from each of the discussions pertaining to <u>Precision</u>, <u>Accuracy</u>, <u>Completeness</u>, <u>Comparability</u> and <u>Representativeness</u> to be consistent with revised wording being proposed in Attachment C3, Section C3-9. Replaced one instance of sampling and analysis with testing.
Attachment C6, Table C6-4	This table was deleted in its entirety since it only pertains to headspace gas sampling/analysis, which is being proposed for deletion in this PMR.

Appendix B
Proposed Revised Permit Text

PART 2 - GENERAL FACILITY CONDITIONS

2.3 GENERAL WASTE ANALYSIS

2.3.1.2 Waste Characterization Testing~~Sampling and Analytical~~ Methods

The Permittees shall require that generator/storage sites ~~and DOE approved laboratories~~ comply with the applicable method requirements, quality control, equipment testing, inspection, maintenance, and equipment calibration and frequency standards for the procedures specified in Permit Attachment C1 (Waste Characterization Testing~~Sampling~~ Methods). ~~For all analytical methods for waste analysis not otherwise specified in Permit Attachment C1, the Permittees shall require the generator/storage sites and DOE approved laboratories to use "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*", EPA Publication SW-846. Updates to EPA Publication SW-846 shall be incorporated into this permit by reference. Sites may use these new or revised methods once they have demonstrated that the results from the new methods will be at least equivalent to the results from the currently used methods.~~

~~2.3.1.3 Statistical Methods used in Sampling and Analysis~~

~~The Permittees shall require that generator/storage sites use the methods for statistically selecting retrievably stored and newly generated TRU mixed waste containers for volatile organic compounds (**VOCs**), semivolatile organic compounds (**SVOCs**), and total metals analysis, and establishing upper confidence limits, as specified in Permit Attachment C2 (Statistical Methods Used in Sampling and Analysis).~~

2.3.1.3~~4~~ Quality Assurance Objectives

The Permittees shall require that all waste characterization activities used by generator/storage sites ~~and DOE approved laboratories~~ comply with the appropriate quality assurance objectives (**QAOs**) specified in Permit Attachment C3 (Quality Assurance Objectives and Data Validation Techniques for Waste Characterization ~~Sampling and Analytical~~ Methods). The Permittees shall require generator/storage sites to review, validate, and verify all testing~~analytical~~ data; reconcile testing~~analytical~~ results with data quality objectives (**DQOs**); satisfy data reporting requirements; and identify, document, and report all nonconformances and operational variances in compliance with Permit Attachment C3.

2.3.1.4~~5~~ Acceptable Knowledge

The Permittees shall require generator/storage sites to assemble acceptable knowledge documentation and re-evaluate acceptable knowledge determinations, and shall audit (as specified in Permit Section 2.3.2) all aspects of the acceptable knowledge waste characterization process as specified in Permit Attachment C4 (TRU Mixed Waste Characterization Using Acceptable Knowledge).

2.3.1.5~~6~~ Quality Assurance

The Permittees shall require each generator/storage site ~~and DOE approved laboratory~~ to develop and implement a quality assurance project plan (**QAPjP**) which demonstrates compliance with, and implementation of, applicable requirements of the WAP, Permit Attachment C, as specified in Permit Attachment C5 (Quality Assurance Project Plan Requirements).

2.3.1.6~~7~~ WIPP Waste Information System (**WWIS**) Database

The Permittees shall provide the Secretary access to the WWIS database as necessary to determine compliance with the WAP. The WWIS shall meet all requirements presented in Section C-5a(1) of the WAP, Permit Attachment C, prior to acceptance of TRU mixed waste. The Secretary's access to the WWIS shall be direct, read-only (via modem or Internet) to all query and reporting functions of the Characterization, Certification, Shipping, and Inventory modules of the WWIS database.

Beginning on December 31, 2005, the Permittees instituted a public database containing certain information from the WWIS. The Permittees shall continue to provide such public access through the WIPP Home Page at <http://www.wipp.energy.gov>.

PERMIT ATTACHMENTS

Permit Attachment A (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "General Facility Description and Process Information" - Chapter A and "Information for Specific Units - Chapter M)

Permit Attachment A1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Container Storage - Appendix M1)

Permit Attachment A2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Geologic Repository - Appendix M2)

Permit Attachment B (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Part A Application").

Permit Attachment C (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Waste Analysis Plan" - Chapter B).

Permit Attachment C1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Waste Characterization Sampling Methods" - Appendix B1).

~~Permit Attachment C2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Statistical Methods Used in Sampling and Analysis" - Appendix B2).~~

Permit Attachment C3 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Sampling and Analytical Methods" - Appendix B3).

Permit Attachment C4 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "TRU Waste Characterization Using Acceptable Knowledge" - Appendix B4).

Permit Attachment C5 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Quality Assurance Project Plan Requirements" - Appendix B5).

Permit Attachment C6 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Waste Isolation Pilot Plant DOE Audit and Surveillance Program" - Appendix B6).

Permit Attachment C7 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Permittee Level TRU Waste Confirmation Processes" - Appendix B7).

Permit Attachment D (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "RCRA Contingency Plan" - Chapter F).

Permit Attachment E (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Inspection Schedule, Process and Forms" - Chapter D).

Permit Attachment F (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Personnel Training” - Chapter H).

Permit Attachment F1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “RCRA Hazardous Waste Management Job Titles and Descriptions” - Appendix H1).

Permit Attachment F2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Training Course and Qualification Card Outlines” - Appendix H2).

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ATTACHMENT C

WASTE ANALYSIS PLAN

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ATTACHMENT C

WASTE ANALYSIS PLAN

C-0 Introduction and Attachment Highlights

This waste analysis plan (**WAP**) has been prepared for management, storage, or disposal activities to be conducted at the Waste Isolation Pilot Plant (**WIPP**) facility to meet requirements set forth in 20.4.1.500 NMAC (incorporating 40 CFR §264.13). Guidance in the most recent U.S. Environmental Protection Agency (**EPA**) manual on waste analysis has been incorporated into the preparation of this WAP (EPA, 1994). This WAP includes test methods~~,~~ and details of planned waste ~~sampling and~~ analysis for complying with the general waste analysis requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13), a description of the waste shipment screening and verification process, and a description of the quality assurance (**QA**)/quality control (**QC**) program. Before the Permittees manage, store, or dispose transuranic (**TRU**) mixed waste from a generator/storage site (**site**), the Permittees shall require that site to implement the applicable requirements of this WAP.

The hazardous components of the TRU mixed waste to be managed at the WIPP facility are designated in Table C-5~~9~~. Some of the waste may also be identified by unique state hazardous waste codes or numbers. These wastes are acceptable at WIPP as long as the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**) in Part 2 are met. This WAP describes the measures that will be taken to ensure that the TRU mixed wastes received at the WIPP facility are within the scope of Table C-5~~9~~ as established by 20.4.1.500 NMAC (incorporating 40 CFR §264), and that they comply with unit-specific requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.600), Miscellaneous Units

Some TRU mixed waste is retrievably stored at the DOE generator/storage sites. Additional TRU mixed waste will be generated and packaged into containers at these generator/storage sites in the future. TRU mixed waste will be retrieved from storage areas at a DOE generator/storage site. Retrievably stored waste is defined as TRU mixed waste generated after 1970 and before the New Mexico Environment Department (**NMED**) notifies the Permittees, by approval of the final audit report, that the characterization requirements of the WAP at a generator/storage site have been implemented. Newly generated waste is defined as TRU mixed waste generated after NMED approves the final audit report for a generator/storage site. Acceptable knowledge (**AK**) information is assembled for both retrievably stored and newly generated waste. Waste characterization of retrievably stored TRU mixed waste will be performed on an ongoing basis, as the waste is retrieved. Waste characterization of newly generated TRU mixed waste is typically performed as it is generated, although some characterization occurs post-generation. ~~Waste characterization requirements for newly generated and retrievably stored TRU mixed wastes differ, as discussed in Sections C-3d(1) and C-3d(2).~~

Waste characterization is defined in Part 1 as the activities performed by the waste generator to satisfy the general waste analysis requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13(a)) before waste containers have been certified for disposal at WIPP. The characterization process for WIPP waste is presented in Figure C-2. Generator site waste characterization programs are first audited by DOE, with NMED approving the final audit report. After this, generator sites determine whether AK alone is sufficient for characterization, or whether radiography or VE~~a sampling and analysis program~~ in conjunction with AK is necessary to adequately characterize wastes. If an AK Sufficiency Determination is sought, information is provided to the Permittees for their review and DOE's provisional approval; NMED determination of adequacy of the AK information is required before final approval by DOE. If the radiography or VE~~sampling and analysis~~ route is chosen, sites proceed to perform radiography or VE~~sample and analyze waste~~ in conjunction with AK and in accordance with this WAP. Once an AK Sufficiency Determination is obtained, or when required radiography or VE~~sampling and analysis~~ data are obtained, sites would then prepare and submit the Waste Stream Profile Form for DOE's approval. Once the WSPF is approved, a site may ship waste to WIPP. The Permittees will perform waste confirmation prior to shipment of the waste from the generator/storage site to WIPP pursuant to Permit Attachment C7, by performing radiography or visual examination of a representative subpopulation of certified waste containers, to ensure that the wastes meet the applicable requirements of the TSDF-WAC.

C-0a Waste Characterization

TRU mixed wastes are initially categorized into the three broad Summary Category Groups that are related to the final physical form of the wastes. This categorization is based on the Summary Category Group constituting the greatest volume of waste for a waste stream. Waste characterization requirements for these groups are specified ~~separately~~ in Section C-2 of this WAP. Each of the three groups is described below.

S3000 - Homogeneous Solids
Homogeneous solids are defined as solid materials, excluding soil, that do not meet the NMED criteria for classification as debris (20.4.1.800 NMAC (incorporating 40 CFR §268.2[g] and [h])). Included in the series of homogeneous solids are inorganic process residues, inorganic sludges, salt waste, and pyrochemical salt waste. Other waste streams are included in this Summary Category Group based on the specific waste stream types and final waste form. This Summary Category Group is expected to contain toxic metals and spent solvents. This category includes wastes that are at least 50 percent by volume homogeneous solids.

S4000 - Soils/Gravel
This Summary Category Group includes S4000 waste streams that are at least 50 percent by volume soil/gravel. This Summary Category Group is expected to contain toxic metals.

S5000 - Debris Wastes
This Summary Category Group includes heterogeneous waste that is at least 50 percent by volume materials that meet the criteria specified in 20.4.1.800 NMAC (incorporating 40 CFR §268.2 (g)). Debris means solid material exceeding a 2.36 inch (in.) (60 millimeter) particle size that is intended for disposal and that is:

1. a manufactured object, or
2. plant or animal matter, or
3. natural geologic material.

Particles smaller than 2.36 inches in size may be considered debris if the debris is a manufactured object and if it is not a particle of S3000 or S4000 material.

~~If a waste does not include at least 50 percent of any given Summary Category Group by volume, characterization shall be performed using the waste characterization process required for the category constituting the greatest volume of waste for that waste stream (see Section C-3d).~~

The generator/storage sites shall characterize their waste in accordance with this WAP and associated Permit Attachments, and ensure that waste proposed for storage and disposal at WIPP meets the applicable requirements of the TSDF-WAC in Part 2. The generator/storage site shall assemble the Acceptable Knowledge (**AK**) information into an auditable record[3] for the waste stream as described in Permit Attachment C4. For those waste streams with an approved AK Sufficiency Determination (see below), radiography or VE~~sampling and analysis~~ per the methods described in Permit Attachment~~s~~ C1~~ and C2~~ is~~are~~ not required.

All waste characterization activities specified in this WAP and associated Permit Attachments shall be carried out at generator/storage sites ~~and DOE approved laboratories~~ in accordance with this WAP. DOE will audit generator/storage site waste characterization programs and activities as described in Section C-3. Waste characterization activities at the generator/storage sites include the following~~, although not all these techniques will be used on each container~~, as discussed in Section C-3:

- Radiography, which is an x-ray technique to determine physical contents of containers
- Visual examination of opened containers as an alternative way to determine their physical contents
- ~~Headspace gas sampling to determine VOC content of gases in the void volume of the containers~~
- ~~Sampling and analysis of waste forms that are homogeneous and can be representatively sampled to determine concentrations of hazardous waste constituents and toxicity characteristic contaminants of waste in containers~~
- Compilation of AK documentation into an auditable record

C-0b AK Sufficiency Determination

Generator/storage sites may submit a request to the Permittees for an AK Sufficiency Determination (**Determination Request**) to be exempt from the requirement to perform radiography or visual examination (**VE**) based on AK~~meet all or part of the waste characterization requirements~~. The contents of the Determination Request are specified in Permit Attachment C4, Section C4-3d. ~~The Determination Request may take one of the following forms:~~

~~Scenario 1 Radiography or visual examination (**VE**) of the waste stream is not required, and chemical sampling and analysis is not required;~~

~~Scenario 2 Radiography or VE of the waste stream is not required, but chemical sampling and analysis of a representative sample of the waste stream is required; or~~

~~Scenario 3 Chemical sampling and analysis is not required, but radiography or VE of 100% of the containers in the waste stream is required.~~

[3] "Auditable records" mean those records which allow the Permittees to conduct a systematic assessment, analysis, and evaluation of the Permittees' compliance with the WAP and this Permit.

The Permittees will review the Determination Request for technical adequacy and compliance with the requirements of the Permit, using trained and qualified individuals in accordance with standard operating procedures that shall, at a minimum, address all of the technical and procedural requirements listed above. The Permittees shall resolve comments with the generator/storage site~~, and the Permittees may change the scope of the Determination Request to one of the three scenarios~~.

If a generator/storage site does not submit a Determination Request, or if DOE does not approve a Determination Request, or if NMED finds that DOE's provisional approval of a Determination Request is inadequate, the generator/storage site shall perform radiography or VE on 100% of the containers in a waste stream. ~~and chemical sampling and analysis on a representative sample of the waste stream using headspace gas sampling and analysis (for debris waste) or solids sampling and analysis (for homogeneous solid or soil/gravel waste) as specified in Permit Attachments C1 and C2.~~

If a generator/storage site submits a Determination Request, DOE provisionally approves the Determination Request~~ as Scenario 1~~, and NMED finds that DOE's provisional approval is adequate, neither radiography nor VE ~~nor chemical sampling and analysis~~ of the waste stream is required.

~~If a generator/storage site submits a Determination Request, DOE provisionally approves the Determination Request as Scenario 2, and NMED finds that DOE's provisional approval is adequate, chemical sampling and analysis of a representative sample of the waste stream is required, but radiography or VE is not required.~~

~~If a generator/storage site submits a Determination Request, DOE provisionally approves the Determination Request as Scenario 3, and NMED finds that DOE's provisional approval is adequate, radiography or VE of 100% of the containers in the waste stream is required, but chemical sampling and analysis is not required.~~

C-0c Waste Stream Profile Form Completion

After a complete AK record has been compiled and either a Determination Request has been approved by DOE or the generator/storage site has completed the applicable ~~representative sampling and analysis~~ testing requirements specified in Permit Attachment~~s~~ C1~~ and C2~~, the generator/storage site will complete a Waste Stream Profile Form (**WSPF**) and Characterization Information Summary (**CIS**). The requirements for the completion of a WSPF and a CIS are specified in Permit Attachment C3, Sections C3-6~~12~~b(1) and C3-6~~12~~b(2) respectively.

In the event the Permittees request detailed information on a waste stream, the site will provide a Waste Stream Characterization Package (Section C3-6~~12~~b(2)). For each waste stream, this package will include the WSPF, the CIS, and the complete AK summary. The Waste Stream Characterization Package will also include specific Batch Data Reports (**BDRs**) and raw ~~analytical~~ data associated with waste container characterization as requested by the Permittees.

C-1 Identification of TRU Mixed Waste to be Managed at the WIPP Facility

C-1a Waste Stream Identification

TRU mixed waste destined for disposal at WIPP will be characterized on a waste stream basis. Generator/storage sites will delineate waste streams using acceptable knowledge. Required acceptable knowledge is specified in Section C-3a~~b~~ and Permit Attachment C4.

~~All of the waste within a waste stream may not be accessible for sampling and analysis at one time. Permit Attachment C2 addresses the requirements for selecting waste containers used for characterization of waste streams as they are generated or retrieved.~~

C-1b Waste Summary Category Groups and Hazardous Waste Accepted at the WIPP Facility

The Permittees will only allow generators to ship those TRU mixed waste streams with EPA hazardous waste numbers listed in Table C-5~~9~~. Some of the waste may also be identified by unique state hazardous waste codes or numbers. These wastes are acceptable at WIPP as long as the TSDF-WAC are met. The Permittees will require sites to perform characterization of all waste streams as required by this WAP. If during the characterization process, new EPA hazardous waste numbers are identified, those wastes will be prohibited for disposal at the WIPP facility until a permit modification has been submitted to and approved by NMED for these new EPA hazardous waste numbers. Similar waste streams at other generator/storage sites will be examined by the Permittees to ensure that the newly identified EPA hazardous waste numbers do not apply to those similar waste streams. If the other waste streams also require new EPA hazardous waste numbers, shipment of these similar waste streams will also be prohibited for disposal until a permit modification has been submitted to and approved by NMED.

C-1c Waste Prohibited at the WIPP Facility

The following TRU mixed waste are prohibited at the WIPP facility:

- liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable:
  - Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination
  - Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited
  - Containers with Hazardous Waste Number U134 assigned shall have no observable liquid
  - Overpacking the outermost container that was examined during radiography or visual examination or redistributing untreated liquid within the container shall not be used to meet the liquid volume limits
- non-radionuclide pyrophoric materials, such as elemental potassium

- hazardous wastes not occurring as co-contaminants with TRU mixed wastes (non-mixed hazardous wastes)

- wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes

- wastes containing explosives or compressed gases

- wastes with polychlorinated biphenyls (**PCBs**) not authorized under an EPA PCB waste disposal authorization

- wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)

- waste that has ever been managed as high-level waste and waste from tanks specified in Table C-4~~8~~, unless specifically approved through a Class 3 permit modification

- any waste container from a waste stream (or waste stream lot) which has not undergone either radiographic or visual examination of a statistically representative subpopulation of the waste stream in each shipment, pursuant to Permit Attachment C7

- any waste container from a waste stream which has not been preceded by an appropriate, certified WSPF (see Section C-1d)

C-1d Control of Waste Acceptance

Every waste stream shipped to WIPP shall be preceded by a WSPF (Figure C-1) and a CIS. The required WSPF information and the CIS elements are found in Section C3-6~~12~~b(1) and Section C3-6~~12~~b(2).

Any time the Permittees request additional information concerning a waste stream, the generator/storage site will provide a Waste Stream Characterization Package (Section C3-6~~12~~b(2)). The option for the Permittees to request additional information ensures that the waste being offered for disposal is adequately characterized and accurately described on the WSPF.

C-2 Waste Characterization Program Requirements and Waste Characterization Parameters

The Permittees shall require the sites to develop the procedure(s) which specify their programmatic waste characterization requirements. DOE will evaluate the procedures during audits conducted under the Audit and Surveillance Program (Section C-5a(3)) and may also evaluate the procedures as part of the review and approval of the WSPF. Sites must notify the Permittees and obtain DOE approval prior to making data-affecting modifications to procedures (Permit Attachment C3, Section C3-9~~15~~). Program procedures shall address the following minimum elements:

- Waste characterization and certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility

- Methods used to ensure prohibited items are documented and managed. These will include procedures for performing radiography, VE, or treatment, if these methods are used to ensure prohibited items are not present in the waste prior to shipment of the waste to WIPP.

- ~~Procedures used to verify packaging configurations to determine the correct drum age criteria (**DAC**) if headspace gas sampling and analysis is used to collect waste characterization information per Section C1-1a(1) of the WAP.~~

- Identify the organization(s) responsible for compliance with waste characterization and certification procedures.

- Identify the oversight procedures and frequency of actions to verify compliance with waste characterization and certification procedures.

- Develop training specific to waste characterization and certification procedures.

- Ensure that personnel may stop work if noncompliance with waste characterization or certification procedures is identified.

- Develop a nonconformance process that complies with the requirements in Permit Attachment C3 of the WAP to document and establish corrective actions.

- As part of the corrective action process, assess the potential time frame of the noncompliance, the potentially affected waste population(s), and the reassessment and recertification of those wastes.

- A listing of all approved hazardous waste numbers which are acceptable at WIPP are included in Table C-5~~9~~.

For those waste streams or containers that are not amenable to radiography (e.g., RH TRU mixed waste, direct loaded ten-drum overpacks (**TDOPs**)) for waste confirmation by the Permittees pursuant to Permit Attachment C7, generator/storage site VE data may be used for waste acceptance. In those cases, the Permittees will review the generator/storage site VE procedures to ensure that data sufficient for the Permittees' waste acceptance activities pursuant to Permit Attachment C7 will be obtained and the procedures meet the minimum requirements for visual examination specified in Permit Attachment C1, Section C1-1~~3~~.

Table~~s~~ C-1~~, C-2, C-3 and C-4~~ provides the parameters of interest for the various constituent groupings and testing~~analytical~~ methodologies. The following sections provide a description of the acceptable methods to evaluate these parameters for each waste Summary Category Group.

C-3 Generator Waste Characterization Methods

The characterization techniques used by generator/storage sites includes acceptable knowledge and may also include, as necessary, ~~headspace gas sampling and analysis,~~ radiography, and visual examination~~, and homogeneous waste sampling and analysis~~. All characterization activities are performed in accordance with the WAP. Table C-1~~5~~ provides a summary of the characterization requirements for TRU mixed waste.

~~C-3a Sampling and Analytical Methods~~

~~C-3a(1) Headspace Gas Sampling and Analysis~~

~~Representative headspace gas sampling and analysis shall be used by generator/storage sites to determine the types and concentrations of VOCs in the void volume of randomly selected waste containers in order to resolve the assignment of EPA hazardous waste numbers for those debris waste streams for which an AK Sufficiency Determination Request has not been approved by DOE. In addition, VOC constituents will be compared to those assigned by acceptable knowledge, which may include an analysis of radiolytically derived VOCs. The generator/storage sites may also consider radiolysis and packaging materials when assessing the presence of hazardous constituents in the headspace gas results, and whether radiolysis would generate wastes which exhibit the toxicity characteristic. Refer to Permit Attachment C4 for additional clarification regarding hazardous waste number assignment and headspace gas results. The methods for random selection of containers for headspace gas sampling and analysis are specified in Permit Attachment C2. Headspace gas sampling and analysis shall be subject to the Audit and Surveillance Program (Permit Attachment C6).~~

~~In accordance with EPA convention, identification of hazardous constituents detected by gas chromatography/mass spectrometry methods that are not on the list of target analytes shall be reported. These compounds are reported as tentatively identified compounds (**TICs**) in the analytical BDR and shall be added to the target analyte list if detected in a given waste stream, if they appear in the 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII, and if they are reported in 25% of the waste containers sampled from a given waste stream. The headspace gas analysis method Quality Assurance Objectives (**QAOs**) are specified in Permit Attachment C3.~~

~~C-3a(2) Homogeneous and Soil/Gravel Waste Sampling and Analysis~~

~~Representative homogeneous and soil/gravel waste sampling and analysis shall be used by generator/storage sites to resolve the assignment of EPA hazardous waste numbers for homogeneous and soil/gravel waste streams for which an AK Sufficiency Determination Request has not been approved by DOE. Sampling of homogeneous and soil/gravel wastes shall result in the collection of a sample that is used to resolve the assignment of hazardous waste numbers. Sampling is accomplished through coring or other EPA approved sampling, which is described in Permit Attachment C1.For those waste streams defined as Summary Category Groups S3000 or S4000 on page C-3, debris that may also be present within these wastes need not be sampled. The waste containers for sampling and analysis are to be selected randomly from the population of containers for the waste stream. The random selection methodology is specified in Permit Attachment C2. Homogeneous and soil/gravel sampling and analysis shall be subject to the Audit and Surveillance Program (Permit Attachment C6).~~

~~Totals or TCLP analyses for VOCs, SVOCs, and RCRA regulated metals are used to determine waste parameters in soils/gravels and solids that may be important to the performance within the disposal system (Tables C-3 and C-4). To determine if a waste exhibits a toxicity characteristic for compounds specified in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C), TCLP may be used instead of total analyses. The generator will use the results from these analyses to determine if a waste exhibits a toxicity characteristic. The mean concentration of toxicity characteristic contaminants are calculated for each waste stream such that it can be reported with an upper 90 percent confidence limit (**UCL_{90}**). The UCL_{90} values for the mean measured contaminant concentrations in a waste stream will be compared to the specified~~

~~regulatory levels in 20.4.1.200 NMAC (incorporating 40 CFR §261 Subpart C), expressed as total/TCLP values, to determine if the waste stream exhibits a toxicity characteristic. A comparison of total analyses and TCLP analyses is presented in Appendix C3 of the WIPP RCRA Part B Permit Application (DOE, 1997), and a discussion of the~~ ~~UCL_{90}~~ ~~is included in Permit Attachment C2. If toxicity characteristic (**TC**) wastes are identified, these will be compared to those determined by acceptable knowledge and TC waste numbers will be revised, as warranted. Refer to Permit Attachment C4 for additional clarification regarding hazardous waste number assignment and homogeneous solid and soil/gravel analytical results.~~

~~C-3a(3) Laboratory Qualification~~

~~DOE will ensure that generator/storage sites conduct analyses using laboratories that are qualified through participation in the Performance Demonstration Program (**PDP**) (DOE, 2003, 2005). Required QAOs are specified in Permit Attachment C3. In addition, methods and supporting performance data demonstrating QAO compliance shall be ensured by DOE during the annual certification audit of the laboratories.~~

~~Analytical methods used by the laboratories shall: 1) satisfy all of the appropriate QAOs, and 2) be implemented through laboratory documented standard operating procedures. These analytical QAOs are discussed in detail in Permit Attachment C3.~~

C-3a~~b~~ Acceptable Knowledge

C-3b~~c~~ Radiography and Visual Examination

Radiography and visual examination (**VE**) are nondestructive qualitative and quantitative techniques used to identify and verify waste container contents as specified in Permit Attachment C1. Generator/storage sites shall perform radiography or VE of 100 percent of CH TRU mixed waste containers in waste streams except for those waste streams for which DOE approves a ~~Scenario 1 or Scenario 2~~ Determination Request. No RH TRU mixed waste will be shipped to WIPP for storage or disposal without documentation of radiography or VE of 100 percent of the containers as specified in Permit Attachment C1. Radiography and/or VE will be used, when necessary, to examine a waste container to verify the~~its~~ physical form of the waste matches its waste stream description as determined by AK. These techniques can detect observable liquid in excess of TSDF-WAC limits and containerized gases, which are prohibited for WIPP disposal. The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the shipment of corrosive, ignitable, or reactive wastes. Radiography and/or VE are also able to verify that the physical form of the waste matches its waste stream description (i.e. Homogeneous Solids, Soil/Gravel, or Debris Waste [including uncategorized metals]). If the physical form does not match the waste stream description, the waste will be designated as another waste stream and assigned the preliminary hazardous waste numbers associated with that new waste stream assignment. That is, if radiography and/or VE indicates that the waste does not match the waste stream description arrived at by acceptable knowledge characterization, a non-conformance report (**NCR**) will be completed and the inconsistency will be resolved as specified in Permit Attachment C4, and the NCR will be dispositioned as specified in Permit Attachment C3, Section C3-7~~13~~. The proper waste stream assignment will be determined (including preparation of a new WSPF), the correct hazardous waste numbers will be assigned, and the resolution will be documented. Refer to Permit Attachment C4 for a discussion of acceptable knowledge and its verification process.

~~C-3d Characterization Techniques and Frequency for Newly Generated and Retrievably Stored Waste~~

~~Generator/storage sites will use acceptable knowledge to delineate all TRU mixed waste containers into waste streams for the purposes of grouping waste for further characterization. The analyses performed may differ based on the waste stream and the physical form of the waste (i.e., heterogeneous debris waste cannot be sampled for totals analyses). Both retrievably stored and newly generated wastes will be delineated in this fashion, though the types of acceptable knowledge used may differ. Section C-3b discusses the use of acceptable knowledge, sampling, and analysis in more detail. Acceptable knowledge is discussed more completely in Permit Attachment C4. Every TRU mixed waste stream will be assigned hazardous waste numbers based upon acceptable knowledge, and the generator/storage sites may resolve the assignment of hazardous waste numbers using headspace gas (Summary Category Group S5000 only) and solid sampling and analysis (Summary Category Groups S3000 and S4000 only).~~

~~In the CIS for each waste stream, the generator/storage site will be required to document their methods, and the findings from those methods, for determining the physical form of the waste and the presence or absence of prohibited items for both retrievably stored and newly generated waste. Radiography and/or VE may be used to verify the physical form of retrievably stored TRU mixed waste. For newly generated waste, physical form and prohibited items may either be documented during packaging using VE or verified after packaging using radiography or VE.~~

~~For debris waste streams that do not have an AK Sufficiency Determination approved by DOE, containers selected in accordance with Permit Attachment C2 from those waste streams must be sampled and analyzed for VOCs in the headspace gas. Likewise, a statistically selected portion of homogeneous solids and soil/gravel waste streams must be sampled and analyzed for RCRA regulated total VOCs, SVOCs, and metals when those waste streams do not have an AK Sufficiency Determination approved by DOE. Sampling and analysis methods used for waste characterization are discussed in Section C-3a.~~

~~In the process of performing organic headspace and solid sample analyses, nontarget compounds may be identified. These compounds will be reported as TICs. TICs reported in 25% of the samples and listed in 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII, will be compared with acceptable knowledge data to determine if the TIC is in a listed hazardous waste in the waste stream. TICs identified through headspace gas analyses that meet the Appendix VIII list criteria and the 25 percent reporting criteria for a waste stream will be added to the headspace gas waste stream target list, regardless of the hazardous waste listing associated with the waste stream. TICs subject to inclusion on the target analyte list that are toxicity characteristic parameters shall be added to the target analyte list regardless of origin because the hazardous waste designation for these numbers is not based on source. However, for toxicity characteristic and non-toxic F003 constituents, the site may take concentration into account when assessing whether to add a hazardous waste number. TICs reported from the Totals VOC or SVOC analyses may be excluded from the target analyte list for a waste stream if the TIC is a constituent in an F-listed waste whose presence is attributable to waste packaging materials or radiolytic degradation from acceptable knowledge documentation. If the TIC associated with a total VOC or SVOC analysis cannot be identified as a component of waste packaging materials or as a product of radiolysis, the generator/storage site will add these TICs to the list of hazardous constituents for the waste stream (and assign additional EPA listed hazardous waste numbers, if appropriate). A permit modification will be submitted to NMED for~~

~~their approval to add these constituents (and waste numbers), if necessary. For toxicity characteristic compounds and non-toxic F003 constituents, the generator/storage site may consider waste concentration when determining whether to change a hazardous waste number. Refer to Permit Attachment C3 for additional information on TIC identification.~~

~~Waste characterization solid sampling and analysis activities may differ for retrievably stored waste and newly generated waste. The waste characterization processes used by the generator/storage sites for both retrievably stored and newly generated waste streams will be evaluated during DOE's audit of the site. The typical waste characterization data collection design used by the generator/storage sites for each type of waste is described in the following sections. Table C-1 provides a summary of hazardous waste characterization requirements for all TRU mixed waste by waste characterization parameters.~~

~~Table C-5 summarizes the parameters, methods, and rationales for stored and newly generated CH-TRU mixed wastes according to their waste forms.~~

~~WIPP may accept TRU mixed waste that has been repackaged or treated. Treated waste shall retain the original waste stream's listed hazardous waste number designation.~~

~~C-3d(1) Newly Generated Waste~~

~~The RCRA regulated constituents in newly generated wastes will typically be documented at the time of generation based on acceptable knowledge for the waste stream. Newly generated TRU mixed waste characterization typically begins with verification that processes generating the waste have operated within established written procedures. Waste containers are delineated into waste streams using acceptable knowledge. The Permittees will require that the generator/storage sites document the methods used to delineate waste streams in the acceptable knowledge record and Acceptable Knowledge Summary Report. Determination that the physical form of the waste (Summary Category Group) corresponds to the physical form of the assigned waste stream may be accomplished either using VE during packaging or by performing radiography as specified in Permit Attachment C1, Section C1-3 for retrievably stored waste. Instead of using a video/audio tape and a single operator, the VE method for newly generated waste (or repackaged retrievably stored waste) may use a second operator, who is equally trained to the requirements stipulated in Permit Attachment C1, to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. If the second operator cannot provide concurrence, corrective actions [4] will be taken as specified in Permit Attachment C3. The subsequent waste characterization activities depend on the assigned Summary Category Group, since waste within the Homogeneous Solids and Soils/Gravel Summary Category Groups may be characterized using different techniques than the waste in the Debris Waste Summary Category Group. The packaging configuration, type and number of filters, and rigid liner vent hole presence and diameter necessary to determine the appropriate drum age criteria (**DAC**) in accordance with Permit Attachment C1, Section C1-1, may be documented as part of the characterization information collected during the packaging of newly generated waste or repackaging of retrievably stored waste for those containers of debris waste that will undergo headspace gas sampling and analysis.~~

[4] ~~"Corrective action" as used in this WAP and its attachments does not mean corrective action as defined under HWA, RCRA, and their implementing regulations.~~

~~C-3d(1)(a) Sampling of Newly Generated Homogeneous Solids and Soil/Gravel~~

~~When a Determination Request has not been approved by DOE, sampling and analysis of newly generated homogeneous solid and soil/gravel waste streams shall be conducted in accordance with the requirements specified in Permit Attachment C1, Section C1-2. The number of newly generated homogeneous solid and soil/gravel waste containers to be sampled will be determined using the procedure specified in Section C2-1, wherein a statistically selected portion of the waste will be sampled.~~

~~C-3d(2) Retrievably Stored Waste~~

~~All retrievably stored waste containers will first be delineated into waste streams using acceptable knowledge. The Permittees will require that the generator/storage sites document the methods used to delineate waste streams in the acceptable knowledge record and Acceptable Knowledge Summary Report. Retrievably stored waste containers may be examined using radiography or VE to determine the physical waste form (Summary Category Group), the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000).~~

~~The headspace gas sampling method provided in Permit Attachment C1 will be used, when necessary, to resolve the assignment of EPA hazardous waste numbers to debris waste streams, as specified in Permit Attachment C4.~~

~~A statistically selected portion of retrievably stored homogeneous solids and soil/gravel wastes will be sampled and analyzed for total VOCs, SVOCs, and metals, when necessary. The sample location selection method is described in Permit Attachment C2. The sampling methods for these wastes are provided in Permit Attachment C1.~~

~~The toxicity characteristic of retrievably stored homogeneous solids and soil/gravel wastes will be determined using total analysis of toxicity characteristic parameters or TCLP. To determine if a waste exhibits a toxicity characteristic for compounds specified in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C), TCLP may be used instead of total analyses. Appendix C3 of the WIPP RCRA Part B Permit Application (DOE, 1997) discusses comparability of totals analytical results to those of the TCLP method.~~

~~Representativeness of containers selected for headspace gas sampling and waste subjected to homogeneous solids and soil/gravel sampling and analysis will be validated by the generator/storage site and by DOE during an audit (Permit Attachment C6) via examination of documentation that shows that random samples were collected. (Because representativeness is a quality characteristic that expresses the degree to which a sample or group of samples represent the population being studied, the random sampling of waste streams ensures representativeness.)~~

C-4 Data Verification and Quality Assurance

The Permittees will ensure that applicable waste characterization processes performed by generator/storage sites sending TRU mixed waste to the WIPP for disposal meets WAP requirements through data validation, usability and reporting controls. Verification occurs at three levels: 1) the data generation level, 2) the project level, and 3) the Permittee level. The validation and verification process and requirements at each level are described in Permit

Attachment C3, Section C3-4~~10~~. The validation and verification process at the Permittee Level is also described in Section C-5.

C-4a Data Generation and Project Level Verification Requirements

C-4a(1) Data Quality Objectives

The waste characterization data obtained through WAP implementation will be used to ensure that the Permittees meet regulatory requirements with regard to both regulatory compliance and to ensure that all TRU mixed wastes are properly managed during the Disposal Phase. To satisfy the RCRA regulatory compliance requirements, the following DQOs are established by this WAP:

- Acceptable Knowledge
  - To delineate TRU mixed waste streams.
  - To assess whether TRU mixed wastes comply with the applicable requirements of the TSDF-WAC.
  - To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart C).
  - To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261, Subpart D).
  - To estimate waste material parameter weights.
- ~~Headspace Gas Sampling and Analysis~~
  - ~~To identify VOCs and quantify the concentrations of VOC constituents in waste containers to resolve the assignment of EPA hazardous waste numbers~~
- ~~Homogeneous Waste Sampling and Analysis~~
  - ~~To compare UCL_{90} values for the mean measured contaminant concentrations in a waste stream with specified toxicity characteristic levels in 20.4.1.200 NMAC (incorporating 40 CFR §261), to determine if the waste is hazardous, and to resolve the assignment of EPA hazardous waste numbers.~~
- Radiography and VE
  - To verify the TRU mixed waste streams contain no prohibited items and to verify the physical form of the waste matches the waste stream description as determined by AK ~~the physical waste form, the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000)~~.

- ~~Visual Examination~~

  - ~~To determine the physical waste form, the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000).~~

Reconciliation of these DQOs by the Generator/Storage Site Project Manager ~~or DOE approved laboratories~~, as applicable, is addressed in Permit Attachment C3. Reconciliation requires determining whether sufficient type, quality, and quantity of data have been collected to ensure the DQOs cited above can be achieved.

C-4a(2) Quality Assurance Objectives

The generator/storage sites ~~or DOE approved laboratories, as applicable,~~ shall demonstrate compliance with each QAO associated with the ~~various~~ characterization methods as presented in Permit Attachment C3. Generator/Storage Site Project Managers ~~or DOE approved laboratories, as applicable,~~ are further required to perform a reconciliation of the data with the DQOs established in this WAP. The Generator/Storage Site Project Manager ~~or DOE approved laboratories, as applicable,~~ shall conclude that all of the DQOs have been met for the characterization of the waste stream prior to submitting a WSPF to DOE for approval (Permit Attachment C3). The following QAO elements shall be considered for each technique, as a minimum:

- Precision

  - Precision is a measure of the mutual agreement among multiple measurements.

- Accuracy

  - Accuracy is the degree of agreement between a measurement result and the true or known value.

- Completeness

  - Completeness is a measure of the amount of valid data obtained from a method compared to the total amount of data obtained that is expressed as a percentage.

- Comparability

  - Comparability is the degree to which one data set can be compared to another.

- Representativeness

  - Representativeness expresses the degree to which data represent characteristics of a population.

A more detailed discussion of the QAOs~~, including a mathematical representation, where appropriate,~~ can be found in Permit Attachment C3, which describes the QAOs associated with each test method ~~of sampling and analysis~~.

~~C-4a(3) Sample Control~~

~~The generator/storage sites and DOE approved laboratories, as applicable, will implement a sample handling and control program that will include the maintenance of field documentation records, proper labeling, and a chain of custody (**COC**) record. The generator/storage site and DOE approved laboratories, as applicable, Quality Assurance Project Plan (**QAPjP**) or procedures referenced in the QAPjP will document this program and include COC forms to control the sample from the point of origin to the final analysis result reporting. DOE will review and approve the QAPjP, including their determination that the sample control program is adequate. The approved QAPjP will be provided to NMED prior to shipment of TRU mixed waste and before the generator/storage site audit, as specified in Permit Attachment C5. Details of this sample control program are provided in Permit Attachment C1 and are summarized below to include:~~

- ~~Field Documentation of samples including: point of origin, date of sample, container ID, sample type, analysis requested, and COC number.~~
- ~~Labeling and/or tagging including: sample numbering, sample ID, sample date, sampling conditions, and analysis requested.~~
- ~~COC control including: name of sample relinquisher, sample receiver, and the date and time of the sample transfer.~~
- ~~Proper sample handling and preservation.~~

C-4a(34) Data Generation

BDRs, in a format approved by DOE, will be used by each generator/storage site~~ and DOE approved laboratories, as applicable,~~ for reporting waste characterization data. This format will be included in the generator/storage site~~ and DOE approved laboratories, as applicable~~, QAPjP, controlled electronic databases, or procedures referenced in the QAPjP (Permit Attachment C5) and will include all of the elements required by this WAP for BDR (Permit Attachment C3).

DOE shall perform audits of the generator/storage site waste characterization programs, as implemented by the generator/storage site QAPjP, to verify compliance with the WAP and the DQOs in this WAP (See Permit Attachment C6 for a discussion of the content of the audit program). The primary functions of these audits are to review generator/storage sites' adherence to the requirements of this WAP and ensure adherence to the WAP characterization program. DOE shall provide the results of each audit to NMED. If audit results indicate that a generator/storage site is not in compliance with the requirements of this WAP, DOE will take appropriate action as specified in Permit Attachment C6.

~~DOE shall perform audits of the DOE approved laboratory's programs, as implemented by the laboratory's QAPjP (See Permit Attachment C6 for a discussion of the content of the audit program). The primary functions of these audits are to review the DOE approved laboratory's adherence to the requirements of this WAP. DOE shall provide the results of each audit to NMED. If audit results indicate that a DOE approved laboratory is not in compliance with the requirements of this WAP, DOE will take appropriate action as specified in Permit Attachment C6.~~

~~DOE shall further require all DOE approved laboratories analyzing WIPP waste samples for the generator/storage sites to have established, documented QA/QC programs. DOE annually evaluates these laboratories and their QA/QC programs as part of their participation in DOE's PDP laboratory performance program. DOE's audits cover the requirements of the lab's QA/QC program, as well as compliance with this WAP. Continued compliance with these parameters will be verified by ongoing audits by DOE at the generator/storage sites and these laboratories as specified in Permit Attachment C6. DOE's audits of the generator/storage sites will verify that the laboratories analyzing the sites' waste have been properly audited by the generator/storage sites. The laboratory's QA/QC program shall include the following:~~

- ~~Facility organization~~
- ~~A list of equipment/instrumentation~~
- ~~Operating procedures~~
- ~~Laboratory QA/QC procedures~~
- ~~Quality assurance review~~
- ~~Laboratory records management~~

C-4a(4~~5~~) Data Verification

BDRs will document the testing~~, sampling, and analytical~~ results from the required characterization activities, and document required QA/QC activities. Data validation and verification at both the data-generation level and the project level will be performed as required by this Permit before the required data are transmitted to the Permittees (Permit Attachment C3). NMED may request, through the Permittees, copies of any BDR, and/or the raw data validated by the generator/storage sites, to check DOE's audit of the validation process.

C-4a(5~~6~~) Data Transmittal

BDRs will include the information required by Section C3-4~~10~~ and will be transmitted by hard copy or electronically (provided a hard copy is available on demand) from the data generation level to the project level.

Once a waste stream is characterized, the Site Project Manager will also submit to the Permittees a WSPF (Figure C-1) accompanied by the CIS for that waste stream which includes reconciliation with DQOs (Sections~~3~~ C3-6~~12~~b(1) and C3-6~~12~~b(2)). The WSPF, the CIS, and information from the WWIS will be used as the basis for acceptance of waste characterization information on TRU mixed wastes to be disposed of at the WIPP.

C-4a(6~~7~~) Records Management

Records related to waste characterization activities performed by the generator/storage sites will be maintained in the testing~~, sampling, or analytical~~ facility files or generator/storage site project files, or at the WIPP Records Archive facility. ~~DOE approved laboratories will forward testing, sampling, and analytical records along with BDRs, to the generator/storage site project office for inclusion in the generator/storage site's project files and to the Permittees for inclusion in the WIPP facility operating record.~~ Raw data obtained by testing~~, sampling, and analyzing~~ TRU mixed waste in support of this WAP will be identifiable, legible, and provide documentary evidence of quality. TRU mixed waste characterization records submitted to the Permittees shall be maintained in the WIPP facility operating record and be available for inspection by NMED.

Waste characterization records include historical characterization records (i.e., headspace gas sampling/analysis and homogeneous solids and soil/gravel sampling/analysis) generated through implementation of previous requirements in this WAP. Those waste characterization records designated as Non-Permanent Records shall be maintained for ten years from the date of (record) generation at the participating generator/storage site or at the WIPP Records Archive facility and then dispositioned according to their approved RIDS. If a generator/storage site ceases to operate, all records shall be transferred before closeout to the Permittees for management at the WIPP Records Archive facility. Table C-2~~6~~ is a listing of records designated as Lifetime Records and Non-Permanent Records. Classified information will not be transferred to WIPP. Notations will be provided to the Permittees indicating the absence of classified information. The approved generator/storage site RIDS will identify appropriate disposition of classified information. Nothing in this Permit is intended to, nor should it be interpreted to, require the disclosure of any U.S. Department of Energy classified information to persons without appropriate clearance to view such information.

C-5 Permittee Level Waste Screening and Verification of TRU Mixed Waste

C-5a Phase I Waste Stream Screening and Verification

The first phase of the waste screening and verification process will occur before TRU mixed waste is shipped to the WIPP facility. Before the Permittees begin the process of accepting TRU mixed waste from a generator/storage site, an initial audit of that generator/storage site will be conducted as part of the Audit and Surveillance Program (Permit Attachment C6). The RCRA portion of the generator/storage site audit program will provide on-site verification of characterization procedures; BDR preparation; and recordkeeping to ensure that all applicable provisions of the WAP requirements are met. Another portion of the Phase I verification is the WSPF approval process. At the WIPP facility, this process includes verification that all of the required elements of the WSPF and the CIS are present (Permit Attachment C3) and that the waste characterization information meet acceptance criteria required for compliance with the WAP (Section C3-6~~12~~b(1)).

A generator/storage site must first prepare a QAPjP, which includes applicable WAP requirements, and submit it to DOE for review and approval (Permit Attachment C5). Once approved, a copy of the QAPjP is provided to NMED for examination. The generator/storage site will implement the specific parameters of the QAPjP after it is approved. An initial audit will be performed after QAPjP implementation and prior to the generator/storage site being certified for shipment of waste to WIPP. Additional audits, focusing on the results of waste characterization, will be performed at least annually. DOE has the right to conduct unannounced audits and to examine any records that are related to the scope of the audit. See Section C-5a(3) and Permit Attachment C6 for further information regarding audits.

When the required waste stream characterization data have been collected by a generator/storage site and the initial generator/storage site audit has been successfully completed, the generator/storage Site Project Manager will verify that waste stream characterization meets the applicable WAP requirements as a part of the project level verification (Section C3-~~10~~4b). If the waste characterization does not meet the applicable requirements of the WAP, the mixed waste stream cannot be managed, stored, or disposed at WIPP until those requirements are met. The Site Project Manager will then complete a WSPF and submit it to the Permittees, along with the accompanying CIS for that waste stream (Section C3-6~~12~~b(1)). All data necessary to check the accuracy of the WSPF will be transmitted to the Permittees for verification. This provides notification that the generator/storage site considers that the waste stream (identified by the waste stream identification number) has been adequately characterized for disposal prior to shipment to WIPP. The Permittees will compare ~~headspace gas,~~ radiographic~~,~~ and visual examination ~~and solid sampling/analysis~~ data obtained subsequent to submittal and approval of the WSPF (and prior to submittal) with characterization information presented on this form. If the Permittees determine (through the data comparison) that the characterization information is adequate, DOE will approve the WSPF. Prior to the first shipment of containers from the approved waste stream, the approved WSPF and accompanying CIS will be provided to NMED. If the data comparison indicates that analyzed containers have hazardous wastes not present on the WSPF, or a different Waste Matrix Code applies, the WSPF is in error and shall be resubmitted. Ongoing WSPF examination is discussed in detail in Section C-5a(2).

Audits of generator/storage sites will be conducted as part of the Audit and Surveillance Program (Permit Attachment C6). The RCRA portion of the generator/storage site audit program will provide on-site verification of waste characterization procedures; BDR preparation; and record keeping to ensure that all applicable provisions of the WAP requirements are met. As part of the waste characterization data submittal, the generator/storage site will also transmit the data on a container basis via the WWIS. This data submittal can occur at any time as the data are being collected, but will be complete for each container prior to shipment of that container. The WWIS will conduct internal edit/limit checks as the data are entered, and the data will be available to the Permittees as supporting information for WSPF review. NMED will have read-only access to the WWIS as necessary to determine compliance with the WAP. The initial WSPF check performed by the Permittees will include WWIS data submitted by the generator/storage site for each waste container submitted for the WSPF review and the CIS. The Permittees will compare ongoing ~~sampling/analysis~~ characterization data obtained and submitted via the WWIS to the approved WSPF. If this comparison shows that containers have hazardous wastes not reported on the WSPF, or a different Waste Matrix Code applies, the data are rejected and the waste containers are not accepted for shipment until a new or revised WSPF is submitted to the Permittees and approved by DOE.

C-5a(1) WWIS Description

All generator/storage sites planning to ship TRU mixed waste to WIPP will supply the required data to the WWIS. The WWIS Data Dictionary includes all of the data fields, the field format and the limits associated with the data as established by this WAP. These data will be subjected to edit and limit checks that are performed automatically by the database, as defined in the *Waste Data System User's Manual* (DOE, 2009).

The Permittees will coordinate the data transmission with each generator/storage site. Actual data transmission will use appropriate technology to ensure the integrity of the data transmissions. The Permittees will require sites with large waste inventories and large databases to populate a data structure provided by the Permittees that contains the required data dictionary fields that are appropriate for the waste stream (or waste streams) at that site. ~~For example, totals analysis data will not be requested from sites that do not have homogeneous solids or soil/gravel waste.~~ The Permittees will access these data via the Internet to ensure an efficient transfer of this data. Small quantity sites will be given a similar data structure by the Permittees that is tailored to their types of waste. Sites with very small quantities of waste will be provided with the ability to assemble the data interactively to this data structure on the WWIS.

The Permittees will use the WWIS to verify that all of the supplied data meet the edit and limit checks prior to the shipment of any TRU mixed waste to WIPP. The WWIS automatically will notify the generator/storage site if any of the supplied data fails to meet the requirements of the edit and limit checks via an appropriate error message. The generator/storage site will be required to correct the discrepancy with the waste or the waste data and re-transmit the corrected data prior to acceptance of the data by the WWIS. The Permittees will review data reported for each container of each shipment prior to providing notification to the shipping generator/storage site that the shipment is acceptable. Read-only access to the WWIS will be provided to NMED. Table C-3~~7~~ contains a listing of the data fields contained in the WWIS that are required as part of this Permit.

The WWIS will generate the following:

- Waste Container Data Report

  This report will be generated on a waste stream basis and will be used by the Permittees during the WSPF review and DOE approval process. This report will contain the data listed in the Characterization Module on Table C-3~~7~~. This report will be generated and attached to the WSPF for inclusion in the facility operating record and will be kept for the life of the facility.

C-5a(2) Examination of the Waste Stream Profile Form and Container Data Checks

The Permittees will verify the completeness and accuracy of the Waste Stream Profile Form (Section C3-6~~12~~b(1)). Figure C-2 includes the waste characterization and waste stream approval process. The assignment of the waste stream description, Waste Matrix Code Group, and Summary Category Groups~~; the results of waste analyses, as applicable;~~ the acceptable knowledge summary documentation; the methods used for characterization; the DOE certification, and appropriate designation of EPA hazardous waste number(s) will be examined by the Permittees. If the WSPF is inaccurate, efforts will be made to resolve discrepancies by contacting the generator/storage site in order for the waste stream to be eligible for shipment to the WIPP facility. If discrepancies in the waste stream are detected at the generator/storage site, the generator/storage site will implement a non-conformance program to identify, document, and report discrepancies (Permit Attachment C3).

The EPA hazardous waste numbers for the wastes that appear on the Waste Stream Profile Form will be compared to those in Table C-5~~9~~ to ensure that only approved wastes are accepted for management, storage, or disposal at WIPP. Some of the waste may also be identified by unique state hazardous waste codes or numbers. These wastes are acceptable at WIPP as long as the TSDF-WAC are met. The CIS will be reviewed by the Permittees to verify that the waste has been classified correctly with respect to the assigned EPA hazardous waste numbers. ~~Any analytical method used will be compared to those listed in Tables C-2, C-3, and C-4 to ensure that only approved analytical methods were used for analysis of the waste.~~ The Permittees will verify that the applicable requirements of the TSDF-WAC have been met by the generator/storage site.

C-5a(3) Audit and Surveillance Program

An important part of the Permittees' verification process is the Audit and Surveillance Program. The focus of this audit program is compliance with this WAP and the Permit. This audit program addresses all AK implementation and testing~~waste sampling and analysis~~ activities, from waste stream classification assignment through waste container certification, and ensures compliance with SOPs and the WAP. Audits will ensure that containers and their associated documentation are adequately tracked throughout the waste handling process. Operator qualifications will be verified, and implementation of QA/QC procedures will be surveyed. A final report that includes generator/storage site ~~or DOE approved laboratory~~ audit results and applicable WAP-related corrective action report (**CAR**) resolution will be provided to NMED for approval, and will be kept in the WIPP facility operating record until closure of the WIPP facility.

DOE will perform an initial audit at each generator/storage site performing waste characterization activities prior to the formal acceptance of the WSPFs and/or any waste characterization data supplied by the generator/storage sites. Audits will be performed at least annually thereafter, including the possibility of unannounced audits (i.e., not a regularly scheduled audit). These audits will allow NMED to verify that the Permittees have implemented the WAP and that generator/storage sites have implemented a QA program for the characterization of waste and meet applicable WAP requirements. ~~DOE will also audit annually the DOE approved laboratories performing waste sampling and/or analysis.~~ The accuracy of physical waste description and waste stream assignment provided by the generator/storage site will be verified by review of the radiography results, and visual examination of data records and radiography images (as necessary) during audits conducted by DOE. More detail on this audit process is provided in Permit Attachment C6.

C-5b(3) Verification

The Permittees will verify that the containers (as identified by their container ID numbers) are the containers for which accepted data already exists in the WWIS. A check will be performed by the Permittees comparing the data on the WWIS Shipment Summary Report for the shipment to the actual shipping papers (including the EPA Hazardous Waste Manifest). This check also verifies that the containers included in the shipment are those for which approved shipping data already exist in the WWIS Transportation Data Module (Table C-3~~7~~). For standard waste boxes (**SWBs**) and ten drum overpacks (**TDOPs**), this check will include comparing the barcode on the container with the container number on the shipping papers and the data on the WWIS Shipment Summary Report. For 7-pack assemblies, one of the seven container barcodes will be read by the barcode reader and compared to the assembly information for this container on the WWIS Shipment Summary Report. This will automatically identify the remaining six containers in the assembly. This process enables the Permittees to identify all of the containers in the assembly with minimum radiological exposure. If all of the container IDs and the information on the shipping papers agree with the WWIS Shipment Summary Report, and the shipment was subject to waste confirmation by the Permittees prior to shipment to WIPP pursuant to Permit Attachment C7, the containers will be approved for storage and disposal at the WIPP facility.

C-9 List of References

U.S. Department of Energy (DOE), 2009, "Waste Data System User's Manual", DOE/WIPP 09-3427, U.S. Department of Energy.

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U.S. Environmental Protection Agency (EPA), April 1980. "A Method for Determining the Compatibility of Hazardous Wastes," EPA-600/2-80-076, California Department of Health Services and the U.S. Environmental Protection Agency, Office of Research and Development.

~~U.S. Environmental Protection Agency (EPA), 1996. "Test Methods for Evaluating Solid Waste," Laboratory Manual Physical/Chemical Methods, SW 846, 3rd ed., U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.~~

~~Table C-1~~

~~Summary of Hazardous Waste Characterization Requirements for Transuranic Mixed Waste~~ [a]

~~**Parameter**~~	~~**Techniques and Procedure**~~
~~Physical Waste Form~~ ~~Summary~~ ~~Category~~ ~~Names~~ ~~S3000~~ ~~Homogeneous Solid~~ ~~S4000~~ ~~Soil/Gravel~~ ~~S5000~~ ~~Debris Wastes~~	**~~Waste Inspection Procedures~~** ~~Radiography~~ ~~Visual Examination~~ ~~(Permit Attachment C1)~~
~~Headspace Gases~~ **~~Volatile Organic Compounds~~** ~~Benzene~~ ~~Bromoform~~ ~~Carbon tetrachloride~~ ~~Chlorobenzene~~ ~~Chloroform~~ ~~1,1-Dichloroethane~~ ~~1,2-Dichloroethane~~ ~~1,1-Dichloroethylene~~ ~~(trans)-1,2-Dichloroethylene~~ ~~Ethyl benzene~~ ~~Ethyl ether~~ ~~Methylene chloride~~ ~~1,1,2,2-Tetrachloroethane~~ ~~Tetrachloroethylene~~ ~~Toluene~~ ~~1,1,1-Trichloroethane~~ ~~Trichloroethylene~~ ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ ~~Xylenes~~ ~~Alcohols and Ketones~~ ~~Acetone~~ ~~Butanol~~ ~~Methanol~~ ~~Methyl ethyl ketone~~ ~~Methyl isobutyl ketone~~	**~~Gas Analysis~~** [f] ~~Gas Chromatography /Mass Spectroscopy (GC/MS), EPA TO-14A or TO-15, or modified SW-846 8260~~ ~~(Permit Attachment C3)~~ ~~GC/Flame Ionization Detector (FID), for alcohols and ketones, SW-846 8015~~ ~~(Permit Attachment C3)~~ ~~Fourier Transform Infrared Spectroscopy (FTIRS), SW-846~~
~~Total Volatile Organic Compounds~~ ~~Acetone~~ ~~Benzene~~ ~~Bromoform~~ ~~Butanol~~ ~~Carbon disulfide~~ ~~Carbon tetrachloride~~ ~~Chlorobenzene~~ ~~Chloroform~~ ~~1,4-Dichlorobenzene~~[d] ~~1,2-Dichlorobenzene~~[d] ~~1,2-Dichloroethane~~ ~~1,1-Dichloroethylene~~ ~~Ethyl benzene~~ ~~Ethyl ether~~ ~~Formaldehyde~~[b] ~~Hydrazine~~[c] ~~Isobutanol~~ ~~Methanol~~ ~~Methyl ethyl ketone~~ ~~Methylene chloride~~ ~~Pyridine~~[d] ~~1,1,2,2-Tetrachloroethane~~ ~~Tetrachloroethylene~~ ~~Toluene~~ ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ ~~Trichlorofluoromethane~~ ~~1,1,1-Trichloroethane~~ ~~1,1,2-Trichloroethane~~ ~~Trichloroethylene~~ ~~Vinyl chloride~~ ~~Xylenes~~ ~~(trans)-1,2-Dichloroethylene~~	**~~Total Volatile Organic Compound Analysis~~** [g] ~~TCLP, SW-846 1311~~ ~~GC/MS, SW-846 8260~~ ~~GC/FID, SW-846 8015~~ ~~(Permit Attachment C3)~~ ~~HPLC, SW-846 8315A~~ ~~Acceptable Knowledge for Summary Category S5000 (Debris Wastes)~~

~~Table C-1~~

~~Summary of Hazardous Waste Characterization Requirements for Transuranic Mixed Waste~~ [a]

~~**Parameter**~~	~~**Techniques and Procedure**~~
~~**Total Semivolatile Organic Compounds**~~ ~~Cresols~~ ~~1,4-Dichlorobenzene~~[e] ~~1,2-Dichlorobenzene~~[e] ~~2,4-Dinitrophenol~~ ~~2,4-Dinitrotoluene~~ ~~Hexachlorobenzene~~ ~~Hexachloroethane~~ ~~Nitrobenzene~~ ~~Pentachlorophenol~~ ~~Pyridine~~[e]	~~**Total Semivolatile Organic Compound Analysis**~~ [g] ~~TCLP, SW-846 1311~~ ~~GC/MS, SW-846 8270~~ ~~(Permit Attachment C3)~~ ~~Acceptable Knowledge for Summary Category S5000 (Debris Wastes)~~
~~**Total Metals**~~ ~~Antimony~~ ~~Mercury~~ ~~Arsenic~~ ~~Nickel~~ ~~Barium~~ ~~Selenium~~ ~~Beryllium~~ ~~Silver~~ ~~Cadmium~~ ~~Thallium~~ ~~Chromium~~ ~~Vanadium~~ ~~Lead~~ ~~Zinc~~	~~**Total Metals Analysis**~~ [g] ~~TCLP, SW-846 1311~~ ~~ICP- MS, SW-846 6020 ,~~ ~~ICP Emission Spectroscopy, SW-846 6010~~ ~~Atomic Absorption Spectroscopy , SW-846 7000~~ ~~(Permit Attachment C3)~~ ~~Acceptable Knowledge for Summary Category S5000 (Debris Wastes)~~

~~a Permit Attachment C~~

~~b Required only for homogeneous solids and soil/gravel waste from Savannah River Site to resolve the assignment of EPA hazardous waste numbers.~~

~~c Required only for homogeneous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site to resolve the assignment of EPA hazardous waste numbers.~~

~~d Can also be analyzed as a semi-volatile organic compound.~~

~~e Can also be analyzed as a volatile organic compound.~~

~~f Required only to resolve the assignment of EPA hazardous waste numbers to debris waste streams.~~

~~g Required only to resolve the assignment of EPA hazardous waste numbers to homogeneous solid and soil/gravel waste streams.~~

~~Table C-2~~
~~Headspace Target Analyte List and Methods b~~

~~Parameter~~	**~~EPA Specified Analytical Method~~**
~~Benzene~~ ~~Bromoform~~ ~~Carbon tetrachloride~~ ~~Chlorobenzene~~ ~~Chloroform~~ ~~1,1-Dichloroethane~~ ~~1,2-Dichloroethane~~ ~~1,1-Dichloroethylene~~ ~~(trans)-1,2-Dichloroethylene~~ ~~Ethyl benzene~~ ~~Ethyl ether~~ ~~Methylene chloride~~ ~~1,1,2,2-Tetrachloroethane~~ ~~Tetrachloroethylene~~ ~~Toluene~~ ~~1,1,1-Trichloroethane~~ ~~Trichloroethylene~~ ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ ~~Xylenes~~	~~EPA: Modified TO-14A, TO-15a; Modified 8260~~ ~~EPA - Approved FTIRS~~
~~Acetone~~ ~~Butanol~~ ~~Methanol~~ ~~Methyl ethyl ketone~~ ~~Methyl isobutyl ketone~~	~~EPA: Modified TO-14 A, TO-15[a];~~ ~~Modified 8260~~ ~~Method 8015~~ ~~EPA - Approved FTIRS~~

~~[a] U.S. Environmental Protection Agency (EPA), 1999, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition (EPA/625/R-96/010b). The most current revision of the specified methods may be used.~~

~~[b] Required only for debris waste when required to resolve the assignment of EPA hazardous waste numbers.~~

~~Table C-3~~

~~Required Organic Analyses and Test Methods Organized by Organic Analytical Groups~~ [~~e~~]

~~Organic Analytical Group~~	~~Required Organic Analyses~~	~~EPA Specified Analytical Method~~ [~~a-d~~]
~~Nonhalogenated Volatile Organic Compounds (VOCs)~~	~~Acetone~~ ~~Benzene~~ ~~n-Butanol~~ ~~Carbon disulfide~~ ~~Ethyl benzene~~ ~~Ethyl ether~~ ~~Formaldehyde~~ ~~Hydrazine~~[~~b~~] ~~Isobutanol~~ ~~Methanol~~ ~~Methyl ethyl ketone~~ ~~Toluene~~ ~~Xylenes~~	~~8015~~ ~~8260~~ ~~8315A~~
~~Halogenated VOCs~~	~~Bromoform~~ ~~Carbon tetrachloride~~ ~~Chlorobenzene~~ ~~Chloroform~~ ~~1,2-Dichloroethane~~ ~~1,1-Dichloroethylene~~ ~~(trans)-1,2-Dichloroethylene~~ ~~Methylene chloride~~ ~~1,1,2,2-Tetrachloroethane~~ ~~Tetrachloroethylene~~ ~~1,1,2-Trichloroethane~~ ~~1,1,1-Trichloroethane~~ ~~Trichloroethylene~~ ~~Trichlorofluoromethane~~ ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ ~~Vinyl Chloride~~	~~8015~~ ~~8260~~
~~Semivolatile Organic Compounds (SVOCs)~~	~~Cresols (o, m, p)~~ ~~1,2-Dichlorobenzene~~[~~c~~] ~~1,4-Dichlorobenzene~~[~~c~~] ~~2,4-Dinitrophenol~~ ~~2,4-Dinitrotoluene~~ ~~Hexachlorobenzene~~ ~~Hexachloroethane~~ ~~Nitrobenzene~~ ~~Pentachlorophenol~~ ~~Pyridine~~[~~c~~]	~~8270~~

~~a U.S. Environmental Protection Agency (EPA), 1996, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Third Edition.~~

~~b Generator/Storage Sites will have to develop an analytical method for hydrazine. This method will be submitted to DOE for approval.~~

~~c These compounds may also be analyzed as VOCs by SW-846 Method 8260.~~

~~d TCLP (SW-846-1311) may be used to determine if compounds in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C) exhibit a toxicity characteristic.~~

~~e Required only to resolve the assignment of EPA hazardous waste numbers.~~

~~Table C-4~~
~~Summary of Sample Preparation and Analytical Methods for Metals~~

~~**Parameters**~~	~~**EPA Specified Analytical Methods**~~[a b c]
~~Sample Preparation~~	~~3051, or equivalent, as appropriate for analytical method~~
~~Total Antimony~~	~~6010, 6020, 7000, 7010, 7062~~
~~Total Arsenic~~	~~6010, 6020, 7010, 7061, 7062~~
~~Total Barium~~	~~6010, 6020, 7000, 7010~~
~~Total Beryllium~~	~~6010, 6020, 7000, 7010~~
~~Total Cadmium~~	~~6010, 6020, 7000, 7010~~
~~Total Chromium~~	~~6010, 6020, 7000, 7010~~
~~Total Lead~~	~~6010, 6020, 7000, 7010~~
~~Total Mercury~~	~~7471~~
~~Total Nickel~~	~~6010, 6020, 7000, 7010~~
~~Total Selenium~~	~~6010, 7010, 7741, 7742~~
~~Total Silver~~	~~6010, 6020, 7000, 7010~~
~~Total Thallium~~	~~6010, 6020, 7000, 7010~~
~~Total Vanadium~~	~~6010, 7000, 7010~~
~~Total Zinc~~	~~6010, 6020, 7000, 7010~~

[a] ~~U.S. Environmental Protection Agency (EPA), 1996. "Test Methods for Evaluating Solid Waste," Laboratory Manual Physical/Chemical Methods, SW-846, 3rd ed., U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.~~

[b] ~~TCLP (SW-846 1311) may be used to determine if compounds in 20.4.1.200 NMAC (incorporating 40 CFR §261, Subpart C) exhibit a toxicity characteristic.~~

[c] ~~Required only for homogeneous solids and soil/gravel to resolve the assignment of EPA hazardous waste numbers.~~

Table C-1~~5~~
Summary of Parameters, Characterization Methods, and Rationale for Transuranic Mixed Waste

Waste Matrix Code Summary Categories	Waste Matrix Code Groups	Characterization Parameter	Method	Rationale
Stored Waste				
S3000-Homogeneous Solids	• Solidified inorganics • Salt waste • Solidified organics	Physical waste form	Acceptable knowledge, radiography and/or visual examination	• Determine waste matrix • Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)
S4000-Soil/Gravel	• Contaminated soil/debris			
S5000–Debris Waste	• Uncategorized metal (metal waste other than lead/cadmium) • Lead/cadmium waste • Inorganic nonmetal waste • Combustible waste • Graphite waste • Heterogeneous debris waste • Composite filter waste	Hazardous constituents • Listed • Characteristic	Acceptable knowledge ~~or statistical sampling[a] (see Tables C-3 and C-4)~~	~~•~~ Determine ~~characteristic metals and organics~~ • ~~Resolve the~~ assignment of EPA hazardous waste numbers
		~~Physical waste form~~	~~Acceptable knowledge, radiography, and/or visual examination~~	~~Determine waste matrix~~ ~~Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)~~
		~~Hazardous constituents~~ ~~Characteristic~~ ~~Listed~~	~~Statistical gas sampling and analysis[a] (see Table C-2)~~	~~Resolve the assignment of EPA hazardous waste numbers~~
		~~Hazardous constituents~~ ~~Characteristic~~	~~Acceptable knowledge~~	~~Determine characteristic metals and organics~~

~~Table C-5~~

~~Summary of Parameters, Characterization Methods, and Rationale for Transuranic Mixed Waste (Continued)~~

~~**Waste Matrix Code Summary Categories**~~	~~**Waste Matrix Code Groups**~~	~~**Characterization Parameter**~~	~~**Method**~~	~~**Rationale**~~
~~**Newly Generated Waste**~~				
~~S3000 Homogeneous Solids~~	• ~~Solidified inorganics~~ • ~~Salt waste~~ • ~~Solidified organics~~	~~Physical waste form~~	~~Acceptable knowledge, radiography, and/or visual examination~~	• ~~Determine waste matrix~~ • ~~Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)~~
~~S4000 Soil/Gravel~~	• ~~Contaminated soil/debris~~	~~Hazardous constituents~~ • ~~Listed~~ • ~~Characteristic~~	~~Statistical sampling[a] (see Tables C-3 and C-4)~~	• ~~Determine characteristic metals and organics~~ • ~~Resolve the assignment of EPA hazardous waste numbers~~
~~S5000 Debris Waste~~	• ~~Uncategorized metal (metal waste other than lead/cadmium)~~ • ~~Lead/cadmium waste~~ • ~~Inorganic nonmetal waste~~ • ~~Combustible waste~~ • ~~Graphite waste~~ • ~~Heterogeneous debris waste~~ • ~~Composite filter waste~~	~~Physical waste form~~	~~Acceptable knowledge, radiography, and/or visual examination~~	• ~~Determine waste matrix~~ • ~~Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)~~
		~~Hazardous constituents~~ • ~~Characteristic~~ • ~~Listed~~	~~Statistical gas sampling and analysis [a] (see Table C-2)~~	• ~~Resolve the assignment of EPA hazardous waste numbers~~
		~~Hazardous constituents~~ • ~~Characteristic~~	~~Acceptable knowledge~~	• ~~Determine characteristic metals and organics~~

~~[a] Applies to waste streams that require sampling.~~

Table C-2~~6~~
Required Program Records Maintained in Generator/Storage Site Project Files

Lifetime Records

- Field sampling data forms
- Field and laboratory chain-of-custody forms
- Test facility and laboratory batch data reports
- Waste Stream Characterization Package
- Sampling Plans
- Data reduction, validation, and reporting documentation
- Acceptable knowledge documentation
- Waste Stream Profile Form and Characterization Information Summary

Non-Permanent Records

- Nonconformance documentation
- Variance documentation
- Assessment documentation
- Gas canister tags
- Methods performance documentation
- Performance Demonstration Program documentation
- Sampling equipment certifications
- Calculations and related software documentation
- Training/qualification documentation
- QAPjPs (generator/storage sites) documentation (all revisions)
- Calibration documentation
- Analytical raw data
- Procurement documentation
- QA procedures (all revisions)
- Technical implementing procedures (all revisions)
- Audio/video recording (radiography, visual, etc.)

Table C-~~7~~3
WIPP Waste Information System Data Fields[a]

Characterization Module Data Fields [b]	
Container ID [c] Generator EPA ID Generator Address Generator Name Generator Contact Hazardous Code ~~Headspace Gas Sample Date~~ ~~Headspace Gas Analysis Date~~ Layers of Packaging Liner Exists Liner Hole Size Filter Model Number of Filters Installed ~~Headspace Gas Analyte [d]~~ ~~Headspace Gas Concentration [d]~~ ~~Headspace Gas Char. Method [d]~~ ~~Total VOC Char. Method [d]~~ ~~Total Metals Char. Method [d]~~ ~~Total Semi-VOC Char. Method [d]~~ Item Description Code Haz. Manifest Number NDE Complete [e]	~~Total VOC Sample Date~~ ~~Total VOC Analysis Date~~ ~~Total VOC Analyte Name [d]~~ ~~Total VOC Analyte Concentration [d]~~ ~~Total Metal Sample Date~~ ~~Total Metal Analysis Date~~ ~~Total Metal Analyte Name [d]~~ ~~Total Metal Analyte Concentration [d]~~ ~~Semi-VOC Sample Date~~ ~~Semi-VOC Analysis Date~~ ~~Semi-VOC Analyte Name [d]~~ ~~Semi-VOC Concentration [d]~~ Transporter EPA ID Transporter Name Visual Exam Container [e] Waste Material Parameter [d] Waste Material Weight [d] Waste Matrix Code Waste Matrix Code Group Waste Stream Profile Number
Certification Module Data Fields	
Container ID [c] Container type Container Weight Contact Dose Rate Container Certification date Container Closure Date	Handling Code
Transportation Data Module	
Contact Handled Package Number Assembly Number[f] Container IDs [c,d] ICV Closure Date	Ship Date Receive Date
Disposal Module Data	
Container ID [c] Disposal Date Disposal Location	

a This is not a complete list of the WWIS data fields.

b Some of the fields required for characterization are also required for certification and/or transportation.

c Container ID is the main relational field in the WWIS Database.

d This is a multiple occurring field for each ~~analyte~~waste material parameter, nuclide, etc.

e These are logical fields requiring only a yes/no.

f Required for 7-packs of 55-gal drums, 4-packs of 85-gal drums, or 3-packs of 100-gal drums to tie all of the drums in that assembly together. This facilitates the identification of waste containers in a shipment without need to breakup the assembly.

Table C-~~8~~4
Waste Tanks Subject to Exclusion

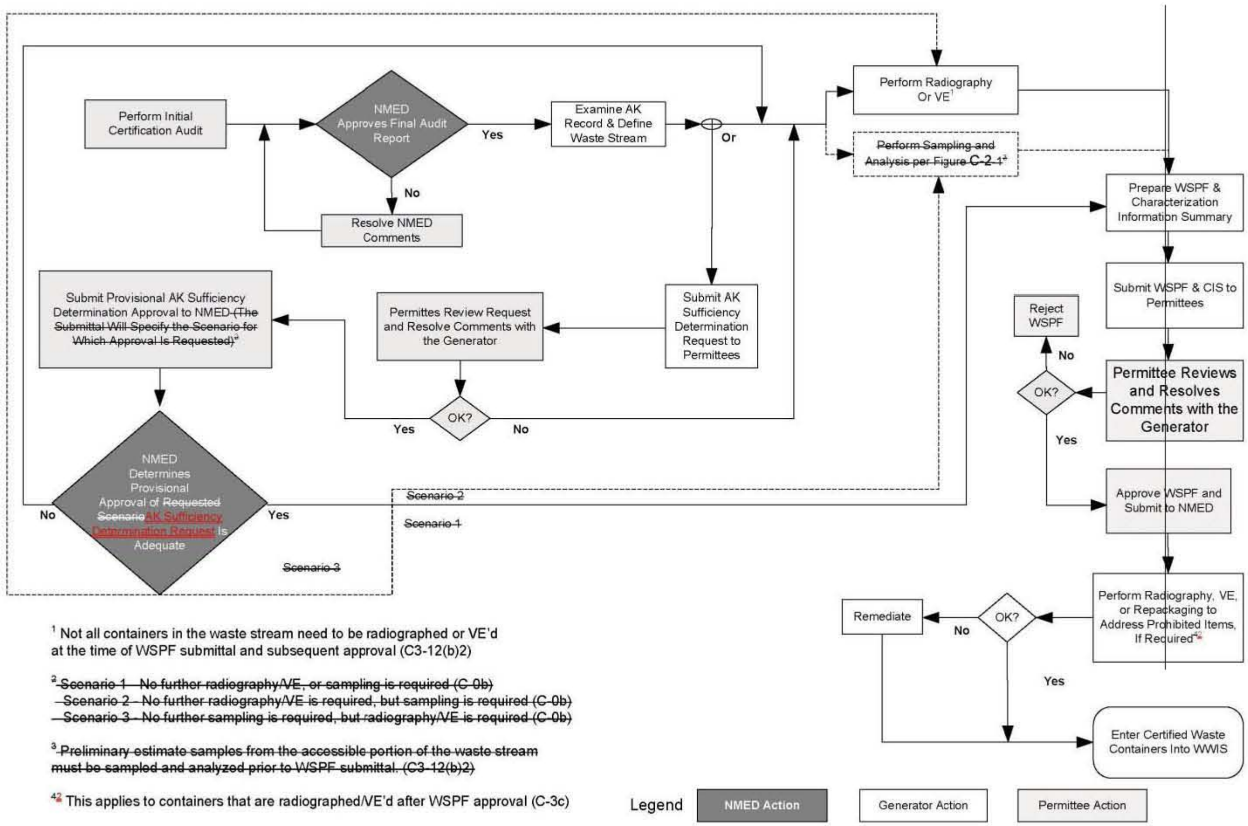
Hanford Site - 177 Tanks	
A-101 through A-106	C-201 through C-204
AN-101 through AN-107	S-101 through S-112
AP-101 through AP-108	SX-101 through SX-115
AW-101 through AW-106	SY-101 through SY-103
AX-101 through AX-104	T-101 through T-112
AY-101 through AY-102	T-201 through T-204
B-101 through B-112	TX-101 through TX-118
B-201 through B-204	TY-101 through TY-106
BX-101 through BX-112	U-101 through U-112
BY-101 through BY-112	U-201 through U-204
C-101 through C-112	
Savannah River Site - 51 Tanks	
Tank 1 through 51	
Idaho National Engineering and Environmental Laboratory - 15 Tanks	
WM-103 through WM-106	WM-180 through 190

Table C-5~~9~~
Listing of Permitted Hazardous Waste Numbers

EPA Hazardous Waste Numbers			
F001	D019	D043	U079
F002	D021	P015	U103
F003	D022	P030	U105
F004	D026	P098	U108
F005	D027	P099	U122
F006	D028	P106	U133*
F007	D029	P120	U134*
F009	D030	U002*	U151
D004	D032	U003*	U154*
D005	D033	U019*	U159*
D006	D034	U037	U196
D007	D035	U043	U209
D008	D036	U044	U210
D009	D037	U052	U220
D010	D038	U070	U226
D011	D039	U072	U228
D018	D040	U078	U239*

* Acceptance of U-numbered wastes listed for reactivity, ignitability, or corrosivity characteristics is contingent upon a demonstration that the wastes no longer exhibit the characteristic of reactivity, ignitability, or corrosivity.

Figure C-2
Waste Characterization Process



[1] Not all containers in the waste stream need to be radiographed or VE'd at the time of WSPF submittal and subsequent approval (C3-12(b)2)

~~[2] Scenario 1 - No further radiography/VE, or sampling is required (C-0b)~~
~~Scenario 2 - No further radiography/VE is required, but sampling is required (C-0b)~~
~~Scenario 3 - No further sampling is required, but radiography/VE is required (C-0b)~~

~~[3] Preliminary estimate samples from the accessible portion of the waste stream must be sampled and analyzed prior to WSPF submittal. (C3-12(b)2)~~

[4] This applies to containers that are radiographed/VE'd after WSPF approval (C-3c)

ATTACHMENT C1

WASTE CHARACTERIZATION TESTING~~SAMPLING~~ METHODS

ATTACHMENT C1

WASTE CHARACTERIZATION TESTING~~SAMPLING~~ METHODS

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ATTACHMENT C1

WASTE CHARACTERIZATION TESTING~~SAMPLING~~ METHODS

Introduction

The Permittees will require generator/storage sites (**sites**) to use the following methods, as applicable, for characterization of TRU mixed waste which is managed, stored, or disposed at WIPP. These methods include requirements for ~~headspace gas sampling, sampling of homogeneous solids and soil/gravel, and~~ radiography or visual examination. Additionally, this Attachment provides quality control~~, sample custody, and sample packing and shipping~~ requirements.

~~C1-1 Sampling of Debris Waste (Summary Category S5000)~~

~~Headspace gas sampling and analysis shall be used to resolve the assignment of Environmental Protection Agency (**EPA**) hazardous waste numbers to debris waste streams.~~

~~C1-1a Method Requirements~~

~~The Permittees shall require all headspace-gas sampling be performed in an appropriate radiation containment area on waste containers that are in compliance with the container equilibrium requirements (i.e., 72 hours at 18° C or higher).~~

~~For those waste streams without an acceptable knowledge (**AK**) Sufficiency Determination approved by the U.S. Department of Energy (**DOE**), containers shall be randomly selected from waste streams designated as summary category S5000 (Debris waste) and shall be categorized under one of the sampling scenarios shown in Table C1-5 and depicted in Figure C1-1. If the container is categorized under Scenario 1, the applicable drum age criteria (**DAC**) from Table C1-6 must be met prior to headspace gas sampling. If the container is categorized under Scenario 2, the applicable Scenario 1 DAC from Table C1-6 must be met prior to venting the container and then the applicable Scenario 2 DAC from Table C1-7 must be met after venting the container. The DAC for Scenario 2 containers that contain filters or rigid liner vent holes other than those listed in Table C1-7 shall be determined using footnotes "a" and "b" in Table C1-7. Containers that have not met the Scenario 1 DAC at the time of venting must be categorized under Scenario 3. Containers categorized under Scenario 3 must be placed into one of the Packaging Configuration Groups listed in Table C1-8. If a specific packaging configuration cannot be determined based on the data collected during packaging and/or repackaging (Attachment C, Section C-3d(1)), a conservative default Packaging Configuration Group of 3 for 55-gallon drums, 6 for Standard Waste Boxes (**SWBs**) ten-drum overpacks (**TDOPs**), and standard larged box 2s (**SLB2s**), and 8 for 85-gallon and 100-gallon drums must be assigned, provided the drums do not contain pipe component packaging. If a container is designated as Packaging Configuration Group 4 (i.e., a pipe component), the headspace gas sample must be taken from the pipe component headspace. Drums, TDOPs, SLB2s, or SWBs that contain compacted 55-gallon drums containing a rigid liner may not be disposed of under any packaging configuration unless headspace gas sampling was performed before compaction in accordance with this waste analysis plan (**WAP**). The DAC for Scenario 3 containers that contain rigid liner vent holes that are undocumented during packaging, repackaging, and/or venting (Section C1-1a[4][ii]) shall be determined using the default conditions in footnote "b" in Table C1-9.The DAC for Scenario 3 containers that contain filters that are either undocumented or are other than those listed in Table C1-9 shall be determined using footnote 'a' in Table C1-9.~~

~~Each of the Scenario 3 containers shall be sampled for headspace gas after waiting the DAC in Table C1-9 based on its packaging configuration (note: Packaging Configuration Groups 4, 5, 6, 7, and 8 are not summary category group dependent, and 85-gallon drum, 100-gallon drum, SWB, TDOP, and SLB2 requirements apply when the 85-gallon drum, 100-gallon drum, SWB, TDOP, or SLB2 is used for the direct loading of waste).~~

~~C1-1a(1) General Requirements~~

~~The determination of packaging configuration consists of identifying the number of confinement layers and the identification of rigid poly liners when present. Generator/storage sites shall use either the default conditions specified in Tables C1-7 through C1-9 for retrievably stored waste or the data documented during packaging, repackaging, and/or venting (Section C1-1a[4][ii]) for determining the appropriate DAC for each container from which a headspace gas sample is collected. These drum age criteria are to ensure that the container contents have reached 90 percent of steady-state concentration within each layer of confinement (Lockheed, 1995; BWXT, 2000). The following information must be reported in the headspace gas sampling documents for each container from which a headspace gas sample is collected:~~

- ~~sampling scenario from Table C1-5 and associated information from Tables C1-6 and/or Table C1-7;~~
- ~~the packaging configuration from Table C1-8 and associated information from Table C1-9, including the diameter of the rigid liner vent hole, the number of inner bags, the number of liner bags, the presence/absence of drum liner, and the filter hydrogen diffusivity,~~
- ~~the permit-required equilibrium time,~~
- ~~the drum age,~~
- ~~for supercompacted waste, both~~
  - ~~the absence of rigid liners in the compacted 55-gallon drums which have not been headspace gas sampled in accordance with this permit prior to compaction, and~~
  - ~~the absence of layers of confinement must be documented in the WWIS if Packaging Configuration Group 7 is used.~~

~~For all retrievably stored waste containers, the rigid liner vent hole diameter must be assumed to be 0.3 inches unless a different size is documented during drum venting or repackaging. For all retrievably stored waste containers, the filter hydrogen diffusivity must be assumed to be the most restrictive unless container-specific information clearly identifies a filter model and/or diffusivity characteristic that is less restrictive. For all retrievably stored waste containers that have not been repackaged, acceptable knowledge shall not be used to justify any packaging configuration less conservative than the default (i.e., Packaging Configuration Group 3 for 55-gallon drums, 6 for SWBs TDOPs, and SLB2s, and 8 for 85-gallon and 100-gallon drums). For information reporting purposes listed above, sites may report the default packaging configuration for retrievably stored waste without further verification.~~

~~All waste containers with unvented rigid containers greater than 4 liters (exclusive of rigid poly liners) shall be subject to innermost layer of containment sampling or shall be vented prior to~~

~~initiating drum age and equilibrium criteria. When sampling the rigid poly liner under Scenario 1, the sampling device must form an airtight seal with the rigid poly liner to ensure that a representative sample is collected (using a sampling needle connected to the sampling head to pierce the rigid poly liner, and that allows for the collection of a representative sample, satisfies this requirement). The configuration of the containment area and remote handling equipment at each sampling facility are expected to differ. Headspace gas samples will be analyzed for the analytes listed in Table C3-2 of Permit Attachment C3. If additional packaging configurations are identified, an appropriate Permit Modification will be submitted to incorporate the DAC using the methodology in BWXT (2000). Consistent with footnote "a" in Table C1-8, any waste container selected for headspace gas sampling that cannot be assigned a packaging configuration specified in Table C1-8 shall be assigned a conservative default packaging configuration..~~

~~Drum age criteria apply only to 55-gallon drums, 85-gallon drums, 100-gallon drums, SWBs, TDOPs, and SLB2s. Drum age criteria for all other container types must be established through permit modification prior to performing headspace gas sampling.~~

~~The Permittees shall require site personnel to collect samples in SUMMA® or equivalent canisters using standard headspace-gas sampling methods that meet the general guidelines established by the EPA in the Compendium Method TO-14A or TO-15, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (EPA, 1999) or by using on-line integrated sampling/analysis systems. Samples will be directed to an analytical instrument instead of being collected in SUMMA® or equivalent canisters if a single sample on-line integrated sampling/analysis system is used. If a multi-sample on-line integrated sampling/analysis system is used, samples will be directed to an integrated holding area that meets the cleaning requirements of Section C1-1c(1). The leak-proof and inert nature of the integrated holding area interior surface must be demonstrated and documented. Samples are not transported to another location when using on-line integrated sampling/analysis systems; therefore, the sample custody requirements of Section C1-4 and C1-5 do not apply. The same sampling manifold and sampling heads are used with on-line integrated sampling/analysis systems and all of the requirements associated with sampling manifolds and sampling heads must be met. However, when using an on-line integrated sampling/analysis system, the sampling batch and analytical batch quality control (**QC**) samples are combined as on-line batch QC samples as outlined in Section C1-1b.~~

~~C1-1a(2) Manifold Headspace Gas Sampling~~

~~This headspace gas sampling protocol employs a multiport manifold capable of collecting multiple simultaneous headspace samples for analysis and QC purposes. The manifold can be used to collect samples in SUMMA® or equivalent canisters or as part of an on-line integrated sampling/analysis system. The sampling equipment will be leak checked and cleaned prior to first use and as needed thereafter. The manifold and sample canisters will be evacuated to 0.0039 inches (in.) (0.10 millimeters [mm]) mercury (**Hg**) prior to sample collection. Cleaned and evacuated sample canisters will be attached to the evacuated manifold before the manifold inlet valve is opened. The manifold inlet valve will be attached to a changeable filter connected to either a side-port needle sampling head capable of forming an airtight seal (for penetrating a filter or rigid poly liner when necessary), a drum punch sampling head capable of forming an airtight seal (capable of punching through the metal lid of a drum for sampling through the drum lid), or a sampling head with an airtight fitting for sampling through a pipe overpack container filter vent hole. Refer to Section C1-1a(4) for descriptions of these sampling heads.~~

~~The manifold shall also be equipped with a purge assembly that allows applicable QC samples to be collected through all sampling components that may affect compliance with the quality assurance objectives (**QAOs**). The Permittees shall require the sites to demonstrate and document the effectiveness of the sampling equipment design in meeting the QAOs. Field blanks shall be samples of room air collected in the sampling area in the immediate vicinity of the waste container to be sampled. If using SUMMA® or equivalent canisters, field blanks shall be collected directly into the canister, without the use of the manifold.~~

~~The manifold, the associated sampling heads, and the headspace gas sample volume requirements shall be designed to ensure that a representative sample is collected. The manifold internal volume must be calculated and documented in a field logbook dedicated to headspace gas sample collection. The total volume of headspace gases collected during each sampling operation will be determined by adding the combined volume of the canisters attached to the manifold and the internal volume of the manifold. The sample volume should remain small in comparison to the volume of the waste container. When an estimate of the available headspace gas volume in the drum can be made, less than 10 percent of that volume should be withdrawn.~~

~~As illustrated in Figure C1-2, the sampling manifold must consist of a sample side and a standard side. The dotted line in Figure C1-2 indicates how the sample side shall be connected to the standard side for cleaning and collecting equipment blanks and field reference standards. The sample side of the sampling manifold shall consist of the following major components:~~

- ~~An applicable sampling head that forms a leak-tight connection with the headspace sampling manifold.~~

- ~~A flexible hose that allows movement of the sampling head from the purge assembly (standard side) to the waste container.~~

- ~~A pressure sensor(s) that must be pneumatically connected to the manifold. This manifold pressure sensor(s) must be able to measure absolute pressure in the range from 0.002 in. (0.05 mm) Hg to 39.3 in. (1,000 mm) Hg. Resolution for the manifold pressure sensors must be ±0.0004 in. (0.01 mm) Hg at 0.002 in. (0.05 mm) of Hg. The manifold pressure sensor(s) must have an operating range from approximately 59°F (15°C) to 104°F (40°C).~~

- ~~Available ports for attaching sample canisters. If using canister-based sampling methods, a sufficient number of ports shall be available to allow simultaneous collection of headspace gas samples and duplicates for VOC analyses. If using an on-line integrated sampling/analysis system, only one port is necessary for the collection of comparison samples. Ports not occupied with sample canisters during cleaning or headspace gas sampling activities require a plug to prevent ambient air from entering the system. In place of using plugs, sites may choose to install valves that can be closed to prevent intrusion of ambient air into the manifold. Ports shall have VCR® fittings for connection to the sample canister(s) to prevent degradation of the fittings on the canisters and manifold.~~

- ~~Sample canisters, as illustrated in Figure C1-3, are leak free, stainless steel pressure vessels, with a chromium-nickel oxide (**Cr-NiO**) SUMMA® passivated interior surface, bellows valve, and a pressure/vacuum gauge. Equivalent designs, such as Silco Steel canisters, may be used so long as the leak proof and inert nature of the canister~~

~~interior surface is demonstrated and documented. All sample canisters must have VCR® fittings for connection to sampling and analytical equipment. The pressure/vacuum gauge must be mounted on each manifold. The canister must be helium leak tested to 1.5×10^{-7} standard cubic centimeters per second (cc/s), have all stainless steel construction, and be capable of tolerating temperatures to 125°C. The gauge range shall be capable of operating in the leak test range as well as the sample collection range.~~

- ~~A dry vacuum pump with the ability to reduce the pressure in the manifold to 0.05 mm Hg. A vacuum pump that requires oil may be used, but precautions must be taken to prevent diffusion of oil vapors back to the manifold. Precautions may include the use of a molecular sieve and a cryogenic trap in series between the headspace sampling ports and the pump.~~

- ~~A minimum distance, based upon the design of the manifold system, between the tip of the needle and the valve that isolates the pump from the manifold in order to minimize the dead volume in the manifold.~~

- ~~If real-time equipment blanks are not available, the manifold must be equipped with an organic vapor analyzer (**OVA**) that is capable of detecting all analytes listed in Table C3-2 of Permit Attachment C3. The OVA shall be capable of measuring total VOC concentrations below the lowest headspace gas PRQL. Detection of 1,1,2-trichloro-1,2,2-trifluoroethane may not be possible if a photoionization detector is used. The OVA measurement shall be verified by the collection of equipment blanks at the frequency specified in Section C1-1 to check for manifold cleanliness.~~

~~The standard side must consist of the following major elements:~~

- ~~A cylinder of compressed zero air, helium, argon, or nitrogen gas that is hydrocarbon and carbon dioxide (**CO_2**) free (only hydrocarbon and CO_2 free gases required for Fourier Transform Infrared System [**FTIRS**]) to clean the manifold between samples and to provide gas for the collection of equipment blanks or on-line blanks. These high-purity gases shall be certified by the manufacturer to contain less than one ppm total VOCs. The gases must be metered into the standard side of the manifold using devices that are corrosion proof and that do not allow for the introduction of manifold gas into the purge gas cylinders or generator. Alternatively, a zero air or nitrogen generator may be used, provided a sample of the zero air or nitrogen is collected and demonstrated to contain less than one ppm total VOCs. Zero air or nitrogen from a generator shall be humidified (except for use with FTIRS).~~

- ~~Cylinders of field reference standard gases or on-line control sample gases. These cylinders provide gases for evaluating the accuracy of the headspace gas sampling process. Each cylinder of field reference gas or on-line control sample gas shall have a flow regulating device. The field reference standard gases or on-line control sample gas shall be certified by the manufacturer to contain analytes from Table C3-2 of Permit Attachment C3 at known concentrations.~~

- ~~If using an analytical method other than FTIRS a humidifier filled with American Society for Testing and Materials (**ASTM**) Type I or II water, connected, and opened to the standard side of the manifold between the compressed gas cylinders and the purge assembly shall be used. Dry gases flowing to the purge assembly will pick up~~

~~moisture from the humidifier. Moisture is added to the dry gases to condition the equipment blanks and field reference standards and to assist with system cleaning between headspace gas sample collection. If using FTIRS for analysis, the sample and sampling system shall be kept dry.~~

~~NOTE: Caution should be exercised to isolate the humidifier during the evacuation of the system to prevent flooding the manifold. In lieu of the humidifier, the compressed gas cylinders (e.g., zero air and field reference standard gas) may contain water vapor in the concentration range of 1,000 to 10,000 parts per million by volume (**ppmv**).~~

- ~~A purge assembly that allows the sampling head (sample side) to be connected to the standard side of the manifold. The ability to make this connection is required to transfer gases from the compressed gas cylinders to the canisters or on line analytical instrument. This connection is also required for system cleaning.~~

- ~~A flow indicating device or a pressure regulator that is connected to the purge assembly to monitor the flow rate of gases through the purge assembly. The flow rate or pressure through the purge assembly shall be monitored to assure that excess flow exists during cleaning activities and during QC sample collection. Maintaining excess flow will prevent ambient air from contaminating the QC samples and allow samples of gas from the compressed gas cylinders to be collected near ambient pressure.~~

~~In addition to a manifold consisting of a sample side and a standard side, the area in which the manifold is operated shall contain sensors for measuring ambient pressure and ambient temperature, as follows:~~

- ~~The ambient pressure sensor must have a sufficient measurement range for the ambient barometric pressures expected at the sampling location. It must be kept in the sampling area during sampling operations. Its resolution shall be 0.039 in. (1.0 mm) Hg or less, and calibration performed by the manufacturer shall be based on National Institute of Standards and Technology (**NIST**), or equivalent, standards.~~

- ~~The temperature sensor shall have a sufficient measurement range for the ambient temperatures expected at the sampling location. The measurement range of the temperature sensor must be from 18°C to 50°C. The temperature sensor calibration shall be traceable to NIST, or equivalent, standards.~~

~~C1-1a(3) Direct Canister Headspace Gas Sampling~~

~~This headspace gas sampling protocol employs a canister sampling system to collect headspace gas samples for analysis and QC purposes without the use of the manifold described above. Rather than attaching sampling heads to a manifold, in this method the sampling heads are attached directly to an evacuated sample canister as shown in Figure C1-4.~~

~~Canisters shall be evacuated to 0.0039 in. (0.10 mm) Hg prior to use and attached to a changeable filter connected to the appropriate sampling head. The sampling head(s) must be capable of either punching through the metal lid of the drums (and/or the rigid poly liner when necessary) while maintaining an airtight seal when sampling through the drum lid, penetrating a filter or the septum in the orifice of the self tapping screw, or maintaining an airtight seal for sampling through a pipe overpack container filter vent hole to obtain the drum headspace samples. Field duplicates must be collected at the same time, in the same manner, and using~~

~~the same type of sampling apparatus as used for headspace gas sample collection. Field blanks shall be samples of room air collected in the immediate vicinity of the waste drum sampling area prior to removal of the drum lid. Equipment blanks and field reference standards must be collected using a purge assembly equivalent to the standard side of the manifold described above. These samples shall be collected from the needle tip through the same components (e.g., needle and filter) that the headspace gas samples pass through.~~

~~The sample canisters, associated sampling heads, and the headspace sample volume requirements ensure that a representative sample is collected. When an estimate of the available headspace gas volume of the waste container can be made, less than 10 percent of that volume should be withdrawn. A determination of the sampling head internal volume shall be made and documented. The total volume of headspace gases collected during each headspace gas sampling operation can be determined by adding the volume of the sample canister(s) attached to the sampling head to the internal volume of the sampling head. Every effort shall be made to minimize the internal volume of sampling heads.~~

~~Each sample canister used with the direct canister method shall have a pressure/vacuum gauge capable of indicating leaks and sample collection volumes. Canister gauges are intended to be gross leak detection devices not vacuum certification devices. If a canister pressure/vacuum gauge indicates an unexpected pressure change, determination of whether the change is a result of ambient temperature and pressure differences or a canister leak shall be made. This gauge shall be helium leak tested to~~ 1.5×10^{-7} ~~standard cc/s, have all stainless steel construction, and be capable of tolerating temperatures to 125°C.~~

~~The SUMMA® or equivalent sample canisters as specified in EPA's Compendium Method TO-14A or TO-15 (EPA 1999) shall be used when sampling each drum. These heads shall form a leak-tight connection with the canister and allow sampling through the drum lid filter, through the drum lid itself and/or rigid poly liner when necessary (by use of a punch or self-tapping screw), using an airtight fitting to collect the sample through the filter vent hole of a pipe overpack container, or using a hollow side-port needle. Figure C1-4 illustrates the direct canister sampling equipment.~~

~~C1-1a(4) Sampling Heads~~

~~A sample of the headspace gas directly under the container lid, pipe overpack filter vent hole, or rigid poly liner shall be collected. Several methods have been developed for collecting a representative sample: sampling through the filter, sampling through the drum lid by drum punching, sampling through a pipe overpack container filter vent hole, and sampling through the rigid poly liner. The chosen sampling method shall preserve the integrity of the drum to contain radionuclides (e.g., replace the damaged filter, replace set screw in filter housing, seal the punched drum lid).~~

~~C1-1a(4)(i) Sampling Through the Filter~~

~~To sample the drum headspace gas through the drum's filter, a side-port needle (e.g., a hollow needle sealed at the tip with a small opening on its side close to the tip) shall be pressed through the filter and into the headspace beneath the drum lid. This permits the gas to be drawn into the manifold or directly into the canister(s). To assure that the sample collected is representative, all of the general method requirements, sampling apparatus requirements, and QC requirements described in this section shall be met in addition to the following requirements that are pertinent to drum headspace gas sampling through the filter:~~

- ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum headspace. A representative sample cannot be collected from the drum headspace until the 90-mil rigid poly liner has been vented. If the DAC for Scenario 1 is met, a sample may be collected from inside the 90-mil rigid poly liner. If the sample is collected by removing the drum lid, the sampling device shall form an airtight seal with the rigid poly liner to prevent the intrusion of outside air into the sample (using a sampling needle connected to the sampling head to pierce the rigid poly liner satisfies this requirement). If headspace gas samples are collected from the drum headspace prior to venting the 90-mil rigid poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment C3.~~

- ~~For sample collection, the drum's filter shall be sealed to prevent outside air from entering the drum and diluting and/or contaminating the sample.~~

~~The sampling head for collecting drum headspace by penetrating the filter shall consist of a side-port needle, a filter to prevent particles from contaminating the gas sample, and an adapter to connect the side-port needle to the filter. To prevent cross contamination, the sampling head shall be cleaned or replaced after sample collection, after field reference standard collection, and after field blank collection. The following requirements shall also be met:~~

- ~~The housing of the filter shall allow insertion of the sampling needle through the filter element or a sampling port with septum that bypasses the filter element into the drum headspace.~~

- ~~The side-port needle shall be used to reduce the potential for plugging.~~

- ~~The purge assembly shall be modified for compatibility with the side-port needle.~~

~~C1-1a(4)(ii) Sampling Through the Drum Lid By Drum Lid Punching~~

~~Sampling through the drum lid at the time of drum punching or thereafter may be performed as an alternative to sampling through the drum's filter if an airtight seal can be maintained. To sample the drum headspace gas through the drum lid at the time of drum punching or thereafter, the lid shall be breached using an appropriate punch. The punch shall form an airtight seal between the drum lid and the manifold or direct canister sampling equipment. To assure that the sample collected is representative, all of the general method requirements, sampling apparatus requirements, and QC requirements specified in EPA's Compendium Method TO-14A or TO-15 (EPA 1999) as appropriate, shall be met in addition to the following requirements:~~

- ~~The seal between the drum lid and sampling head shall be designed to minimize intrusion of ambient air.~~

- ~~All components of the sampling system that come into contact with sample gases shall be purged with humidified zero air, nitrogen, or helium prior to sample collection.~~

- ~~Equipment blanks and field reference standards shall be collected through all the components of the punch that contact the headspace-gas sample.~~

- ~~Pressure shall be applied to the punch until the drum lid has been breached.~~

- ~~Provisions shall be made to relieve excessive drum pressure increases during drum punch operations; potential pressure increases may occur during sealing of the drum punch to the drum lid.~~

- ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum headspace. A representative sample cannot be collected from the drum headspace until the 90-mil rigid poly liner has been vented. If the DAC for Scenario 1 is met, a sample may be collected from inside the 90-mil rigid poly liner. If headspace gas samples are collected from the drum headspace prior to venting the 90-mil rigid poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment C3.~~

- ~~During sampling, the drum's filter, if present, shall be sealed to prevent outside air from entering the drum.~~

- ~~While sampling through the drum lid using manifold sampling, a flow-indicating device or pressure regulator to verify flow of gases shall be pneumatically connected to the drum punch and operated in the same manner as the flow-indicating device described above in Section C1-1a(2).~~

- ~~Equipment shall be used to adequately secure the drum punch sampling system to the drum lid.~~

- ~~If the headspace gas sample is not taken at the time of drum punching, the presence and diameter of the rigid liner vent hole shall be documented during the punching operation for use in determining an appropriate Scenario 2 DAC.~~

~~C1-1a(4)(iii) Sampling Through a Pipe Overpack Container Filter Vent Hole~~

~~Sampling through an existing filter vent hole in a pipe overpack container (**POC**) may be performed as an alternative to sampling through the POC's filter if an airtight seal can be maintained. To sample the container headspace gas through a POC filter vent hole, an appropriate airtight seal shall be used. The sampling apparatus shall form an airtight seal between the POC surface and the manifold or direct canister sampling equipment. To assure that the sample collected is representative, all of the general method, sampling apparatus, and QC requirements specified in EPA's Compendium Method TO-14A or TO-15 (EPA 1999) as appropriate, shall be met in addition to the following requirements:~~

- ~~The seal between the POC surface and sampling apparatus shall be designed to minimize intrusion of ambient air.~~

- ~~The filter shall be replaced as quickly as is practicable with the airtight sampling apparatus to ensure that a representative sample can be taken. Sites must provide documentation demonstrating that the time between removing the filter and installing the airtight sampling device has been established by testing to assure a representative sample.~~

- ~~All components of the sampling system that come into contact with sample gases shall be cleaned according to requirements for direct canister sampling or manifold sampling, whichever is appropriate, prior to sample collection.~~

- ~~Equipment blanks and field reference standards shall be collected through all the components of the sampling system that contact the headspace gas sample.~~

- ~~During sampling, openings in the POC shall be sealed to prevent outside air from entering the container.~~

- ~~A flow indicating device shall be connected to sampling system and operated according to the direct canister or manifold sampling requirements, as appropriate.~~

~~C1-1b Quality Control~~

~~For manifold and direct canister sampling systems, field QC samples shall be collected on a per sampling batch basis. A sampling batch is a suite of samples collected consecutively using the same sampling equipment within a specific time period. A sampling batch can be up to 20 samples (excluding QC samples), all of which shall be collected within 14 days of the first sample in the batch. For on-line integrated sampling/analysis systems, QC samples shall be collected and analyzed on a per on-line batch basis. Holding temperatures and container requirements for gas sample containers are provided in Table C1-1. An on-line batch is the number of headspace gas samples collected within a 12-hour period using the same on-line integrated analysis system. The analytical batch requirements are specified by the analytical method being used in the on-line system. Table C1-2 provides a summary of field QC sample collection requirements. Table C1-3 provides a summary of QC sample acceptance criteria.~~

~~For on-line integrated sampling analysis systems, the on-line batch QC samples serve as combined sampling batch/analytical batch QC samples as follows:~~

- ~~The on-line blank replaces the equipment blank and laboratory blank~~

- ~~The on-line control sample replaces the field reference standard and laboratory control sample~~

- ~~The on-line duplicate replaces the field duplicate and laboratory duplicate~~

~~The acceptance criteria for on-line batch QC samples are the same as for the sampling batch and analytical batch QC samples they replace. Acceptance criteria are shown in Table C1-3. A separate field blank shall still be collected and analyzed for each on-line batch. However, if the results of a field blank collected through the sampling manifold meets the acceptance criterion, a separate on-line blank need not be collected and analyzed.~~

~~The Permittees shall require the site project manager to monitor and document field QC sample results and fill out a nonconformance report if acceptance or frequency criteria are not met. The Permittees shall require the site project manager to ensure appropriate corrective action is taken if acceptance criteria are not met.~~

~~C1-1b(1) Field Blanks~~

~~Field blanks shall be collected to evaluate background levels of program-required analytes. Field blanks shall be collected prior to sample collection, and at a frequency of one per sampling batch. The Permittees shall require the site project manager to use the field blank data to assess impacts of ambient contamination, if any, on the sample results. Field blank results determined by gas chromatography/mass spectrometry and gas chromatography/flame~~

~~ionization detection shall be acceptable if the concentration of each VOC analyte is less than or equal to three times the method detection limit (**MDL**) listed in Table C3-2 in Permit Attachment C3. Field blank results determined by FTIRS shall be acceptable if the concentration of each VOC analyte is less than the program required quantitation limit listed in Table C3-2. A nonconformance report shall be initiated and resolved if the final reported QC sample results do not meet the acceptance criteria.~~

~~C1-1b(2) Equipment Blanks~~

~~Equipment blanks shall be collected to assess cleanliness prior to first use after cleaning of all sampling equipment. On-line blanks will be used to assess equipment cleanliness as well as analytical contamination. After the initial cleanliness check, equipment blanks collected through the manifold shall be collected at a frequency of one per sampling batch for VOC analysis or one per day, whichever is more frequent. If the direct canister method is used, field blanks may be used in lieu of equipment blanks. The Permittees shall require the site project manager to use the equipment blank data to assess impacts of potentially contaminated sampling equipment on the sample results. Equipment blank results determined by gas chromatography/mass spectrometry or gas chromatography/flame ionization detection shall be acceptable if the concentration of each VOC analyte is less than or equal to three times the MDL listed in Table C3-2 in Permit Attachment C3. Equipment blank results determined by FTIRS shall be acceptable if the concentration of each VOC analyte is less than the program required quantitation limit listed in Table C3-2.~~

~~C1-1b(3) Field Reference Standards~~

~~Field reference standards shall be used to assess the accuracy with which the sampling equipment collects VOC samples into SUMMA® or equivalent canisters prior to first use of the sampling equipment. The on-line control sample will be used to assess the accuracy with which the sampling equipment collects VOC samples as well as an indicator of analytical accuracy for the on-line sampling system. Field reference standards shall contain a minimum of six of the analytes listed in Table C3-2 in Permit Attachment C3 at concentrations within a range of 10 to 100 ppmv and greater than the MDL for each compound. Field reference standards shall have a known valid relationship to a nationally recognized standard (e.g., NIST), if available. If NIST traceable standards are not available and commercial gases are used, a Certificate of Analysis from the manufacturer documenting traceability is required. Commercial stock gases shall not be used beyond their manufacturer specified shelf life. After the initial accuracy check, field reference standards collected through the manifold shall be collected at a frequency of one per sampling batch and submitted as blind samples to the analytical laboratory. For the direct canister method, field reference standard collection may be discontinued if the field reference standard results demonstrate the QAO for accuracy specified in Attachment C3. Field reference standard results shall be acceptable if the accuracy for each tested compound has a recovery of 70 to 130 percent.~~

~~C1-1b(4) Field Duplicates~~

~~Field duplicate samples shall be collected sequentially and in accordance with Table C1-1 to assess the precision with which the sampling procedure can collect samples into SUMMA® or equivalent canisters. Field duplicates will also serve as a measure of analytical precision for the on-line sampling system. Field duplicate results shall be acceptable if the relative percent difference is less than or equal to 25 for each tested compound found in concentrations greater than the PRQL in both duplicates.~~

~~C1-1c Equipment Testing, Inspection and Maintenance~~

~~All sampling equipment components that come into contact with headspace sample gases shall be constructed of relatively inert materials such as stainless steel or Teflon®. A passivated interior surface on the stainless steel components is recommended.~~

~~To minimize the potential for cross contamination of samples, the headspace sampling manifold and sample canisters shall be properly cleaned and leak checked prior to each headspace gas sampling event. Procedures used for cleaning and preparing the manifold and sample canisters shall be equivalent to those provided in EPA's Compendium Method TO-14A or TO-15 (EPA 1999). Cleaning requirements are presented below.~~

~~C1-1c(1) Headspace Gas Sample Canister Cleaning~~

~~SUMMA® or equivalent canisters used in these methods shall be subjected to a rigorous cleaning and certification procedures prior to use in the collection of any samples. Guidance for the development of this procedure has been derived from Method TO-14A or TO-15 (EPA 1999). Specific detailed instructions shall be provided in laboratory standard operating procedures (**SOPs**) for the cleaning and certification of canisters.~~

~~Canisters shall be cleaned and certified on an equipment cleaning batch basis. An equipment cleaning batch is any number of canisters cleaned together at one time using the same cleaning method. A cleaning system, capable of processing multiple canisters at a time, composed of an oven (optional) and a vacuum manifold which uses a dry vacuum pump or a cryogenic trap backed by an oil sealed pump shall be used to clean SUMMA® or equivalent canisters. Prior to cleaning, a positive or negative pressure leak test shall be performed on all canisters. The duration of the leak test must be greater than or equal to the time it takes to collect a sample, but no greater than 24 hours. For a leak test, a canister passes if the pressure does not change by a rate greater than ±2 psig per 24 hours. Any canister that fails shall be checked for leaks, repaired, and reprocessed. One canister per equipment cleaning batch shall be filled with humid zero air or humid high purity nitrogen and analyzed for VOCs. The equipment cleaning batch of canisters shall be considered clean if there are no VOCs above three times the MDLs listed in Table C3-2 of Permit Attachment C3. After the canisters have been certified for leak tightness and found to be free of background contamination, they shall be evacuated to 0.0039 in. (0.10 mm) Hg or less for storage prior to shipment. The Permittees shall require the laboratory responsible for canister cleaning and certification to maintain canister certification documentation and initiate the canister tags as described in Permit Attachment C3.~~

~~C1-1c(2) Sampling Equipment Initial Cleaning and Leak Check~~

~~The surfaces of all headspace gas sampling equipment components that will come into contact with headspace gas shall be thoroughly inspected and cleaned prior to assembly. The manifold and associated sampling heads shall be purged with humidified zero air, nitrogen, or helium, and leak checked after assembly. This cleaning shall be repeated if the manifold and/or associated sampling heads are contaminated to the extent that the routine system cleaning is inadequate.~~

~~C1-1c(3) Sampling Equipment Routine Cleaning and Leak Check~~

~~The manifold and associated sampling heads which are reused shall be cleaned and checked for leaks in accordance with the cleaning and leak check procedures described in EPA's Compendium Method TO-14A or TO-15 (EPA 1999). The procedures shall be conducted after headspace gas and field duplicate collection; after field blank collection, after field blanks are collected through the manifold; and after the additional cleaning required for field reference standard collection has been completed. The protocol for routine manifold cleaning and leak check requires that sample canisters be attached to the canister ports, or that the ports be capped or closed by valves, and requires that the sampling head be attached to the purge assembly.~~

~~VOCs shall be removed from the internal surfaces of the headspace sampling manifold to levels that are less than or equal to three times the MDLs of the analytes listed in Table C3-2 of Permit Attachment C3, as determined by analysis of an equipment blank or through use of an OVA. It is recommended that the headspace sampling manifold be heated to 150° Centigrade and periodically evacuated and flushed with humidified zero air, nitrogen, or helium. When not in use, the manifold shall be demonstrated clean before storage with a positive pressure of high purity gas (i.e., zero air, nitrogen, or helium) in both the standard and sample sides.~~

~~Sampling shall be suspended and corrective actions shall be taken when the analysis of an equipment blank indicates that the VOC limits have been exceeded or if a leak test fails. The Permittees shall require the site project manager to ensure that corrective action has been taken prior to resumption of sampling.~~

~~C1-1c(4) Manifold Cleaning After Field Reference Standard Collection~~

~~The sampling system shall be specially cleaned after a field reference standard has been collected, because the field reference standard gases contaminate the standard side of the headspace sampling manifold when they are regulated through the purge assembly. This cleaning requires the installation of a gas-tight connector in place of the sampling head, between the flexible hose and the purge assembly. This configuration allows both the sample and standard sides of the sampling system to be flushed (evacuated and pressurized) with humidified zero air, nitrogen, or helium which, combined with heating the pneumatic lines, should sweep and adequately clean the system's internal surfaces. After this protocol has been completed and prior to collecting another sample, the routine system cleaning and leak check (see previous section) shall also be performed.~~

~~C1-1c(5) Sampling Head Cleaning~~

~~To prevent cross contamination, the needle, airtight fitting or airtight seal, adapters, and filter of the sampling heads shall be cleaned in accordance with the cleaning procedures described in EPA's Compendium Method TO-14A or TO-15 (EPA 1999). After sample collection, a sampling head shall be disposed of or cleaned in accordance with EPA's Compendium Method TO-14A or TO-15 (EPA1999), prior to reuse. As a further QC measure, the needle, airtight fitting or airtight seal, and filter, after cleaning, should be purged with zero air, nitrogen, or helium and capped for storage to prevent sample contamination by VOCs potentially present in ambient air.~~

~~C1-1d Equipment Calibration and Frequency~~

~~The manifold pressure sensor shall be certified prior to initial use, then annually, using NIST traceable, or equivalent, standards. If necessary, the pressure indicated by the pressure sensor(s) shall be temperature compensated. The ambient air temperature sensor, if present, shall be certified prior to initial use, then annually, to NIST traceable, or equivalent, temperature standards.~~

~~The OVA shall be calibrated once per day, prior to first use, or as necessary according to the manufacturer's specifications. Calibration gases shall be certified to contain known analytes from Table C3-2 of Permit Attachment C3 at known concentrations. The balance of the OVA calibration gas shall be consistent with the manifold purge gas when the OVA is used (i.e., zero air, nitrogen, or helium).~~

~~C1-2 Sampling of Homogeneous Solids and Soil/Gravel (Summary Categories S3000/S4000)~~

~~For those waste streams without an AK Sufficiency Determination approved by DOE, randomly selected containers of homogeneous solid and/or soil/gravel waste streams (S3000/S4000) shall be sampled and analyzed to resolve the assignment of EPA hazardous waste numbers. For example, analytical results may be useful to resolve uncertainty regarding hazardous constituents used in a process that generated the waste stream when the hazardous constituents are not documented in the acceptable knowledge information for the waste.~~

~~C1-2a Method Requirements~~

~~The methods used to collect samples of transuranic (**TRU**) mixed waste, classified as homogeneous solids and soil/gravel from waste containers, shall be such that the samples are representative of the waste from which they were taken. To minimize the quantity of investigation derived waste, laboratories conducting the analytical work may require no more sample than is required for the analysis, based on the analytical methods. However, a sufficient number of samples shall be collected to adequately represent waste being sampled. For those waste streams defined as Summary Category Groups S3000 or S4000 in Attachment C, debris that may also be present within these wastes need not be sampled.~~

~~Samples of retrievably stored waste containers will be collected using appropriate coring equipment or other EPA approved methods to collect a representative sample. Newly generated wastes that are sampled from a process as it is generated may be sampled using EPA approved methods, including scoops and ladles, that are capable of collecting a representative sample. All sampling and core sampling will comply with the QC requirements specified in C1-2b.~~

~~C1-2a(1) Core Collection~~

~~Coring tools shall be used to collect cores of homogeneous solids and soil/gravel from waste containers, when possible, in a manner that minimizes disturbance to the core. A rotational coring tool (i.e., a tool that is rotated longitudinally), similar to a drill bit, to cut, lift the waste cuttings, and collect a core from the bore hole, shall be used to collect sample cores from waste containers. For homogeneous solids and soil/gravel that are relatively soft, non-rotational coring tools may be used in lieu of a rotational coring tool.~~

~~To provide a basis for describing the requirements for core collection, diagrams of a rotational coring tool (i.e., a light weight auger) and a non-rotational coring tool (i.e., a thin-walled sampler) are provided in Figures C1-5 and C1-6, respectively.~~

~~The following requirements apply to the use of coring tools:~~

- ~~Each coring tool shall contain a removable tube (liner) that is constructed of fairly rigid material unlikely to affect the composition and/or concentrations of target analytes in the sample core. Materials that are acceptable for use for coring device sleeves are polycarbonate, teflon, or glass for most samples, and stainless steel or brass if samples are not to be analyzed for metals. The Permittees shall require site quality assurance project plans (**QAPjPs**) to document that analytes of concern are not present in liner material. The Permittees shall also require sites to document that the materials are unlikely to affect sample results through the collection and analysis of an equipment blank prior to first use as specified in the 'Equipment Blanks' section of this appendix. Liner outer diameter is recommended to be no more than 2 in. and no less than one in. Liner wall thickness is recommended to be no greater than 1/16 in. Before use, the liner shall be cleaned in accordance the requirements in Section C1-2b. The liner shall fit flush with the inner wall of the coring tool and shall be of sufficient length to hold a core that is representative of the waste along the entire depth of the waste. The depth of the waste is calculated as the distance from the top of the sludge to the bottom of the drum (based on the thickness of the liner and the rim at the bottom of the drum). The liner material shall have sufficient transparency to allow visual examination of the core after sampling. If sub-sampling is not conducted immediately after core collection and liner extrusion, then end caps constructed of material unlikely to affect the composition and/or concentrations of target analytes in the core (e.g., Teflon®) shall be placed over the ends of the liner. End caps shall fit tightly to the ends of the liner. The Permittees shall require site specific QAPjPs to indicate the acceptable materials for core liners and end caps.~~

- ~~A spring retainer, similar to that illustrated in Figures C1-5 and C1-6, shall be used with each coring tool when the physical properties of the waste are such that the waste may fall out of the coring tool's liner during sampling activities. The spring retainer shall be constructed of relatively inert material (e.g., stainless steel or Teflon®) and its inner diameter shall not be less than the inner diameter of the liner. Before use, spring retainers shall be cleaned in accordance with the requirements in Section C1-2b.~~

- ~~Coring tools may have an air-lock mechanism that opens to allow air inside the liners to escape as the tool is pressed into the waste (e.g., ball check valve). If used, this air-lock mechanism shall also close when the core is removed from the waste container.~~

- ~~After disassembling the coring tool, a device (extruder) to forcefully extrude the liner from the coring tool shall be used if the liner does not slide freely. All surfaces of the extruder that may come into contact with the core shall be cleaned in accordance with the requirements in Section C1-2(b) prior to use.~~

- ~~Coring tools shall be of sufficient length to hold the liner and shall be constructed to allow placement of the liner leading edge as close as possible to the coring tools leading edge.~~

- ~~All surfaces of the coring tool that have the potential to contact the sample core or sample media shall be cleaned in accordance with the requirements in Section C1-2(b) prior to use.~~

- ~~The leading edge of the coring tools may be sharpened and tapered to a diameter equivalent to, or slightly smaller than, the inner diameter of the liner to reduce the drag of the homogeneous solids and soil/gravel against the internal surfaces of the liner, thereby enhancing sample recovery.~~

- ~~Rotational coring tools shall have a mechanism to minimize the rotation of the liner inside the coring tool during coring activities, thereby minimizing physical disturbance to the core.~~

- ~~Rotational coring shall be conducted in a manner that minimizes transfer of frictional heat to the core, thereby minimizing potential loss of VOCs.~~

- ~~Non-rotational coring tools shall be designed such that the tool's kerf width is minimized. Kerf width is defined as one-half of the difference between the outer diameter of the tool and the inner diameter of the tool's inlet.~~

~~C1-2a(2) Sample Collection~~

~~Sampling of cores shall be conducted in accordance with the following requirements:~~

- ~~Sampling shall be conducted as soon as possible after core collection. If a substantial delay (i.e., more than 60 minutes) is expected between core collection and sampling, the core shall remain in the liner and the liner shall be capped at each end. If the liner containing the core is not extruded from the coring tool and capped, then two alternatives are permissible: 1) the liner shall be left in the coring tool and the coring tool shall be capped at each end, or 2) the coring tool shall remain in the waste container with the air lock mechanism attached.~~

- ~~Samples of homogeneous solids and soil/gravel for VOC analyses shall be collected prior to extruding the core from the liner. These samples may be collected by collecting a single sample from the representative subsection of the core, or three sub-samples may be collected from the vertical core to form a single 15-gram composite sample. Smaller sample sizes may be used if method PRQL requirements are met for all analytes. The sampling locations shall be randomly selected. If a single sample is used, the representative subsection is chosen by randomly selecting a location along the portion of the core (i.e. core length). If the three sub-sample method is used, the sampling locations shall be randomly selected within three equal-length subsections of the core along the long axis of the liner and access to the waste shall be gained by making a perpendicular cut through the liner and the core. The Permittees shall require sites to develop documented procedures to select, and record the selection, of random sampling locations. True random sampling involves the proper use of random numbers for identifying sampling locations. The procedures used to select the random sampling locations will be subject to review as part of annual audits by DOE. A sampling device such as the metal coring cylinder described in EPA's SW-846 Manual (1996), or equivalent, shall be immediately used to collect the sample once the core has been exposed to air. Immediately after sample collection, the sample shall be extruded into 40-ml volatile organics analysis (**VOA**) vials (or other containers specified in~~

~~appropriate SW 846 methods), the top rim of the vial visually inspected and wiped clean of any waste residue, and the vial cap secured. Sample handling requirements are outlined in Table C1 4. Additional guidance for this type of sampling can be found in SW 846 (EPA 1996).~~

- ~~Samples of the homogeneous solids and soil/gravel for semi volatile organic compound and metals analyses shall be collected. These samples may be collected from the same sub sample locations and in the same manner as the sample collected for VOC analysis, or they may be collected by splitting or compositing the representative subsection of the core. The representative subsection is chosen by randomly selecting a location along the portion of the core (i.e. core length). The Permittees shall require sites to develop documented procedures to select, and record the selection, of random sampling locations. True random sampling involves the proper use of random numbers for identifying sampling locations. The procedures used to select the random sampling locations will be subject to review as part of annual audits by DOE. Guidance for splitting and compositing solid materials can be found in SW 846 (EPA 1996). All surfaces of the sampling tools that have the potential to come into contact with the sample shall be constructed of materials unlikely to affect the composition or concentrations of target analytes in the waste (e.g., Teflon®). In addition, all surfaces that have the potential to come into contact with core sample media shall either be disposed or decontaminated according to the procedures found in Section C1 2(b). Sample sizes and handling requirements are outlined in Table C1 4.~~

~~Newly generated waste samples may be collected using methods other than coring, as discussed in Section C1 2a. Newly generated wastes samples will be collected as soon as possible after sampling, but the spatial and temporal homogeneity of the waste stream dictate whether a representative grab sample or composite sample shall be collected. As part of the site audit, DOE shall assess waste sampling to ensure collection of representative samples.~~

~~C1 2b Quality Control~~

~~QC requirements for sampling of homogeneous solids and soil/gravel include collecting co located samples from cores or other sample types to determine precision; equipment blanks to verify cleanliness of the sampling and coring tools and sampling equipment; and analysis of reagent blanks to ensure reagents, such as deionized or high pressure liquid chromatography (**HPLC**) water, are of sufficient quality. Coring and sampling of homogeneous solids and soil/gravel shall comply, at minimum, with the following QC requirements.~~

~~C1 2b(1) Co located Samples~~

~~In accordance with the requirement to collect field duplicates required by the EPA methods found in SW 846 (EPA 1996), samples shall be collected to determine the combined precision of the coring and sampling procedures. The co located core methodology is a duplicate sample collection methodology intended to collect samples from a second core placed at approximately the same location within the drum when samples are collected by coring. Waste may not be amenable to coring in some instances. In this case, a co located sample may be collected from a sample (e.g. scoop) collected from approximately the same location in the waste stream. A sample from each co located core or waste sample collected by other means shall be collected side by side as close as feasible to one another, handled in the same manner, visually inspected through the transparent liner (if cored), and sampled in the same manner at the same~~

~~randomly selected sample location(s). If the visual examination detects inconsistencies such as color, texture, or waste type in the waste at the sample location, another sampling location may be randomly selected, or the samples may be invalidated and co-located samples or cores may again be collected. Co-located samples, from either core or other sample type, shall be collected at a frequency of one per sampling batch or once per week, whichever is more frequent. A sampling batch is a suite of homogeneous solids and soil/gravel samples collected consecutively using the same sampling equipment within a specific time period. A sampling batch can be up to 20 samples (excluding field QC samples), all of which shall be collected within 14 days of the first sample in the batch.~~

~~C1-2b(2) Equipment Blanks~~

~~In accordance with SW-846 (EPA 1996), equipment blanks shall be collected from fully assembled sampling and coring tools (i.e., at least those portions of the sampling equipment that contact the sample) prior to first use after cleaning at a frequency of one per equipment cleaning batch. An equipment cleaning batch is the number of sampling equipment items cleaned together at one time using the same cleaning method. The equipment blank shall be collected from the fully assembled sampling or coring tool, in the area where the sampling or coring tools are cleaned, prior to covering with protective wrapping and storage. The equipment blank shall be collected by pouring clean water (e.g., deionized water, HPLC water) down the inside of the assembled sampling or coring tool. The water shall be collected in a clean sample container placed at the leading edge of the sampling or coring tool and analyzed for the analytes listed in Tables C3-4, C3-6, and C3-8 of Permit Attachment C3. The results of the equipment blank will be considered acceptable if the analysis indicates no analyte at a concentration greater than three times the MDLs listed in Tables C3-4 and C3-6 or in the Program Required Detection Limits (**PRDL**) in Table C3-8 of Permit Attachment C3. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of sampling or coring tools shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank.~~

~~Equipment blanks for coring tools shall be collected from liners that are cleaned separately from the coring tools. These equipment blanks shall be collected at a frequency of one per equipment cleaning batch. The equipment blanks shall be collected by randomly selecting a liner from the equipment cleaning batch, pouring clean water (e.g., deionized water or HPLC water) across its internal surface, collecting the water in a clean sample container, and analyzing the water for the analytes listed in Tables C3-4, C3-6, and the PRDLs in Table C3-8 of Permit Attachment C3. The results of the equipment blank analysis will be considered acceptable if the results indicate no analyte at a concentration greater than three times the MDLs listed in Tables C3-4, C3-6, or C3-8 of Permit Attachment C3. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of liners shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank.~~

~~Sampling equipment (e.g., bowls, spoons, chisel, VOC sub-sampler) shall also be cleaned. Equipment blanks shall be collected for the sampling equipment at a frequency of one per equipment cleaning batch. After the sampling equipment has been cleaned, one item from the equipment cleaning batch is randomly selected, water (e.g., deionized water, HPLC water) is passed over its surface, collected in a clean container, and analyzed for the analytes listed in~~

~~Tables C3-4, C3-6, and C3-8 of Permit Attachment C3. The results of the equipment blank will be considered acceptable if the results indicate no analyte present at a concentration greater than three times the MDLs listed in Tables C3-4 and C3-6 and in the PRDLs in C3-8 of Permit Attachment C3. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of sampling equipment shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank. The above equipment blanks may be performed on a purchased batch basis for sampling equipment purchased sterile and sealed in protective packaging. Equipment blanks need not be performed for equipment purchased in sealed protective packaging accompanied by a certificate certifying cleanliness.~~

~~The results of equipment blanks shall be traceable to the items in the equipment cleaning batch that the equipment blank represents. All sampling items should be identified, and the associated equipment cleaning batch should be documented. The method of documenting the connection between equipment and equipment cleaning batches shall be documented. Equipment blank results for the coring tools, liners, and sampling equipment shall be reviewed prior to use. A sufficient quantity of these items should be maintained in storage to prevent disruption of sampling operations.~~

~~The Permittees may require a site to use certified clean disposable sampling equipment and discard liners and sampling tools after one use. In this instance, cleaning and equipment blank collection is not required.~~

~~C1-2b(3) Coring Tool and Sampling Equipment Cleaning~~

~~Coring tools and sampling equipment shall be cleaned in accordance with the following requirements:~~

- ~~All surfaces of coring tools and sampling equipment that will come into contact with the samples shall be clean prior to use. All sampling equipment shall be cleaned in the same manner. Immediately following cleaning, coring tools and sampling equipment shall be assembled and sealed inside clean protective wrapping.~~

- ~~Each reusable sampling or coring tool shall have a unique identification number. Each number shall be referenced to the waste container on which it was used. This information shall be recorded in the field records. One sampling or coring tool from each equipment cleaning batch shall be tested for cleanliness in accordance with the requirements specified above. The identification number of the sampling or coring tool from which the equipment blank was collected shall be recorded in the field records. The results of the equipment blank analysis for the equipment cleaning batch in which each sampling or coring tool was cleaned shall be submitted to the sampling facility with the identification numbers of all sampling or coring tools in the equipment cleaning batch. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of sampling equipment shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank.~~

- ~~Sample containers shall be cleaned in accordance with SW-846 (EPA 1996).~~

~~C1-2c Equipment Testing, Inspection and Maintenance~~

~~Prior to initiation of sampling or coring activities, sampling and coring tools shall be tested in accordance with manufacturer specifications to ensure operation within the manufacturer's tolerance limits. Other specifications specific to the sampling operations (e.g., operation of containment structure and safety systems) should also be tested and verified as operating properly prior to initiating coring activities. Coring tools shall be assembled, including liners, and tested. Air lock mechanisms and rotation mechanisms shall be inspected for free movement of critical parts. Sampling and coring tools found to be malfunctioning shall be repaired or replaced prior to use.~~

~~Coring tools and sample collection equipment shall be maintained in accordance with manufacturer's specifications. Clean sampling and coring tools and sampling equipment shall be sealed inside clean protective wrapping and maintained in a clean storage area prior to use. Sampling equipment shall be properly maintained to avoid contamination. A sufficient supply of spare parts should be maintained to prevent delays in sampling activities due to equipment down time. Records of equipment maintenance and repair shall be maintained in the field records in accordance with site SOPs.~~

~~Inspection of sampling equipment and work areas shall include the following:~~

- ~~Sample collection equipment in the immediate area of sample collection shall be inspected daily for cleanliness. Visible contamination on any equipment (e.g., waste on floor of sampling area, hydraulic fluid from hoses) that has the potential to contaminate a waste core or waste sample shall be thoroughly cleaned upon its discovery.~~

- ~~The waste coring and sampling work areas shall be maintained in clean condition to minimize the potential for cross contamination between waste (including cores) and samples.~~

- ~~Expendable equipment (e.g., plastic sheeting, plastic gloves) shall be visually inspected for cleanliness prior to use and properly discarded after each sample.~~

- ~~Prior to removal of the protective wrapping from a coring tool designated for use, the condition of the protective wrapping shall be visually assessed. Coring tools with torn protective wrapping should be returned for cleaning. Coring tools visibly contaminated after the protective wrapping has been removed shall not be used and shall be returned for cleaning or properly discarded.~~

- ~~Sampling equipment shall be visually inspected prior to use. All sampling equipment that comes into contact with waste samples shall be stored in protective wrapping until use. Prior to removal of the protective wrapping from sampling equipment, the condition of the protective wrapping shall be visually assessed. Sampling equipment with torn protective wrapping should be discarded or returned for cleaning. Sampling equipment visibly contaminated after the protective wrapping has been removed shall not be used and shall be returned for cleaning or properly discarded.~~

- ~~Cleaned sampling and coring equipment will be physically segregated from all equipment that has been used for a sampling event and has not been decontaminated.~~

~~C1-2d Equipment Calibration and Frequency~~

~~The scale used for weighing sub-samples shall be calibrated as necessary to maintain its operation within manufacturer's specification, and after repairs and routine maintenance. Weights used for calibration shall be traceable to a nationally recognized standard. Calibration records shall be maintained in the field records.~~

C1-1~~3~~ Radiography

C1-2~~4~~ Visual Examination

~~C1-5 Custody of Samples~~

~~Chain-of-Custody on field samples (including field QC samples) will be initiated immediately after sample collection or preparation. Sample custody will be maintained by ensuring that samples are custody sealed during shipment to the laboratory. After samples are accepted by the analytical laboratory, custody is maintained by assuring the samples are in the possession of an authorized individual, in that individual's view, in a sealed or locked container controlled by that individual, or in a secure controlled access location. Sample custody will be maintained until the sample is released by the site project manager or until the sample is expended. The Permittees shall require that site QAPjPs or site-specific procedures include a copy of the sample chain-of-custody form and instructions for completing sample chain-of-custody forms in a legally defensible manner. This form will include provisions for each of the following:~~

- ~~Signature of individual initiating custody control, along with the date and time.~~
- ~~Documentation of sample numbers for each sample under custody. Sample numbers will be referenced to a specific sampling event description that will identify the sampler(s) through signature, the date and time of sample collection, type/number containers for each sample, sample matrix, preservatives (if applicable), requested methods of analysis, place/address of sample collection and the waste container number.~~
- ~~For off-site shipping, method of shipping transfer, responsible shipping organization or corporation, and associated air bill or lading number.~~
- ~~Signatures of custodians relinquishing and receiving custody, along with date and time of the transfer.~~
- ~~Description of final sample container disposition, along with signature of individual removing sample container from custody.~~
- ~~Comment section.~~
- ~~Documentation of discrepancies, breakage or tampering.~~

~~All samples and sampling equipment will be identified with unique identification numbers. Sampling Coring tools and equipment will be identified with unique equipment numbers to ensure that all sampling equipment, coring tools, and sampling canisters are traceable to equipment cleaning batches.~~

~~All samples will be uniquely identified to ensure the integrity of the sample and can be used to identify the generator/storage site and date of collection. Sample tags or labels will be affixed to all samples and will identify at a minimum:~~

- ~~Sample ID number~~
- ~~Sampler initials and organization~~
- ~~Ambient temperature and pressure (for gas samples only)~~
- ~~Sample description~~
- ~~Requested analyses~~
- ~~Data and time of collection~~
- ~~QC designation (if applicable)~~

~~C1.6 Sample Packing and Shipping~~

~~In the event that the analytical facilities are not at the generator/storage site, the samples shall be packaged and shipped to an off site laboratory. Sample containers shall be packed to prevent any damage to the sampling container and maintain the preservation temperature, if necessary. Department of Transportation (**DOT**) regulations shall be adhered to for shipment of the package.~~

~~When preparing SUMMA® or equivalent canisters for shipment, special care shall be taken with the pressure gauge and the associated connections. Metal boxes which have separate compartments, or cardboard boxes with foam inserts are standard shipping containers. The chosen shipping container shall meet selected DOT regulations. If temperatures shall be maintained, an adequate number of cold packs necessary to maintain the preservation temperature shall be added to the package.~~

~~Glass jars are wrapped in bubble wrap or another type of protection. The wrapped jar should be placed in a plastic bag inside of the shipping container, so that if the jar breaks, the inside of the shipping container and the other samples will not be contaminated. The plastic bag will enable the receiving analytical lab to prevent contamination of their shipping and receiving area. Plastic jars do not present a problem for shipping purposes. All shipping containers will contain appropriate blank samples to detect any VOC cross-contamination. A DOT approved cooler, or similar package may be used as the shipping container. If temperatures must be maintained, an adequate number of cold packs necessary to maintain the preservation temperature shall be added to the package. If fill material is needed, compatibility between the samples and the fill should be evaluated prior to use.~~

~~All sample containers should be affixed with signed tamper-proof seals or devices so that it is apparent if the sample integrity has been compromised and that the identity of the seal or device is traceable to the individual who affixed the seal. A seal should also be placed on the outside of the shipping container for the same reason. Sample custody documentation shall be placed inside the sealed or locked shipping container, with the current custodian signing to release custody. Transfer of custody is completed when the receiving custodian opens the shipping container and signs the custody documentation. The shipping documentation will serve to track the physical transfer of samples between the two custodians.~~

~~A Uniform Hazardous Waste Manifest is not required, since samples are exempted from the definition of hazardous waste under RCRA. All other shipping documentation specified in the site specific SOP for sample shipment (i.e., bill of lading, site-specific shipping documentation) is required.~~

~~C1-7 List of References~~

~~Bechtel BWXT Idaho, LLC (BWXT), 2000, Determination of Drum Age Criteria and Prediction Factors Based on Packaging Configurations, INEEL/EXT-2000-01207, October 2000, Liekhus, K.J., S.M. Djordjevic, M. Devarakonda, and M.J. Connolly, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.~~

~~Lockheed Idaho Technologies Company, 1995, Position for Determining Gas Phase Volatile Organic Compound Concentrations in Transuranic Waste Containers, INEL-95/0109/Revision 1, M.J. Connolly, et. al.~~

~~U.S. Environmental Protection Agency (EPA), 1999, Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air (EPA/625/R-96/10b, January 1999).~~

~~U.S. Environmental Protection Agency (EPA), 1996. Test Methods for Evaluating Solid Waste, "Laboratory Manual Physical/Chemical Methods, SW-846, 3rd ed., U.S. EPA, OSW and ER, Washington D.C.~~

ATTACHMENT C2

~~STATISTICAL METHODS USED IN SAMPLING AND ANALYSIS~~RESERVED

~~ATTACHMENT C2~~

~~STATISTICAL METHODS USED IN SAMPLING AND ANALYSIS~~

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~~ATTACHMENT C2~~

~~STATISTICAL METHODS USED IN SAMPLING AND ANALYSIS~~

~~Introduction~~

~~The Permittees shall require generator/storage sites (**sites**) to use the following statistical methods for sampling and analysis of TRU mixed waste which is managed, stored, or disposed at WIPP, unless determined unnecessary by the U.S. Department of Energy (**DOE**) as a result of an Acceptable Knowledge (AK) Sufficiency Determination. These statistical methods include methods for selecting waste containers for totals analysis, selecting waste containers for headspace gas sampling and analysis, and setting the upper confidence limit.~~

~~C2-1 Approach for Selecting Waste Containers for Statistical Sampling~~

~~C2-1a Statistical Selection of Containers for Totals Analysis~~

~~The statistical approach for characterizing retrievably stored and newly generated homogeneous solids (S3000) and soil/gravel (S4000) waste and repackaged or treated S3000 waste relies on using acceptable knowledge to segregate waste containers into relatively homogeneous waste streams. Using acceptable knowledge, generator/storage sites will classify the entire waste stream as hazardous or nonhazardous rather than individual waste containers. Individual waste containers serve as convenient units for characterizing the combined mass of waste from the waste stream of interest. Once segregated by waste stream, random selection and sampling of the waste containers followed by analysis of the waste samples shall be performed to ensure that the resulting mean contaminant concentration provides an unbiased representation of the true mean contaminant concentration for each waste stream. The Permittees shall require each site project manager to verify that the samples collected from within a waste stream were selected randomly.~~

~~An end use of analytical results for retrievably stored homogeneous solids and soil/gravel is for assigning the Environmental Protection Agency (**EPA**) hazardous waste numbers associated with toxicity characteristic waste (D-numbers) that apply to each mixed waste stream. The toxicity characteristic D-numbers are indicators that the waste exhibits the toxicity characteristic for specific contaminants under the Resource Conservation and Recovery Act (**RCRA**). The RCRA toxicity determination is made on the basis of sampling and analysis of waste streams and on whether or not the waste stream includes F-number wastes. If a waste stream includes one or more RCRA F-numbers identified via acceptable knowledge, toxicity characteristic contaminants associated with the F-number waste(s) are not included in the RCRA toxicity characteristic determination. That is, the F-numbers take precedence over RCRA toxicity D-number, and the waste stream is assumed hazardous regardless of the concentration. Therefore, toxicity characteristics contaminants associated with F-numbers for a waste stream shall be omitted from all calculations for determining the number of containers to sample because these wastes streams are assumed to be hazardous. In addition, each toxicity characteristic contaminant associated with the F-number(s) shall be excluded from evaluation of analytical results to determine D-numbers. Contaminants of interest for the sampling, analysis, and RCRA toxicity determination of a waste stream, then, excludes contaminants associated with F-numbers that have been assigned to the waste stream.~~

~~The sampling and analysis strategy is illustrated in Figure C2-1. Preliminary estimates of the mean concentration and variance of each RCRA regulated contaminant in the waste will be~~

~~used to determine the number of waste containers to select for sampling and analysis. Preliminary estimates will be based on a minimum of five samples selected randomly from the waste stream. If the entire waste stream is not accessible for sampling then a minimum of five preliminary samples will be selected randomly from the accessible population. As the rest of the waste stream is retrieved or generated, additional selected containers will be sampled as provided below and the analytical results will be reported to the Permittees. Samples collected to establish preliminary estimates that are selected, sampled, and analyzed using a DOE approved laboratory in accordance with applicable provisions of the WAP may be used as part of the required number of samples to be collected. The applicability of the preliminary estimates to the waste stream to be sampled shall be justified and documented. The preliminary estimates will be determined in accordance with the following equations:~~

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad \text{(C2-1)}$$

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2 \qquad \text{(C2-2)}$$

~~Where:~~

~~$\bar{x}$ = the calculated mean.~~

~~s^2 = the calculated concentration variance.~~

~~n = the number of samples analyzed.~~

~~x_i = the concentration determined in the *ith* sample.~~

~~*i* = an index from 1 to n.~~

~~Based upon the preliminary estimates of $\bar{x}$ and s^2 for each chemical contaminant of concern, estimate the appropriate minimum number of samples (*n*) to be collected for each contaminant using the following formula from SW-846 (EPA 1996):~~

$$n = \frac{t^2_{\alpha, n_0-1}\, s^2}{\left(RT - \bar{x}\right)^2} \qquad \text{(C2-3)}$$

~~Where:~~

~~n_0 = the initial number of samples used to calculate the preliminary estimates.~~

~~*n* = the calculated minimum number of samples to be collected.~~

~~$t_{\alpha,n-1}$ = the 90th percentile for the *t* distribution with n_0-1 degrees of freedom.~~

~~*RT* = the Regulatory Threshold of the contaminant (TC limit for toxicity characteristic wastes, PRQL for listed wastes)~~

~~The number of samples to be collected will be based upon the largest *n* calculated for each of the contaminants of concern. The actual number of samples collected shall be adjusted as necessary to ensure that an adequate number of samples are collected to allow for acceptable levels of completeness.~~

~~Non-integer results of calculations for the required sample size should be rounded up to the next integer. A minimum of five containers shall be sampled and analyzed in each waste stream. If there are fewer containers than the minimum or required number of samples in a waste stream, one or more randomly selected containers shall be sampled more than once to obtain the number of needed samples of the waste. Otherwise any one container may be selected for sampling only once.~~

~~The calculated total number of required waste containers will then be randomly sampled and analyzed using a DOE approved laboratory. Waste container samples from the preliminary mean and variance estimates may be counted as part of the total number of calculated required samples if and only if:~~

- ~~There is documented evidence that the waste containers for the preliminary estimate samples were selected in the same random manner as is chosen for the required samples.~~

- ~~There is documented evidence that the method of sample collection in the preliminary estimate samples were identical to the methodology to be employed for the required samples.~~

- ~~There is documented evidence that the method of sample analysis in the preliminary estimate samples were identical to the analytical methodology employed for the required samples.~~

- ~~There is documented evidence that the validation of the sample analyses in the preliminary estimate samples were comparable to the validation employed for the required samples. In addition, the validated samples results shall indicate that all sample results were valid according to the analytical methodology.~~

~~If only a portion of a waste stream is accessible for sampling (e.g., the remainder of the waste stream will be recovered from storage at the generator/storage site, or only a portion of the waste stream has been repackaged, treated, or generated), the calculated number of samples will be randomly selected from the accessible portion of the waste stream. A minimum of five randomly selected samples will be obtained and analyzed from the accessible portion of the waste stream. DOE may approve the WSPF and authorize the generator/storage site to begin shipping the waste stream to WIPP once the analytical data for the randomly selected samples from the accessible portion of the waste stream have been obtained.~~

~~The generator/storage site will also randomly select the calculated number of sample locations from the waste stream as a whole. A minimum of five randomly selected sample locations will be selected from the waste stream as a whole. As those randomly selected locations (e.g., buried or newly generated waste containers) become accessible for sampling, samples will be obtained and analyzed.~~

~~For those waste streams where the population of the waste stream as a whole is indeterminate (e.g., continually generated waste streams from ongoing processes) or to facilitate waste~~

~~processing, the generator/storage site may divide the waste stream into lots. In this case, a minimum of five randomly selected sample locations will be selected from within each subsequent lot. As those randomly selected locations (e.g., buried or newly generated waste containers) become accessible, samples will be obtained and analyzed. As with sampling from the waste stream as a whole, the generator/storage site may ship waste from the lot being generated or retrieved prior to completing sampling and analysis of the lot.~~

~~The generator/storage site will use the data to update the UCL_{90} values for the waste stream as described in Section C2-2a and assign EPA hazardous waste numbers as appropriate. The generator/storage sites will submit the analytical data from subsequent sampling to the Permittees for inclusion in the WIPP facility operating record upon completion of project level data validation in Permit Attachment C3, Section C3-10b. If changes to EPA hazardous waste numbers are required as a result of subsequent sampling, the generator/storage site will notify the Permittees and shipments of the affected waste stream shall be suspended until DOE approves a revised WSPF for the affected waste stream.~~

~~Upon collection and analysis of the preliminary samples, or at any time after the preliminary samples have been analyzed, the generator/storage site may presumptively assign hazardous waste numbers to a waste stream even if the calculated number of required samples is greater than the preliminary number of samples collected. For waste streams with calculated upper confidence limits below the regulatory threshold, the site shall collect the required number of samples if the site intends to establish that the constituent is below the regulatory threshold.~~

~~C2-1b Statistical Selection of Containers for Headspace Gas Analysis~~

~~Headspace gas sampling of a waste stream may be done on a randomly selected portion of containers in the waste stream. The minimum number of containers, *n*, that must be sampled is determined by taking an initial VOC sample from ten randomly selected containers. These samples are analyzed for all the target analytes analytes using a DOE approved laboratory. The standard deviation, *s*, is calculated for each of the nine VOCs in Part 4, Table 4.4.1. The value of *n* is determined as the largest number of samples (not to exceed the number of containers in the waste stream or waste stream lot) calculated using the following equation:~~

$$n_{voc_i} = \frac{t^2_{\alpha,n-1}\, s^2_{evoc_i}}{E^2_{voc_i}} \qquad \text{(C2-4)}$$

~~Where:~~

~~n_{voci} = the number of samples needed to representatively sample the waste stream for the VOC_i from Table 4.4.1~~

~~$t_{\alpha,n-1}$ = the 90th percentile of the *t* distribution with *n*-1 degrees of freedom~~

~~s_{evoci} = the estimated standard deviation, based on the initial *n* samples, for VOC_i from Table 4.4.1~~

~~E_{voci} = the allowable error determined as 1 percent of the limiting concentration for VOC_i from Table 4.4.1~~

~~Non-integer results of calculations for the required sample size should be rounded up to the next integer. A minimum of ten containers shall be sampled and analyzed in each waste stream. If there are fewer containers than the minimum or required number of samples in a waste stream, then each container should be sampled once.~~

~~The calculated total number of required waste containers will then be randomly sampled and analyzed. Waste container samples from the preliminary mean and variance estimates may be counted as part of the total number of calculated required samples if and only if:~~

- ~~There is documented evidence that the waste containers for the preliminary estimate samples were selected in the same random manner as is chosen for the required samples.~~

- ~~There is documented evidence that the method of sample collection in the preliminary estimate samples were identical to the methodology to be employed for the required samples.~~

- ~~There is documented evidence that the method of sample analysis in the preliminary estimate samples were identical to the analytical methodology employed for the required samples.~~

- ~~There is documented evidence that the validation of the sample analyses in the preliminary estimate samples were comparable to the validation employed for the required samples. In addition, the validated samples results shall indicate that all sample results were valid according to the analytical methodology.~~

~~The mean and standard deviation calculated after sampling *n* containers can be used to calculate a~~ $\cancel{UCL_{90}}$ ~~for each of the headspace gas VOCs using the methodology presented in Section C2-2b.~~

~~If only a portion of a waste stream is accessible for sampling (e.g., the remainder of the waste stream will be recovered from storage at the generator/storage site or only a portion of the waste stream has been repackaged or treated), the calculated number of samples will be randomly selected from the accessible portion of the waste stream. A minimum of ten randomly selected samples will be obtained and analyzed from the accessible portion of the waste stream. DOE may approve the WSPF and authorize the generator/storage site to begin shipping the waste stream to WIPP once the analytical data for the randomly selected samples from the accessible portion of the waste stream has been obtained.~~

~~The generator/storage site will also randomly select the calculated number of sample locations from the waste stream as a whole. A minimum of ten randomly selected sample locations will be selected from the waste stream as a whole. As those randomly selected locations (e.g., buried or newly generated waste containers) become accessible for sampling, samples will be obtained and analyzed.~~

~~For those waste streams where the population of the waste stream as a whole is indeterminate (e.g., continually generated waste streams from ongoing processes) or to facilitate waste processing, the generator/storage site may divide the waste stream into lots. In this case, a minimum of ten randomly selected containers will be selected from within each subsequent lot. As those randomly selected containers (e.g., buried or newly generated waste containers) become accessible, samples will be obtained and analyzed. As with sampling from the waste~~

~~stream as a whole, the generator/storage site may ship waste from the lot being generated or retrieved prior to completing sampling and analysis of the lot.~~

~~The generator/storage site will use the data to update the~~ ~~UCL_{90}~~ ~~values for the waste stream as described in Section C2-2b and assign EPA hazardous waste numbers as appropriate. The generator/storage sites will submit the analytical data from subsequent sampling to the Permittees for inclusion in the WIPP facility operating record upon completion of project level data validation in Permit Attachment C3, Section C3-10b. If changes to EPA hazardous waste numbers are required as a result of subsequent sampling, the generator/storage site will notify the Permittees, and shipments of the affected waste stream shall be suspended until DOE approves a revised WSPF for the affected waste stream.~~

~~Upon collection and analysis of the preliminary samples, or at any time after the preliminary samples have been analyzed, the generator/storage site may presumptively assign hazardous waste numbers to a waste stream even if the calculated number of required samples is greater than the preliminary number of samples collected. For waste streams with calculated upper confidence limits below the regulatory threshold, the site shall collect the required number of samples if the site intends to establish that the constituent is below the regulatory threshold.~~

~~C2-2 Upper Confidence Limits for Statistical Sampling~~

~~C2-2a Upper Confidence Limit for Statistical Solid Sampling~~

~~Upon completion of the required sampling, final mean and variance estimates and the~~ ~~UCL_{90}~~ ~~for the mean concentration for each contaminant shall be determined. The observed sample *n** shall be checked against the preliminary estimate for the number of samples (n) to be collected before proceeding, where n* is:~~

$$n^{*} = \frac{t^{2}_{\alpha,n-1} s^{2}}{\left(RT - \bar{x}\right)^{2}} \qquad \text{(C2-5)}$$

~~and the right side terms in the equation are as defined in Section C2-1a.~~

~~If the observed sample *n** estimate results in greater than 20 percent or more required samples than were originally calculated, then the additional samples required to fulfill the revised sample estimate shall be collected and analyzed. The determination of *n** is an iterative process that follows the collection and analysis of any additional samples and continues until the difference between *n** and the previous sample size determination is less than 20 percent.~~

~~Once sufficient sampling and analysis has occurred, the waste characterization will proceed. The assessment will be made at the 90 percent confidence level. The~~ ~~UCL_{90}~~ ~~for the mean concentration of each contaminant will be calculated using the following equation from OSWER 9285.6-10 (EPA 2002):~~

$$UCL_{90} = \bar{x} + \frac{t_{\alpha,n-1} s}{\sqrt{n}} \qquad \text{(C2-6)}$$

~~If the~~ ~~UCL_{90}~~ ~~for the mean concentration is less than the regulatory threshold limit, the waste stream is not required to be assigned the hazardous waste number for the associated~~

~~contaminant. If the UCL_{90} is greater than or equal to the regulatory threshold limit, the waste stream will be assigned the hazardous waste number for the associated contaminant.~~

~~C2-2b Upper Confidence Limit for Statistical Headspace Gas Sampling~~

~~A *UCL_{90}* concentration for each of the headspace gas VOCs must be calculated from the sample data collected. The observed sample *n** shall be checked against the estimate for the number of samples (n) to be collected before proceeding, where n* is:~~

$$n^* = \frac{t^2_{\alpha,n-1} s^2}{E^2} \qquad \text{(C2-7)}$$

~~where *E* is as defined in Section C2-1b and the remaining right side terms in the equation are defined in Section C2-1a. When composite headspace gas sample results are used, the mean, standard deviation, and t statistic are based on the number of composite samples analyzed, rather than the number of containers sampled.~~

~~If the observed sample *n** estimate results in greater than 20 percent or more required samples than were originally calculated, then the additional samples required to fulfill the revised sample estimate shall be collected and analyzed. The determination of *n** is an iterative process that follows the collection and analysis of any additional samples and continues until the difference between *n** and the previous sample size determination is less than 20 percent. The *UCL_{90}* is then calculated using equation C2-6. In this case, *UCL_{90}* is the 90 percent upper confidence limit for the mean VOC concentration, $\bar{x}$ is the calculated sample mean VOC concentration and *s* is the calculated sample standard deviation. The value of $t_{(\alpha,n-1)}$ is found in Table 9-2 of Chapter 9 of SW-846 (EPA, 1996).~~

~~References~~

~~U.S. EPA, 1996. *Test Methods for Evaluating Solid Waste*. SW 846, Office of Solid Waste and Emergency Response, Washington DC.~~

~~U.S. EPA, 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*. OSWER 9285.6 10, Office of Emergency and Remedial Response, Washington DC.~~

~~**FIGURES**~~

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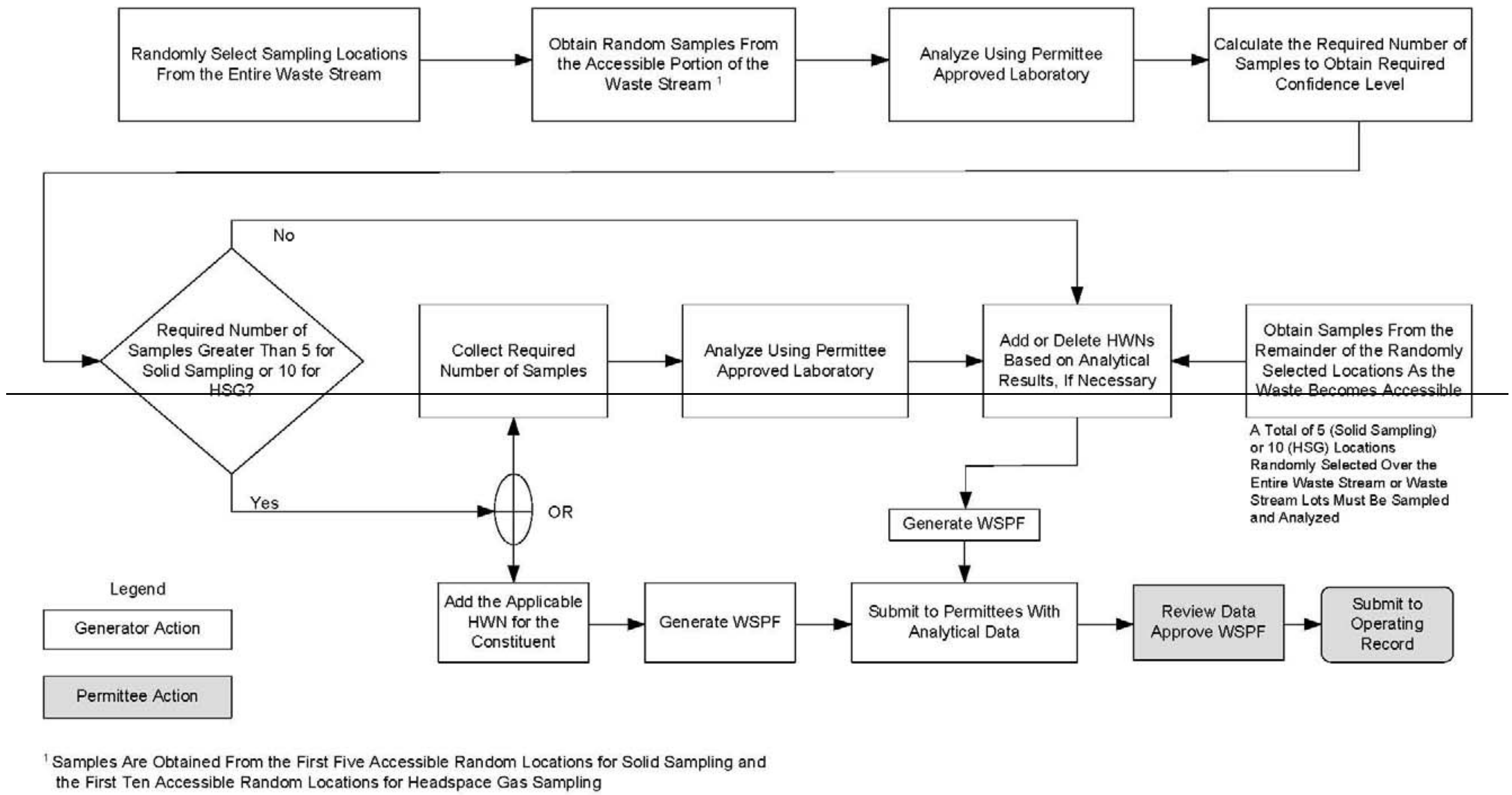

~~Figure C2-1~~

~~Approach for Solid and Headspace Gas Sampling and Analysis to Obtain Additional Waste Characterization Information~~

ATTACHMENT C3

QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION ~~SAMPLING AND ANALYTICAL~~ METHODS

ATTACHMENT C3

QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION ~~SAMPLING AND ANALYTICAL~~ METHODS

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ATTACHMENT C3

QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION ~~SAMPLING AND ANALYTICAL~~ METHODS

C3-1 Validation Methods

The Permittees shall require the generator/storage sites (**sites**) to perform validation of all data ~~(qualitative as well as quantitative)~~ so that data used for Waste Isolation Pilot Plant (**WIPP**) compliance programs will be of known and acceptable quality. ~~Validation includes a quantitative determination of precision, accuracy, completeness, and method detection limits (as appropriate) for analytical data (headspace Volatile Organics Compounds (**VOC**), total VOCs, Semivolatile Organic Compounds (**SVOC**), and metals data). Quantitative data validations shall be performed according to the conventional methods outlined below (equations C3-1 through C3-8). These quantitative determinations will be compared to the Quality Assurance Objectives (**QAOs**) specified in Sections C3-2 through C3-9. A qualitative determination of comparability and representativeness will also be performed.~~

Precision

Precision is a measure of the mutual agreement among multiple measurements. ~~of a single analyte, either by the same method or by different methods. Precision is either expressed as the relative percent difference (**RPD**) for duplicate measurements or as the percent relative standard deviation (**%RSD**) for three or more replicate measurements. For duplicate measurements, the precision expressed as the RPD is calculated as follows:~~

$$\cancel{RPD = \frac{C_1 - C_2}{\frac{(C_1 + C_2)}{2}} \times 100} \qquad \text{(C3-1)}$$

~~where C_1 and C_2 are the two values obtained by analyzing the duplicate samples. C_1 is the larger of the two observed values.~~

~~For three or more replicate measurements, the precision expressed as the %RSD is calculated as follows:~~

$$\cancel{\%RSD = \frac{s}{y_{mean}} \times 100} \qquad \text{(C3-2)}$$

~~where s is the standard deviation and y_{mean} is the mean of the replicate sample analyses.~~

~~The standard deviation, s, is calculated as follows:~~

$$\cancel{s = \sqrt{\frac{\sum_{i=1}^{n} (y_i - y_{mean})^2}{n - 1}}} \qquad \text{(C3-3)}$$

~~where y_i is the measured value of the *i*th replicate sample analysis measurement, and n equals the number of replicate analyses.~~

~~Another aspect of precision is associated with analytical equipment calibration. In these instances, the percent difference (**%D**) between multiple measurements of an equipment calibration standard shall be calculated as follows:~~

$$\%D = \frac{|C_1 - C_2|}{C_1} \times 100 \qquad \text{(C3-4)}$$

~~where C_1 is the initial measurement and C_2 is the second or other additional measurement.~~

Accuracy

Accuracy is the degree of agreement between a measured result~~analyte concentration (or the average of replicate measurements of a single analyte concentration)~~ and the true or known value.~~concentration. Accuracy is determined as the percent recovery (**%R**).~~

~~For situations where a standard reference material is used, the %R is calculated as follows:~~

$$\%R = \frac{C_m}{C_{srm}} \times 100 \qquad \text{(C3-5)}$$

~~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.~~

~~For measurements where matrix spikes are used, the %R is calculated as follows:~~

$$\%R = \frac{S - U}{C_{SC}} \times 100 \qquad \text{(C3-6)}$$

~~where S is the measured concentration in the spiked aliquot, U is the measured concentration in the unspiked aliquot, and C_{SC} is the actual concentration of the spike added.~~

~~Method Detection Limit~~

~~The method detection limit (**MDL**) is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The MDL for all quantitative measurements (except for those using Fourier Transform Infrared Spectroscopy [**FTIRS**]) is defined as follows:~~

$$MDL = t_{(n-1,1-\alpha=99)} \times s \qquad \text{(C3-7)}$$

~~where $t_{(n-1,1-\alpha=.99)}$ is the t distribution value corresponding to a 99 percent confidence level with n-1 degrees of freedom, n is the number of observations, and s is the standard deviation of replicate measurements.~~

~~For headspace gas analysis using FTIRS, MDL is defined as follows:~~

$$~~MDL = 3s~~ \qquad ~~(C3-8)~~$$

~~where s is the standard deviation. Initially, a minimum of seven samples spiked at a level of three to five times the estimated MDL and analyzed on non consecutive days must be used to establish the MDLs. MDLs should be updated using the results of the laboratory control sample or on-line control samples.~~

Completeness

Completeness is a measure of the amount of valid data obtained from a method~~the overall measurement system~~ compared to the total amount of data obtained~~collected and submitted for analysis~~. ~~Completeness must be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Completeness, expressed as the percent complete (**%C**), is calculated as follows:~~

$$\cancel{\%C = \frac{V}{n} \times 100} \qquad ~~(C3-9)~~$$

~~where V is the number of valid sampling or analytical results obtained and n is the number of samples submitted for analysis.~~

Comparability

Comparability is the degree to which one data set can be compared to another. ~~Comparability of data generated at different sites will be ensured through the use of standardized, approved testing, sampling, preservation, and analytical techniques and by meeting the QAOs specified in Sections C3-2 through C3-9.~~

~~The comparability of waste characterization data shall be ensured through the use of generator/storage site data usability criteria. The Permittees shall ensure that data usability criteria are consistently established and used by the generator/storage sites to assess the usability of analytical and testing data. The criteria shall address. as appropriate, the following:~~

- ~~Definition or reference of criteria used to define and assign data qualifier flags based on Quality Assurance Objective results,~~
- ~~Criteria for assessing the usability of data impacted by matrix interferences,~~
- ~~Criteria for assessing the usability of data based upon positive and negative bias as indicated by quality control data, of data qualifiers, and qualifier flags,~~
- ~~Criteria for assessing the usability of data due to~~
  - ~~Severe matrix effects,~~
  - ~~Misidentification of compounds,~~
  - ~~Gross exceedance of holding times,~~
  - ~~Failure to meet calibration or tune criteria~~
- ~~Criteria for assessing the usability of data that does not meet minimum detection limit requirements.~~

~~The Permittees shall be responsible for evaluating generator/storage site data usability and the U.S. Department of Energy (**DOE**) shall assess implementation through the generator/storage site audit.~~

Representativeness

Representativeness is the degree to which ~~sample~~ data represent a characteristic of a population. ~~, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that concerns the proper design of the sampling program.~~

~~Representativeness of waste containers from waste streams subjected to headspace gas, homogeneous solids, and soil/gravel sampling and analysis will be validated, through documentation, that a true random sample with an adequate population was identified and collected consistent with Permit Attachment C2, Section C2-1. Since representativeness is a quality characteristic that expresses the degree to which a sample or group of samples represents the population being studied, the random selection of waste containers ensures representativeness on a Program level. The Permittees shall require the Site Project Manager to document that the selected waste containers from within a waste stream were randomly selected. Sampling personnel shall verify that proper procedures are followed to ensure that samples are representative of the waste contained in a particular waste container or a waste stream.~~

~~Identification of Tentatively Identified Compounds~~

~~In accordance with SW-846 convention, identification of compounds detected by gas chromatography/mass spectrometry methods that are not on the list of target analytes shall be reported. Both composited and individual container headspace gas, volatile analysis (TCLP/Totals), and semi-volatile (TCLP/Totals) shall be subject to tentatively identified compound (**TIC**) reporting. These TICs for GC/MS Methods are identified in accordance with the following SW-846 criteria:~~

~~Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.~~

~~The relative intensities of the major ions should agree within ± 20 percent.~~

~~Molecular ions present in the reference spectrum should be present in the sample spectrum.~~

~~Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.~~

~~Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks.~~

~~The reference spectra used for identifying TICs shall include, at minimum, all of the available spectra for compounds that appear in the 20.4.1.200 NMAC (incorporating 40 CFR Part 261) Appendix VIII list. The reference spectra may be limited to VOCs when analyzing headspace gas samples.~~

~~TICs for headspace gas analyses that are performed through FTIRS analyses shall be identified in accordance with the specifications of SW 846 Method 8410.~~

~~TICs shall be reported as part of the analytical batch data reports for GC/MS Methods in accordance with the following minimum criteria:~~

~~a TIC in an individual container headspace gas or solids sample shall be reported in the analytical batch data report if the TIC meets the SW 846 identification criteria listed above and is present with a minimum of 10% of the area of the nearest internal standard.~~

~~a TIC in a composited headspace gas sample that contains 2 to 5 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW 846 identification criteria listed above and is present with a minimum of 2% of the area of the nearest internal standard.~~

~~a TIC in a composited headspace gas sample that contains 6 to 10 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW 846 identification criteria listed above and is present with a minimum of 1% of the area of the nearest internal standard.~~

~~a TIC in a composited headspace gas sample that contains 11 to 20 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW 846 identification criteria listed above and is present with a minimum of 0.5% of the area of the nearest internal standard.~~

~~TICs that meet the SW 846 identification criteria, are reported in 25 percent of all waste containers sampled from a given waste stream, and that appear in the 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII list, will be compared to acceptable knowledge data to determine if the TIC is a listed waste in the waste stream. TICs identified through headspace gas analyses that meet the Appendix VIII list criteria and the 25 percent reporting criteria for a waste stream will be added to the headspace gas waste stream target list regardless of the hazardous waste listing associated with the waste stream. TICs reported from the Totals VOC or SVOC analyses may be excluded from the target analyte list for a waste stream if the TIC is a constituent in an F-listed waste whose presence is attributable to waste packaging materials or radiolytic degradation from acceptable knowledge documentation. If a listed waste constituent TIC cannot be attributed to waste packaging materials, radiolysis, or other origins, the constituent will be added to the target analyte list and new hazardous waste numbers will be assigned, if appropriate. TICs subject to inclusion on the target analyte list that are toxicity characteristic parameters shall be added to the target analyte list regardless of origin because the hazardous waste designation for these numbers is not based on source. However, for toxicity characteristic and non-toxic F003 constituents, the site may take concentration into account when assessing whether to add a hazardous waste number. If a target analyte list for a waste stream is expanded due to the presence of TICs, all subsequent samples collected from that waste stream will be analyzed for constituents on the expanded list.~~

~~C3-2 Headspace Gas Sampling~~

~~Quality Assurance Objectives~~

~~The precision and accuracy of the container headspace gas sampling operations must be assessed by analyzing field QC headspace gas samples. These samples must include~~

~~equipment blanks, field reference standards, field blanks, and field duplicates. If the QAOs described below are not met, a nonconformance report must be prepared, submitted, and resolved (Section C3-13).~~

~~Precision~~

~~The precision of the headspace-gas sampling and analysis operation must be assessed by sequential collection of field duplicates for manifold sampling operations or simultaneous collection of field duplicates for direct canister sampling operations for VOCs determination. Corrective actions must be taken if the RPD exceeds 25 percent for any analyte found greater than the PRQL in both of the duplicate samples.~~

~~Accuracy~~

~~A field reference standard must be collected using headspace-gas sampling equipment to assess the accuracy of the headspace-gas sampling operation at a frequency of one field reference standard for every 20 containers sampled or per sampling batch. Corrective action must be taken if the %R of the field reference standard is less than 70 or greater than 130.~~

~~Field blanks must also be collected at a frequency of 1 field blank for every 20 containers or sampling batch sampled to assess possible contamination in the headspace gas sampling method. Equipment blanks must also be collected at a frequency of 1 equipment blank for each equipment cleaning batch to assess possible contamination in the equipment cleaning method. Corrective actions must be taken if the blank exceeds three times the MDLs listed for any of the compounds listed in Table C3-2.~~

~~Completeness~~

~~Sampling completeness shall be expressed as the number of valid samples collected as a percent of the total number of samples collected for each waste stream A valid sample is defined as a sample collected in accordance with approved sampling methods and the container was properly prepared for sampling (e.g., the polyliner was vented to the container headspace). The Permittees shall require participating sampling facilities to achieve a minimum 90 percent completeness. The amount and type of data that may be lost during the headspace gas sampling operation cannot be predicted in advance. The Permittees shall require the Site Project Manager to evaluate the importance of any lost or contaminated headspace gas samples and take corrective action as appropriate.~~

~~Comparability~~

~~Consistent use and application of uniform procedures and equipment, as specified in Permit Attachment C1 and application of data usability criteria, should ensure that headspace gas sampling operations are comparable when sampling headspace at the different sampling facilities. The Permittees shall require each site to take corrective actions if uniform procedures, equipment, or operations are not followed without approved and justified deviations. In addition, laboratories analyzing samples must successfully participate in the Performance Demonstration Program (**PDP**) (DOE, 2003).~~

~~Representativeness~~

~~Specific headspace-gas sampling steps to ensure samples are representative include:~~

~~Selection of the correct Drum Age Criteria (**DAC**) Scenario and waste packaging configuration and meeting DAC equilibrium times.~~

~~A sample canister cleaning and leak check after assembly~~

~~Sampling equipment cleaning or disposal after use~~

~~Sampling equipment leak check after sample collection~~

~~Use of sample canisters with passivated internal surfaces~~

~~Use of low internal volume sampling equipment~~

~~Collection of samples with a low sample volume to available headspace volume ratio (less than 10 percent of the headspace when the headspace can be determined)~~

~~Careful and documented pressure regulation of all activities specified in Attachment C1, Section C1-1~~

~~Performance audits~~

~~Collection of equipment blanks, field reference standard, field blanks, and field duplicates at the specified frequencies.~~

~~Manifold pressure sensors and temperature sensors calibrated before initial use and annually using NIST, or equivalent standards.~~

~~OVA calibrated daily, prior to first use, or as necessary according to manufacturer's specifications.~~

~~Failure to perform the checks at the prescribed frequencies would result in corrective actions.~~

~~C3-3 Sampling of Homogeneous Solids and Soils/Gravel~~

~~Quality Assurance Objectives~~

~~To ensure that sampling is conducted in a representative manner on a waste stream basis for waste containers containing homogeneous solids and soil/gravel, samples must be collected randomly in both the horizontal and vertical planes of each container's waste. For waste containers that contain homogeneous solids and soil/gravel in smaller containers (e.g., 1 gal [4.0 L] poly bottles) within the waste container, one randomly chosen smaller container must be sampled from each container.~~

~~Precision~~

~~Sampling precision must be determined by collecting and sampling field duplicates (e.g., co-located cores or co-located samples as described in Permit Attachment C1-2b(1)) once per sampling batch or once per week during sampling operations, whichever is more frequent. A sampling batch is a suite of homogeneous solids and soil/gravel samples collected consecutively using the same sampling equipment within a specific time period. A sampling batch can be up to 20 samples (excluding field QC samples), all of which must be collected~~

~~within 14 days of the first sample in the batch. The Permittees shall require the Site Project Manager to calculate and report the RPD between co-located core/samples.~~

~~The recommended method for establishing acceptance criteria for co-located cores and co-located samples is the F test method because the F Test: 1) does not require potentially arbitrary groupings into batches, 2) is based on exact distributions, and 3) is more likely to detect a change in the process. When a sufficient number of samples are collected (25 to 30 pairs of co-located cores or samples), control charts of the RPD will be developed for each constituent and for each waste matrix or waste type (e.g., pyrochemical salts or organic sludges). The limits for the control chart will be three standard deviations above or below the average RPD. Once constructed, RPDs for additional co-located pairs will be compared with the control chart to determine whether or not the co-located cores are acceptable. Periodically, the control charts will be updated using all available data.~~

~~The statistical test will involve calculating the variance for co-located cores and samples by pooling the variances computed for each pair of duplicate results. The variance for the waste stream will be computed excluding any data from containers with co-located cores, because the test requires the variance estimates to be independent. All data must be transformed to normality prior to computing variances and performing the test. The test hypothesis is evaluated using the F distribution and the method for testing the difference in variances.~~

~~Accuracy~~

~~Sampling accuracy through the use of standard reference materials shall not be measured. Because waste containers containing homogeneous solids and soil/gravel with known quantities of analytes are not available, sampling accuracy cannot be determined. However, sampling methods and requirements described are designed to minimize sample degradation and hence maximize sampling accuracy.~~

~~Sampling accuracy as a function of sampling cross-contamination will be measured. Equipment blanks will be collected at a frequency of once per equipment cleaning batch. Corrective actions must be taken if the blank exceeds three times the MDLs (PRDLs for metals) listed for any of the compounds or analytes listed in Tables C3-4, C3-6, and C3-8. Equipment blanks will be collected from the following equipment types:~~

- ~~Fully assembled coring tools~~
- ~~Liners cleaned separately from coring tools~~
- ~~Miscellaneous sampling equipment that is reused (bowls, spoons, chisels)~~

~~Completeness~~

~~Sampling completeness shall be expressed as the number of valid samples collected as a percent of the total number of samples collected for each waste stream. A valid sample is any sample that is collected from a randomly selected container using randomly selected horizontal and vertical planes in accordance with approved sampling methods. The Permittees shall require participating sampling facilities to achieve a minimum 90 percent completeness.~~

~~Comparability~~

~~Consistent use and application of uniform procedures, sampling equipment, and measurement units must ensure that sampling operations are comparable. Consistent application of data~~

~~usability criteria will also ensure comparability. In addition, the Permittees shall require laboratories analyzing samples to successfully participate in the PDP (DOE, 2005).~~

~~Representativeness~~

~~Specific steps to ensure the representativeness of samples include the following for both waste containers and smaller containers:~~

~~Coring tools and sampling equipment must be clean prior to sampling.~~

~~The entire depth of the waste minus a site defined approved safety factor must be cored, and the core collected must have a length greater than or equal to 50 percent of the depth of the waste. This is called the core recovery and is calculated as follows:~~

$$\cancel{\text{Core recovery (percent)} = \frac{y}{x} \times 100} \qquad \text{~~(C3-10)~~}$$

~~where~~

~~x = the depth of the waste in the container~~

~~y = the length of the core collected from the waste.~~

~~Coring operations and tool selection should be designed to minimize alteration of the in place waste characteristics. Minimal waste disturbance must be verified by visually examining the core and describing the observation (e.g., undisturbed, cracked, or pulverized) in the field logbook.~~

~~If core recovery is less than 50 percent of the depth of the waste, a second coring location shall be randomly selected. The core with the best core recovery shall be used for sample collection.~~

~~One randomly selected container within a container will be chosen if the container contains individual waste containers.~~

C3-2~~4~~ Non Destructive Examination Methods

Quality Assurance Objectives

The QAOs for non destructive examination (**NDE**) are detailed in this section. NDE can be either radiography or visual examination (**VE**). If the QAOs described below are not met, then corrective action shall be taken. It should be noted that NDE ~~does not have a specific MDL because it~~ is primarily a qualitative determination. The objective of NDE for the program is to verify that the physical form of the waste matches the waste stream description as determined by AK and~~determine the physical waste form,~~ the absence of prohibited items~~, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000)~~. The Permittees shall require each site to describe all activities required to achieve these objectives in the site quality assurance project plan (**QAPjP**) and standard operating procedures (**SOP**).

C3-~~2~~4a Radiography

Completeness

A video and audio media recording of the radiography examination and a validated radiography data form will be obtained for 100 percent of the waste containers subject to radiography. All video and audio media recordings and radiography data forms will be subject to validation as indicated in Section C3-4~~10~~.

C3-~~2~~4b Visual Examination

~~C3-5 Gas Volatile Organic Compound Analysis~~

~~Quality Assurance Objectives~~

~~The development of data quality objective (**DQOs**) specifically for this program has resulted in the QAOs listed in Table C3-2. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP-required limits, such as the program required quantitation limits (**PRQL**) associated with VOC analysis, are specified to ensure that the analytical data collected satisfy the requirements of all data users. A summary of the Quality Control Samples and the associated acceptance criteria is included in Table C3-3. Key data quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory duplicates and replicate analyses of laboratory control samples and PDP blind audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-2. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy as %R shall be assessed for the laboratory operations by analyzing PDP blind audit samples and laboratory control samples. Results from these measurements must be compared to the criteria listed in Table C3-2. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~GC/MS Tunes, Initial Calibrations, and Continuing Calibration will be performed and evaluated using the procedures and criteria specified in Table C3-3. These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Method Detection Limit~~

~~MDLs shall be expressed in nanograms for VOCs and must be less than or equal to those listed in Table C3-2. MDLs shall be determined based on the method described in Section C3-1. The detailed procedures for MDL determination shall be included in site SOPs.~~

~~Program Required Quantitation Limit~~

~~Laboratories must demonstrate the capability to quantitate analytes at or below the PRQLs given in Table C3-2. Laboratories shall set the concentration of at least one calibration standard below the PRQL. The detailed procedures for PRQL demonstration shall be included in laboratory SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. A composited sample is treated as one sample for the purposes of completeness, because only one sample is run through the analytical instrument. Valid results are defined as results that meet the data usability criteria based on application of the Quality Control Criteria specified in Tables C3-2 and C3-3; and meet the detection limit, calibration representativeness, and comparability criteria within this section. The Permittees shall require that participating laboratories meet the completeness criteria specified in Table C3-2.~~

~~Comparability~~

~~For VOC analysis, data generated through analysis of samples from different sites shall be comparable. The Permittees shall require each site to achieve comparability by using standardized methods and traceable standards and by requiring all sites to successfully participate in the PDP (DOE, 2003).~~

~~Representativeness~~

~~Representativeness for VOC analysis shall be achieved by collecting sufficient numbers of samples using clean sampling equipment that does not introduce sample bias. Samples must be collected as described in Permit Attachment C1.~~

~~C3-6 Total Volatile Organic Compound Analysis~~

~~Quality Assurance Objectives~~

~~The development of DQOs specifically for this program has resulted in the QAOs listed in Table C3-4. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP required limits, such as the PRQL associated with VOC analysis, are specified to ensure that the analytical data collected satisfy the requirements of all data users. Key data quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory duplicates or matrix spike duplicates, replicate analyses of laboratory control samples, and PDP blind audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-4. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy as %R shall be assessed for the laboratory operations by analyzing laboratory control samples, matrix spikes, surrogate compounds, and PDP blind audit samples. Results from these measurements for matrix spikes samples must be compared to the %R criteria listed in Table C3-4. Results for surrogates and internal standards are evaluated as specified in the SW-846 method (EPA 1996) or Table C3-5. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Laboratory blanks shall be assessed to determine possible laboratory contamination and are evaluated as specified in Table C3-5. These QC measurements will be used to demonstrate acceptable levels of laboratory contamination and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~GC/MS Tunes, Initial Calibrations, and Continuing Calibration will be performed and evaluated using the procedures and criteria specified in Table C3-5 and the SW-846 method (EPA 1996). These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Method Detection Limit~~

~~MDLs shall be expressed in milligrams per kilogram (mg/kg) for VOCs and must be less than or equal to those listed in Table C3-4. The detailed procedures for MDL determination shall be included in site SOPs.~~

~~Program Required Quantitation Limit~~

~~Laboratories must demonstrate the capability to quantitate analytes in samples at or below the PRQLs given in Table C3-4. Laboratories shall set the concentration of at least one calibration standard below the PRQL. The detailed procedures for PRQL demonstration shall be included in laboratory SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Valid results are defined as results that meet the data usability criteria based upon application of the Quality Control Criteria specified in Tables C3-4 and C3-5 and meet the calibration, detection limit, representativeness, and comparability criteria within this section. Participating laboratories must meet the completeness criteria specified in Table C3-4.~~

~~Comparability~~

~~For VOC analysis, data generated through analysis of samples from different sites shall be comparable. The Permittees shall require sites to achieve comparability by using standardized SW-846 sample preparation and methods that meet the QAO requirements in Tables C3-4 and C3-5, traceable standards, and by requiring all sites to successfully participate in the PDP (DOE, 2005). Generator/storage sites may use the most recent version of SW-846. Any~~

~~changes to SW-846 methodology that results in the elimination of sample preparation or analytical methods in use at generator/storage sites must be addressed as a corrective action to address the comparability of data before and after the SW-846 modification.~~

~~Representativeness~~

~~Representativeness for VOC analysis shall be achieved by collecting unbiased samples. Samples must be collected as described in Permit Attachment C1.~~

~~C3-7   Total Semivolatile Organic Compound Analysis~~

~~Quality Assurance Objectives~~

~~The development of DQOs specifically for this program has resulted in the QAOs listed in Table C3-6. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP-required limits, such as the PRQLs, are specified to ensure that the analytical data collected satisfy the requirements of all data users. A summary of Quality Control Samples and associated acceptance criteria for this analysis is included in Table C3-7. Key data quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory duplicates or matrix spike duplicates, replicate analyses of laboratory control samples, and PDP blind-audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-6. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy as %R shall be assessed for the laboratory operations by analyzing laboratory control samples, matrix spikes, surrogate compounds, and PDP blind-audit samples. Results from these measurements for matrix spikes samples must be compared to the %R criteria listed in Table C3-6. Results for surrogates and internal standards are evaluated as specified in the SW-846 method (EPA 1996) or Table C3-7. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Laboratory blanks shall be assessed to determine possible laboratory contamination and are evaluated as specified in Table C3-7. These QC measurements will be used to demonstrate acceptable levels of laboratory contamination and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~GC/MS Tunes, Initial Calibrations, and Continuing Calibration will be performed and evaluated using the procedures and criteria specified in Table C3-7 and the SW-846 method (EPA 1996). These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Method Detection Limit~~

~~MDLs shall be expressed in mg/kg for SVOCs and must be less than or equal to those listed in Table C3-6. The detailed procedures for MDL determination shall be included in site SOPs.~~

~~Program Required Quantitation Limit~~

~~Laboratories must demonstrate the capability to quantitate analytes in samples at or below the PRQLs given in Table C3-6. Laboratories shall set the concentration of at least one calibration standard below the PRQL. The detailed procedures for PRQL demonstration shall be included in laboratory SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Valid results are defined as results that meet the data usability criteria based on application of the Quality Control Criteria specified in Tables C3-6 and C3-7 and meet the detection limit, calibration, representativeness, and comparability criteria within this section. The Permittees shall require participating laboratories to meet the level of completeness specified in Table C3-6.~~

~~Comparability~~

~~For SVOC analysis, data generated through analysis of samples from different sites shall be comparable. The Permittees shall require sites to achieve comparability by using standardized SW-846 sample preparation and methods that meet the QAO requirements in Tables C3-6 and C3-7, traceable standards, and by requiring all sites to successfully participate in the PDP (DOE, 2005). Generator/storage sites may use the most current version of SW-846 if the methods are consistent with QAO requirements. Any changes to SW-846 methodology that results in the elimination of sample preparation or analytical methods in use at generator/storage sites must be addressed as a corrective action to address the comparability of data before and after the SW-846 modification.~~

~~Representativeness~~

~~Representativeness for SVOC analysis shall be achieved by collecting unbiased samples. Samples must be collected as described in Permit Attachment C1.~~

~~C3-8 Total Metal Analysis~~

~~Quality Assurance Objectives~~

~~The development of DQOs for the program has resulted in the QAOs listed in Table C3-8. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP required limits, such as the PRQLs associated with metal analysis, are specified to ensure that the analytical data collected satisfy the requirements of all data users. A summary of Quality Control Samples and the associated acceptance criteria for this analysis is provided in Table C3-9. Key data quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory sample duplicates or laboratory matrix spike duplicates, replicate analyses of laboratory control samples, and PDP blind audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-8. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy shall be assessed through the analysis of laboratory matrix spikes, PDP blind audit samples, serial dilutions, interference check samples, and laboratory control samples. Results from these measurements must be compared to the criterion listed in Table C3-8 and C3-9. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Laboratory blanks and calibration blanks shall be assessed to determine possible laboratory contamination and are evaluated as specified in Table C3-9. These QC measurements will be used to demonstrate acceptable levels of laboratory contamination and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~Mass Tunes (for ICP-MS only), Standards Calibration, Initial Calibration verifications, and Continuing Calibrations will be performed and evaluated using the procedures and criteria specified in Table C3-9 and the SW-846 method (EPA 1996). These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Program Required Detection Limits~~

~~PRDLs, expressed in units of micrograms per L (µg/L), are the maximum values for instrument detection limits (**IDL**) permissible for program support under the WAP. IDLs must be less than or equal to the PRDL for the method used to quantitate a specific analyte. Any method listed in Table C-5 of the Waste Analysis Plan (Permit Attachment C) may be used if the IDL meets this criteria. For high concentration samples, an exception to the above requirements may be made in cases where the sample concentration exceeds five times the IDL of the instrument being used. In this case, the analyte concentration may be reported even though the IDL may exceed the PRDL. IDLs shall be determined semiannually (i.e., every six months). Detailed procedures for IDL determination shall be included in laboratory SOPs.~~

~~Program Required Quantitation Limit~~

~~The Permittees shall require participating laboratories to demonstrate the capability of analyte quantitation at or below the PRQLs in units of mg/kg wet weight (given in Table C3-8). The PRDLs are set an order of magnitude less than the PRQLs (assuming 100 percent solid sample diluted by a factor of 100 during preparation). The Permittees shall require participating laboratories to set the concentration of at least one QC or calibration standard at or below the solution concentration equivalent of the PRQL. Detailed calibration procedures shall be included in site SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Valid results are defined as results that meet the data usability criteria based upon application of the Quality Control Criteria specified in Tables C3-8 and C3-9 and meet the detection limit, calibration, representativeness, and comparability criteria within this section. The Permittees shall require participating laboratories to meet the completeness specified in Table C3-8.~~

~~Comparability~~

~~For metals analysis, data generated through analysis of samples from different sites shall be comparable. Comparability will be achieved by using standardized SW-846 sample preparation and methods that meet QAO requirements in Tables C3-8 and C3-9, demonstrating successful participation in the PDP (DOE, 2005), and use of traceable standards. Generator/storage sites may use the most recent SW-846 update. Any changes to SW-846 methodology that results in the elimination of sample preparation or analytical methods in use at generator/storage sites must be addressed as a corrective action to address the comparability of data before and after the SW-846 modification.~~

~~Representativeness~~

~~Representativeness for metals analysis shall be achieved by the collection of unbiased samples and the preparation of samples in the laboratory using representative and unbiased methods. Samples must be collected as described in Permit Attachment C1.~~

C3-3~~9~~ Acceptable Knowledge

Acceptable knowledge documentation provides primarily qualitative information that cannot be assessed according to specific data quality goals that are used for quantitative~~analytical~~ techniques. ~~QAOs for analytical results are described in terms of precision, accuracy, completeness, comparability, and representativeness. Appropriate analytical and testing results may be used to augment the characterization of wastes based on acceptable knowledge.~~ To ensure that the acceptable knowledge process is consistently applied, t~~T~~he Permittees shall require sites to comply with the following data quality requirements for acceptable knowledge documentation:

- Precision - ~~Precision is the agreement among a set of replicate measurements without assumption of the knowledge of a true value.~~ The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. However, the acceptable knowledge information will be addressed by the independent review of acceptable knowledge information during internal and external audits.

- Accuracy - ~~Accuracy is the degree of agreement between an observed sample result and the true value.~~ The percentage of waste containers which require reassignment to a new waste matrix code and/or designation of different hazardous waste numbers based on testing~~sampling and analysis~~ data and discrepancies identified by the Permittees during waste confirmation will be reported as a measure of acceptable knowledge accuracy.

- Completeness - ~~Completeness is an assessment of the number of waste streams or number of samples collected to the number of samples determined to be useable through the data validation process.~~ The acceptable knowledge record must contain 100 percent of the required information (Permit Attachment C4-3). The usability of the acceptable knowledge information will be assessed for completeness during audits.

- Comparability - ~~Data are considered comparable when one set of data can be compared to another set of data.~~ Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites must assign hazardous waste numbers in accordance with Permit Attachment C4-3b and provide this information regarding its waste to other sites who store or generate a similar waste stream.

- Representativeness - ~~Representativeness expresses the degree to which sample data accurately and precisely represent characteristics of a population.~~ Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Permit Attachment C4. Sites also must assess and document the limitations of the acceptable knowledge information used to assign hazardous waste numbers (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed).

The Permittees shall require each generator/storage site to comply with the nonconformance notification and reporting requirements of Section C3-7~~13~~ if the results of testing~~sampling and analysis~~ specified in Permit Attachment C are inconsistent with acceptable knowledge documentation.

The Permittees shall require each site to address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting acceptable knowledge inconsistencies identified through radiography~~,~~ and visual examination~~, headspace gas analyses, and solidified waste analyses~~. In addition, the acceptable knowledge process and waste stream documentation must be evaluated through internal assessments by generator/storage site quality assurance organizations and assessments by auditors external to the organization (i.e., the Permittees).

C3-4~~10~~ Data Review, Validation, and Verification Requirements

Procedures shall be developed for the review, validation, and verification of data at the data generation level; the validation and verification of data at the project level; and the verification of data at the Permittee level. Data review determines if raw data have been properly collected and ensures raw data are properly reduced. Data validation verifies that the data reported satisfy the requirements of this WAP and is accompanied by signature release. Data verification authenticates that data as presented represent the testing~~sampling and analysis~~ activities as performed and have been subject to the appropriate levels of data review. The requirements presented in this section ensure that WAP records furnish documentary evidence of quality.

The Permittees shall require the sites to generate the following Batch Data Reports for data validation, verification, and quality assurance activities:

- A Testing Batch Data Report or equivalent includes all data pertaining to radiography or visual examination for up to 20 waste containers without regard to waste matrix. Table C3-3~~11~~ lists all of the information required in Testing Batch Data Reports (identified with an "X") and other information that is necessary for data validation, but is optional in Testing Batch Data Reports (identified with an "O").

- ~~A Sampling Batch Data Report or equivalent includes all sample collection data pertaining to a group of no more than 20 headspace gas or homogeneous waste samples that were collected for chemical analysis. Table C3-12 lists all of the information required in Sampling Batch Data Reports (identified with an "X") and other information that is necessary for data validation, but is optional in Sampling Batch Data Reports (identified with an "O").~~

- ~~An Analytical Batch Data Report or equivalent includes analytical data from the analysis of TRU mixed waste for up to 20 headspace gas or homogeneous waste samples. Analytical Batch Data Reports or equivalent that contain results for composited headspace gas samples must contain sufficient information to identify the containers that were composited for each composite sample and the sample volume that was taken from each waste container. Because Analytical Batch Data Reports are generated based on the number of samples analyzed, an Analytical Batch Data Report may contain results that are applicable to more than 20 containers depending on how many composite samples are part of the report, but may not exceed a total of 20 samples analyzed. Table C3-13 lists all of the information required in Analytical Batch Data Reports (identified with an "X") and other information that is necessary for data validation, but is optional in Analytical Batch Data Reports (identified with an "O").~~

  ~~Raw analytical data need not be included in Analytical Batch Data Reports, but must be maintained in the site project files and be readily available for review upon request. Raw data may include all analytical bench sheet and instrumentation readouts for all calibration standard results, sample data, QC samples, sample preparation conditions and logs, sample run logs, and all re-extraction, re-analysis, or dilution information pertaining to the individual samples. Raw data may also include calculation records and any qualitative or semi-quantitative data collected for a sample and that has been recorded on a bench sheet or in a log book.~~

- ~~An On-line Batch Data Report or equivalent contains the combined information from the Sampling Batch Data Report and Analytical Batch Data Report that is relevant to the on-line method used.~~

C3-4~~10~~a Data Generation Level

The following are minimum requirements for raw data collection and management which the Permittees shall require for each site:

- All raw data shall be signed and dated in reproducible ink by the person generating it. Alternately, unalterable electronic signatures may be used.

- All data must be recorded clearly, legibly, and accurately in field~~ and laboratory~~ records ~~(bench sheets, logbooks), and include applicable sample identification numbers (for sampling and analytical labs)~~.

- All changes to original data must be lined out, initialed, and dated by the individual making the change. A justification for changing the original data may also be included. Original data must not be obliterated or otherwise disfigured so as not to be readable. Data changes shall only be made by the individual who originally collected the data or an individual authorized to change the data.

- All data must be transferred and reduced from field ~~and laboratory~~ records completely and accurately.

- All field ~~and laboratory~~ records must be maintained as specified in Table C-2~~6~~ of Attachment C.

- Data must be organized into a standard format for reporting purposes (Batch Data Report), as outlined in specific testing~~sampling and analytical~~ procedures.

- All electronic and video data must be stored appropriately to ensure that waste container~~, sample,~~ and associated QC data are readily retrievable. In the case of classified information, additional security provisions may apply that could restrict retrievability. The additional security provisions will be documented in generator/storage site procedures as outlined in the QAPjP in accordance with prevailing classified information security standards.

Data review, validation, and verification at this level involves scrutiny and signature release from qualified independent technical reviewer(s) not involved in the generation or recording of the data under review, as specified below. Individuals conducting this data review, validation, and verification must use checklists that address all of the items included in this section. ~~Checklists must contain or reference tables showing the results of sampling, analytical or on-line batch QC samples, if applicable. Checklists must reflect review of all QC samples and quality assurance objective categories in accordance with criteria established in Tables C3-2 through C3-9 (as applicable to the methods validated).~~ Completed checklists must be forwarded with Batch Data Reports to the project level. ~~Analytical raw data must be available and reviewed by the data generation level reviewer.~~

C3-4~~10~~a(1) Independent Technical Review

One hundred percent of the Batch Data Reports must receive an independent technical review by a trained and qualified individual who was not involved in the generation or recording of the data under review. This review shall be performed by an individual other than the data generator who is qualified to have performed the initial work. The independent technical review must be performed as soon as practicably possible in order to determine and correct negative quality trends in the testing~~sampling or analytical~~ process. However at a minimum, the independent technical review must be performed before any waste associated with the data reviewed is managed, stored, or disposed at WIPP~~, unless the data are being obtained from waste sampling and analysis as containers are being retrieved or generated after initial WSPF approval as described in Attachment C2, Section C2-1~~. The reviewer(s) must release the data as evidenced by signature, and as a consequence ensure the following:

- Data generation and reduction were conducted in a technically correct manner in accordance with the methods used (procedure with revision). Data were reported in the proper units and correct number of significant figures.

- Calculations have been verified by a valid calculation program, a spot check of verified calculation programs, and/or 100 percent check of all hand calculations. Values that are not verifiable to within rounding or significant difference discrepancies must be rectified prior to completion of independent technical review.

- The data have been reviewed for transcription errors.

- The testing~~, sampling, or analytical~~ data QA documentation for Batch Data Reports is complete and includes, as applicable, raw data, ~~DAC and equilibrium calculations and times,~~ calculation records, ~~chain of custody (**COC**) forms,~~ calibration records (or references to an available calibration package)~~, QC sample results, and copies or originals of gas canister sample tags~~. Corrective action will be taken to ensure that all Batch Data Reports are complete and include all necessary raw data prior to completion of the independent technical review.

- ~~QC sample results are within established control limits, and if not, the data have been appropriately qualified in accordance with data usability criteria. Data outside of established control limits will be qualified as appropriate, assigned an appropriate qualifier flag, discussed in the case narrative, and included as appropriate in calculations for completeness. QC criteria that were not met are documented.~~

- ~~Reporting flags (Table C3-14) were assigned correctly.~~

- ~~Sample holding time and preservation requirements were met, or exceptions documented.~~

- Radiography tapes have been reviewed (independent observation) on a waste container basis at a minimum of once per testing batch or once per day of operation, whichever is less frequent (Attachment C1, Section C1-1~~3~~). The radiography tape will be reviewed against the data reported on the radiography form to ensure that the data are correct and complete.

- ~~Field sampling records are complete. Incomplete or incorrect field sampling records will be subject to resubmittal prior to completion of the independent technical review.~~

- QAOs have been met according to the methods outlined in Sections C3-2 ~~through~~and C3-3~~9~~.

C3-4~~10~~b Project Level

Data validation and verification at this level involves scrutiny and signature release from the Site Project Manager (or designee). The Permittees shall require each site to meet the following minimum requirements for each waste container. Any nonconformance identified during this process shall be documented on a nonconformance report (Section C3-7~~13~~).

C3-~~4~~10b(1) Site Project Manager Review

The Site Project Manager Review is the final validation that all of the data contained in Batch Data Reports from the data generation level are complete and have been properly reviewed as evidenced by signature release and completed checklists.

One hundred percent of the Batch Data Reports must have Site Project Manager signature release. At a minimum, the Site Project Manager signature release must be performed before any waste associated with the data reviewed is managed, stored, or disposed at WIPP~~, unless the data are being obtained from waste sampling and analysis as containers are being retrieved or generated as described in Permit Attachment C2, Section C2-1~~. This signature release must ensure the following:

- ~~The validity of the DAC assignment made at the data generation level based upon an assessment of the data collection and evaluation necessary to make the assignment.~~

- Testing batch QC checks (e.g., replicate scans, measurement system checks) were properly performed. Radiography data are complete and acceptable based on evidence of videotape review of one waste container per day or once per testing batch, whichever is less frequent, as specified in Permit Attachment C1, Section C1-1~~3~~.

- ~~Sampling batch QC checks (e.g., equipment blanks, field duplicates, field reference standards) were properly performed, and meet the established QAOs and are within established data usability criteria.~~

- ~~Analytical batch QC checks (e.g., laboratory duplicates, laboratory blanks, matrix spikes, matrix spike duplicates, laboratory control samples) were properly performed and meet the established QAOs and are within established data usability criteria.~~

- ~~On line batch QC checks (e.g., field blanks, on line blanks, on line duplicates, on line control samples) were properly performed and meet the established QAOs and are within established data usability criteria.~~

- ~~Proper procedures were followed to ensure representative samples of headspace gas and homogeneous solids and soil/gravel were taken.~~

- Data generation level independent technical review, validation, and verification have been performed as evidenced by the completed review checklists and appropriate signature releases.

- Independent technical reviewers were not involved in the generation or recording of the data under review.

- Batch data review checklists are complete.

- Batch Data Reports are complete and data are properly reported (e.g., data are reported in the correct units, and with the correct number of significant figures~~, and with qualifying flags~~).

- Verify that data are within established data assessment criteria and meet all applicable QAOs (Sections C3-2 ~~through~~and C3-3~~9~~).

C3-4~~10~~b(2) Prepare Site Project Manager Summary and Data Validation Summary

To document the project-level validation and verification described above, the Permittees shall require each Site Project Manager (or designee) to prepare a Site Project Manager Summary and a Data Validation Summary. These reports may be combined to eliminate redundancy. The Site Project Manager Summary includes a validation checklist for each Batch Data Report. Checklists for the Site Project Manager Summary must be sufficiently detailed to validate all aspects of a Batch Data Report that affect data quality. The Data Validation Summary provides verification that, on a per waste container~~ or sample~~ basis as evidenced by Batch Data Report reviews, all data have been validated in accordance with the site QAPjP. The Data Validation Summary must identify each Batch Data Report reviewed (including all waste container numbers), describe how the validation was performed and whether or not problems were detected (e.g., nonconformance reports), and include a statement indicating that all data are acceptable. Summaries must include release signatures.

~~Once the data have received project level validation and verification or when the Site Project Manager decides the sample no longer needs to be retained, the Site Project Manager must ensure that the laboratory is notified. Samples must be retained by the laboratory until this notification is received. Gas sample canisters may then be released from storage for cleaning, recertification, and subsequent reuse. Sample tags must be removed and retained in the project files before recycling the canisters. If the Site Project Manager requests that samples or canisters be retained for future use (e.g., an experimental holding time study), the same sample identification and COC forms shall be used and cross referenced to a document which specifies the purpose for sample or canister retention.~~

C3-4~~10~~b(3) Prepare Waste Stream Characterization Package

C3-4~~10~~c Permittee Level

The final level of data verification occurs at the Permittee level and must, at a minimum, consist of reviewing a sample of the Batch Data Reports during audits of generator/storage sites ~~and DOE approved laboratories~~ to verify completeness. During such audits, DOE is responsible for the verification that Batch Data Reports include the following:

- Project-level signature releases
- Listing of all waste containers being presented in the report
- Listing of all testing~~, sampling, and analytical~~ batch numbers associated with each waste container being reported in the package
- ~~Analytical Batch Data Report case narratives~~
- Site Project Manager Summary
- Data Validation Summary
- ~~Complete summarized qualitative and quantitative data for all waste containers with data flags and qualifiers.~~

C3-5~~11~~ Reconciliation with Data Quality Objectives

Reconciling the results of waste testing~~ and analysis~~ with the DQOs provides a way to ensure that data will be of adequate quality to support the regulatory compliance programs. Reconciliation with the DQOs will take place at both the project level and the Permittees' level. At the project level, reconciliation will be performed by the Site Project Manager, while at the Permittees' level, reconciliation will be performed as described below.

C3-5~~11~~a Reconciliation at the Project Level

The Permittees shall require each Site Project Manager to ensure that all data generated and used in decision making meet the DQOs provided in Section C-4a(1) of Permit Attachment C. To do so, the Site Project Manager must assess whether data of sufficient type, quality, and quantity have been collected. ~~The Site Project Manager must determine if the variability of the data set is small enough to provide the required confidence in the results. The Site Project Manager must also determine if, based on the desired error rates and confidence levels, a sufficient number of valid data points have been determined (as established by the associated completeness rate for each sampling and analytical process). In addition, the Site Project Manager must document that random sampling of containers was performed for the purposes of waste stream characterization.~~

For each waste stream characterized, the Permittees shall require each Site Project Manager to determine if sufficient data have been collected to determine the following WAP-required waste parameters, as applicable:

- Waste matrix code
- Waste material parameter weights
- If each waste container of waste contains TRU radioactive waste
- ~~Mean concentrations, UCL_{90} for the mean concentrations, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream~~
- ~~Mean concentrations, UCL_{90} for the mean concentrations, standard deviations, and number of samples collected for VOCs, SVOCs, and metals in the waste stream~~
- Whether the waste stream exhibits a toxicity characteristic (**TC**) under 40 CFR Part 261, Subpart C
- Whether the waste stream contains listed waste found in 20.4.1.200 NMAC incorporating 40 CFR Part 261, Subpart D
- Whether the waste stream can be classified as hazardous or nonhazardous~~ at the 90 percent confidence level~~
- ~~Whether an appropriate packaging configuration and DAC were applied and documented in the headspace gas sampling documentation, and whether the drum age was met prior to sampling.~~

- ~~Whether all TICs were appropriately identified and reported in accordance with the requirements of Section C3-1 prior to submittal of a WSPF for a waste stream or waste stream lot.~~

- Whether the overall completeness, comparability, and representativeness QAOs were met for each of the~~ analytical and~~ testing procedures as specified in Sections C3-2 ~~through~~and C3-3~~9~~ prior to submittal of a WSPF for a waste stream or waste stream lot.

- ~~Whether the PRQLs for all analyses were met prior to submittal of a WSPF for a waste stream or waste stream lot.~~

If the Site Project Manager determines that insufficient data have been collected to make the determinations listed above, additional data collection efforts must be undertaken. The reconciliation of a waste stream shall be performed, as described in Permit Attachment C4, prior to submittal of WSPF and Characterization Information Summary to the Permittees for that waste stream. The Permittees shall not manage, store, or dispose a TRU mixed waste stream at WIPP unless the Site Project Manager determines that the WAP-required waste parameters listed above have been met for that waste stream.

~~The statistical procedure presented in Permit Attachment C2 shall be used by participating Site Project Managers to evaluate and report waste characterization data from the analysis of homogeneous solids and soil/gravel. The procedure, which calculates UCL_{90} values, shall be used to assess compliance with the DQOs in Attachment C, Section C-4a(1) as well as with RCRA regulations. The procedure must be applied to all laboratory analytical data for total VOCs, total SVOCs, and total metals. For RCRA regulatory compliance (40 CFR §261.24), data from the analysis of the appropriate metals and organic compounds shall be expressed as toxicity characteristic leaching procedure (**TCLP**) values or results may also be compared to the TC levels expressed as total values. These total values will be considered the regulatory threshold limit (**RTL**) values for the WAP. RTL values are obtained by calculating the weight/weight concentration (in the solid) of a TC analyte that would give the regulatory weight/volume concentration (in the TCLP extract), assuming 100-percent analyte dissolution.~~

C3-5~~11~~b Reconciliation at the Permittee Level

C3-6~~12~~ Data Reporting Requirements

C3-6~~12~~a Data Generation Level

Data shall be transmitted by hard copy or electronically (provided a hard copy is available on demand) from the data generation level to the project level. Transmitted data shall include all Batch Data Reports and data review checklists. The Batch Data Reports and checklists used must contain all of the information required by the testing~~, sampling, and analytical~~ techniques described in Permit Attachments C1 through C6, as well as the signature releases to document the review, validation, and verification as described in Section C3-4~~10~~. All Batch Data Reports and checklists shall be in approved formats, as provided in site-specific documentation.

Batch Data Reports shall be forwarded to the Site Project Manager. All Batch Data Reports shall be assigned serial numbers, and each page shall be numbered. The serial number used for Batch Data Reports can be the same as the testing~~, sampling, or analytical~~ batch number.

QA documentation, including raw data, shall be maintained in either testing~~, sampling, and analytical~~ facility files, or site project files for those facilities located on site in accordance with the document storage requirements of site approved site QAPjPs. ~~DOE approved laboratories shall forward testing, sampling, and analytical QA documentation along with Batch Data Reports to the site project office for inclusion in site project files.~~

C3-6~~12~~b Project Level

The site project office shall prepare a WSPF for each waste stream certified for shipment to WIPP based on information obtained from acceptable knowledge and Batch Data Reports, if applicable. In addition, the site project office must ensure that the Characterization Information Summary and the Waste Stream Characterization Package (when requested by the Permittees) are prepared as appropriate. The Site Project Manager must also verify these reports are consistent with information found in~~ analytical~~ batch reports. Summarized testing~~, sampling, and analytical~~ data are included in the Characterization Information Summary. The contents of the WSPF, Characterization Information Summary, and Waste Stream Characterization Package are discussed in the following sections.

C3-6~~12~~b(1) Waste Stream Profile Form

C3-6~~12~~b(2) Characterization Information Summary

The Characterization Information Summary shall include the following elements, if applicable:

- Data reconciliation with DQOs

- ~~Headspace gas summary data listing the identification numbers of samples used in the statistical reduction, the maximum, mean, standard deviation, UCL~~$_{90}$~~, RTL, and associated EPA hazardous waste numbers that must be applied to the waste stream.~~

- ~~Total metal, VOC, and SVOC analytical results for homogeneous solids and soil/gravel (if applicable).~~

- ~~TIC listing and evaluation.~~

- Radiography and VE summary to document that all prohibited items are absent in the waste and to verify that the physical form of the waste matches the waste stream description as determined by AK (if applicable).

- A justification for the selection of radiography and/or~~/~~ VE as an appropriate method for characterizing the waste.

- A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each Batch Data Report

- Complete AK summary, including stream name and number, point of generation, waste stream volume (current and projected), generation dates, TRUCON codes, Summary Category Group, Waste Matrix Code(s) and Waste Matrix Code Group, other TWBIR information, waste stream description, areas of operation, generating processes, RCRA determinations, radionuclide information, all references used to generate the AK summary, and any other information required by Permit Attachment C4, Section C4-2b.

- Method for determining Waste Material Parameter Weights per unit of waste.

- List of any AK Sufficiency Determinations requested for the waste stream.

- Certification through acceptable knowledge or testing ~~and/or analysis~~ that any waste assigned the hazardous waste number of U134 (hydrofluoric acid) no longer exhibits the characteristic of corrosivity. This is verified by ensuring that no liquid is present in U134 waste.

C3-6~~12~~b(3) Waste Stream Characterization Package

The Waste Stream Characterization Package includes the following information:

- Waste Stream Profile Form (WSPF, Section C3-6~~12~~b(1))

- Accompanying Characterization Information Summary (Section C3-6~~12~~b(2))

- Complete AK summary (Section C3-6~~12~~b(2))

- Batch Data Reports supporting the characterization of the waste stream and any others requested by the Permittees

- Raw testing~~analytical~~ data requested by the Permittees

C3-6~~12~~b(4) WIPP Waste Information System (**WWIS**) Data Reporting

The WWIS Data Dictionary includes all of the data fields, the field format and the limits associated with the data as established by this WAP. These data will be subjected to edit and limit checks that are performed automatically by the database, as defined in the *Waste Data System User's Manual* (DOE, 2009). ~~If a container was part of a composite headspace gas sample, the analytical results from the composite sample must be assigned as the container headspace gas data results, including associated TICs, for every waste container associated with the composite sample.~~

C3-7~~13~~ Nonconformances

Nonconformances

Management at all levels shall foster a "no-fault" attitude to encourage the identification of nonconforming items and processes. Nonconformances may be detected and identified by anyone performing WAP activities, including

- Project staff - during field operations, supervision of subcontractors, data validation and verification, and self-assessment

- Testing Facility~~Laboratory~~ staff - during the preparation for and performance of ~~laboratory~~ testing; calibration of equipment; QC activities; ~~laboratory~~ data review, validation, and verification; and self-assessment

- QA personnel - during oversight activities or audits

A NCR shall be prepared for each nonconformance identified. Each NCR shall be initiated by the individual(s) identifying the nonconformance. The NCR shall then be processed by knowledgeable and appropriate personnel. For this purpose, a NCR including, or referencing as appropriate, results of ~~laboratory analysis,~~ QC tests, audit reports, internal memoranda, or letters shall be prepared. The NCR must provide the following information:

- Identification of the individual(s) identifying or originating the nonconformance
- Description of the nonconformance
- Method(s) or suggestions for correcting the nonconformance (corrective action)
- Schedule for completing the corrective action
- An indication of the potential ramifications and overall usability of the data, if applicable
- Any approval signatures specified in the site nonconformance procedures

C3-8~~14~~ Special Training Requirements and Certifications

~~Analytical laboratory line management must ensure that analytical personnel are qualified to perform the analytical method(s) for which they are responsible.~~ The minimum qualifications for certain specified positions for the WAP are summarized in Table C3-2~~10~~. QAPjPs, or their implementing SOPs, shall specify the site-specific titles and minimum training and qualification requirements for personnel performing WAP activities. QAPjPs/procedures shall also contain the requirements for maintaining records of the qualification, training, and demonstrations of proficiency by these personnel.

C3-9~~15~~ Changes to WAP-Related Plans or Procedures

C3-10~~6~~ List of References

DOE, 2009. Waste Data System User's Manual. DOE/WIPP 09-3427, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.

~~DOE. 2003. Performance Demonstration Program Plan for the Analysis of Simulated Headspace Gases. DOE/CAO 95-1076, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.~~

~~DOE. 2005. Performance Demonstration Program Plan for RCRA Constituent Analysis of Solidified Wastes. DOE/CBFO 95-1077, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.~~

~~EPA. 1996. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. SW-846, Fourth Edition, Washington, D.C., Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency.~~

~~Fisenne, I. M., et al. 1973. "Least Squares Analysis and Minimum Detection Levels Applied to Multi-Component Alpha Emitting Samples." *Radiochem. Radioanal. Letters,* 16, No. 1: pp. 5-16.~~

Pasternack B. S. and N. H. Harley. 1971. "Detection Limits for Radionuclides in the Analysis of Multi-Component Gamma-Spectrometric Data." *Nucl. Instr. and Meth,* No. 91: pp. 533-40.

~~Table C3-2~~
~~Gas Volatile Organic Compounds Target Analyte List and Quality Assurance Objectives~~

Compound	CAS Number	Precision [a] (%RSD or RPD)	Accuracy [a] (%R)	MDL [b,d] (ng)	FTIRS MDL [b] (ppmv)	PRQL (ppmv)	Completeness (%)
Benzene	71-43-2	≤25	70-130	10	5	10	90
Bromoform	75-25-2	≤25	70-130	10	5	10	90
Carbon tetrachloride	56-23-5	≤25	70-130	10	5	10	90
Chlorobenzene	108-90-7	≤25	70-130	10	5	10	90
Chloroform	67-66-3	≤25	70-130	10	5	10	90
1,1-Dichloroethane	75-34-3	≤25	70-130	10	5	10	90
1,2-Dichloroethane	107-06-2	≤25	70-130	10	5	10	90
1,1-Dichloroethylene	75-35-4	≤25	70-130	10	5	10	90
trans-1,2-Dichloroethylene	156-60-5	≤25	70-130	10	5	10	90
Ethyl benzene [d]	100-41-4	≤25	70-130	10	10	10	90
Ethyl ether	60-29-7	≤25	70-130	10	5	10	90
Methylene chloride	75-09-2	≤25	70-130	10	5	10	90
1,1,2,2-Tetrachloroethane	79-34-5	≤25	70-130	10	5	10	90
Tetrachloroethylene	127-18-4	≤25	70-130	10	5	10	90
Toluene	108-88-3	≤25	70-130	10	5	10	90
1,1,1-Trichloroethane	71-55-6	≤25	70-130	10	5	10	90
Trichloroethylene	79-01-6	≤25	70-130	10	5	10	90
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	≤25	70-130	10	5	10	90
m-Xylene [c]	108-38-3	≤25	70-130	10	5	10	90
o-Xylene	95-47-6	≤25	70-130	10	5	10	90
p-Xylene [c]	106-42-3	≤25	70-130	10	5	10	90
Acetone	67-64-1	≤25	70-130	150	50	100	90
Butanol	71-36-3	≤25	70-130	150	50	100	90
Methanol	67-56-1	≤25	70-130	150	50	100	90
Methyl ethyl ketone	78-93-3	≤25	70-130	150	50	100	90
Methyl isobutyl ketone	108-10-1	≤25	70-130	150	50	100	90

~~[a] Criteria apply to PRQL concentrations.~~

~~[b] Values based on delivering 10 mL to the analytical system.~~

~~[c] These xylene isomers cannot be resolved by GC/MS.~~

~~[d] The ethyl benzene PRQL for FTIRS is 20 ppm~~

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

~~RPD = Relative percent difference~~

~~%R = Percent recovery~~

~~MDL = Method detection limit (maximum permissible value), for GC/MS and GC/FID; total number of nanograms delivered to the analytical system per sample (nanograms); for FTIRS based on 1 m sample cell~~

~~PRQL = Program required quantitation limit (parts per million/volume basis)~~

~~Table C3-3~~
~~Summary of Laboratory Quality Control Samples and Frequencies for Gas Volatile Organic Compound Analysis~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
~~Method performance samples~~	~~Seven (7) samples initially and four (4) semiannually~~	~~Meet method QAOs~~	~~Repeat until acceptable~~
~~Laboratory duplicates or on-line duplicates~~	~~One (1) per analytical batch or on-line batch~~	~~RPD ≤ 25~~[b]	~~Nonconformance if RPD >25~~
~~Laboratory blanks or on-line blanks~~	~~Daily prior to sample analysis for GC/MS and GC/FID. Otherwise, daily prior to sample analysis and one (1) per analytical batch or on-line~~	~~Analyte amounts ≤ 3 × MDLs for GC/MS and GC/FID; ≤ PRQL for FTIRS~~	~~Flag Data if analyte amounts > 3 × MDLs for GC/MS and GC/FID; > PRQL for FTIRS~~
~~Laboratory control samples or on-line control samples~~	~~One (1) per analytical batch or on-line batch~~	~~70-130 %R~~	~~Nonconformance if %R <70 or >130~~
~~GC/MS comparison sample (for FTIRS only)~~	~~One (1) per analytical or on-line batch~~	~~RPD ≤ 25~~[b]	~~Nonconformance if RPD > 25~~
~~Blind audit samples~~	~~Samples and frequency controlled by the Gas PDP Plan~~	~~Specified in the Gas PDP Plan~~	~~Specified in the Gas PDP Plan~~
~~GC/MS~~	~~BFB Tune Every 12 hours~~	~~Abundance criteria for key ions are met~~	~~Repeat Until Acceptable~~
~~GC/MS~~	~~Minimum 5-point initial calibration (minimum of 5 standards) Initially and as needed~~	~~%RSD of response factor for each target analyte <35~~	~~Repeat Until Acceptable~~
~~GC/MS~~	~~Continuing calibration Every 12 hours~~	~~%D for all target analytes ≤ 30 of initial calibration~~	~~Repeat Until Acceptable~~
~~GC/FID~~	~~Minimum 3-point initial calibration (minimum 3 standards) Initially and as needed~~	~~Correlation coefficient ≥ 0.99 or %RSD <20 for each target analyte and the retention time of each target analyte within an acceptance criteria defined in the method~~	~~Repeat Until Acceptable~~
~~GC/FID~~	~~Continuing calibration Every 12 hours~~	~~%RSD ≤ 15%~~	~~Repeat Until Acceptable~~

[a] ~~Corrective action per Section C3-13 when final reported QC samples do not meet the acceptance criteria.~~

[b] ~~Applies only to concentrations greater than the PRQLs listed in Table C3-2.~~

~~MDL = Method Detection Limit~~

~~QAO = Quality Assurance Objective~~

~~PDP = Performance Demonstration Program~~

~~PRQL = Program Required Quantitation Limit~~

~~%R = Percent Recovery~~

~~RPD = Relative Percent Difference~~

~~BFB= 4-Bromofluorobenzene~~

~~%D = Percent difference~~

~~%RSD = Percent relative standard deviation~~

~~Table C3-4~~
~~Volatile Organic Compounds Target Analyte List and Quality Assurance Objectives~~

~~Compound~~	~~CAS Number~~	~~Precision~~ [a] ~~(%RSD or RPD)~~	~~Accuracy~~ [a] ~~(%R)~~	~~MDL~~ [b] ~~(mg/kg)~~	~~PRQL~~ [b] ~~(mg/kg)~~	~~Completeness (%)~~
~~Benzene~~	~~71-43-2~~	~~≤45~~	~~37-151~~	~~1~~	~~10~~	~~90~~
~~Bromoform~~	~~75-25-2~~	~~≤47~~	~~45-169~~	~~1~~	~~10~~	~~90~~
~~Carbon disulfide~~	~~75-15-0~~	~~≤50~~	~~60-150~~	~~1~~	~~10~~	~~90~~
~~Carbon tetrachloride~~	~~56-23-5~~	~~≤30~~	~~70-140~~	~~1~~	~~10~~	~~90~~
~~Chlorobenzene~~	~~108-90-7~~	~~≤38~~	~~37-160~~	~~1~~	~~10~~	~~90~~
~~Chloroform~~	~~67-66-3~~	~~≤44~~	~~51-138~~	~~1~~	~~10~~	~~90~~
~~1,4-Dichlorobenzene~~ [c]	~~106-46-7~~	~~≤60~~	~~18-190~~	~~1~~	~~10~~	~~90~~
~~ortho-Dichlorobenzene~~ [c]	~~95-50-1~~	~~≤60~~	~~18-190~~	~~1~~	~~10~~	~~90~~
~~1,2-Dichloroethane~~	~~107-06-2~~	~~≤42~~	~~49-155~~	~~1~~	~~10~~	~~90~~
~~1,1-Dichloroethylene~~	~~75-35-4~~	~~≤250~~	~~D-234~~[d]	~~1~~	~~10~~	~~90~~
~~trans-1,2-Dichloroethylene~~	~~156-60-5~~	~~≤50~~	~~60-150~~	~~1~~	~~10~~	~~90~~
~~Ethyl benzene~~	~~100-41-4~~	~~≤43~~	~~37-162~~	~~1~~	~~10~~	~~90~~
~~Methylene chloride~~	~~75-09-2~~	~~≤50~~	~~D-221~~[d]	~~1~~	~~10~~	~~90~~
~~1,1,2,2-Tetrachloroethane~~	~~79-34-5~~	~~≤55~~	~~46-157~~	~~1~~	~~10~~	~~90~~
~~Tetrachloroethylene~~	~~127-18-4~~	~~≤29~~	~~64-148~~	~~1~~	~~10~~	~~90~~
~~Toluene~~	~~108-88-3~~	~~≤29~~	~~47-150~~	~~1~~	~~10~~	~~90~~
~~1,1,1-Trichloroethane~~	~~71-55-6~~	~~≤33~~	~~52-162~~	~~1~~	~~10~~	~~90~~
~~1,1,2-Trichloroethane~~	~~79-00-5~~	~~≤38~~	~~52-150~~	~~1~~	~~10~~	~~90~~
~~Trichloroethylene~~	~~79-01-6~~	~~≤36~~	~~71-157~~	~~1~~	~~10~~	~~90~~
~~Trichlorofluoromethane~~	~~75-69-4~~	~~≤110~~	~~17-181~~	~~1~~	~~10~~	~~90~~
~~1,1,2-Trichloro-1,2,2-trifluoroethane~~	~~76-13-1~~	~~≤50~~	~~60-150~~	~~1~~	~~10~~	~~90~~
~~Vinyl chloride~~	~~75-01-4~~	~~≤200~~	~~D-251~~[d]	~~1~~	~~4~~	~~90~~
~~m-xylene~~	~~108-38-3~~	~~≤50~~	~~60-150~~	~~1~~	~~10~~	~~90~~
~~o-xylene~~	~~95-47-6~~	~~≤50~~	~~60-150~~	~~1~~	~~10~~	~~90~~
~~p-xylene~~	~~106-42-3~~	~~≤50~~	~~60-150~~	~~1~~	~~10~~	~~90~~
~~Acetone~~	~~67-64-1~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Butanol~~	~~71-36-3~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Ethyl ether~~	~~60-29-7~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Formaldehyde~~ [f]	~~50-00-0~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Hydrazine~~ [g]	~~302-01-2~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Isobutanol~~	~~78-83-1~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Methanol~~	~~67-56-1~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Methyl ethyl ketone~~	~~78-93-3~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~
~~Pyridine~~ [c]	~~110-86-1~~	~~≤50~~	~~60-150~~	~~10~~[e]	~~100~~	~~90~~

[a] ~~Applies to laboratory control samples and laboratory matrix spikes. If a solid laboratory control sample material which has established statistical control limits is used, then the established control limits for that material should be used for accuracy requirements.~~

[b] ~~TCLP MDL and PRQL values are reported in units of mg/l and limits are reduced by a factor of 20.~~

[c] ~~Can also be analyzed as a semi-volatile organic compound. If analyzed as a semi-volatile compound, the QAOs of Table C3-6 apply.~~

[d] ~~Detected; result must be greater than zero.~~

[e] ~~Estimate, to be determined.~~

[f] ~~Required only for homogeneous solids and soil/gravel waste from Savannah River Site, if analysis is required to~~

~~resolve assignment of EPA hazardous waste numbers.~~

[g] ~~Required only for homogeneous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site, if analysis is required to resolve assignment of EPA hazardous waste numbers.~~

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

~~RPD = Relative percent difference~~

~~%R = Percent recovery~~

~~MD = Method detection limit (maximum permissible value) (milligrams per kilogram)~~

~~PRQL = Program required quantitation limit; calculated from the toxicity characteristic level for benzene assuming a 0.9 oz (25-gram [g]) sample, 0.1 gal (0.5 liter [L]) of extraction fluid, and 100 percent analyte extraction (milligrams per kilogram)~~

~~Table C3-5~~
~~Summary of Laboratory Quality Control Samples and~~
~~Frequencies for Volatile Organic Compound Analysis~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
~~Method performance samples~~	~~Seven (7) samples initially and four (4) semiannually~~	~~Meet Table C3-4 QAOs~~	~~Repeat until acceptable~~
~~Laboratory duplicates~~ [b]	~~One (1) per analytical batch~~	~~Meet Table C3-4 precision QAOs~~	~~Nonconformance if RPDs > values in Table C3-4~~
~~Laboratory blanks~~	~~One (1) per analytical batch~~	~~Analyte concentrations ≤ 3 × MDLs~~	~~Nonconformance if analyte concentrations > 3 × MDLs~~
~~Matrix spikes~~ [b]	~~One (1) per analytical batch~~	~~Meet Table C3-4 accuracy QAOs~~	~~Nonconformance if %Rs are outside the range specified in Table C3-4~~
~~Matrix spike duplicates~~	~~One (1) per analytical batch~~	~~Meet Table C3-4 accuracy and precision QAOs~~	~~Nonconformance if RPDs > values and %Rs outside range specified in Table C3-4~~
~~Laboratory control samples~~	~~One (1) per analytical batch~~	~~Meet Table C3-4 accuracy QAOs~~	~~Nonconformance if %R < 80 or > 120~~
~~GC/MS Calibration~~	~~BFB Tune every 12 hours~~ ~~5-pt. Initial Calibration initially, and as needed~~	~~Abundance criteria met as per method~~ ~~Calibrate according to SW-846 Method requirements:~~ ~~%RSD for CCC ≤ 30, %RSD for all other compounds ≤ 15%~~ ~~Average response factor (RRF) used if %RSD ≤ 15, use linear regression if %RSD >15; R or R^2 ≥ 0.990 if using alternative curve~~ ~~System Performance Check Compound (SPCC) minimum RRF as per SW-846 Method; RRF for all other compounds ≥ 0.01~~	~~Repeat until acceptable~~
~~GC/MS Calibration (continued)~~	~~Continuing Calibration every 12 hours~~	~~%D ≤ 20 for CCC;~~ ~~SPCC minimum RRF as per SW-846 Method; RRF for all other compounds ≥ 0.01~~ ~~RT for internal standard must be ± 30 seconds from last daily calibration, internal standard area count must be >50% and <200% of last daily calibration~~	~~Repeat until acceptable~~
~~GC/FID Calibration~~	~~3-pt. Initial Calibration initially and as needed~~	~~Correlation Coefficient ≥ 0.990 or %RSD ≤ 20 for all~~	~~Repeat until acceptable.~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
	~~Continuing Calibration every 12 hours~~	~~analytes~~ ~~%D or %Drift for all analytes ≤ 15 of expected values,~~ ~~RT ± 3 standard deviations from initial RT calibration per applicable SW 846 Method~~	
~~Surrogate compounds~~	~~Each analytical sample~~	~~Average %R from minimum of 30 samples for a given matrix ±3 standard deviations~~	~~Nonconformance if %R < (average %R - 3 standard deviation) or > (average %R + 3 standard deviation)~~
~~Blind audit samples~~	~~Samples and frequency controlled by the Solid PDP Plan~~	~~Specified in the Solid PDP Plan~~	~~Specified in the Solid PDP Plan~~

~~[a] Corrective Action per Section C3-13 when final reported QC samples do not meet the acceptance criteria. Nonconformances do not apply to matrix related exceedances.~~

~~[b] May be satisfied using matrix spike duplicate; acceptance criteria applies only to concentrations greater than the PRQLs listed in Table C3-4.~~

~~MDL = Method detection limit~~

~~QAO = Quality assurance objective~~

~~PDP = Performance Demonstration Program~~

~~%R = Percent recovery~~

~~RPD = Relative percent difference~~

~~Table C3-6~~
~~Semi-Volatile Organic Compound Target Analyte List and Quality Assurance Objectives~~

~~Compound~~	~~CAS Number~~	~~Precision~~ [a] ~~(%RSD or RPD)~~	~~Accuracy~~ [a] ~~(%R)~~	~~MDL~~ [b] ~~(mg/kg)~~	~~PRQL~~ [b] ~~(mg/kg)~~	~~Completeness (%)~~
~~Cresols~~	~~1319-77-3~~	~~≤50~~	~~25-115~~	~~5~~	~~40~~	~~90~~
~~1,4-Dichlorobenzene~~ [bc]	~~106-46-7~~	~~≤86~~	~~20-124~~	~~5~~	~~40~~	~~90~~
~~ortho-Dichlorobenzene~~ [c]	~~95-50-1~~	~~≤64~~	~~32-129~~	~~5~~	~~40~~	~~90~~
~~2,4-Dinitrophenol~~	~~51-28-5~~	~~≤119~~	~~D-172~~ [d]	~~5~~	~~40~~	~~90~~
~~2,4-Dinitrotoluene~~	~~121-14-2~~	~~≤46~~	~~39-139~~	~~0.3~~	~~2.6~~	~~90~~
~~Hexachlorobenzene~~	~~118-74-1~~	~~≤319~~	~~D-152~~ [d]	~~0.3~~	~~2.6~~	~~90~~
~~Hexachloroethane~~	~~67-72-1~~	~~≤44~~	~~40-113~~	~~5~~	~~40~~	~~90~~
~~Nitrobenzene~~	~~98-95-3~~	~~≤72~~	~~35-180~~	~~5~~	~~40~~	~~90~~
~~Pentachlorophenol~~	~~87-86-5~~	~~≤128~~	~~14-176~~	~~5~~	~~40~~	~~90~~
~~Pyridine~~ [c]	~~110-86-1~~	~~≤50~~	~~25-115~~	~~5~~	~~40~~	~~90~~

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

~~RPD = Relative percent difference~~

~~%R = Percent recovery~~

~~MDL = Method detection limit (maximum permissible value) (milligrams per kilogram)~~

~~PRQL = Program required quantitation limit; calculated from the toxicity characteristic level for nitrobenzene assuming a 100 gram (g) sample, 0.5 gal (2 liter [L]) of extraction fluid, and 100 percent analyte extraction (milligrams per kilograms)~~

~~a Applies to laboratory control samples and laboratory matrix spikes. If a solid laboratory control sample material which has established statistical control limits is used, then the established control limits for that material should be used for accuracy requirements.~~

~~b TCLP MDL and PRQL values are reported in units of mg/l and limits are reduced by a factor of 20.~~

~~c Can also be analyzed as a volatile organic compound~~

~~d Detected; result must be greater than zero~~

~~Table C3 7~~
~~Summary of Laboratory Quality Control Samples and~~
~~Frequencies for Semi Volatile Organic Compounds Analysis~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
~~Method performance samples~~	~~Seven (7) samples initially and four (4) semiannually~~	~~Meet Table C3 6 QAOs~~	~~Repeat until acceptable~~
~~Laboratory duplicates~~ [b]	~~One (1) per analytical batch~~	~~Meet Table C3 6 precision QAOs~~	~~Nonconformance if RPDs > values in Table C3 6~~
~~Laboratory blanks~~	~~One (1) per analytical batch~~	~~Analyte concentrations ≤ 3 × MDLs~~	~~Nonconformance if analyte concentrations > 3 × MDLs~~
~~Matrix spikes~~	~~One (1) per analytical batch~~	~~Meet Table C3 6 accuracy QAOs~~	~~Nonconformance if RPDs > values and %Rs outside range in Table C3 6~~
~~GC/MS Calibration~~	~~DFTPP Tune every 12 hours~~ ~~5 pt. Initial Calibration initially, and as needed~~ ~~Continuing Calibration every 12 hours~~	~~Abundance criteria met as per method~~ ~~Calibrate according to SW 846 Method requirements:~~ ~~%RSD for CCC ≤ 30, %RSD for all other compounds ≤ 15% Average response factor (RRF) used if %RSD ≤ 15, use linear regression if >15; R or~~ R^2 ~~≥0.990 if using alternative curve~~ ~~System Performance Check Compound (SPCC) minimum RRF as per SW 846 Method; RRF for all other compounds ≥ 0.01~~ ~~%D≤ 20 for CCC,~~ ~~SPCC minimum RRF as per SW 846 Method; RRF for all other compounds ≥ 0.01~~ ~~RT for internal standard must be ± 30 seconds from last daily calibration, internal standard area count must be >50% and <200% of last daily calibration~~	~~Repeat until acceptable~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
~~GC/ECD Calibration~~	~~5-pt. Calibration initially and as needed~~ ~~Continuing Calibration every 12 hours~~	~~Correlation Coefficient ≥ 0.990 or %RSD < 20 for all analytes~~ ~~%D or %Drift for all analytes ≤ 15 of expected values,~~ ~~RT ± 3 standard deviations of initial RT calibration per applicable SW-846 Method~~	~~Repeat until acceptable~~
~~Matrix spike duplicates~~	~~One (1) per analytical batch~~	~~Meet Table C3-6 accuracy and precision QAOs~~	~~Nonconformance if RPDs > values and %Rs outside range specified in Table C3-6~~
~~Laboratory control samples~~	~~One (1) per analytical batch~~	~~Meet Table C3-6 accuracy QAOs~~	~~Nonconformance if %R < 80 or > 120~~
~~Surrogate compounds~~	~~Each analytical sample~~	~~Average %R from minimum of 30 samples from a given matrix ±3 standard deviations~~	~~Nonconformance if %R < (average %R - 3 standard deviations) or > (average %R + 3 standard deviations)~~
~~Blind audit samples~~	~~Samples and frequency controlled by the Solid PDP Plan~~	~~Specified in the Solid PDP Plan~~	~~Specified in the Solid PDP Plan~~

~~[a] Corrective action per Section C3-13 when final reported QC samples do not meet the acceptance criteria. Nonconformances do not apply to matrix related exceedances.~~

~~[b] May be satisfied by using matrix spike duplicate; acceptance criteria applies only to concentrations greater than the PRQLs listed in Table C3-6.~~

~~MDL = Method Detection Limit~~

~~QAO = Quality Assurance Objective~~

~~PDP = Performance Demonstration Program~~

~~%R = Percent Recovery~~

~~RPD = Relative Percent Difference~~

~~**Table C3-8**~~
~~**Metals Target Analyte List and Quality Assurance Objectives**~~

~~**Analyte**~~	~~**CAS Number**~~	~~**Precision (%RSD or RPD)[a]**~~	~~**Accuracy (%R)[b]**~~	~~**PRDL [d] (µg/L)**~~	~~**PRQL [c] (mg/kg)**~~	~~**Completeness (%)**~~
~~Antimony~~	~~7440-36-0~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Arsenic~~	~~7440-38-2~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Barium~~	~~7440-39-3~~	~~≤30~~	~~80-120~~	~~2000~~	~~2000~~	~~90~~
~~Beryllium~~	~~7440-41-7~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Cadmium~~	~~7440-43-9~~	~~≤30~~	~~80-120~~	~~20~~	~~20~~	~~90~~
~~Chromium~~	~~7440-47-3~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Lead~~	~~7439-92-1~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Mercury~~	~~7439-97-6~~	~~≤30~~	~~80-120~~	~~4.0~~	~~4.0~~	~~90~~
~~Nickel~~	~~7440-02-0~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Selenium~~	~~7782-49-2~~	~~≤30~~	~~80-120~~	~~20~~	~~20~~	~~90~~
~~Silver~~	~~7440-22-4~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Thallium~~	~~7440-28-0~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Vanadium~~	~~7440-62-2~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~
~~Zinc~~	~~7440-66-6~~	~~≤30~~	~~80-120~~	~~100~~	~~100~~	~~90~~

~~[a] ≤ 30 percent control limits apply when sample and duplicate concentrations are ≥ 10 × IDL for ICP-AES and AA techniques, and ≥ 100 × IDL for Inductively Coupled Plasma - Mass Spectrometry (ICP-MS) techniques. If less than these limits, the absolute difference between the two values shall be less than or equal to the PRQL.~~

~~[b] Applies to laboratory control samples and laboratory matrix spikes. If a solid laboratory control sample material which has established statistical control limits is used, then the established control limits for that material should be used for accuracy requirements.~~

~~[c] TCLP PRQL values are reported in units of mg/l and limits are reduced by a factor of 20.~~

~~[d] PRDL set such that it is a factor of 10 below the PRQL for 100 percent solid samples, assuming a 100× dilution during digestion.~~

~~CAS = Chemical Abstract Service~~
~~%RSD = Percent relative standard deviation~~
~~RPD = Relative percent difference~~
~~%R = Percent recovery~~
~~PRDL = Program required detection limit (i.e., maximum permissible value for IDL) (micrograms per liter)~~
~~PRQL = Program required quantitation limit (milligrams per kilogram)~~

~~Table C3 9~~
~~Summary of Laboratory Quality Control Samples and Frequencies for Metals Analysis~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
~~Method performance samples~~	~~Seven (7) samples initially and four (4) semiannually~~	~~Meet Table C3 8 QAOs~~	~~Repeat until acceptable~~
~~Laboratory blanks~~	~~One (1) per analytical batch~~	~~≤ 3 × IDL (≤ 5 × IDL for ICP MS)~~[b]	~~Redigest and reanalyze any samples with analyte concentrations which are ≤10 × blank value and ≥ 0.5 × PRQL~~
~~Matrix spikes~~	~~One (1) per analytical batch~~	~~Meet Table C3 8 accuracy QAOs~~	~~Nonconformance if %R outside the range specified in Table C3 8~~
~~Matrix spike duplicates~~	~~One (1) per analytical batch~~	~~Meet Table C3 8 accuracy and precision QAOs~~	~~Nonconformance if RPDs > values and %Rs outside range specified in Table C3 8~~
~~ICP MS Tune (ICP MS Only)~~	~~Daily~~	~~4 Replicate %RSD ≤ 5; mass calibration within 0.9 amu; resolution < 1.0 amu full width at 10% peak height~~	~~Nonconformance if %RSD > 5; mass calibration > 0.9 amu; resolution > 1.0 amu~~
~~Initial Calibration 1 blank, 1 standard (ICP, ICP MS)~~ ~~3 standard, 1 blank (GFAA, FLAA)~~ ~~5 standard, 1 blank (CVAA, HAA)~~	~~Daily~~	~~90 110 %R (80 120% for CVAA, GFAA, HAA, FLAA) for initial calibration verification solution.~~ ~~Regression coefficient ≥ 0.995 for FLAA, CVAA, GFAA, MAA~~	~~Correct problem and recalibrate; repeat initial calibration~~
~~Continuing Calibration~~	~~Every 10 samples and beginning and end of run~~	~~90 110% for continuing calibration verification solution.~~ ~~(80 120% for CVAA, GFAA, HAA, FLAA)~~	~~Correct problem and recalibrate; rerun last 10 samples~~
~~Internal Standard Area Verification (ICP MS)~~	~~Every Sample~~	~~Meet SW-846 Method 6020 criteria~~	~~Nonconformance if not reanalyzed at 5 × dilution until criteria are met~~
~~Serial Dilution (ICP, ICP MS)~~	~~One (1) per analytical batch~~	~~5 × dilution must be ≤10% D of initial value for sample > 50×IDL~~	~~Flag Data if >10% and > 50×IDL~~
~~Interference Correction Verification (ICP, ICP MS)~~	~~Beginning and end of run or every 12 hours (8 for ICP) whichever is more frequent~~	~~80 120% recovery for analytes~~ ~~Note: Acceptance Criteria and Corrective Action apply only if interferents found in samples at levels greater than ICS A Solution~~	~~Correct problem and recalibrate, nonconformance if not corrected~~
~~Laboratory Control Samples~~	~~One (1) per analytical batch~~	~~Table C3 8 accuracy QAOs~~	~~Redigest and reanalyze for affected analytes; non conformance if not reanalyzed~~

~~QC Sample~~	~~Minimum Frequency~~	~~Acceptance Criteria~~	~~Corrective Action~~ [a]
~~Blind audit samples~~	~~Samples and frequency controlled by the Solid PDP Plan~~	~~Specified in the Solid PDP Plan~~	~~Specified in the Solid PDP Plan~~

~~[a] Corrective action per Section C3-13 when final reported QC samples do not meet the acceptance criteria. Nonconformances do not apply to matrix related exceedances.~~

~~[b] Applies only to concentrations greater than the PRQLs listed in Table C3-8.~~

~~IDL = Instrument Detection Limit~~

~~PDP = Performance Demonstration Program~~

~~PRQL = Program Required Quantitation Limit~~

~~%R = Percent Recovery~~

~~RPD = Relative Percent Difference~~

Table C3-~~10~~2
Minimum Training and Qualifications Requirements [a]

Personnel Re	quirements [a]
Radiography Operators [a] ~~[c]~~	Site-specific training based on waste matrix codes and waste material parameters; requalification every 2 years
~~FTIRS Technical Supervisors [b]~~ ~~FTIRS Operators [c]~~	~~Site-specific and on-the-job training based on the site-specific FTIRS system; requalification every 2 years~~
~~Gas Chromatography Technical Supervisors [b]~~ ~~Gas Chromatography Operators [c]~~	~~B.S. or equivalent experience and 6 months previous applicable experience~~
~~Gas Chromatography/Mass Spectrometry Operators [c]~~ ~~Mass Spectrometry Operators [c]~~	~~B.S. or equivalent experience and 1 year independent spectral interpretation or demonstrated expertise~~
~~Gas Chromatography/Mass Spectrometry Technical Supervisors [b]~~ ~~Mass Spectrometry Technical Supervisors [b]~~ ~~Atomic Absorption Spectroscopy Technical Supervisors [b]~~ ~~Atomic Absorption Spectroscopy Operators [c]~~ ~~Atomic Mass Spectrometry Operators [c]~~ ~~Atomic Emission Spectroscopy Operators [c]~~	~~B.S. or equivalent experience and 1 year applicable experience~~
~~Atomic Mass Spectrometry Technical Supervisors [b]~~	~~B.S. and specialized training in Atomic Mass Spectrometry and 2 years applicable experience~~
~~Atomic Emission Spectroscopy Technical Supervisors [b]~~	~~B.S. and specialized training in Atomic Emission Spectroscopy and 2 years applicable experience.~~

~~[a] Based on requirements contained in *USEPA Contract Laboratory Program Statement of Work for Organics Analysis* (Document Number OLM 01.0) and *Statement of Work for Inorganics Analysis* (Document Number ILM 03.0).~~

~~[b] Technical Supervisors are those persons responsible for the overall technical operation and development of a specific laboratory technique. QAPjPs shall include the site-specific title for this position.~~

[a] ~~[c]~~ Operators are those persons responsible for the actual operation of testing~~analytical~~ equipment. QAPjPs shall include the site-specific title for this position.

Table C3-3~~11~~
Testing Batch Data Report Contents

Required Information	Radiography	Visual Examination	Comment
Batch Data Report Date	X	X	
Batch number	X	X	
Waste container number	X	X	
Waste stream name and/or number	O	O	
Waste Matrix Code	X	X	Summary Category Group included in waste matrix code
Implementing procedure (specific version used)	X	X	If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used.
Container type	O	O	Drums, Standard Waste Box, Ten Drum Overpack, etc.
Video media reference	X	X	Reference to Video media applicable to each container. For visual examination of newly generated waste, video media not required if two trained operators review the contents of the waste container to ensure correct reporting.
Imaging check	O		
Camera check		O	
Audio check	O	O	
QC documentation	X	X	
Verification that the physical form matches the waste stream description and Waste Matrix Code.	X	X	Summary Category Group included in waste matrix code
Comments	X	X	
Reference to or copy of associated NCRs, if any	X	X	Copies of associated NCRs must be available.
Verify absence of prohibited items	X	X	
Operator signature and date of test	X	X	Signatures of both operators required for Visual Verification of Acceptable Knowledge
Data review checklists	X	X	All data review checklists will be identified

LEGEND:

X - Required in batch data report.

O - Information must be documented and traceable; inclusion in batch data report is optional.

~~Table C3-12~~
~~Sampling Batch Data Report Contents~~

~~Required Information~~	~~Headspace Gas~~	~~Solid Sampling~~	~~Comment~~
~~Batch Data Report Date~~	~~X~~	~~X~~	
~~Batch number~~	~~X~~	~~X~~	
~~Waste stream name and/or number~~	~~O~~	~~O~~	
~~Waste Matrix Code~~		~~X~~	~~Summary Category Group included in Waste Matrix Code~~
~~Procedure (specific version used)~~	~~X~~	~~X~~	~~If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used.~~
~~Container number~~	~~X~~	~~X~~	
~~Container type~~	~~O~~	~~O~~	~~Drums, Standard Waste Box, Ten Drum Overpack, etc.~~
~~Sample matrix and type~~	~~X~~	~~X~~	
~~Analyses requested and laboratory~~	~~X~~	~~X~~	
~~Point of origin for sampling~~	~~X~~	~~X~~	~~Location where sample was taken (e.g., building number, room)~~
~~Sample number~~	~~X~~	~~X~~	
~~Sample size~~	~~X~~	~~X~~	
~~Sample location~~	~~X~~	~~X~~	~~Location within container where sample is taken. (For HSG, specify what layer of confinement was sampled. For solids, physical location within container.)~~
~~Sample preservation~~	~~X~~	~~X~~	
~~Person collecting sample~~	~~X~~	~~X~~	
~~Person attaching custody seal~~	~~O~~	~~O~~	~~May or may not be the same as the person collecting the sample~~
~~Chain of custody record~~	~~X~~	~~X~~	~~Original or copy is allowed~~
~~Sampling equipment numbers~~	~~X~~	~~X~~	~~For disposable equipment, a reference to the lot~~

~~Required Information~~	~~Headspace Gas~~	~~Solid Sampling~~	~~Comment~~
~~Drum age~~	~~X~~		~~Must include all supporting determinative information, including but not limited to packaging date, equilibrium start time, storage temperature, and sampling date/time. If Scenario 3 is used, the packaging configuration, filter diffusivity, liner presence/absence, and rigid liner vent hole diameter used in determining the DAC must be documented. If Scenario 1 and 2 are used together, the filter diffusivity and rigid liner vent hole diameter used in determining the DAC must be documented. If default values are used for retrievably stored waste, these values must clearly be identified as such.~~
~~Cross-reference of sampling equipment numbers with associated cleaning batch numbers~~	~~O~~	~~X~~	~~As applicable to the equipment used for the sampling. For disposable equipment, a reference to the lot and procurement records to support cleanliness is sufficient~~
~~Drum age~~	~~X~~		
~~Equilibration time~~	~~X~~		
~~Verification of rigid liner venting~~	~~X~~		~~Only applicable to containers with rigid liners~~
~~Verification that sample volume taken is small in comparison to the available volume~~	~~X~~		~~Must include headspace gas volume when it can be estimated~~
~~Scale Calibration~~		~~O~~	
~~Depth of waste~~		~~X~~	~~For newly generated waste, if a sampling method other than coring is used, this is replaced by documentation that a representative sample has been taken.~~
~~Calculation of core recovery~~		~~X~~	~~For newly generated waste, if a sampling method other than coring is used, this is replaced by documentation that a representative sample has been taken.~~
~~Co-located core description~~		~~X~~	~~For newly generated waste, if a sampling method other than coring is used, this is replaced by documentation that a QC sample has been taken.~~
~~Time between coring and subsampling~~		~~X~~	~~Only applicable to coring.~~
~~OVA calibration and reading~~	~~O~~		~~Only applicable to manifold systems. Must be done in accordance with manufacturer's specifications~~

~~Required Information~~	~~Headspace Gas~~	~~Solid Sampling~~	~~Comment~~
~~Field Records~~	~~X~~	~~X~~	~~Must contain the following as applicable to the sampling method used: Collection problems, Sequence of sampling collection, Inspection of the solids sampling area, Inspection of the solids sampling equipment, Coring tool test, random location of sub sample, canister pressure, and ambient temperature and pressure.~~
~~Reference to or copy of associated NCRs, if any~~	~~X~~	~~X~~	~~Copies of associated NCRs must be available.~~
~~Operator Signature and date and time of sampling~~	~~X~~	~~X~~	
~~Data review checklists~~	~~X~~	~~X~~	~~All data review checklists will be identified~~

~~LEGEND:~~

~~X Required in batch data report.~~

~~O Information must be documented and traceable; inclusion in batch data report is optional.~~

~~Table C3-13~~
~~Analytical Batch Data Report Contents~~

~~Required Information~~	~~Headspace Gas~~	~~Solid Sampling~~	~~Comment~~
~~Batch Data Report Date~~	~~X~~	~~X~~	
~~Batch number~~	~~X~~	~~X~~	
~~Sample numbers~~	~~X~~	~~X~~	
~~QC designation for sample~~	~~X~~	~~X~~	
~~Implementing procedure (specific version used)~~	~~X~~	~~X~~	~~If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used.~~
~~QC sample results~~	~~X~~	~~X~~	
~~Sample data forms~~	~~X~~	~~X~~	~~Form should contain reduced data for target analytes and TICs~~
~~Chain of custody~~	~~X~~	~~X~~	~~Original or copy~~
~~Gas canister tags~~	~~X~~		~~Original or copy~~
~~Sample preservation~~	~~X~~	~~X~~	
~~Holding time~~		~~X~~	
~~Cross-reference of field numbers to laboratory sample numbers~~	~~X~~	~~X~~	
~~Date and time analyzed~~	~~X~~	~~X~~	
~~Verification of spectra used for results~~	~~O~~	~~O~~	~~Analyst must qualitatively evaluate the validity of the results based on the spectra, can be implemented as a check box for each sample~~
~~TIC evaluation~~	~~X~~	~~X~~	
~~Reporting flags, if any~~	~~X~~	~~X~~	~~Table C3-14 lists applicable flags~~
~~Case narrative~~	~~X~~	~~X~~	
~~Reference to or copy of associated NCRs, if any~~	~~X~~	~~X~~	~~Copies of associated NCRs must be available.~~
~~Operator signature and analysis date~~	~~X~~	~~X~~	
~~Data review checklists~~	~~X~~	~~X~~	~~All data review checklists will be identified~~

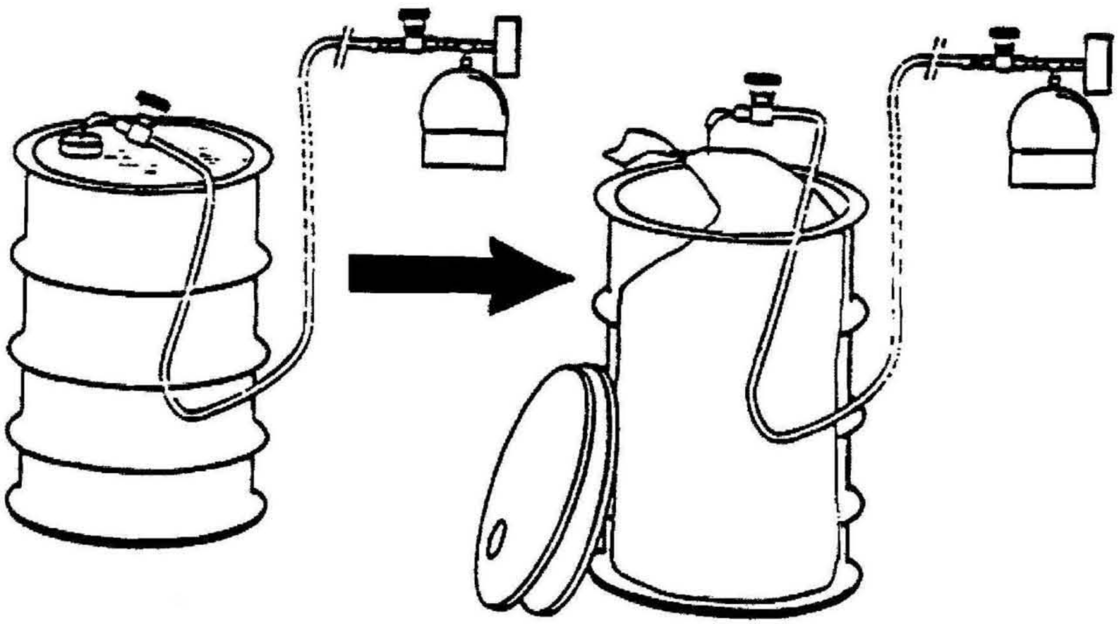
~~LEGEND:~~

~~X - Required in batch data report.~~

~~O - Information must be documented and traceable; inclusion in batch data report is optional.~~

~~Table C3-14~~
~~Data Reporting Flags~~

~~Data Flag~~	~~Indicator~~
~~B~~	~~Analyte detected in blank (Organics/ Headspace gases)~~
~~B~~	~~Analyte blank concentration greater than or equal to 20 percent of sample concentration prior to dilution corrections (Metals)~~
~~E~~	~~Analyte exceeds calibration curve (Organics/ Headspace gases)~~
~~J~~	~~Analyte less than PRQL but greater than or equal to MDL (Organics/ Headspace gases)~~
~~J~~	~~Analyte greater than or equal to IDL but less than 5 times the IDL before dilution correction (Metals)~~
~~U~~	~~Analyte was not detected and value is reported as the MDL (IDL for Metals)~~
~~D~~	~~Analyte was quantitated from a secondary dilution, or reduced sample aliquot (Organics/ Headspace gases)~~
~~Z~~	~~One or more QC samples do not meet acceptance criteria~~
~~H~~	~~Holding time exceeded~~



~~Figure C3-1~~
~~Overall Headspace Gas Sampling Scheme Illustrating Manifold Sampling~~

ATTACHMENT C4

TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

C4-1 Introduction

EPA's 1994 Waste Analysis Guidance Manual broadly defines the term "acceptable knowledge" to include process knowledge, whereby detailed information on the wastes is obtained from existing published or documented waste analysis data or studies conducted on hazardous waste generated by processes similar to that which generated the waste; facility records of analysis performed before the effective date of RCRA; and waste analysis data obtained from generators of similar wastes that send their wastes off-site for treatment, storage, or disposal (EPA, 1994). If a generator/storage site determines that AK alone is insufficient to accurately characterize a waste, the site may use radiography and/or visual examination~~, headspace gas sampling and analysis, and homogeneous waste sampling and analysis~~ (specified in Permit Attachment C1) to complete the waste characterization process and satisfy the requirements of the Waste Analysis Plan (**WAP**) specified in Permit Attachment C. Acceptable knowledge is used in TRU mixed waste characterization activities in five ways:

- To delineate TRU mixed waste streams
- To assess whether TRU mixed wastes comply with the applicable requirements of the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**)
- To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart C)
- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart D)
- To estimate waste material parameter weights

Radiography and/or VE~~Sampling and analysis~~ may be performed to augment the characterization of wastes based on acceptable knowledge when an AK Sufficiency Determination has not been requested by the generator/storage site or, if requested, has not been granted by the U.S. Department of Energy (**DOE**) (see Section C4-3d). ~~Sampling and analysis consists of radiography, visual examination, headspace gas, and homogeneous waste sampling and analysis.~~ TRU mixed waste streams shall undergo applicable provisions of the acceptable knowledge process prior to management, storage, or disposal by the Permittees at WIPP.

C4-2 Acceptable Knowledge Documentation

C4-2b Required TRU Mixed Waste Stream Information

The acceptable knowledge written record shall include a summary that identifies all sources of waste characterization information used to delineate the waste stream. The basis and rationale for delineating each waste stream, based on the parameters of interest, shall be clearly summarized and traceable to referenced documents. Assumptions made in delineating each waste stream also shall be identified and justified. If discrepancies exist between required information, then sites may consider applying all hazardous waste numbers indicated by the information to the subject waste stream, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements. The Permittees shall obtain from each site, at a minimum, procedures that comply with the following acceptable knowledge requirements:

- Procedures for identifying and assigning the physical waste form of the waste
- Procedures for delineating waste streams and assigning Waste Matrix Codes
- Procedures for resolving inconsistencies in acceptable knowledge documentation
- Procedures for ~~headspace gas sampling and analysis,~~ visual examination and/or radiography~~, and homogeneous waste sampling and analysis~~, if applicable
- For newly generated waste, procedures describing process controls used to ensure prohibited items (specified in the WAP, Permit Attachment C) are documented and managed
- Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container (e.g., liquid exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes)
- Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated Environmental Protection Agency (**EPA**) hazardous waste numbers based on material composition are documented for any waste
- Procedures that ensure the assignment of EPA hazardous waste numbers is appropriate, consistent with RCRA requirements, and considers site historical waste management
- Procedures for estimating waste material parameter weights

C4-2c Additional Acceptable Knowledge Information

~~For waste containers that belong to LANL sealed sources waste streams, these containers do not require headspace gas sampling and analysis if the following information is part of the AK documentation:~~

- ~~Documentation that the waste container contents meet the definition of sealed sources per 10 CFR §30.4 and 10 CFR §835.2 (effective January 1, 2004).~~
- ~~Documentation of the certification of the sealed sources as U.S. Department of Transportation Special Form Class 7 (Radioactive) Material per 49 CFR §173.403 (effective October 1, 2003).~~
- ~~Documentation of contamination survey results that validate the integrity of each sealed source per 10 CFR §34.27 (effective January 1, 2004).~~

- ~~AK documentation does not indicate the use of VOCs or VOC bearing materials as constituents of the sealed sources.~~

- ~~The outer casing of each sealed source must be of a non VOC bearing material, which must be verified at the time of packaging.~~

- ~~AK Documentation shall also include but shall not be limited to, as available and as necessary to determine the hazardous constituents associated with sealed sources, the following: source manufacturer's sales catalogues, original purchase records, source manufacturer's fabrication documents, source manufacturer's drawings, source manufacturer's fuel capture assembly reports, source manufacturer's operational procedures for cleanliness requirements, source manufacturer's shipping documents, source manufacturer's welding records, transuranic batch material records, and information from national databases (e.g., NMMSS). All of this information may not and need not be available for each source, but sufficient information must be included in the auditable record to derive an adequate understanding of source construction and history to ensure that no VOCs are present in association with the sealed source itself that would render the source hazardous. If AK data indicate that assignment of a hazardous waste number related to organic materials is required in association with a source, this specific source will be assigned to a separate waste stream and that waste stream will be subject to representative headspace gas sampling unless a separate AK Sufficiency Determination is approved by DOE for the waste stream.~~

C4-3 Acceptable Knowledge Training, Procedures and Other Requirements

C4-3d AK Sufficiency Determination Request Contents

Generator/storage sites may submit an AK Sufficiency Determination Request (**Determination Request**) to meet all or part of the waste characterization requirements. The Determination Request shall include, at a minimum:

- ~~Identification of the scenario for which the approval is sought (Permit Attachment C, Section C-0b).~~

- A complete AK Summary that addresses the following technical requirements:

  - Executive Summary;

  - Waste Stream Identification Summary, including a demonstration that the waste stream has been properly delineated and meets the Permit definition of waste stream (Permit Attachment C, Introduction);

  - Mandatory Program Information (including, but not limited to, facility location and description, mission, defense waste assessment, spent nuclear fuel and high-level waste assessment, description of waste generating processes, research/development [as necessary], facility support operations [as applicable], types and quantities of TRU waste generated, correlation of waste streams to buildings/processes, waste identification and categorization, physical form identifiers);

- Mandatory Waste Stream Information (including, but not limited to, Area and Building of Generation, waste stream volume/period of generation (including, for newly generated waste, the rate and quantity of waste to be generated), waste generating activities, types of waste generated, material input related to physical form and identification of percentage of each waste material parameter in the waste stream, chemical content information including hazardous constituents and hazardous waste identification, prohibited item content (including documented evidence that the waste meets the TSDF-WAC Permit Sections 2.3.3.1 through 2.3.3.10), waste packaging, presence of filter vents, number of layers of confinement);

- Types of additional information gathered;

- Container specific data (if available and relevant); and

- A complete reference list including all mandatory and additional information.

- An AK roadmap (defined as a cross reference between mandatory programmatic and mandatory waste stream information, with references supporting these requirements).

- A complete reference list including all mandatory and additional documentation.

- Additional relevant information for the required programmatic and waste stream data addressed in the AK Summary, examples of which are presented in Permit Attachment C4, Section C4-2c.

- Identification of any mandatory requirements supported only by upper tier documents (i.e., there is insufficient supporting data).

- Description or other means of demonstrating that the AK process described in the Permit was followed (for example, AK personnel were appropriately trained; discrepancies were documented, etc).

- Information showing that the generator/storage site has developed a written procedure for compiling the AK information and assigning hazardous waste numbers as required in Permit Attachment C4-3b.

- Information showing that the generator/storage site has assessed the AK process (e.g. internal audits, Permit Attachment C4-3b).

C4-3e Requirements for Re-evaluating Acceptable Knowledge Information

Acceptable knowledge includes information regarding the physical form of the waste, the base materials composing the waste, and the process that generates the waste. Waste testing~~sampling and analysis~~ (i.e., radiography or visual examination~~, headspace gas sampling and analysis, and homogeneous waste sampling and analysis~~) may be used to augment acceptable knowledge information.

The Waste Stream Profile Form (**WSPF**) and Characterization Information Summary (including the acceptable knowledge summary) will be reviewed by the Permittees for each waste stream prior to DOE approval of the WSPF. The Permittees' review will ensure that the submitted AK information was collected under procedures that ensure implementation of the WAP, provides data sufficient to meet the DQOs in Section C-4a(1), and allow the Permittees to demonstrate compliance with the waste analysis requirements of the Permit. A detailed discussion of the Permittees' waste stream review and DOE's WSPF approval process is provided in Section C-1d.

The Permittees shall require sites to establish procedures for reevaluating acceptable knowledge if the results of waste confirmation indicate that the waste to be shipped does not match the approved waste stream, or if data obtained from radiography or visual examination for waste streams without an AK Sufficiency Determination exhibit this discrepancy. Site procedures shall describe how the waste is reassigned, acceptable knowledge reevaluated, and appropriate hazardous waste numbers assigned. If the reevaluation requires that the Waste Matrix Code be changed for the waste stream or the waste does not match the approved waste stream, the following minimum steps shall be taken to reevaluate acceptable knowledge:

- Review existing information based on the container identification number and document all differences in hazardous waste number assignments

- If differences exist in the hazardous waste numbers that were assigned, reassess and document all required acceptable knowledge information (Section C4-3b) associated with the new designation

- Reassess and document all testing~~sampling and analytical~~ data associated with the waste

- Verify and document that the reassigned Waste Matrix Code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination

- Record all changes to acceptable knowledge records

- If discrepancies exist in the acceptable knowledge information for the revised Waste Matrix Code, document the segregation of the affected portion of the waste stream, and define the actions necessary to fully characterize the waste

~~Potential toxicity characteristics for base materials that compose TRU mixed heterogeneous debris (S5000) waste may be determined without destructive sampling and analysis via acceptable knowledge. Sites will assign a Waste Matrix Code and waste stream to each container of waste using acceptable knowledge. Sites shall assign the toxicity characteristic hazardous waste numbers consistent with RCRA requirements. If a toxicity characteristic hazardous constituent is identified during AK, the potential assignment of a hazardous waste number must be evaluated and the results placed in the AK record. Procedures shall describe how additions to hazardous waste numbers based on material composition are documented, as necessary (Section C4-3b).~~

~~The Permittees shall require sites to use acceptable knowledge to identify spent solvents associated with each TRU mixed waste stream or waste stream lot. Headspace gas data will be used to resolve the assignment of EPA F-listed hazardous waste numbers to debris waste streams when waste streams do not have an AK Sufficiency Determination approved by DOE. In this case, sites shall assign F-listed hazardous waste numbers (20.4.1.200 NMAC,~~

~~incorporating 40 CFR §261.31) by evaluating the average concentrations of each VOC detected in container headspace gas for each waste stream or waste stream lot using the upper 90 percent confidence limit (**UCL_{90}**). The UCL_{90} for the mean concentration shall be compared to the program required quantitation limit (**PRQL**) for the constituent. If the UCL_{90} for the mean concentration exceeds the PRQL, sites shall reevaluate their acceptable knowledge information and determine the potential source of the constituent. Sites shall provide documentation to support any determination that F-listed organic constituents are associated with packaging materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected F-listed solvents can not be identified, the appropriate spent solvent hazardous waste number will be conservatively applied to the waste stream. In the case of applicable toxicity characteristic VOCs and non-toxic F003 constituents, generator/storage sites may assess whether the head space gas concentration would render the waste non-hazardous for those characteristics and change the initial acceptable knowledge determination accordingly.~~

~~EPA hazardous waste numbers associated with S3000 and S4000 waste streams will be assigned based on the results of the total/TCLP analysis of a representative homogeneous waste sample when waste streams do not have an AK Sufficiency Determination approved by DOE. As with headspace gas, if the total/TCLP results indicate that the concentration of a characteristic waste or non-toxic constituent of an F003 waste is below regulatory levels, the hazardous waste number assigned initially by acceptable knowledge may be changed. Otherwise, if an F-listed waste constituent is detected, the appropriate hazardous waste number shall be applied.~~

~~If the site determines that the source of the F-listed constituent is a spent solvent used in the process or is determined to be the result of mixing a listed waste with a solid waste during waste packaging, or applicable toxicity characteristic or non-toxic F003 wastes are present in excess of regulatory levels, then the site will either: 1) assign the applicable listed hazardous waste number to the entire waste stream, or 2) segregate the drums containing detectable concentrations of the solvent into a separate waste stream and assign applicable hazardous waste numbers. Each site shall document, justify, and consistently delineate waste streams and assign hazardous waste numbers as required in this permit and must consider all generator-specific waste streams and hazardous waste number assignments. The site must also consider site-specific permit requirements and other state-enforced agreements in this analysis.~~

~~To determine the mean concentration of solvent VOCs, all headspace gas data or homogeneous waste data for a waste stream or waste stream lot (i.e., the portion of the waste stream that is characterized as a unit) will be used, including data qualified with a 'J' flag (i.e., less than the PRQL but greater than the method detection limit [**MDL**]) or qualified with a 'U' flag (i.e., undetected). For data qualified with a 'U' flag, sites shall use one-half the MDL in calculating the mean concentration. Because listed wastes are not defined based on concentration, sites may not remove hazardous waste numbers assigned using acceptable knowledge if hazardous constituents are not detected in the headspace gas or solids/soil analysis.~~

~~TRU mixed headspace gases and homogeneous waste matrices may contain one or two constituents (e.g., carbon tetrachloride and 1,1,1-trichloroethane) at concentrations that are orders of magnitude higher than the other target analytes. In these cases, samples shall be diluted to remain within the instrument calibration range for the elevated constituents. Sample dilution results in elevated MDLs for the constituents with elevated concentrations. Only the concentrations of detected constituents will be used to calculate the mean for the purpose of assigning F-listed hazardous waste numbers. Because the presence or absence of F-listed~~

~~solvents can not be assigned based on the artificially high MDLs that are caused by sample dilution, data flagged as 'U' and showing an elevated MDL will not be used in calculating the mean concentration.~~

C4-3f Acceptable Knowledge Data Quality Requirements

The data quality objectives for testing~~sampling and analysis~~ techniques are provided in Permit Attachment C3. Testing~~Analytical~~ results will be used to augment the characterization of wastes based on acceptable knowledge. To ensure that the acceptable knowledge process is consistently applied, the Permittees shall require sites to comply with the data quality requirements for acceptable knowledge documentation in Permit Attachment C3.

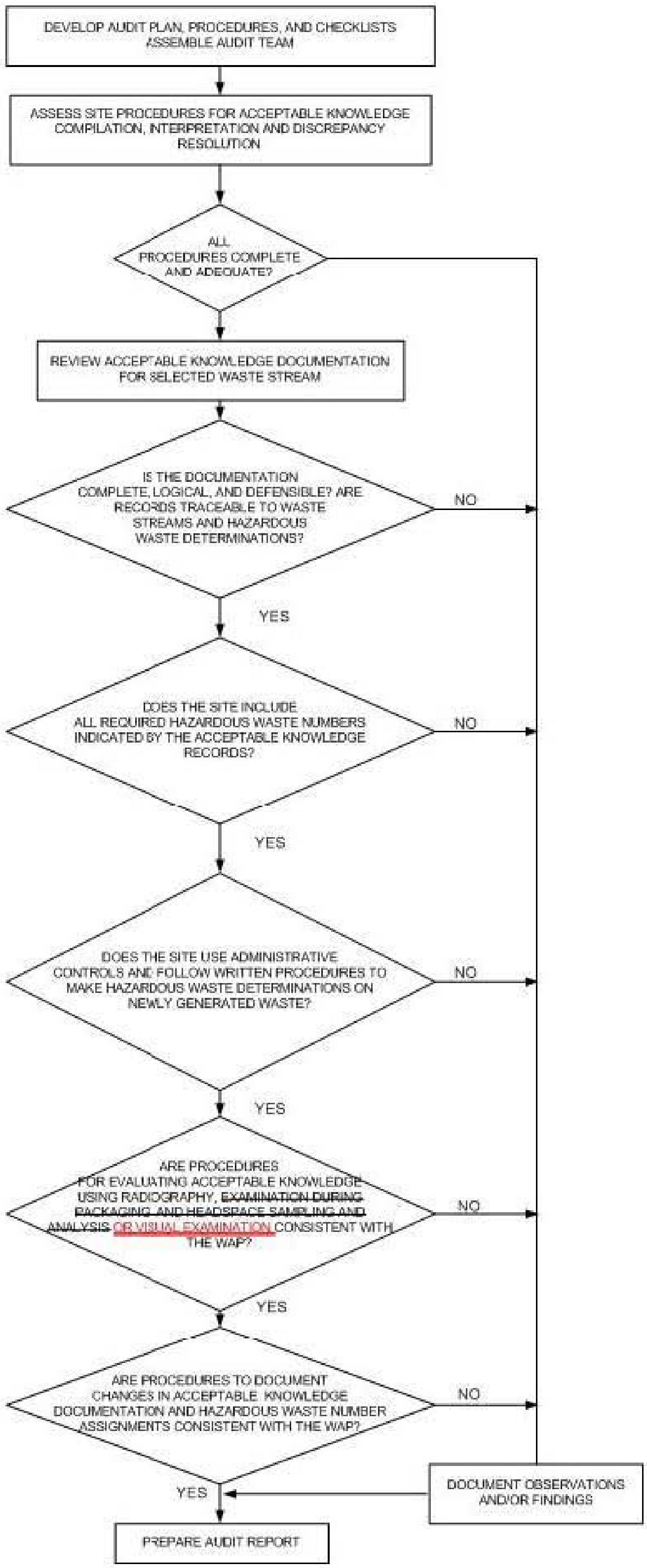


Figure C4-2
Acceptable Knowledge Auditing

ATTACHMENT C5

QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

C5-2 Document Review, Approval, and Control

DOE shall ensure that QAPjPs include a detailed description of the reporting and approval requirements for changes to approved QA documents and SOPs, including procedures for implementing changes to these documents. All members of the site project staff are responsible for reporting any obsolete or superseded information to the site project manager. All site-specific changes shall be evaluated and approved by the site project manager before implementation. The site project manager shall notify the appropriate personnel and the affected documents shall be revised as necessary. The site project manager shall also be responsible for notifying the DOE field office of the changes. DOE shall ensure that changes that affect performance criteria or data quality, ~~such as sample handling and custody requirements, sampling and analytical~~ testing procedures, quality assurance objectives, calibration requirements, or QC ~~sample~~ acceptance criteria comply with the WAP (Permit Attachment C) and shall not be made without prior approval of DOE.

ATTACHMENT C6

AUDIT AND SURVEILLANCE PROGRAM

LIST OF TABLES

Table Title

Table C6-1	Waste Analysis Plan (WAP) Checklist
~~Table C6-2~~	~~Solids and Soils/Gravel Sampling Checklist~~
Table C6-2~~3~~	Acceptable Knowledge (AK) Checklist
~~Table C6-4~~	~~Headspace Gas Checklist~~
Table C6-3~~5~~	Radiography Checklist
Table C6-4~~6~~	Visual Examination (VE) Checklist

ATTACHMENT C6

AUDIT AND SURVEILLANCE PROGRAM

C6-1 Introduction

The Waste Isolation Pilot Plant (**WIPP**) Audit and Surveillance Program shall ensure that: 1) the operators of each generator/storage site (**site**) ~~and U.S. Department of Energy (**DOE**) approved laboratory~~ that plan to transport transuranic (**TRU**) mixed waste to the WIPP facility conduct testing~~sampling and analysis~~ of wastes in accordance with the current WIPP Waste Analysis Plan (**WAP**) (Permit Attachment C), and 2) the information supplied by each site to satisfy the waste screening and acceptability requirements of Section C-4 of the WAP is being managed properly. DOE will conduct these audits and surveillances at each site ~~and DOE approved laboratory~~ performing these activities in accordance with a standard operating procedure (**SOP**). NMED personnel may observe these audits and surveillances to validate the implementation of WAP requirements (Permit Attachment C) at each site ~~and DOE approved laboratory~~. Only personnel with appropriate U.S. Department of Energy clearances will have access to classified information during audits. Classified information will not be included in audit reports and records. The audit SOP will contain steps for selecting audit personnel, reviewing applicable background information, preparing an audit plan, preparing audit checklists, conducting the audit, developing an audit report, and following up audit deficiencies. A deficiency is any failure to comply with an applicable provision of the WAP. The checklists for each site ~~and DOE approved laboratory~~ shall include, at a minimum, the appropriate checklists found in Tables C6-1 through C6-4~~6~~ for the summary category groups undergoing audit.

C6-2 Audit Procedures

Audit procedures shall establish the responsibilities and methodology for planning, scheduling, performing, reporting, verifying, and closing announced and unannounced audits of sites ~~and DOE approved laboratories~~. Records of all audit activities shall be part of the WIPP Operating Record and maintained at the WIPP facility until closure. NMED shall be provided unlimited access to these records.

C6-3 Audit Position Functions

DOE will approve lead auditors, auditors, and technical specialists based upon the expertise required for the functions being examined according to the audit scope. DOE will supply auditors/technical specialists with expertise in the Resource Conservation and Recovery Act (**RCRA**) requirements and knowledge of the testing~~analysis~~ and documentation methods required to verify the hazardous waste characterization performed by the sites. DOE shall identify all audit team members to NMED prior to the audit, and shall provide upon request the qualifications of all audit team members.

The lead auditor assigned to be the audit team leader must perform the following tasks:

- Concur that assigned auditors and technical specialists have the collective experience and training commensurate with the scope, complexity, or special nature of the activities to be audited

- Develop an audit plan and coordinate the preparation of an overall checklist to cover the scope of the audit, with consideration given to all nonconformances reported as specified in Permit Attachment C3 and to previous audit results from that site~~ or DOE approved laboratory~~

- Assign specific audit areas to individual auditors and technical specialists within their particular specialty and provide guidance on checklist development

- Review individual auditor checklists to assure complete coverage of assigned scope, and approve the checklists

- Conduct the audit at the site~~ or DOE approved laboratory~~

- Encourage observers to participate according to the protocol established by DOE

- Communicate audit results at the conclusion of the audit, including any deficiencies and observations

- Prepare and sign the audit report

- Maintain complete records of each audit and transfer them to the manager when the audit report is issued

Auditors and technical specialists assigned to the specific audit will report to the audit team leader for supervision and may perform the following tasks:

- Attend any required specific training and team orientation and planning meetings as directed by the audit team leader

- Prepare specific audit checklists to verify that the WAP Quality Assurance Objectives (**QAO**) are met for the areas being audited

- Obtain audit team leader approval of checklist

- Review acceptable knowledge documentation packages, test report data, and documentation of data verification activities

- Obtain and evaluate objective evidence by means of observation, document reviews, or the conduct of interviews with operators, ~~analysts, ~~technicians, and others necessary to determine the adequacy and effective implementation of the WAP

- Conduct inspection tours of waste generating stations, ~~sampling areas and equipment, analytical laboratories~~waste testing facilities, calibration facilities, administrative, and document control/record facility

- Complete checklist during the audit indicating the objective evidence observed verifies that the site~~ or DOE approved laboratory~~ has met the QAOs for the program elements, methods, and the activities being audited. Add other items to the checklist as they are observed or as needed during the audit

- Prepare narrative statements for all deficiencies, and observations that clearly and concisely identify the conditions involved
- Prepare any portion of the final audit report assigned by the lead auditor.

C6-4 Audit Conduct

The conduct of the audit shall commence with an entrance meeting, conducted by the audit team leader, with site ~~or DOE approved laboratory~~ management. At this meeting, the audit objectives and scope, the specific areas to be audited, the processes or functions to be observed, and the site ~~or DOE approved laboratory~~ participation required, including site interfaces, will be identified. The purpose of this meeting is to confirm the audit scope, discuss the audit sequence, establish channels of communication, and confirm the daily and exit meeting. Audits shall be performed using approved audit checklists that include the checklists in Tables C6-1 to C6-4~~6~~ for the summary category groups undergoing audit. Consistency of evaluation shall be ensured before the audit through site ~~or DOE approved laboratory~~ QAPjP approval (see Permit Attachment C5). QAPjPs for each site ~~or DOE approved laboratory~~ shall incorporate the same requirements from the WAP. Objective evidence shall be examined (to the depth necessary) to determine if the identified activities, procedures, or QAOs are adequate and are being effectively implemented.

Audits may not include all waste summary category groups, and thus some audit checklists or portions of checklists (Tables C6-1 through C6-4~~6~~) may not be applicable to some sites ~~or DOE approved laboratory~~ (e.g., approved acceptable knowledge sufficiency determination request for one or more waste streams at a site~~headspace gas sampling and analysis is not used because debris waste is not being analyzed by the site~~). In these instances, DOE shall indicate nonapplicability in the appropriate checklist row, and justify the exclusion under the "Comment" column. In addition, in cases where discrepancies exist between the audit checklists in Tables C6-1 through C6-4~~6~~ and the Permit, Permit requirements take precedence. DOE may add to the checklists as necessary to clarify Permit requirements, but any additions will be clearly designated on the checklists (i.e., redline the additions).

Audits shall include site personnel interviews, document and record reviews, observations of operations, and any other activities deemed necessary by the auditors to meet the objectives of the audit. Observations or deficiencies identified during the audit will be investigated or evaluated, as necessary, to determine if they are isolated conditions or represent a general breakdown of the waste characterization quality assurance program. During audit interviews or audit meetings, site ~~or DOE approved laboratory~~ personnel may be advised of deficiencies identified within their areas of responsibility to establish a clear understanding of the identified condition.

The site ~~or DOE approved laboratory~~ personnel will be given the opportunity to correct any deficiency that can be corrected during the audit period. Deficiencies and observations will be documented and included as part of the final audit report. Those items that have been resolved during the audit (isolated deficiencies that do not require a root cause determination or actions to preclude recurrence), will be verified prior to the end of the audit, and the resolution will be described in the audit report. Those items that affect the quality of the program, and/or the data generated by that program, which are required by the WAP will be documented on a Corrective Action Report (**CAR**) and included as a part of the final audit report. The CAR will be entered into DOE's CAR tracking system and tracked until closure. RCRA-related items will be uniquely identified within the CAR tracking system so that they can be tracked separately. RCRA-related CARs identified by the site ~~or DOE approved laboratory~~ during self-audits will be evaluated during DOE's audit and surveillance program and tracked in DOE's tracking systems.

When a deficiency is identified by the audit team, the audit team member who identified the deficiency prepares the CAR. DOE reviews the CAR, determine validity (assures that a requirement has in fact been violated), classify the significance of the deficiency, assign a response due date, and issue the CAR to the site~~ or DOE approved laboratory~~. The site~~ or DOE approved laboratory~~ reviews the CAR, evaluates the extent and cause of the deficiency, and provides a response to DOE indicating the remedial actions and actions taken to preclude recurrence. DOE reviews the response from the site~~ or DOE approved laboratory~~ and, if acceptable, communicate the acceptance to the site~~ or DOE approved laboratory~~. The site~~ or DOE approved laboratory~~ completes remedial actions and actions to preclude recurrence. After all corrective actions have been completed, DOE may schedule and perform a verification visit to assure that corrective actions have been completed and are effective. NMED personnel may participate as observers in these verification visits. When all actions have been completed and verified as being effective, the CAR is closed by the DOE manager responsible for quality assurance. As part of the planning process for subsequent audits and surveillances, past deficiencies will be reviewed and the previous deficient activity or process is subject to reassessment.

NMED may submit a written Observer Inquiry to DOE if necessary to seek resolution to a question raised or issue posed during the audit. DOE shall be responsible for obtaining a response to the Observer Inquiry and submitting a written response to NMED within 30 days of inquiry submission. NMED will examine the response and consider this information as part of the audit review and approval process.

The sites~~ or DOE approved laboratories~~ shall submit corrective action plans to eliminate the deficiency stated on the CAR, including a resolution of the acceptability of any data generated prior to the resolution of the corrective action.

The corrective action response will include a discussion of the investigation performed to determine the extent and impact of the deficiency, a description of the remedial actions taken, determination of root cause, and actions to preclude recurrence.

An exit meeting will be conducted by the lead auditor prior to departure of the audit team from the site~~ or DOE approved laboratory~~. This meeting will include site~~ or DOE approved laboratory~~ management personnel, and may include DOE field office personnel. All draft audit results will be presented to the site~~ or DOE approved laboratory~~ management.

The audit report will be prepared, approved, and issued to the site~~ or DOE approved laboratory~~ within 30 days of the completion of the audit by DOE. NMED shall receive a copy of the audit report upon issuance for information purposes. A formal final audit report will be provided to NMED which will include WAP-related CAR resolution results and audit results that will include, as a minimum, sections describing the scope, purpose, summary of deficiencies, and observations in narrative format, completed audit checklists, audited procedures, and other applicable documents which provide evidence of WAP implementation. The report will also include an identification of the organization audited, the dates of the audit, and the requested response date. NMED will make the final audit report available for public review and comment. One copy of the formal final audit report shall be submitted to NMED in hard copy, but any additional copies may be submitted in electronic format. The audited site~~ or DOE approved laboratory~~ will respond to any deficiencies and observations within (30 days after receipt of any CARs and indicate the corrective action taken or to be taken. If the corrective action has not been completed, the response must indicate the expected date the action will be completed. CARs applicable to WAP requirements shall be resolved prior to waste shipment. Subsequent audits or specific verifications, announced or unannounced, will determine if the corrective action has been satisfactorily implemented. Deficiencies (items corrected during the audit

[**CDAs**] and CARs) and observations will be tracked to completion according to established procedure(s). In addition, deficiencies will be trended to determine if similar situations exist system wide. Trend reports will be issued as necessary to provide a “lessons learned” announcement to other sites ~~or DOE approved laboratories~~ who might benefit from program improvements implemented as a result of resolutions to the specific situations discovered at the performance of these audits.

The final audit report provided to NMED and audit records will be maintained at WIPP as a part of the Operating Record. These records will be included on the Record Inventory and Disposition Schedule and maintained on-site until closure of the WIPP facility. NMED shall be provided unlimited access to these records.

Table C6-1 Waste Analysis Plan (WAP) Checklist

Waste Analysis Plan (WAP) General Checklist for use at DOE'S Generator/Storage Sites

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Waste Stream Identification					
4	Are procedures in place to ensure that the generator/storage site assigns a Waste Stream WIPP Identifier (ID) to each waste stream? (Section C3-6~~12~~b(1))					
4b	If a generator/storage site does not submit a Determination Request or if the Determination Request is not approved, are procedures in place for the generator/storage site to perform radiography or VE on 100% of the containers in a waste stream ~~and chemical sampling and analysis on a representative sample of the waste stream using headspace gas sampling and analysis (for debris waste) or solids sampling and analysis (for homogeneous solid or soil/gravel waste)~~ as specified in Permit Attachment~~s~~ C1 ~~andC2~~? (Section C-0b)					
4c	Are procedures in place to ensure that the generator/storage sites complete a Waste Stream Profile Form (WSPF) and Characterization Information Summary (CIS) as specified in Permit Attachment C3, Sections C3-6~~12~~b(1) and C3-6~~12~~b(2)? (Section C-0c)					
~~5~~	~~Are procedures in place to ensure that the generator/storage site divides waste streams into waste stream lots if all of the waste within a waste stream is not accessible for sampling and analysis, as required, at one time? If so, is the division of waste streams into waste stream lots based on staging, transportation and handling issues? (Section C-1a)~~					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
6	Are procedures in place to ensure that the generator/storage site assigns EPA hazardous waste numbers associated with the waste? If so, do these assigned EPA hazardous waste numbers correspond to the permitted EPA hazardous waste numbers in Table C-5~~9~~? Are there any assigned EPA hazardous waste numbers that are not permitted EPA hazardous waste numbers on the Table C-5~~9~~? If so, did the generator/storage site reject the waste for shipment to and disposal at WIPP? Did the generator assign a state hazardous waste codes or numbers? If so, is it assigned to waste that is permitted at WIPP? (Section C-1b)					
10	Are procedures in place to ensure that the generator/storage site uses acceptable knowledge and, as necessary~~, headspace gas sampling and analysis~~, radiography, and visual examination~~, and homogeneous waste sampling and analysis~~ as specified in Table C-1~~5~~? (Section C-3)					
	Unacceptable Waste					
12a	• wastes with polychlorinated biphenyls (PCBs) not authorized under an EPA PCB waste disposal authorization • wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003) • waste that has ever been managed as high-level waste and waste from tanks specified in Table C-4~~8~~, unless specifically approved through a Class 3 permit modification • any waste container from a waste stream (or waste stream lot) which has not undergone either radiographic or visual examination of a statistically representative subpopulation of the wastes stream in each shipment pursuant to Permit Attachment C7 • any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form (see Section C-1d) (Section C-1c)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	~~Laboratory Qualification~~					
~~17~~	~~Are procedures in place to ensure that the generator/storage site conduct analyses using laboratories that are qualified through participation in the Performance Demonstration Program (PDP) for headspace gas sampling and analysis, and PDP homogeneous waste sampling and analysis? (Section C-3a(3))~~					
~~18~~	~~Are procedures in place to ensure that the generator/storage sites conduct analyses using laboratories that implement the analytical methods through laboratory-documented standard operating procedures (SOPs) that ensure that analytical QAOs are met? (Section C-3a(3))~~					
~~19~~	~~Are procedures in place to ensure that documented laboratory QA/QC programs include the following:~~ • ~~Facility organization~~ • ~~List of equipment/instrumentation~~ • ~~Operating procedures~~ • ~~Laboratory QA/QC procedures~~ • ~~Quality assurance review~~ • ~~Laboratory records management~~ ~~(Section C-4a(4))~~					
	General Characterization~~Sampling and Analytical~~ Requirements					
~~20~~	~~Are procedures in place to ensure that headspace gas sampling and analysis shall be used to:~~ • ~~Determine the types and concentrations of VOCs in the void volume of waste containers~~ • ~~VOC constituents shall be compared to those assigned by Acceptable Knowledge~~ ~~(Section C-3a(1))~~					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
~~22~~	~~Are procedures in place to ensure that compounds not on the list of target analytes are reported as tentatively identified compounds (TICs) and that the TIC will be added to the target analyte list if it appears in the 20.4.1.200 NMAC (incorporating 40 CFR 261) Appendix VIII list and if they are reported in 25% of the waste containers sampled from a given waste stream? (Section C-3a(1))~~					
~~23~~	~~Are procedures in place to ensure that a randomly selected set of samples will be collected through core sampling or other EPA approved sampling from the population of waste containers for homogeneous and soil/gravel waste streams? Are procedures in place that a sufficient number of samples are collected to evaluate the toxicity characteristic of a waste stream at a 90 percent Upper Confidence limit as specified in Attachment C2? (Section C-3a(2))~~					
~~24~~	~~Are procedures in place to ensure that total analyses or TCLP of VOCs, SVOCs, and RCRA-regulated metals are performed on all core samples to determine if the waste exhibits a toxicity characteristic? (Section C-3a(2))~~					
25	Are procedures in place to ensure that Acceptable Knowledge is used in waste characterization activities to delineate TRU mixed waste streams, to assess whether TRU mixed wastes comply with the TSDF-WAC, to assess whether TRU mixed waste exhibits a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR 261 Subpart C), and to assess whether TRU wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR 261 Subpart D), and to estimate waste material parameter weights? (Section C-3a~~b~~)					
26	Are procedures in place to ensure that radiography and/or visual examination are used as necessary to: • Examine a waste container to determine the physical form • Identify observable liquid in excess of TSDF-WAC limits and containerized gases • Verify the physical form matches the waste stream description (Section C-3b~~c~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
~~27~~	~~Are procedures in place to ensure that the following characterization activities shall occur for newly generated wastes:~~ • ~~Acceptable Knowledge for all wastes, with sampling and analysis as necessary to augment AK including; :~~ – ~~Either visual examination during packaging or radiography (or VE in lieu of radiography) after packaging for all waste containers, ensuring this occurs prior to any treatment designed to supercompact waste~~ – ~~Headspace gas analysis for randomly selected containers , except for qualifying waste containers belonging to LANL sealed sources waste streams~~ – ~~Total VOC, SVOC, and Metals analyses for a selected number of homogeneous solids and soil/gravel waste containers as specified in Attachment C2~~ – ~~Evaluation of any TICs found in headspace gas and totals analyses~~ ~~(Section C-3d(1))~~					
~~27a~~	~~Are procedures in place to ensure that the visual examination during packaging for all waste containers includes the documentation of packaging configuration, type and number of filters, and rigid liner vent hole presence and diameter necessary to determine the appropriate DAC in accordance with Permit Attachment C1, Section C1-1?~~ ~~(Section C-3d(1))~~					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
28	Are procedures in place to ensure that the following characterization activities shall occur ~~for retrievably stored wastes~~: • Acceptable Knowledge for all wastes, with testing~~sampling and analysis~~ as necessary to augment AK including; – Visual examination or radiography for all waste containers ~~– adspace gas analysis for randomly selected containers except for qualifying waste containers belonging to LANL sealed sources waste streams~~ ~~– Total VOC, SVOC, and Metals analyses for a statistically selected number of homogeneous solids and soil/gravel waste containers as specified in Attachment C2~~ ~~– Evaluation of any TICs found in headspace gas and totals analyses~~ ~~(Section C-3d(2))~~					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Data Generation, Verification, Validation, Documentation, and Quality Assurance					
30	Are procedures in place to ensure that the following Data Quality Objectives are met: • Use Acceptable Knowledge to delineate TRU mixed waste streams, assess whether TRU mixed wastes comply with the applicable requirements of the TSDF-WAC, assess whether TRU mixed wastes exhibit a hazardous characteristic, assess whether TRU mixed wastes are listed and to estimate waste material parameter weights ~~• Use Headspace gas sampling and analysis, as necessary, to identify and quantify VOCs in waste containers to resolve the assignment of EPA hazardous waste numbers~~ ~~• Perform totals analyses of homogeneous solids and soils/gravel wastes to establish if the waste is hazardous based on the toxicity characteristics levels in 20.4.1.200 NMAC through a comparison of the upper confidence limits (UCL_{90}) of the mean concentrations to resolve the assignment of hazardous waste numbers~~ • Use radiography or visual examination to verify the waste matches the waste description as determined by AK and to verify~~determine physical waste form,~~ the absence of prohibited items~~, and additional waste characterization techniques that may be used based on Summary Category Groups~~ (Section C-4a(1))					
32	With respect to data generation, are procedures in place to ensure that the generator/storage site's waste characterization program meets the following general requirements: • Testing~~Analytical~~ data packages and batch data reports must be reported accurately in a pre-approved format, must be maintained in permanent files, and must be traceable? • All data must receive a technical review by another qualified operator~~analyst~~? (Section C3-~~10~~4a)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
33	Are procedures in place to ensure that the generator/storage site performs validation of waste characterization data for each waste container? (Section C-4)					
34	Are procedures in place to ensure that the generator/storage site has a pre-approved format for reporting waste characterization data? (Section C-4a(3~~4~~))					
35	Are procedures in place to ensure that the generator/storage site prepares ~~analytical,~~ testing~~, and sampling~~ batch data reports to meet the requirements of their own site-specific QAPjP and/or SOPs? (Section C-4a(3~~4~~))					
36	Are procedures in place to ensure that all raw data is collected and managed at the data generation level in accordance with the following criteria: • All raw data shall be signed and dated in reproducible ink by the individual collecting the data, or signed and dated using electronic signatures • All data shall be recorded clearly, legibly, and accurately in field ~~and laboratory~~ records~~ and include applicable sample identification numbers~~ • All changes to original data shall be lined out, initialed, and dated by the individual making the change. Original data may not be obliterated or otherwise be made unreadable • All data shall be transferred and reduced from field~~ and laboratory~~ records completely and accurately • All field~~ and laboratory~~ records shall be maintained as specified in Table C-2~~ 6~~ of Attachment C • Data shall be organized into standard reporting formats for reporting purposes. • All electronic and video data must be stored to ensure that waste container~~, sample~~ and QC data are readily retrievable (Section C3-~~10~~4a)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
37	Are procedures in place to ensure that 100 % of batch data reports are subject to independent technical review by an individual qualified to review the data who was not involved in the generation or recording of the data under review. The reviewer shall release the data through signature with an associated review checklist prior to characterization of the associated waste and shipment to the WIPP. The review shall ensure the following, as applicable: • Data generation and reduction were conducted according to the methods used and reported in the proper units and significant figures • Calculations have been verified by a valid calculation program, a spot check of verified calculation programs, and/or a 100 percent check of all hand calculations • The data have been reviewed for transcription errors • The testing~~, sampling, and analytical~~ QA documentation for BDRs is complete and includes, as applicable, raw data~~, DAC and equilibrium calculations and times~~, calculation records~~, chain of custody forms~~, calibration records~~, QC sample results and copies or originals of gas canister sample tags~~. ~~• All QC sample results are within established control limits, and if not, the data has been appropriately qualified~~ ~~• Reporting flags were assigned correctly~~ ~~• Sample holding times and preservation requirements were met, or exceptions documented~~ • Radiography tapes are reviewed on a waste container basis at a minimum of once per testing batch or once per day of operation, whichever is less frequent. The radiography tape will be reviewed against the data on the radiography form to ensure that data are complete and correct ~~• Field sampling records are complete~~ • QAOs have been met (Section C3-~~10~~4a(1))					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
40	Are procedures in place to ensure that 100 percent of all batch data reports receive a Site Project Manager signature release with an associated review checklist prior to characterization of the associated waste and shipment to the WIPP. This release shall ensure the following: • ~~The Site Project Manager or designee shall determine the validity of the drum age criteria (**DAC**) assignment made at the data generation level based upon an assessment of the data collection and evaluation necessary to make the assignment.~~ • Testing batch QC checks were properly performed. Radiography data are complete and acceptable based on evidence of videotape review of one waste container per day or once per testing batch, whichever is less frequent • ~~Sampling batch QC checks were properly performed, and meet the established QAOs and are within established data usability criteria~~ • ~~Analytical batch QC checks were properly performed and meet the established QAOs and are within established data usability criteria~~ • ~~Online batch QC checks were properly performed and meet the established QAOs and are within established data usability criteria~~ • ~~Proper procedures were followed to ensure representative samples of headspace gas and homogeneous solids and soil/gravel were taken~~ • Data generation level independent technical review, validation, and verification have been performed as evidenced by the completed review checklists and appropriate signature releases. • Independent technical reviewers were not involved in the generation or recording of the data under review. • Batch Data review checklists are complete • Batch Data Reports are complete and data properly reported • Verify that data are within established data assessment criteria and meet all applicable QAOs					

		Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
W	AP Requirement[1]	Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	(Section C3-~~10~~4b(1))					
42	Are procedures in place to ensure that a repeat of the data review process at the data generation level will be performed on a minimum of one randomly chosen waste container every quarter to determine if the verification and validation is performed according to documented procedures? (Section C3-~~10~~4b)					
43	Are procedures in place and checklists are available to prepare a Site Project Manager (**SPM**) Summary and a Data Validation Summary (the summaries may be in the same document)? The SPM Summary includes a validation checklist for each batch that is of sufficient detail to document all aspects of a batch data report that could affect data quality. The Data Validation Summary must identify each Batch Data Report reviewed, describe how the validation was performed, identify all problems, and identify all acceptable and unacceptable data. Summaries must include release signatures. (Section C3-~~10~~4b(2))					
44	Are procedures in place to ensure that non-administrative, WAP-related nonconformances first identified at the site project manager level are reported to the Permittees within seven calendar days of identification, that nonconformance reports are prepared within 30 calendar days, and that corrective action is implemented prior to waste shipment? (Section C3-7~~13~~)					
45	Are procedures in place to ensure that any waste container for which a nonconformance report (**NCR**) has been written will not be shipped to the WIPP facility unless the condition that led to the NCR for that container is appropriately identified, reconciled, corrected, and documented? Are nonconformance reports prepared for nonconformances identified? Are nonconformances identified and tracked, and does the Site Project Manager oversee the nonconformance report process? (Section C3-7~~13~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	~~**Sample Control**~~					
~~46~~	~~Are procedures in place to ensure that the site's sample handling and control program includes the following:~~ • ~~Field documentation of samples including point of origin, date of sample, container identification, sample type, analysis requested, and chain-of-custody (COC) number?~~ • ~~Proper labeling and/or tagging including proper sample numbering, sample identification, sample date, sampling conditions, and analysis requested?~~ • ~~COC record including name of sample relinquisher, sample receiver, and date and time of sample transfer? and~~ • ~~Proper sample handling and preservation?~~ ~~(Section C-4a(3))~~					
~~47~~	~~Are procedures in place to ensure that the site's QAPjP or site-specific procedures includes COC forms to control the sample from the point of origin to the final analysis result reporting? (Section C-4a(3))~~					
	Data Transmittal					
48	Are procedures in place to ensure that the generator/storage site transmits data by hard copy or electronic copy from the data generation level to the site project level? If electronic, does the generator/site have a hard copy available on demand? (Section C-4a(5~~6~~))					
50	Are procedures in place to ensure that the generator/storage site inputs the data into the WWIS manually or electronically? (Section C-4a(5~~6~~))					
51	Are procedures in place to ensure that the generator/storage site enters the data into the WWIS in the exact format required by the database? (Section C-4a(5~~6~~))					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
~~51a~~	~~Are procedures in place to ensure that if a container was part of a composite headspace gas sample, the analytical results from the composite sample must be assigned as the container headspace gas data results, including associated TICs, for every waste container associated with the composite sample in the WWIS? (Section C3-12b(4))~~					
52	Are procedures in place to ensure all of the data presented on Table C-3 ~~7~~ of the Permit is transmitted to the WWIS? (Table C-3~~7~~)					
	Records and Record Management					
55	Are procedures in place to ensure that the generator/storage site's hard copy and/or electronic data reports follow the Permittees' format requirements? (Section C-4a(34))					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
56	Are procedures in place to ensure that hard copy or electronic Waste Stream Profile Form will include the following • Generator/storage site name • Generator/storage site EPA ID • Date of audit report approval by NMED (if obtained) • Original generator of waste stream • Whether waste is Contact-Handled or Remote-Handled • Waste Stream WIPP Identification Number • Summary Category Group • Waste Matrix Code Group • Waste Material Parameter Weight Estimates per unit of waste • Waste stream name • A description of the waste stream • Applicable EPA hazardous waste numbers • Applicable TRUCON codes • A listing of acceptable knowledge documentation used to identify the waste stream • The waste characterization procedures used and the reference and date of the procedure • Certification signature of Site Project Manager, name, title, and date signed (Section C3-6~~12~~b(1))					
56a	Are procedures in place to ensure that hard copy or electronic Characterization Information Summary will include the following: • Data reconciliation with DQOs ~~• Headspace gas summary data listing the identification numbers of samples used in the statistical reduction, the maximum, mean, standard deviation, UCL_{90}, RTL, and associated EPA hazardous waste numbers that must be applied to the waste stream.~~ ~~• Total metal, VOC, and SVOC analytical results for~~					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	~~homogeneous solids and soil/gravel (if applicable),~~ • ~~TIC listing and evaluation,~~ • Radiography and visual examination summary to document that all prohibited items are absent in the waste and to verify that the waste matches the waste stream description (if applicable) • A complete listing of all container identification numbers used to generate the Waste Stream Profile Form, cross-referenced to each Batch Data Report • Complete AK summary, including stream name and number, point of generation, waste stream volume (current and projected), generation dates, TRUCON codes, Summary Category Group, Waste Matrix Code(s) and Waste Matrix Code Group, other TWBIR information, waste stream description, areas of operation, generating processes, RCRA determinations, radionuclide information, all references used to generate the AK summary, and any other information required by Permit Attachment C4, Section C4-2b. • Method for determining Waste Material Parameter Weights per unit of waste. • List of any AK Sufficiency Determinations requested for the waste stream. • Certification through acceptable knowledge or testing ~~and/or analysis~~ that any waste assigned the hazardous waste number of U134 (hydrofluoric acid) no longer exhibits the characteristic of corrosivity. This is verified by ensuring that no liquid is present in U134 waste. • A justification for the selection of radiography and/or VE as an appropriate method of characterizing the waste. (Section C3-6~~12~~b(2))					
56b	Are procedures in place to assure that ongoing container characterization results are cross referenced to Batch Data Reports? Section C3-6~~12~~b					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
58	Are procedures in place to ensure that project level reports are compiled into Characterization Information Summaries (Section C3-6~~12~~b)					
59	Are procedures in place to ensure that the generator/storage site uses forms for data reporting that are pre-approved forms in site-specific documentation? (Section C3-6~~12~~)					
60	Are procedures in place to ensure that the generator/storage site's site project manager submits to the WIPP facility a summary of the waste stream information and reconciliation with data quality objectives (DQOs) once a waste stream is characterized? (Section C-4a(5~~6~~))					
61	Are procedures in place to ensure that the generator/storage site project office completes a WSPF based on the Batch Data Reports? C3-6~~12~~b)					
62	Are procedures in place to ensure that the generator/storage Site Project Manager submits the WSPF to the Permittees for DOE's approval along with the accompanying Characterization Information Summary for that waste stream? (Section C-4a(5~~6~~))					
63	Are procedures in place to ensure that the generator/storage site maintains records related to waste characterization testing~~sampling and analysis~~ activities in the testing~~, sampling or analytical~~ facility~~ies~~ files, or site project files for those facilities located on-site? (Section C-4a(6~~7~~))					
64	Are procedures in place to ensure that the appropriate documented training and indoctrination is performed for all individuals and that procedures are documented in site specific QAPjPs and procedures? (Section C3-8~~14~~)					
~~65~~	~~Are procedures in place to ensure that the generator/storage site requires contract waste analytical facilities to forward testing, sampling and analytical records along with testing, sampling and analytical batch data reports to the site project office for inclusion in the sites project files? (Section C-4a(7))~~					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
66	Are procedures in place to ensure that the generator/storage site has an appropriate records inventory and disposition schedule (RIDS) or equivalent that was prepared and approved by appropriate site personnel? (Section C-4a(6~~7~~))					
67	Are procedures in place to ensure that the generator/storage site maintains all records relevant to an enforcement action, regardless of disposition, until they are no longer needed for enforcement action, and then dispositioned per the approved RIDS? (Section C-4a(6~~7~~))					
68	Are procedures in place to ensure that the generator/storage site maintains records that are designated as Lifetime Records for the life of the waste characterization program plus six years, or that the records have been transferred for permanent archival storage to the WIPP Records Archive facility? Lifetime Records include: ~~• Field sampling data forms,~~ ~~• Field and laboratory COC forms,~~ • Test facility ~~and laboratory~~ Batch Data Reports, • Waste Stream Characterization Package, ~~• Sampling plans,~~ • Data reduction, validation, and reporting documentation, • Acceptable knowledge documentation, • WSPF and Characterization Information Summary (Section C-4a(6~~7~~), Table C-2~~6~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
69	Are procedures in place to ensure that the generator/storage site maintains records that are designated as Non-Permanent Records for ten years from the date of record generation, and then dispositioned according per the approved RIDS or transferred to the WIPP Records Archive facility? Non-Permanent Records include: • Nonconformance documentation, • Variance documentation, • Assessment documentation, • ~~Gas canister tags,~~ • ~~Methods performance documentation,~~ • ~~PDP documentation,~~ • ~~Sampling equipment certifications,~~ • Calculations and related software documentation, • Training/qualification documentation, • QAPjP documentation (all revisions), • Calibration documentation, • ~~Analytical raw data,~~ • Procurement documentation, • QA procedures (all revisions), • Technical implementing procedures (all revisions), and • Audio/video recording (radiography, visual, etc.). (Section C-4a(6~~7~~), Table C-2~~6~~)					
70	Are procedures in place to ensure that the generator/storage site has raw data that is identifiable and legible, and provides documentary evidence of quality? (Section C-4a(6~~7~~))					
71	Are procedures in place to ensure that if the generator/storage site ceases to operate, that all records be transferred before closeout? (Section C-4a(6~~7~~))					

~~**Table C6 2 Solids and Soils/Gravel Sampling Checklist**~~

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~~Solids and Soils/Gravel Sampling Checklist~~

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~General Solids Sampling Requirements~~					
~~75~~	~~Are procedures documented that adequately ensure that when a Determination Request has not been approved, sampling and analysis of newly generated homogeneous solid and soil/gravel waste streams shall be conducted in accordance with the requirements specified in Attachment C1, Section C1-2.~~ ~~(Section C-3d(1)(a))~~					
~~76~~	~~Are procedures in place to ensure that the number of newly generated soils/gravel waste containers to be randomly sampled will be determined using the procedure specified in Section C2-1, wherein a statistically selected portion of the waste will be sampled? (Section C-3d(1)(a))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~77~~	~~Are procedures in place to ensure that the following sample collection requirements for retrievably stored and newly generated waste streams are met:~~ • ~~The number of random samples collected for characterization of retrievably homogeneous solid and soil/gravel stored waste is performed by developing preliminary mean and variance estimates for each analyte to define the number of required random samples; and that the sample selection process is adequately documented.~~ • ~~A minimum of 5 waste containers in a retrievably stored waste streams are sampled to establish the preliminary estimate for the number of samples.~~ • ~~Based on the number of samples required by the preliminary estimate, the subsequent sample means and deviations for each analyte are evaluated against the regulatory threshold for each constituent to determine if additional samples shall be collected.~~ • ~~Samples (the number of which is statistically determined) are collected to verify that a TRU mixed waste is below the regulatory threshold, where the regulatory threshold is the toxicity limit for toxicity characteristics and the PRQL for listed waste constituents.~~ • ~~Samples from preliminary estimates counted as required samples were randomly selected and were collected, analyzed, and validated using representative methods~~ ~~(Section C2-1a)~~					
~~80~~	~~Are procedures in place that allow toxicity characteristic contaminants associated with F-numbers for a waste stream to be omitted from sampling requirements? (Section C2-1a)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Solids Sampling Procedures~~					
~~81~~	~~Do procedures ensure that samples for retrievably stored waste are collected using appropriate coring tools or other EPA approved methods, and that newly generated wastes that are sampled from a process as it is generated are sampled using EPA approved methods, including scoops and ladles, that are capable of collecting a representative sample? (Section C1-2a)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~82~~	~~Do site specific procedures, QAPjPs, and/or SOPs indicate that rotational coring tools are available for the collection of cores and non-rotational coring tools available for collection of cores in relatively soft media. The method used shall be appropriate to retrieve the maximum core amount. The coring tools will include the following features:~~ • ~~Removable tube liners constructed of rigid materials unlikely to affect the composition and/or concentration of target analytes in the sample core (Teflon®) and sufficiently transparent to allow visual examination of the core. The liner outer diameters are between 1-2 inches and the liner wall thickness is no greater than 1/16 inch. The liner shall fit flush with the coring tool inner wall and be of sufficient length to hold a core representative of the waste along the entire depth of the waste.~~ • ~~Sleeves composed of polycarbonate, Teflon, or glass for most samples and brass or stainless steel for non-metal samples~~ • ~~Liner end caps shall fit tightly around the ends of the liner and shall be composed of materials unlikely to affect the composition and/or concentration of analytes in the core (Teflon®)~~ • ~~Spring retainers shall be used when the physical properties of the sampling media may cause the sample to fall out of the liner. The retainer shall be composed of inert materials and the inner diameter shall not be less than the inner diameter of the liner~~ • ~~Coring tools may have an air lock mechanism. The air lock shall also close when the core is removed from the waste container~~ • ~~Core extruders shall be used to extrude the liner if the liner does not slide freely~~ • ~~Coring tools shall be of sufficient length to hold the liner and shall be constructed to allow placement of the liner leading edge as close as possible to the coring tools leading edge~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~82a~~	• ~~All surfaces of the coring tool that have the potential to contact the sample core or sample media shall be cleaned prior to use~~ • ~~Rotational coring tools shall have a mechanism to minimize inner liner rotation and shall be designed to minimize frictional heat transfer to the sample core~~ • ~~The leading edge of the coring tool may be sharpened and tapered to a diameter equivalent or slightly smaller than the inner diameter of the liner.~~ • ~~Non Rotational coring tools shall be designed to minimize the kerf width (½ the difference between the outer diameter of the tool and the tools inlet inner diameter)~~ ~~(Section C1-2a(1))~~					
~~83~~	~~Does the site adequately document that the liner material and retainers are not likely to contain any analytes of concern? (Section C1-2a(1))~~					
~~84~~	~~Are procedures in place to ensure that equipment blanks are collected and evaluated to verify that liner material, retainers, or other sampling equipment in contact with the sample do not contain analytes of concern? (Section C1-2b(2))~~					
	~~**Sample Collection**~~					
~~85~~	~~Are procedures in place to ensure that sampling is completed in a timely manner, within 60 minutes of core collection, or that the core shall remain in the capped liner, or the coring tool shall remain in the waste container with the air lock mechanism attached? (Section C1-2a(2))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~86~~	~~Are procedures in place to ensure that VOC samples are sampled prior to extruding the core from the liner and that the sample locations are documented? These samples may be collected by choosing a single sample from the representative subsection of the core, or three equal length VOC sample locations on the core are selected randomly along the long axis of the core to form a single 15-gram composite sample. Smaller sample sizes may be used if method PRQL requirements are met for all analytes. (Section C1-2a(2))~~					
~~87~~	~~Are procedures documented to ensure that a VOC sample is collected using a metal coring cylinder or equivalent equipment as described in SW-846 and that the sample is immediately extruded into a 40 mL VOA vial (or other containers specified in appropriate SW-846 methods)? (Section C1-2a(2))~~					
~~88~~	~~Are procedures in place to ensure that SVOC and Metals sample location(s) on the core are selected randomly along the long axis of the core and that the sample locations are documented, or that samples are collected at the same locations as VOC samples? Samples may be collected by splitting or compositing the representative subsection of the core. The representative subsections are chosen by randomly selecting a location along the portion of the core from which the sample was taken. (Section C1-2a(2))~~					
~~89~~	~~Are procedures in place to ensure that the SVOC and Metals sample s are collected using equipment constructed of materials unlikely to affect the composition or concentrations of the samples? (Section C1-2a(2))~~					
~~90~~	~~Are procedures in place to ensure that newly generated waste samples collected by means other than coring are collected as soon as possible and that spatial and temporal homogeneity is evaluated to determine if composite or grab samples are appropriate? (Section C1-2a(2))~~					

		~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		
	~~WAP Requirement~~[1]	~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	~~Comment(e.g., any change in procedure since last audit, etc.)~~
~~91~~	~~Are procedures in place to ensure sample volumes, preservatives, containers, and holding times meet the following specifications:~~ **~~Minimum sample quantity~~** ~~VOC 15 grams~~ ~~SVOC 50 grams~~ ~~Metals 10 grams~~ ~~(Quantity may be increased or decreased according to the requirements of the analytical laboratory, as long as the QAOs are met.)~~ **~~Preservative~~** ~~VOC Cool to 4C~~ ~~SVOC Cool to 4C~~ ~~Metals Cool to 4C~~ **~~Sample Container~~** ~~VOC 40 mL VOA glass vial (or other appropriate containers) cap~~ ~~SVOC glass jar with Teflon© lined cap~~ ~~Metals polyethylene or polypropylene bottle~~ **~~Holding Time from Date of Collection~~** ~~VOC 14 days prep/40 days analyze~~ ~~SVOC 14 days prep/40 days analyze~~ ~~Metals 180 days/ 28 days Hg~~ ~~(Table C1 4)~~					
	~~Quality Control Sample Collection~~					
~~92~~	~~Are procedures in place to ensure that sampling precision will be determined through the collection of co located core field duplicate samples for core samples and through the collection of co located samples for samples collected using alternate methods at the frequency of once per 20 sample batch collected over 14 days or once per week, whichever is more frequent? (Section C1 2b(1))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~93~~	~~Are procedures in place to ensure that co located cores are collected side by side as close as feasible to each other, that the cores are collected and handled in the same manner? (Section C1-2b(1))~~					
~~94~~	~~Are procedures in place to ensure that an additional sampling location is found or new co located cores are collected if the visual examination of the original co located cores detects inconsistency in the sample color, texture, or waste type? (Section C1-2b(1))~~					
~~95~~	~~Are procedures in place to ensure that all surfaces of sampling tools that have the potential to come into contact with the sample, including tube liners, endcaps, spring retainers, extruders, coring tool surfaces, or any other sampling equipment, are either thoroughly decontaminated or disposed of after each sampling event? (Sections C1-2b(2), C1-2b(3))~~					
~~96~~	~~Are procedures in place to ensure that equipment blanks are collected from randomly selected fully assembled coring tools or randomly selected liners (if they are cleaned separately) and from randomly selected sampling equipment (e.g. VOC subsampler, spoons, bowls) at a frequency of once per equipment cleaning batch and that the sample is collected prior to first use? (Section C1-2b(2))~~					
~~97~~	~~Are procedures in place to ensure that equipment blanks will be collected in the area where sampling equipment coring tools are cleaned, prior to covering the coring tools with protective wrapping and storage? (Section C1-2b(2))~~					
~~99~~	~~Are procedures in place to ensure that miscellaneous sampling tool equipment blanks will be collected by pouring deionized or HPLC water over the surface of the equipment and into a clean sample container appropriate for the requested analysis? (Section C1-2b(2))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~100~~	~~Are procedures in place to ensure that equipment blanks are analyzed for VOC, SVOC, and Metals and that the entire equipment batch will be re cleaned and re sampled if any analytes are detected at levels greater than 3 times the MDL or PRDL (Section C1-2b(2))~~					
~~101~~	~~Are procedures and processes in place to ensure that equipment blanks are traceable to a specific equipment cleaning batch and that the equipment cleaning batch is traceable to specific identified sampling equipment? Are sampling equipment or coring tools labeled with unique identification numbers that are referenced in field records? (Section C1-2b(3))~~					
~~102~~	~~Are procedures in place to ensure that disposable sampling equipment is certified as clean prior to use? (Section C1-2b(2))~~					
	~~**Sample Equipment Testing, Inspection and Maintenance**~~					
~~103~~	~~Are procedures in place to ensure that all sampling and coring tools are tested prior to use in accordance with manufacturers specification to ensure that the air-lock mechanism and rotation mechanism are in working order? (Section C1-2c)~~					
~~104~~	~~Are procedures in place to ensure that malfunctioning sampling and coring tools are repaired or replaced prior to use? (Section C1-2c)~~					
~~105~~	~~Are procedures in place to ensure that all equipment is cleaned, sealed inside a protective wrapping and stored in a clean area? (Section C1-2c)~~					
~~106~~	~~Are procedures in place to ensure that an adequate spare part inventory is available? (Section C1-2c)~~					
~~107~~	~~Are procedures in place to ensure that all equipment maintenance and repair is documented in field records and that field record logbooks are available to document equipment maintenance and repair activities? (Section C1-2c)~~					

	~~WAP Requirement[1]~~	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~108~~	~~Are procedures in place to ensure that inspection of equipment and work area cleanliness will encompass the following:~~ • ~~Sample collection equipment in the immediate area of sample collection shall be inspected daily for cleanliness and that any visible contamination that has a potential to contaminate a waste sample shall be thoroughly cleaned upon discovery~~ • ~~The waste coring and sampling work areas shall be maintained in clean condition~~ • ~~Expendable equipment shall be visually inspected for cleanliness prior to use and properly discarded after use~~ • ~~Protective wrapping on coring tools and other sampling equipment are visually inspected prior to unwrapping. Coring tools or other equipment with torn protective wrappers or with visible contamination are returned to be cleaned or properly discarded prior to use.~~ • ~~All sampling equipment shall be visually inspected prior to use to determine if protective wrapping is torn or if equipment is contaminated after unwrapping. Equipment with torn wrapping or signs of contamination will be returned for cleaning or properly discarded.~~ • ~~Clean sampling and coring equipment is segregated from all equipment that has not been decontaminated.~~ ~~(Section C1-2c)~~					
~~109~~	~~Are procedures documented to ensure that scales used for weighing sub-samples are calibrated as necessary to maintain its operation within manufacturer's specification, that the calibration is documented, that calibration is verified using NIST traceable weights upon each day of use, and that all calibration verification is documented in field records? (Section C1-2d)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Sample Handling and Custody~~					
~~111~~	~~Do formats for field logs and custody records specify documentation of the following information:~~ • ~~Signature of individual initiating custody control, along with the date and time~~ • ~~Documentation of sample numbers for each sample under custody. Sample numbers will be referenced to a specific sampling event description that will identify the sampler(s) through signature, date and time of sample collection, type/number containers for each sample, sample matrix, preservatives (if applicable), requested methods of analysis, place/address of sample collection and the waste container number~~ • ~~For off site shipping, method of shipping transfer, responsible shipping organization or corporation, and associated air bill or lading number.~~					
~~111a~~	• ~~Signatures of custodians relinquishing and receiving custody of samples including date and time of transfer.~~ • ~~Description of final sample container disposition, along with signature of individual removing sample container from custody~~ • ~~Comments section~~ • ~~Documentation of discrepancies, breakage or tampering~~ ~~(Section C1-5)~~					
~~112~~	~~Are procedures in place to ensure that samples and sampling equipment are identified with unique identification numbers? (Section C1-5)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~113~~	~~Do sample tags or labels contain the following information:~~ • ~~Sample ID number~~ • ~~Sampler initials and organization~~ • ~~Ambient temperature and pressure (for gas samples only)~~ • ~~Sample description~~ • ~~Requested analysis~~ • ~~Date and time of collection~~ • ~~QC designation (if applicable)~~ ~~(Section C1-5)~~					
~~114~~	~~Are procedures in place to ensure waste containers and samples are sealed with intact custody seals and that one or more of the following custody conditions are met:~~ • ~~It is in the possession of an authorized individual~~ • ~~It is in the view of an authorized individual, after being in the possession of that individual~~ • ~~It was in the possession of an authorized individual and access to the sample was controlled by locking or placement of signed custody seals that prevent undetected access~~ • ~~It is in a designated secure area, such as a controlled access location with complete documentation of personnel access or a radiological containment area (hot cell or glove box)~~ ~~(Section C1-5)~~					
~~117~~	~~Are procedures in place to ensure that sample custody is maintained until the sample is released by the SPM or is expended. (Section C1-5)~~					
~~118~~	~~Are procedures in place to ensure that samples in glass jars are wrapped in plastic to prevent breakage and placed in appropriate containers, such as coolers, for shipment? (Section C1-6)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~119~~	~~Are procedures in place to ensure that adequate cold packs are included in the sample shipping container to ensure that all temperature requirements are met? (Section C1-6)~~					
~~120~~	~~Are procedures in place to ensure that sample COC forms are secured for shipment to the inside of the sealed and locked shipping container and that samples and shipping containers are affixed with tamper proof seals? (Section C1-6)~~					
~~121~~	~~Are procedures in place to ensure that appropriate blank samples are included with each shipment container containing VOC samples? (Section C1-6)~~					
~~122~~	~~Are procedures in place to ensure that a custody seal or device is securely affixed across the lid and body of each sample and shipment container, and is traceable to the individual who affixed the seal or device? (Section C1-5)~~					
	~~Laboratory Operations~~					
~~123~~	~~Are procedures in place to ensure that only laboratories that are qualified through participation in the Performance Demonstration Program are eligible to analyze waste samples? (Section C-3a(3))~~					
~~124~~	~~Are procedures available from all participating laboratories that adequately document that custody is maintained until the sample is released by the site project manager or until the sample is expended? (Section C1-5)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Volatile and Semi Volatile Analysis of Core Samples~~					
~~125~~	~~Are procedures documented to ensure that all VOC and SVOC analyses are evaluated using the following criteria:~~ • ~~GC/MS Tunes, Initial Calibrations and Continuing Calibration will be performed and evaluated using criteria in Table C3-5 (VOCs) or Table C3-7 (SVOCs) and SW-846 methods~~ • ~~Precision shall be assessed through analyzing laboratory duplicates or matrix spike duplicates, LCS replicates, and PDP blind-audit samples in comparison to Table C3-4 (VOCs) and Table C3-6 (SVOCs)~~ • ~~Accuracy as %R shall be assessed through evaluation of LCS , Matrix spikes, PDP blind audit samples, and surrogate compounds in comparison to criteria in Table C3-4 and Table C3-5 (VOCs) and Table C3-6 and Table C3-7(SVOCs) or the SW-846 method.~~ • ~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples collected.~~ • ~~Comparability is assessed through use of standardized SW-846 methods sample preparation and methods that meet the QAO requirements in Tables C3-4 and C3-5 (VOCs) and Tables C3-6 and C3-7(SVOCs), traceable standards, and by requiring participation in the PDP.~~ • ~~Representativeness is assured through the use of unbiased sample collection~~ • ~~Results and method detection limits are expressed in Mg/Kg~~ • ~~All method detection limits and program required quantitation limits shall be less than or equal to the limits listed in Table C3-4 or Table C3-6 and the detection limit study procedures shall be documented in SOPs~~ ~~(Section C3-6 and C3-7)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~126~~	~~Are procedures documented to ensure that Tentatively Identified Compounds shall be added to the target analyte list if detected in a given waste stream if they are reported in 25% of the waste containers sampled from a given waste stream, and if they appear in the 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII list? (Section C-3a(1))~~					
~~126a~~	~~Are procedures documented to ensure that the following criteria are met with regard to the recognition and reporting of TICS for GC/MS Methods for homogeneous solids and soils and gravels in accordance with SW 846 criteria:~~ • ~~Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.~~ • ~~The relative intensities of the major ions should agree within ± 20 percent.~~ • ~~Molecular ions present in the reference spectrum should be present in the sample spectrum.~~ • ~~Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.~~ • ~~Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks.~~ • ~~The reference spectra used for identifying TICs shall include, at minimum, all of the available spectra for compounds that appear in the 20.4.1.200 NMAC (incorporating 40 CFR Part 261) Appendix VIII list. The reference spectra may be limited to VOCs when analyzing headspace gas samples.~~ • ~~TICs for headspace gas analyses that are performed through FTIR analyses shall be identified in accordance with the specifications of SW-846 Method 8410.~~ ~~(Section C3-1)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~126b~~	~~TICs shall be reported as part of the analytical batch data reports for GC/MS Methods in accordance with the following minimum criteria:~~ • ~~a TIC in an individual container headspace gas or solids sample shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 10% of the area of the nearest internal standard.~~ • ~~a TIC in a composited headspace gas sample that contains 2 to 5 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 2% of the area of the nearest internal standard.~~ • ~~a TIC in a composited headspace gas sample that contains 6 to 10 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 1% of the area of the nearest internal standard.~~ • ~~a TIC in a composited headspace gas sample that contains 11 to 20 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 0.5% of the area of the nearest internal standard.~~ ~~(Section C3-1)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Metals Analysis of Core Samples~~					
~~127~~	~~Are procedures in place to ensure that all Metals analyses are evaluated using the following criteria:~~ • ~~Precision shall be assessed by analyzing of laboratory sample duplicates or laboratory matrix spike duplicates, LCS replicates, and PDP blind audit samples in comparison to Table C3-8~~ • ~~Accuracy shall be assessed through analysis of laboratory matrix spikes, PDP blind audit samples, serial dilutions, interference check samples, and laboratory control samples in comparison to criteria in Tables C3-8 and C3-9~~ • ~~Instrument detection limits are expressed in ug/L and results are listed in Mg/Kg.~~ • ~~All instrument detection limits and program required detection limits shall be less than the limits listed in Table C3-8 and the detection limit study procedures shall be documented in laboratory SOPs. The Instrument detection limits shall be less than the associated PRDL for each analyte~~ ~~*(This requirement is not mandatory if the sample concentrations are greater than 5 times the instrument detection limit (IDL) for a method)*~~ • ~~Instrument detection limits shall be determined semiannually using procedures documented in laboratory SOPs~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~127a~~	• ~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis.~~ • ~~Comparability is assessed through use of standardized SW 846 sample preparation and methods that meet the QAO requirements in Tables C3 8 and C3 9, demonstrating successful participation in the PDP and use of traceable standards.~~ • ~~Representativeness is assured through the use of unbiased sample collection and preparation of samples using unbiased methods.~~ • ~~Results PRQLs are expressed in Mg/Kg wet weight~~ ~~(Section C3 8)~~					
	~~Quality Assurance Objectives~~					
~~128~~	~~Are procedures in place to ensure that the sample completeness rate is expressed as the number of valid samples collected as a percentage of the total samples collected for each waste stream? The rate must be greater than 90 percent for all compounds in a waste stream. (Section C3 3)~~					
~~129~~	~~Are procedures in place to ensure that sampling operations are comparable through the use of standardized procedures, sampling equipment, and measurement units participation in the PDP? (Section C3 3)~~					
~~130~~	~~Are procedures in place to ensure that sampling precision shall be determined through the collection of field duplicates at a rate of 1 per sampling batch (up to 20 samples) or 1 per week, whichever is more frequent? (Section C3 3)~~					
~~131~~	~~Are procedures in place to ensure that the variance measured between co located core samples is compared to the variance within the waste stream using the F test? (Section C3 3)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment(e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~132~~	~~Are procedures in place to ensure that sampling accuracy as a result of equipment blank evaluation is determined through the collection of equipment blanks at a frequency of once per equipment cleaning batch (Section C3-3)~~					
~~133~~	~~Are procedures in place to ensure that the representativeness of samples is demonstrated through the following requirements:~~ • ~~Use of coring tools and sampling equipment that are clean prior to use~~ • ~~The entire depth of the waste minus a documented safety factor shall be cored and the core collected shall have a core length greater than or equal to 50 percent~~ • ~~The core recovery is calculated as the length of the core collected over the depth of the waste in the container~~ • ~~Coring operations and tools should be designed to minimize alteration of the in place waste characteristics and the minimum waste disturbance shall be verified by visually examining the core and documenting the observation in field logbooks~~ ~~(Note: if core recovery is less than 50 percent, a second core shall be randomly selected. The core with the best recovery shall be used for sample collection)~~ ~~(Section C3-3)~~					

1. ~~The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.~~

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Table C6-2~~3~~ Acceptable Knowledge (AK) Checklist

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Acceptable Knowledge (AK) Checklist[1]

W	AP Requirement[2]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Required and Additional Information					
144	Have the following procedures been prepared? A. Procedures for identifying and assigning the physical waste form of the waste B. Procedures for delineating waste streams and assigning Waste Matrix Codes C. Procedures for resolving inconsistencies in acceptable knowledge documentation D. Procedures for ~~headspace gas sampling and analysis,~~ visual examination and/or radiography~~, and homogeneous waste sampling and analysis~~, if applicable E. For newly generated waste, procedures describing process controls used to ensure prohibited items (specified in the WAP, Permit Attachment C) are documented and managed F. Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container (e.g. liquid exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes) G. Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated Environmental Protection Agency hazardous waste numbers based on material composition are documented for any waste H. Procedures that ensure the assignment of EPA hazardous waste numbers is appropriate, consistent with RCRA requirements, and adequately considers site historical waste management I. Procedures for estimating waste material parameter weights (Section C4-2b)					
~~145a~~	~~For waste containers that belong to LANL sealed sources waste streams, and for which headspace gas sampling and analysis is not required, are there procedures in place to assure the collection of the following additional AK?~~					

W	AP Requirement[2]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	~~A. Documentation that the waste container contents meet the definition of sealed sources per 10 CFR §30.4 and 10 CFR §835.2 (effective January 1, 2004)~~ ~~B. Documentation of the certification of the sealed sources as U.S. Department of Transportation Special Form Class 7 (Radioactive) Material per 49 CFR §173.403 (effective October 1, 2003)~~ ~~C. Documentation of contamination survey results that validate the integrity of each sealed source per 10 CFR §34.27 (effective January 1, 2004).~~ ~~D. AK documentation does not indicate the use of VOCs or VOC bearing materials as constituents of the sealed sources.~~ ~~E. The outer casing of each sealed source must be of a non VOC bearing material, which must be verified at the time of packaging.~~ ~~F. AK documentation that includes but is not limited to, as available and as necessary to determine the hazardous constituents associated with sealed sources, the following: source manufacturer's sales catalogues, original purchase records, source manufacturer's fabrication documents, source manufacturer's drawings, source manufacturer's fuel capture assembly reports, source manufacturer's operational procedures for cleanliness requirements, source manufacturer's shipping documents, source manufacturer's welding records, transuranic batch material records, and information from national databases (e.g., NMMSS). All of this information may not and need not be available for each source, but sufficient information must be included in the auditable record to derive an adequate understanding of source construction and history to ensure that no VOCs are present in association with the sealed source itself that would render the source hazardous. If AK data indicate that assignment of a hazardous waste number related to organic materials is required in association with a source, this specific source will be assigned to a separate waste stream and that waste stream will be subject to headspace gas sampling unless a separate AK Sufficiency Determination is approved for the waste stream. (Section C4-2c)~~					

W	AP Requirement[2]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Procedures					
151	If the generator site submitted an AK Sufficiency Determination Request for a specific waste stream, did the site provide all of the requisite information~~ including the identification of the applicable scenario~~ for which approval is sought? (Section C-0b)					
	Re-evaluating Acceptable Knowledge					
152	Does the generator site have written procedures for the augmentation of all acceptable knowledge information using testing~~sampling and analysis~~. Testing~~Sampling and analysis~~ consists of radiography~~,~~ and visual examination~~, headspace gas, and homogeneous waste sampling and analysis~~. Do site procedures indicate that the following testing~~sampling and analysis~~ will be conducted based upon the results of the Determination Request AKSD~~ny scenario~~ denied - 100% RTR or VE~~ and statistical HSG or solids S&A~~ ~~Scenario 1 Granted No sampling and analysis radiography/visual examination is required~~ ~~Scenario 2 Granted Radiography/visual examination is not required but statistical HSG or solids S&A is required~~ ~~Scenario 3 Granted 100% RTR or VE is required, sampling and analysis is not required~~ (Section C4-1, C-0b)					

W	AP Requirement[2]	Procedure Documented: Location	Procedure Documented: Adequate? Y/N (Why?)	Example of Implementation/ Objective Evidence, as applicable: Item Reviewed	Example of Implementation/ Objective Evidence, as applicable: Adequate? Y/N	Comment (e.g., any change in procedure since last audit, etc.)
	Criteria for Assembling an Acceptable Knowledge Record Delineating the Waste Stream					
158	If wastes are reassigned to a different waste matrix code based on site visual examination or radiography or Permittee confirmation activities, does the generator site have written documentation to ensure that the following steps are followed: F. Review existing information based on the container identification number and document all differences in hazardous waste number assignments G. If differences exist in the hazardous waste numbers that were assigned, reassess and document all required acceptable knowledge information (Section C4-3b~~3-b~~) associated with the new designation H. Reassess and document all testing~~sampling and analytical~~ data associated with the waste I. Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination J. Record all changes to acceptable knowledge records K. If discrepancies exist in the acceptable knowledge information for the revised waste matrix code, document the segregation of the affected portion of the waste stream, and define the actions necessary to fully characterize the waste (Section C4-3e)					

W	AP Requirement[2]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
~~161~~	~~Do site procedures ensure that headspace gas and solid/soil analytical data are used to resolve AK assignments for hazardous waste, as necessary? If a constituent is detected in headspace gas that the site believes isn't from the waste process, the site must provide documentation to support any determination that organic constituents are associated with packaging materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected headspace gas solvents cannot be identified, the appropriate F listing will be assigned. If a constituent in a listed waste is present in solid/soil analytical results, the appropriate listed waste shall be added to the waste stream. F listed waste assigned by acceptable knowledge shall not be removed based on headspace gas or solids analysis. In the case of totals/TCLP analysis, do procedures reflect the allowance for concentration assessments, wherein sites may add or remove total/TCLP and non-toxic F003 constituents found in headspace and solid/soil analyses? (Section C4-3e)~~					
~~162~~	~~If sampling and analysis conducted to augment AK determines that a hazardous constituent as identified in headspace gas sampling or soil/homogeneous waste sampling is present in the waste, does the generator site indicate that they will: 1) assign the hazardous waste number to the entire waste stream as applicable, or 2) segregate drums containing detectable concentrations of solvent into a separate waste stream, and assign applicable hazardous waste numbers? (Section C4-3e)~~					
~~164~~	~~Does the generator site have written methodologies for determining the mean concentration of solvent VOCs detected by either headspace gas analysis or homogeneous waste sampling for each waste stream or waste stream lot, and are all data ("U" flags designated as one half the MDL and "J" flags, which are less than the PRQL but greater than the MDL)? (Section C4-3e)~~					
~~165~~	~~Do procedures ensure that spent solvent assignments are made by using the~~ $\cancel{UCL_{90}}$ ~~(of mean concentration), and comparing this with the PRQLs? If the~~ $\cancel{UCL_{90}}$ ~~exceeds the PRQL, is acceptable knowledge reevaluated and determine potential source of the constituent? (Section C4-3e)~~					

W	AP Requirement[2]	Procedure Documented: Location	Procedure Documented: Adequate? Y/N (Why?)	Example of Implementation/ Objective Evidence, as applicable: Item Reviewed	Example of Implementation/ Objective Evidence, as applicable: Adequate? Y/N	Comment (e.g., any change in procedure since last audit, etc.)
~~167~~	~~Does the site have written procedures for situations where concentrations of some VOCs are orders of magnitude higher than other target analytes? In these cases, elevated MDLs may be generated, and those constituents with an elevated MDL but "U" designation will not be used in mean calculations.~~ ~~(Section C4-3e)~~					
	Data Quality Requirements					
168	Are acceptable knowledge processes consistently applied among all generator sites, and does each generator site comply with the following data quality requirements for acceptable knowledge documentation: A. Precision - ~~Precision is the agreement among a set of replicate measurements without assumption of the knowledge of a true value.~~ The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. However, the acceptable knowledge information will be addressed by the independent review of acceptable knowledge information during internal and external audits. B. Accuracy - ~~Accuracy is the degree of agreement between an observed sample result and the true value.~~ The percentage of waste containers which require reassignment to a new waste matrix code and/or designation of different hazardous waste numbers based on testing~~sampling and analysis~~ data and discrepancies identified by the Permittees during waste confirmation will be reported as a measure of acceptable knowledge accuracy. C. Completeness - ~~Completeness is an assessment of the number of waste streams or number of samples collected to the number of samples determined to be useable through the data validation process.~~ The acceptable knowledge record must contain 100 percent of the information (Permit Attachment C4-3). The usability of the acceptable knowledge information will be assessed for completeness during audits.					

W	AP Requirement[2]	Procedure Documented: Location	Procedure Documented: Adequate? Y/N (Why?)	Example of Implementation/ Objective Evidence, as applicable: Item Reviewed	Example of Implementation/ Objective Evidence, as applicable: Adequate? Y/N	Comment (e.g., any change in procedure since last audit, etc.)
168a	D. Comparability - ~~Data are considered comparable when one set of data can be compared to another set of data.~~ Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites must assign hazardous waste numbers in accordance with Permit Attachment C4-4 and provide this information regarding its waste to other sites who store or generate a similar waste stream. E. Representativeness - ~~Representativeness expresses the degree to which sample data accurately and precisely represent characteristics of a population.~~ Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Permit Attachment C4. Sites also must assess and document the limitations of the acceptable knowledge information used to assign hazardous waste numbers (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed). (Section C3-3~~9~~)					

~~**Table C6-4 Headspace Gas Checklist**~~

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~~**Headspace Gas Checklist**~~

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~**Headspace Gas Sampling Frequency**~~					
~~182~~	~~Are procedures in place to ensure that randomly selected retrievably stored and newly generated waste containers will undergo headspace gas sampling and analysis as required to augment AK? (Section C-3a)~~					
~~183~~	~~Are procedures in place to ensure that randomly selected containers will be allowed to equilibrate to sampling room temperature for 72 hours prior to sampling (18º C or higher) and that the drum ages specified in accordance with Section C1-1a(1) are met? All information necessary to determine drum age criteria must be determined, including but not limited to:~~ • ~~Scenario Determination~~ • ~~Packaging Configuration~~ • ~~Filter Diffusivity~~ • ~~Liner/Lid Opening Diameter~~ ~~? (Section C1-1a)~~					
	~~**Headspace Gas Sampling General Requirements**~~					
~~184~~	~~Are procedures in place to ensure all containers of waste are vented through filters to ensure that gases are adequately vented preventing over pressurization or development of conditions that would lead to the development of ignitable, corrosive, reactive, or other characteristic waste? (Section C-1c)~~					
~~186~~	~~Are procedures in place to ensure that the following gas sample container and holding time requirements are met:~~ • ~~The minimum sample volume for VOC. sample collection is 250 mL. (Note: a single 100 mL sample may be collected if the headspace is limited)~~ • ~~Holding temperatures shall be between 0º C and 40º C~~ ~~(Table C1-1)~~					
~~187~~	~~Are procedures in place to ensure that all sampling is performed in an appropriate radiation containment area? (Section C1-1a)~~					

		Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		
	~~WAP Requirement~~[1]	~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	~~Comment (e.g., any change in procedure since last audit, etc.)~~
~~188~~	~~Are procedures in place to ensure that headspace gas is analyzed for the analytes listed in Table C3-2 of the Attachment C3? (Section C1-1a(1))~~					
~~189~~	~~Are procedures in place to ensure that all headspace gas analyses utilize either SUMMA® or equivalent canisters or on-line integrated sampling/analysis systems? (Section C1-1a(1))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~**Manifold Sampling**~~					
~~190~~	~~Are procedures, processes, and equipment in place to ensure that the following sampling procedures are implemented:~~ • ~~The sampling equipment is leak checked and cleaned upon first use and as needed~~ • ~~The manifold and sample canisters are evacuated to 0.1 mm Hg prior to sample collection~~ • ~~Cleaned and evacuated sample canisters are attached to the evacuated manifold before the manifold inlet valve is opened~~ • ~~The manifold inlet valve is attached to a changeable filter connected to either a side port needle sampling head capable of forming an airtight seal (for penetrating a filter or rigid poly liner when necessary), a drum punch sampling head capable of forming an airtight seal (capable of punching through the metal lid of a drum while maintaining and airtight seal for sampling through the drum lid), or a sampling head with an airtight fitting for sampling through a pipe overpack container filter vent hole. Refer to Section C1-1a(4) for descriptions of these sampling heads.~~ • ~~Field blanks are collected using samples of room air collected in the sampling area in the immediate vicinity of the waste container.~~ ~~*(Note: field blanks for SUMMA® canisters are collected directly into the canister without the use of the manifold.)*~~ • ~~Manifold equipped with purge assembly that allows QC samples to be collected through all sampling components that affect compliance with QAOs~~ • ~~The manifold internal volume is calculated and documented in a field logbook~~ • ~~The total volume of headspace gas collected is calculated by adding the canister volume and internal manifold volume and should be less than 10 percent of the available headspace volume when a volume estimate is available~~ ~~(Section C1-1a(2))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~191~~	~~Are procedures, processes, and equipment in place to ensure that the following manifold sample side conditions are met:~~ • ~~The sampling head forms a leak-tight connection with the sampling manifold~~ • ~~A flexible hose allowing movement from the purge assembly to the waste container~~ • ~~Pressure sensors that are pneumatically connected to the manifold and must be able to measure absolute pressure from 0.05 mm Hg to 1000 mm Hg with a resolution that must be 0.01 mm Hg at 0.05 mm of Hg. The pressure sensors shall have an operating range of 15°C to 40°C.~~ • ~~Sufficient canister ports shall be available to allow simultaneous collection of headspace gas samples and duplicates for VOC analysis.~~ • ~~Ports not occupied with sample canisters require a plug to prevent ambient air from entering the system~~ • ~~Ports shall have VCR® fittings for connection to the sample canisters to prevent degradation of the fitting on the canister and manifold.~~ • ~~Sample canisters are leak-free, stainless steel pressure vessels, with a Cr NiO SUMMA® passivated interior surface or canisters with equivalently inert surfaces, bellows valve, and a pressure/vacuum gauge. All canisters shall have VCR® fittings to sampling and analytical equipment~~ • ~~The pressure/vacuum gauge must be mounted on each manifold and shall be helium leak tested to~~ 1.5×10^{-7} ~~cc/s, have all stainless steel construction, and be capable of operating at temperatures to 125°C~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~191a~~	• ~~A dry vacuum pump capable of reducing the manifold pressure to 0.05 mm Hg. (Note: If an oil vacuum pump is used precautions such as a molecular sieve or cryogenic trap shall be used to prevent diffusion of oil vapors back into the manifold)~~ • ~~A minimum distance between the needle and the valve that isolates the pump from the manifold in order to minimize the dead volume in the manifold.~~ • ~~If real time equipment blanks are not available, the manifold shall be equipped with an OVA capable of detecting all analytes listed in Table C3-2 and is capable of measuring total VOC concentrations below the lowest headspace gas PRQL~~ ~~(Section C1-1a(2))~~					

		~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		
	~~WAP Requirement~~[1]	~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	~~Comment (e.g., any change in procedure since last audit, etc.)~~
~~192~~	~~Are procedures, processes, and equipment in place to ensure that the following manifold standard side conditions are met:~~ • ~~A cylinder of compressed zero air, helium, argon, or nitrogen that is hydrocarbon and CO_2 free air (only hydrocarbon and CO_2-free gases required for FTIRS) and certified by the manufacturer to contain less than one ppm VOCs. The gas is used to clean the manifold between samples and to provide gas for the collection of equipment and on-line blanks~~ ~~*(Note: a zero air or nitrogen generator may be used, provided a sample of air is collected and found to contain less than 1 ppm total VOCs and the air is humidified)*~~ • ~~Cylinders of reference gas with known concentrations of analytes from Table C3-2 certified by the manufacturer to provide gases for evaluating the accuracy of the headspace gas sampling process~~ • ~~All cylinders of reference gases and zero air shall be connected to flow regulating devices~~ • ~~A humidifier filled with ASTM Type I or II water, connected, and opened to the standard side of the manifold between the compressed gas cylinders and the purge assembly shall be used, if the Fourier Transform Infrared System (FTIRS) is not used. No humidifier if the FTIRS is used~~ ~~*(Note: Compressed gas may include water vapor between 1000 and 10000 ppmv in lieu of a humidifier)*~~ • ~~The humidifier is off-line during system evacuation to prevent manifold flooding~~					
~~192a~~	• ~~A purge assembly that allows the sampling head to be connected to the standard side of the manifold.~~ • ~~A flow indicating device or pressure regulator that is connected downstream of the purge assembly to monitor the flow rate or pressure of gases through the purge assembly to ensure that excess flow is available to prevent ambient air from contaminating the QC samples and allow sample of gas from the compress gas cylinders to be collected near ambient pressure.~~ ~~(Section C1-1a(2))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~193~~	~~Do procedures ensure that NIST Certified (or equivalent) ambient pressure sensors maintained in the sampling area must have a sufficient measurement range for the expected ambient barometric pressures and a resolution shall be 1.0 mm Hg or less? (Section C1-1a(2))~~					
~~194~~	~~Do procedures ensure that the NIST traceable (or equivalent) temperature sensor in the sampling location shall have a sufficient measurement range for the ambient temperatures 18 to 50°C? (Section C1-1a(2))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Direct Canister Sampling~~					
~~195~~	~~Are procedures, processes, and equipment in place to ensure that the following operating conditions are in place for direct canister sampling:~~ • ~~Canisters are evacuated to 0.1 mm Hg prior to use and attached to a changeable filter connected to the sampling head~~ • ~~Sampling heads are capable of either punching through the metal lid of the drums while maintaining an airtight seal for sampling through the drum lid, penetrating a filter or the septum in the orifice of a self-tapping screw, or maintaining an airtight seal for sampling through a pipe overpack container filter vent hole.~~ • ~~Field duplicates are collected in the same manner and at the same time and using the same type of sampling apparatus as used for headspace gas sample collection.~~ • ~~Field blanks shall be samples of room air collected in the immediate vicinity of the waste drum sampling area prior to removal of the drum lid.~~ • ~~Equipment blanks and field reference standards shall be collected using a purge assembly equivalent to the standard side of the manifold~~ • ~~Less than 10 percent of the headspace is withdrawn when a headspace estimate is available~~ ~~(Note: The total volume withdrawn can be determined by adding the canister volume and the internal volume of the sampling head)~~ • ~~Each sample canister shall be equipped with a pressure/vacuum gauge capable of indicating leaks and sample collection volumes. The gauge shall be helium leak tested to 1.5 × 10~~$^{-7}$ ~~cc/s, have all stainless steel construction and be capable of tolerating temperatures to 125°C~~ • ~~Summa® canisters or equivalent are used to collect samples~~ ~~(Section C1-1a(3))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Sampling Heads Under Drum Lids: Sampling Through a Carbon Filter~~					
~~196~~	~~Are procedures, process, and equipment adequate to ensure that samples collected through a filter meet the following requirements:~~ • ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum~~ • ~~That non-vented drums are not sampled until an internal nonconformance report is prepared, submitted, and resolved in order to obtain a representative sample~~ • ~~The filter shall be sealed to prevent outside air from entering the drum~~ • ~~The sampling head for collecting drum headspace gas shall consist of a side-port needle, a filter to prevent particle contamination of the sample, and an adapter to connect the side-port needle to the filter~~ • ~~The sampling head is cleaned or replaced after each use~~ • ~~The housing of the filter shall allow insertion of the sampling needle through the filter element or a sampling port with septum that bypasses the filter element into the drum headspace~~ • ~~The side port needle shall be used to reduce the potential for plugging~~ • ~~The purge assembly shall be modified for compatibility with the side port needle.~~ ~~(Section C1-1a(4)(i))~~					
	~~Sampling Heads Under Drum Lids: Sampling Through the Drum Lid~~					
~~197~~	~~Are procedures in place to establish the criteria for sampling through the drum lid as opposed to sampling through a filter?~~ ~~(Section C1-1a(4)(ii))~~					
~~197a~~	~~If sampling through a pipe overpack container filter vent hole with an airtight device is used, are procedures in place to ensure that a sampling head with an airtight seal for sampling through a pipe overpack container filter vent hole are available? (Section C1-1a(4)(iii))~~					

		~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		
	~~WAP Requirement~~[1]	~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	~~Comment (e.g., any change in procedure since last audit, etc.)~~
~~197b~~	~~If sampling through a pipe overpack container filter vent hole is used, are the following criteria met?~~ • ~~The seal between the pipe overpack container surface and sampling apparatus shall be designed to minimize intrusion of ambient air.~~ • ~~The filter shall be replaced as quickly as is practicable with the airtight sampling apparatus to ensure that a representative sample can be taken.~~ • ~~All components of the sampling system that come into contact with sample gases shall be cleaned according to requirements for direct canister sampling or manifold sampling, whichever is appropriate, prior to sample collection.~~ • ~~Equipment blanks and field reference standards shall be collected through all the components of the sampling system that contact the headspace gas sample.~~ • ~~During sampling, openings in the pipe overpack container shall be sealed to prevent outside air from entering the container.~~ • ~~A flow-indicating device shall be connected to sampling system and operated according to the direct canister or manifold sampling requirements, as appropriate.~~ ~~(Section C1-1a(4)(iii))~~					
~~197c~~	~~If sampling through a pipe overpack container filter vent hole is used, are the following criteria met?~~ • ~~The site has documentation that demonstrates that they have determined through testing the appropriate length of time for exchanging the filter with the sampling device to assure representative samples are collected.~~ ~~(Section C1-1a(4)(iii))~~					

		~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		
	~~WAP Requirement~~[1]	~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	~~Comment (e.g., any change in procedure since last audit, etc.)~~
~~198~~	~~Are procedures, process, and equipment adequate to ensure that samples collected through the drum lid by punching meet the following requirements:~~ • ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum. If the DAC for Scenario 1 is met, a sample may be collected from inside the 90-mil rigid poly liner.~~ • ~~If headspace gas samples are collected from the drum headspace prior to venting the 90-mil rigid poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved.~~ • ~~The drum lid shall be breached using a punch that forms an airtight seal between the drum lid and the manifold or canister~~ • ~~The seal between the drum lid and the sampling head shall be designed to minimize the intrusion of ambient air~~ • ~~All components of the sampling system that come in contact with sample gases shall be purged with humidified zero air, nitrogen, or helium prior to sample collection~~ • ~~Equipment blanks and field reference standards shall be collected through all components of the punch that contact the headspace gas sample~~ • ~~Pressure shall be applied to the punch until the drum lid has been breached~~ • ~~Provisions shall be made to relieve excessive drum pressure increases during drum punch operations; potential pressure increases may occur during sealing of the drum punch to the drum lid~~ • ~~The filter is sealed to prevent outside air from entering the drum~~ ~~(Section C1-1a(4)(ii))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~198a~~	• ~~A flow indicating device or pressure regulator to verify flow of gases shall be pneumatically connected to the drum punch and operated in the same manner as the flow indicating device~~ • ~~Equipment are used to secure the drum punch sampling system to the drum lid~~ • ~~If the headspace gas sample is not taken at the time of drum punching, the presence and diameter of the rigid liner vent hole is documented during the punching operation for use in determining an appropriate Scenario 2 DAC.~~ ~~(Section C1-1a(4)(ii))~~					
	~~Quality Control Sample Collection~~					
~~199~~	~~Are procedures in place to ensure that the following QC sample requirements are met:~~ • ~~Field QC samples are collected on per sample batch basis for manifold and direct canister sampling. A sampling batch is defined as up to 20 samples collected within 14 days of the first sample~~ • ~~Field samples are collected and analyzed on a per on-line batch basis for on-line sampling/analysis systems. An on-line batch is defined as the number of headspace gas samples that are collected within a 12 hour period from the same on-line integrated analysis system~~ • ~~For the manifold sampling method, field blanks, equipment blanks, field duplicates, and field reference samples are collected prior to sample collection on a per sampling batch basis or one per day, whichever is more frequent~~ • ~~For the direct canister sampling method field blanks and field duplicates are collected on a per sampling batch basis prior to sample collection; while equipment blanks and field reference samples are collected after equipment purchase, cleaning, and assembly~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~199a~~	• ~~For the On-line sampling method, field blanks, equipment blanks, field duplicates, and field reference samples are collected on a per on-line batch basis.~~ ~~*(Note: The on-line blank replaces the laboratory and equipment blanks, the on-line duplicate replaces the field duplicate and the laboratory duplicate, and the on-line sample control replace the field reference standard and the laboratory control sample.)*~~ ~~(Section C1-1b, C1-1b(1), C1-1b(2), C1-1b(3), C1-1b(4))~~					
~~200~~	~~Do procedures adequately assign the site project manager with the responsibility of monitoring field QC results and initiate the nonconformance report process in the event the following acceptance criteria are not met or sample collection frequencies are not met:~~ • ~~Field and equipment blanks shall be less than 3 times the detection limits specified in Table C3-2 and equipment blank results determined by FTIR shall be less than the PRQL specified in Table C3-2 (Section C1-1b(1) and C1-1b(2))~~ • ~~Field reference standards shall have a recovery of between 70 and 130% (Table C1-3)~~ • ~~Field Duplicates shall have an RPD of less than or equal to 25~~ ~~(Sections C1-1b and C1-1b(4); Table C1-3)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~201~~	~~Are procedures in place to ensure that field reference standards meet the following criteria:~~ • ~~Field reference standards shall contain a minimum of 6 analytes listed in Table C3-2 at a range of between 10 and 100 ppmv and at concentrations greater than the MDL~~ • ~~Field reference standards shall be traceable to a nationally recognized standard, if available~~ • ~~If commercial gases are used, they shall be accompanied by a Certificate of Analysis and all field reference standards are traceable to certificates.~~ • ~~Commercial gases are not used past the manufacturer specified shelf life.~~ • ~~Field reference samples are submitted blind to the laboratory at a frequency of one per sampling batch. (Note: Field reference standards may be discontinued for direct canister method if QAO accuracy objectives are met)~~ ~~(Section C1-1b(3))~~					
~~202~~	~~Are procedures in place to ensure that field duplicate samples are collected sequentially and in accordance with Table C1-1. (Section C1-1b(4))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Sample Equipment Testing, Inspection and Maintenance~~					
~~203~~	~~Are procedures in place to ensure that sample containers are cleaned in accordance with the following specifications:~~ • ~~All sampling components that contact sample gases are constructed of inert materials such as stainless steel or Teflon®~~ • ~~The sampling manifold and canisters are properly cleaned and leak checked prior to each sampling event in accordance to or equivalent with TO-14A or TO-15 methodology~~ • ~~SUMMA® canisters or equivalent are cleaned on an equipment cleaning batch basis. An equipment cleaning batch is defined as the number of canisters that can be cleaned together at one time using the same cleaning method~~ • ~~The cleaning system consists of an optional oven and a vacuum manifold which uses a dry vacuum pump or a cryogenic trap backed by an oil sealed pump~~ • ~~Prior to cleaning a 24 hour leak check shall be performed (+/- 2 psig) on all canisters~~ • ~~Canisters that shall be checked for leaks, repaired, and reprocessed~~ • ~~One canister per equipment cleaning batch is filled with humid zero air or humid high purity nitrogen and analyzed for VOCs~~ • ~~A batch is considered clean if VOC concentrations are less than 3 times the MDLs specified in Table C3-2~~ • ~~Certified leak-free canisters are evacuated to 0.1 mm Hg or less for storage~~ • ~~Canister cleaning certification documentation is available at the cleaning facility and the cleaning facility initiates canister tags.~~ ~~(Section C1-1c, C1-1c(1))~~					
~~204~~	~~Are procedures in place to ensure that manifold pressure sensors and ambient air temperature sensors are certified prior to initial use and annually using NIST traceable standards. In addition OVAs if used shall be calibrated daily using known calibration gases and the balance of the OVA calibration is consistent with the manifold purge gas.~~ ~~(Section C1-1d)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~205~~	~~Are procedures in place to ensure that sampling equipment are cleaned and leak checked using the following specifications:~~ • ~~Surfaces of all sampling equipment that will come in contact with sample gases are thoroughly inspected and cleaned prior to assembly~~ • ~~Manifolds and sampling heads shall be purged with humidified zero air, nitrogen, or helium and leak checked after assembly~~ • ~~The cleaning shall be repeated if routine system cleaning is inadequate~~ • ~~Manifolds and sampling heads which are reused shall be cleaned and leak checked according to procedures in the EPA's Compendium Method TO-14A or TO-15 after sample collection, field duplicate collection, field blank collection, and after the additional cleaning require for field reference samples. All manifold ports shall be capped or closed with valves (sample canisters may be attached as well)~~ • ~~Manifolds are cleaned by heating the sample side of the manifold to 150°C and periodically evacuated and flushed with humidified zero air, nitrogen, or helium~~ • ~~Manifolds not in use are demonstrated as clean before storage with a positive pressure of humidified zero air, nitrogen, or helium gas in the sampling and standard sides~~ • ~~Sampling is suspended when the analysis of an equipment blank indicated the VOC limits have been exceeded or if a leak test fails.~~ • ~~Sampling systems are cleaned after field reference standard collection by installing a gas tight connector in place of the sampling head, between the flexible hose and purge assembly. This allows the sample and standard side to be flushed with humidified zero air, nitrogen, or helium in conjunction with heated pneumatic lines~~ • ~~Needles, airtight fitting or seal, adapters, and filters are cleaned in accordance with the EPA Method TO-14A or TO-15 procedures. Sample heads shall be discarded or cleaned according to Method TO-15. In addition, the needle, the airtight fitting and seal, and the filter should be purged with zero air, nitrogen, or helium and capped~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~for storage~~ ~~(Section C1-1c(2) , Section C1-1c(3), Section C1-1c(4), and Section C1-c(5))~~					
	~~Sample Handling and Custody~~					
~~207~~	~~Do formats for field logs and custody records specify documentation of the following information:~~ • ~~Name of sampling facility~~ • ~~Waste container identification number~~ • ~~Sample identification number of each sample referenced to waste container~~ • ~~Sample matrix~~ • ~~Time and date of sample collection~~ • ~~Type/number and size of sample container(s)~~ • ~~Method of sample preservation~~ • ~~Requested analyses~~ • ~~Sampler(s) name through signature~~ • ~~Signatures of custodians relinquishing and receiving custody of samples including date and time of transfer until time of final disposition~~ • ~~Analytical laboratory~~ • ~~Off-site shipping information (date, time, shipper, mode, air bill or lading number)~~ ~~(Section C1-5)~~					
~~208~~	~~Are procedures are in place to ensure that samples and sampling equipment are identified with unique identification numbers? (Section C1-5)~~					

		~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		
	~~WAP Requirement~~[1]	~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	~~Comment (e.g., any change in procedure since last audit, etc.)~~
~~209~~	~~Do sample tags or labels contain the following information:~~ • ~~Sample Description~~ • ~~Ambient temperature and pressure~~ • ~~Sample identification number~~ • ~~Analyses requested~~ • ~~Date/Time of collection~~ • ~~QC Designation (if applicable)~~ • ~~Sampler's initials and organization~~ ~~(Section C1- 5)~~					
~~210~~	~~All sampling equipment, canisters, and samples are identified with unique identification numbers that are traceable to equipment cleaning batches.~~ ~~(Section C1- 5)~~					
~~211~~	~~Are procedures in place to ensure samples are sealed with intact custody seals and that one or more of the following custody conditions are met:~~ • ~~It is in the possession of an authorized individual~~ • ~~It is in the view of an authorized individual, after being in the possession of that individual~~ • ~~It was in the possession of an authorized individual and access to the sample was controlled by locking or placement of signed custody seals that prevent undetected access~~ • ~~It is in a designated secure area, such as a controlled access location with complete documentation of personnel access or a radiological containment area (hot cell or glove box)~~ ~~(Section C1- 5)~~					
~~212~~	~~Are procedures in place to ensure that discrepant sample information, indications of damage, or indications of tampering are documented?~~ ~~(Section C1- 5)~~					
~~214~~	~~Are procedures in place to ensure that sample custody is maintained until the sample is released by the site project manager or expended?~~ ~~(Section C1- 5)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~215~~	~~Are procedures in place to ensure that SUMMA canisters are packaged to prevent damage to the pressure gauge or associated connections by packaging in metal boxes with separate compartments or cardboard boxes with foam inserts? (Section C1- 6)~~					
~~216~~	~~Are procedures in place to ensure that samples are packaged to prevent damage to the sample container and maintain preservation temperature?~~ ~~(Section C1- 6)~~					
~~217~~	~~Are procedures in place to ensure that adequate cold packs are included in the DOT approved sample shipping container to ensure that all temperature requirements are met? (Section C1- 6)~~					
~~218~~	~~Are procedures in place to ensure that sample COC forms are secured for shipment to the inside of the sealed or locked shipping container lid and that samples and shipping containers are affixed with tamper proof seals or devices? (Section C1- 6)~~					
~~219~~	~~Are procedures in place to ensure that an appropriate blank sample is included with each shipment container to detect any VOC cross-contamination? (Section C1- 6)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
	~~Laboratory Operations~~					
~~220~~	~~Are procedures in place to ensure that all VOC analyses are evaluated using the following criteria:~~ • ~~Precision is assessed by analyzing laboratory duplicates, Laboratory Control Sample (LCS) , and PDP blind-audit samples in comparison to Table C3- 2~~ • ~~Accuracy as %R shall be assessed by analyzing LCS samples and PDP blind-audit samples in comparison to criteria in Table C3-3~~ • ~~MDLs are expressed in nanograms/ for VOCs and must be less than or equal to those listed in Table 3-2~~ • ~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. A composited sample is treated as one sample for the purposes of completeness, because only one sample is run through the analytical instrument~~ • ~~Comparability shall be achieved through the use of standardized methods, traceable standards by requiring successful participation in the PDP program~~ • ~~Representativeness will be achieved by collecting sufficient numbers of samples using clean sampling equipment that does not introduce sample bias.~~ • ~~All method detection limits and program required detection limits shall be less than the Program Required Detection Limits listed in Table C3-2 and the detection limit study procedures shall be documented in laboratory SOPs. In addition, the laboratory shall demonstrate that they are capable of meeting the Program Required Detection Limits by analyzing at least one calibration standard below the PRQL~~ ~~(Section C3-5)~~					
~~221~~	~~Are procedures in place to ensure that only laboratories that are qualified through participation in the Performance Demonstration Program are eligible to analyze waste samples? (Section C-3a(3))~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~222~~	~~Are procedures in place to ensure that Tentatively Identified Compounds shall be added to the target compound list if they are reported in 25% of the waste containers sampled from a given waste stream and if they appear in the 20 NMAC 4.1.200 (incorporating 40 CFR §261) Appendix VIII list? (Section C-3a(1))~~					
~~222a~~	~~Are procedures documented to ensure that the following criteria are met with regard to the recognition and reporting of TICS for GC/MS Methods for headspace gas sampling:~~ • ~~Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.~~ • ~~The relative intensities of the major ions should agree within ± 20 percent.~~ • ~~Molecular ions present in the reference spectrum should be present in the sample spectrum.~~ • ~~Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.~~ • ~~Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks.~~ • ~~The reference spectra used for identifying TICs shall include, at minimum, all of the available spectra for compounds that appear in the 20.4.1.200 NMAC (incorporating 40 CFR Part 261) Appendix VIII list. The reference spectra may be limited to VOCs when analyzing headspace gas samples.~~ • ~~TICs for headspace gas analyses that are performed through FTIR analyses shall be identified in accordance with the specifications of SW-846 Method 8410.~~ ~~(Section C3-1)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~222b~~	~~Are procedures in place to assure that TICs are reported as part of the analytical batch data reports for GC/MS Methods in accordance with the following minimum criteria:~~ • ~~a TIC in an individual container headspace gas or solids sample shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 10% of the area of the nearest internal standard.~~ • ~~a TIC in a composited headspace gas sample that contains 2 to 5 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 2% of the area of the nearest internal standard.~~ • ~~a TIC in a composited headspace gas sample that contains 6 to 10 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 1% of the area of the nearest internal standard.~~ • ~~a TIC in a composited headspace gas sample that contains 11 to 20 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 0.5% of the area of the nearest internal standard.~~ ~~(Section C3-1)~~					
	~~Quality Assurance Objectives~~					
~~224~~	~~Are procedures in place to ensure that the precision of the headspace gas sampling and analysis must be assessed by the sequential collection of field duplicates for manifold sampling operations or simultaneous collection of field duplicates for direct canister sampling operations for VOCs? (Section C3-2)~~					
~~225~~	~~Are procedures in place to ensure that corrective action will be taken if the duplicate RPD exceeds 25% for any analyte found greater than the PRQL in both of the duplicate samples? (Section C3-2)~~					

	~~WAP Requirement~~[1]	~~Procedure Documented~~		~~Example of Implementation/ Objective Evidence, as applicable~~		~~Comment (e.g., any change in procedure since last audit, etc.)~~
		~~Location~~	~~Adequate? Y/N (Why?)~~	~~Item Reviewed~~	~~Adequate? Y/N~~	
~~226~~	~~Are procedures in place to ensure that the accuracy of headspace gas sampling is assessed through the collection of field reference standards and at a frequency of one field response standard for every 20 containers sampled or per sampling batch and through the collection of equipment blanks at the frequency of one for every equipment cleaning batch? (Section C3-2)~~					
~~227~~	~~Are procedures in place to ensure that corrective actions are taken if the field reference standard is less than 70% recovery or greater than 130% and that if the blank concentration for any blank exceeds 3 times the MDL listings in Table C3-2? (Section C3-2)~~					
~~228~~	~~Are procedures in place to ensure that sampling completeness shall be expressed as the number of valid samples collected as a percent of the total number of samples collected for each waste steam, where a valid sample is defined as a sample collected in accordance with approved sampling methods and the drum was properly prepared for sampling? (Section C3-2)~~					
~~229~~	~~Are procedures in place to ensure that the minimum sampling completeness percentage for any waste stream is 90 percent? (Section C3-2)~~					
~~230~~	~~Are procedures in place to ensure that sample comparability is assured through the use and application of uniform procedures and equipment and application of data usability criteria, and that corrective action is taken if the uniform procedures and equipment are not used without approved and justified deviations (Section C3-2)~~					
~~231~~	~~Are procedures in place to ensure that sample representativeness is maintained (Section C3-2)~~					

~~1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.~~

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Table C6-3~~5~~ Radiogr aphy Checklist

Radiography Checklist

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Quality Assurance Objectives					
233	Are process procedures in place to meet the following Quality Assurance Objectives? Precision • Does the site describe in its QAPjP and SOP(s) activities to reconcile any discrepancies between two radiography operators with regard to identification of the waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases through independent replicate scans and independent observations? And additionally, activities to verify the precision of radiography prior to use by tuning precisely enough to demonstrate compliance with QAOs through viewing an image test pattern? Accuracy • Was accuracy obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the required items in a training container during their initial qualification and subsequent requalification?					
233a	Completeness • Was an audio/videotape (or equivalent media) of the radiography examination and a radiography data form validated according to the requirements in Section C3-4~~10~~? • Was an audio/videotape (or equivalent media) of the radiography examination and a radiography data form obtained for 100% of the waste containers subject to radiography? Comparability • Is comparability ensured through the use of standardized radiography procedures and operator training and qualifications (Section C3-42a)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Characterization and System Requirements					
234	Does the site have procedures to ensure that radiography is used to identify and verify waste container contents and verify the waste's physical form? Does the site have procedures to identify prohibited materials? (Section C-3b~~c~~; C1-1~~3~~)					
235	Do procedures or other supporting documentation ensure that every waste container will undergo radiography and/or VE as necessary to augment AK? (Section C-3b~~c~~)					
236	Do procedures ensure that containers whose contents prevent full examination are examined by visual examination rather than by radiography unless the site certifies that visual examination would provide no additional relevant information for that container based on the AK information for the waste stream? (Section C1-1~~3~~)					
237	Do procedures or other supporting documentation ensure that the physical form determined by radiography is compared with the waste stream descriptions? If discrepancies are noted, will a new waste stream be identified? (Section C-3b~~c~~)					
238	Are there procedures to ensure the data is obtained from an audio/video recorded scan provided by trained radiography operators? (Section C1-1~~3~~)					
239	Were all activities required to achieve the radiography objective described in site Quality Assurance Project Plans (QAPjPs) and Standard Operating Procedures (SOPs)? (Section C3-2~~4~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
240	Did the radiography system consist of the following equipment or equivalent: • an X-ray producing device? • an imaging system? • an enclosure for radiation protection? • a waste container handling system? • an audio/video recording system or equivalent? • an operator control and data acquisition station? (Section C1-1~~3~~)					
241	Did the X-ray producing device have controls which allow the operator to vary voltage, thereby controlling image quality? Was it possible to vary the voltage, typically between 150-400 kV, to provide an optimum degree of penetration through the waste? Was high-density material examined with the X-ray device set on the maximum voltage? Was low-density material examined at lower voltage settings to improve contrast and image definition? (Section C1-1~~3~~)					
242	Do procedures or other documentation ensure that an audio/videotape or equivalent is made of the waste container scan and maintained as a non-permanent record? (Section C1-1~~3~~)					
	Data Compilation					
243	Are there procedures to ensure that a radiography data form is used to document the waste matrix code, ensure the waste container contains no ignitable, corrosive or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented on the WSPF? (Section C1-1~~3~~)					
245	If radiography indicates that the waste does not match the waste stream description, do procedures ensure that the appropriate corrective action was taken? (Section C-3b~~c~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
246	If a discrepancy is noted, do procedures ensure that the proper waste stream assignment is determined, the correct hazardous waste numbers assigned, and the resolution documented? (Section C-3b~~c~~)					
	Training					
247	Do site procedures ensure that only trained personnel are allowed to operate radiography equipment? (Section C1-1~~3~~)					
248	Do site procedures ensure that training requirements for radiography operators is based upon existing industry standard training requirements? (Section C1-1~~3~~)					
249	Does the documented training program provide radiography operators with both formal and on-the-job training (OJT)? (Section C1-1~~3~~)					
250	Does the documented training program ensure that the radiography operators are instructed in the specific waste generating practices and typical packaging configurations expected to be found in each waste stream at the site? (Section C1-1~~3~~)					
251	Does the documented training program ensure that the OJT and apprenticeship are conducted by an experienced, qualified radiography operator prior to qualification of the candidate? (Section C1-1~~3~~)					
252	Is the documented training program site specific? (Section C1-1~~3~~)					
262	Does the documented training program ensure that a training drum with various container sizes is scanned by each operator on a semiannual basis? Is the videotape reviewed by a supervisor to ensure that operators' interpretations remain consistent and accurate? (Section C1-1~~3~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
263	Do site procedures ensure that the site prepares Testing Batch Data Reports or equivalent which includes all data pertaining to radiography for up to 20 waste containers without regard to waste matrix? (Section C3-4~~10~~)					
	Quality Assurance					
265	Does the documented training program ensure that the imaging system characteristics are verified on a routine basis? (Section C1-1~~3~~)					
266	Do procedures ensure that independent replicate scans and replicate observations of the video output of the radiography process are performed under uniform conditions and procedures? Are independent replicate scans performed on one waste container per day or per testing batch of 20 samples, which ever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container? Are independent observations of one scan (not the replicate scan) performed once per day or per testing batch, which ever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container? (Section C1-1~~3~~)					
267	Do procedures ensure that oversight functions include periodic audio/video media reviews of accepted waste containers, are performed by qualified radiography operators that were not involved in the original scans of the waste containers? (Section C1-1~~3~~)					
268	Is the site project manager responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary? (Section C1-1~~3~~)					
	Data Validation, Review, Verification and Reporting					
277	Do procedures ensure that all applicable data generation review verification and validation activities specified in C3-4~~10~~ are followed, including all signatory releases? (Section C3-4~~10~~)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
278	Do procedures ensure that radiography tapes have been reviewed at a frequency of one waste container per day or once per testing batch, whichever is less frequent, to ensure data are correct and completed? (Section C1-1~~3~~)					
279	Do procedures ensure that all applicable project-level signatory releases and DQOs (Section C3-3~~11~~) as specified in the WAP are performed? (Section C3-~~10~~4b)					
282	At the data generation level, do procedures ensure that all electronic and video data stored appropriately to ensure that waste container, sample, and associated QA data are readily retrievable? Are radiography tapes reviewed, at a frequency of one waste container per day or once per testing batch, whichever is less frequent, against the data reported on the radiography form? (Section C3-~~10~~4a, C3-~~10~~4a(1))					
283	At the project level, do procedures require the Site Project Manager to certify that the radiography data are complete and acceptable based on the videotape review of at least one waste container per testing batch or daily, whichever is less frequent? (Section C3-~~10~~4b(1))					

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

Table C6-4~~6~~ Visual Examination (VE) Checklist

Visual Examination (VE) Checklist

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
	Training					
296	Is there documentation which shows that a standardized training program for visual examination operators has been developed? Is it specific to the site and include the various waste configurations generated/stored at the site? (Section C1-24)					
297	Is there documentation which shows that the visual examination operators receive training on the specific waste generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code at the site? (Section C1-24)					
298	Are the visual examination personnel requalified once every two years? (Section C1-24)					
298a	Does the training include the following regardless of Summary Category Group? • Identifying and describing the contents of a waste container by examining all items in waste containers of previously packaged waste. • Identifying when VE cannot be used to meet the DQOs, (Section C1-24)					
	Visual Examination Expert Requirements					
300	Does documentation ensure that the site has designated a visual examination expert? Is the visual examination expert familiar with the waste generating processes that have taken place at the site? Is the visual examination expert familiar with all of the types of waste being characterized at that site? (Section C1-24)					

W	AP Requirement[1]	Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		Comment (e.g., any change in procedure since last audit, etc.)
		Location	Adequate? Y/N (Why?)	Item Reviewed	Adequate? Y/N	
301	Does documentation ensure that the visual examination expert shall be responsible for the overall t direction and implementation of the visual examination aspects of the program? Does the site's QAPjP specify the selection, qualification, and training requirements of the visual examination expert? (Section C1-24)					
	Visual Examination Procedures					
304	Do procedures indicate that all visual examination activities are documented on video/audio media or VE performed by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting? (Section C1-24)					
304a	Are procedures in place to ensure that when VE is performed using a second operator, each operator performing VE shall observe for themselves the waste being placed in the container or the contents within the examined waste container when waste is not removed? (Section C1-24)					
313	Do site procedures ensure that when liquid is found, the non-transparent internal container holding the liquid will be assumed to be filled with liquid and this volume will be added to the total liquid in the container being characterized using VE? The container being characterized using VE would then be rejected and/or repackaged to exclude the internal container if it is over the TSDF-WAC limits. (Section C-3b~~c~~)					

		Procedure Documented		Example of Implementation/ Objective Evidence, as applicable		
W	**AP Requirement[1]**	**Location**	**Adequate? Y/N (Why?)**	**Item Reviewed**	**Adequate? Y/N**	**Comment (e.g., any change in procedure since last audit, etc.)**
	Quality Assurance Objectives					
314	Are process procedures in place to meet the following Quality Assurance Objectives? Precision • Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to identification of waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases. Accuracy • Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification and subsequent requalification. Completeness • A validated VE data form will be obtained for 100 percent of the waste containers subject to VE. Comparability • The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications. (Section C3-~~4~~2b)					

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

ATTACHMENT C7

TRU WASTE CONFIRMATION

C7-1b(2) Radiography Oversight

Independent replicate scans and replicate observations of the video output of the radiography process shall be performed under uniform conditions and procedures. Independent replicate scans shall be performed on one waste container per day or once per shipment, whichever is less frequent. Independent observations of one scan (not the replicate scan) shall also be made once per day or once per shipment, whichever is less frequent, by a qualified radiography operator other than the individual who performed the first examination. When confirmation is performed by review of audio/video recorded scans produced by the generator/storage site as specified in Permit Attachment C1, Section C1-1~~3~~, independent observations shall be performed on two waste containers per shipment or two containers per day, whichever is less frequent.

C7-1c Visual Examination Methods Requirements

If the generator/storage site documented VE using audio/video media in accordance with Permit Attachment C1, Section C1-2~~4~~, the Permittees must use the audio/video media to perform confirmation. If the Permittees perform waste confirmation by review of audio/video media, the audio/video record of the VE must be sufficiently complete for the Permittees to confirm the Waste Matrix Code and waste stream description, and verify the waste contains no liquid in excess of TSDF-WAC limits or compressed gases. Generator/storage site VE video/audio media subject to review by the Permittees shall meet the following minimum requirements:

- The video/audio media shall record the waste packaging event for the container such that all waste items placed into the container are recorded in sufficient detail and shall contain an inventory of waste items in sufficient detail that a trained Permittee VE operator can identify the associated waste material parameter.

- The video/audio media shall capture the waste container identification number.

- The personnel loading the waste container shall be identified on the video/audio media or on packaging records traceable to the loading of the waste container.

- The date of loading of the waste container will be recorded on the video/audio media or on packaging records traceable to the loading of the waste container.

C7-1d Quality Assurance Objectives (**QAOs**) for Radiography and Visual Examination

The QAOs the Permittees must meet for radiography and visual examination are detailed in this section. If the QAOs described below are not met, then corrective action as specified in Permit Attachment C3, Section C3-7~~13~~ shall be taken.

Appendix C
"Joint NRC/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste" (62 Federal Register 62079)

discussions with representatives of the NRC staff regarding proposed final SRP Chapter 19, Regulatory Guide DG–1061, and use of uncertainty versus point values in the PRA-related decisionmaking process.

10:15 A.M.–12:00 Noon: Operating Events at Oconee Nuclear Power Plant Units 1 and 2 (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding the results of the investigation performed by an Augmented Inspection Team (AIT) of the June 20 and 23 event at Oconee Unit 1 involving failure of emergency electrical power supply, and of the April 22, 1997 event at Oconee Unit 2 that involved inoperability of the high pressure injection pump.

1:00 P.M.–3:00 P.M.: Capability and Application of the EPRI Checkworks Code (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff and Electric Power Research Institute (EPRI) regarding the capability and application of the EPRI Checkworks Code.

3:15 P.M.–3:45 P.M.: Future ACRS Activities (Open)—The Committee will discuss the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future meetings.

3:45 P.M.–4:00 P.M.: Reconciliation of ACRS Comments and Recommendations (Open)—The Committee will discuss responses from the NRC Executive Director for Operations (EDO) to comments and recommendations included in recent ACRS reports, including the EDO response to the October 10, 1997 ACRS report related to the differing professional opinion pertaining to steam generator tube integrity.

4:00 P.M.–4:15 P.M.: Election of ACRS Officers For CY 1998 (Open)—The Committee will elect the Chairman and Vice Chairman for the ACRS, and Member-at-Large for the Planning and Procedures Subcommittee for CY 1998.

4:15 P.M.–7:00 P.M.: Preparation of ACRS Reports (Open)—The Committee will continue its discussion of proposed ACRS reports on matters considered during this meeting.

Saturday, December 6, 1997

8:30 A.M.–9:00 A.M.: Report of the Planning and Procedures Subcommittee (Open/Closed)—The Committee will hear a report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, qualifications of candidates nominated for appointment to the ACRS, agenda for the planning meeting, and organizational and personnel matters relating to the ACRS.

[Note: A portion of this session may be closed to discuss organizational and personnel matters that relate solely to the internal personnel rules and practices of this Advisory Committee, and information the release of which would constitute a clearly unwarranted invasion of personal privacy.]

9:00 A.M.–4:00 P.M. (12:00–1:00 P.M. Lunch): Preparation of ACRS Reports (Open)—The Committee will continue its discussion of proposed ACRS reports on matters considered during this meeting.

4:00 P.M.–4:30 P.M.: Miscellaneous (Open)—The Committee will discuss matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

Procedures for the conduct of and participation in ACRS meetings were published in the **Federal Register** on September 4, 1997 (62 FR 46782). In accordance with these procedures, oral or written views may be presented by members of the public, including representatives of the nuclear industry, electronic recordings will be permitted only during the open portions of the meeting, and questions may be asked only by members of the Committee, its consultants, and staff. Persons desiring to make oral statements should notify Mr. Sam Duraiswamy, Chief, Nuclear Reactors Branch, at least five days before the meeting, if possible, so that appropriate arrangements can be made to allow the necessary time during the meeting for such statements. Use of still, motion picture, and television cameras during this meeting may be limited to selected portions of the meeting as determined by the Chairman. Information regarding the time to be set aside for this purpose may be obtained by contacting the Chief of the Nuclear Reactors Branch prior to the meeting. In view of the possibility that the schedule for ACRS meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should check with the Chief of the Nuclear Reactors Branch if such rescheduling would result in major inconvenience.

In accordance with Subsection 10(d) P.L. 92–463, I have determined that it is necessary to close portions of this meeting noted above to discuss matters that relate solely to the internal personnel rules and practices of this Advisory Committee per 5 U.S.C. 552b(c)(2) and to discuss information the release of which would constitute a clearly unwarranted invasion of personal privacy per 5 U.S.C. 552b(c)(6).

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor, can be obtained by contacting Mr. Sam Duraiswamy, Chief, Nuclear Reactors Branch (telephone 301/415–7364), between 7:30 A.M. and 4:15 P.M. EST.

ACRS meeting agenda, meeting transcripts, and letter reports are available for downloading or reviewing on the internet at http://www.nrc.gov/ACRSACNW.

The ACRS meeting dates for Calendar Year 1998 are provided below:

ACRS Meeting No.	1998 ACRS Meeting Date
	Jan.—No Meeting.
448	Feb. 5–7, 1998.
449	Mar. 2–4, 1998.
450	Mar. 5–7, 1998. (Safety Research Program)
451	Apr. 2–4, 1998.
452	Apr. 30–May 2, 1998.
453	June 3–5, 1998.
454	July 8–10, 1998.
	Aug.—No Meeting.
455	Sept. 2–4, 1998.
456	Oct. 1–3, 1998.
457	Nov. 5–7, 1998.
458	Dec. 3–5, 1998.

Dated: November 14, 1997.

Andrew L. Bates,

Advisory Committee Management Officer.

[FR Doc. 97–30526 Filed 11–19–97; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

ENVIRONMENTAL PROTECTION AGENCY

Joint NRC/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste

AGENCIES: Environmental Protection Agency and Nuclear Regulatory Commission.

ACTION: Publication of Final Joint Guidance on the Testing Requirements for Mixed Waste.

SUMMARY: The Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA) are jointly publishing herein final guidance on the testing requirements for mixed radioactive and hazardous waste (mixed waste). NRC and EPA began development of this guidance in 1987 and a draft was completed in 1989. EPA's adoption of the Toxicity Characteristic Leaching Procedure (TCLP) in 1990 required the agencies to substantially revise the guidance. The agencies issued a draft for public comment on March 26, 1992. A public meeting was held on April 14, 1992, in Washington, D.C., to solicit oral comments on the draft guidance document. The comment period ended on May 26, 1992. NRC and EPA received more than 700 requests for copies of the draft guidance document and NRC received approximately 100 written comments from 20 individuals and groups, including comments resulting from a review of the guidance by the U.S. Department of Energy. NRC and EPA staffs have incorporated the appropriate comments into the final guidance.

The guidance emphasizes the use of process knowledge, whenever possible, to determine if a waste is hazardous as a way to avoid unnecessary exposures to radioactivity. The guidance also provides guidelines for generators wishing to rely on process knowledge as the basis for evaluating their waste.

The guidance offers two strategies for helping to maintain radiation exposures As Low As is Reasonably Achievable (ALARA) if testing is required. These strategies are the use of a sample size of less than 100 grams, as long as the resulting test is sufficiently sensitive to measure the constituents of interest at the regulatory levels prescribed in the TCLP, and the use of surrogate materials, as long as they are chemically identical to the mixed waste and faithfully represent the hazardous constituents in the waste mixture.

The guidance also discusses other allowable sampling and testing procedures, such as representative drum sampling, or sampling from drums containing lower concentrations of radioactive material, as long as the chemical contents are identical to those found in the drums with higher concentrations of radioactive material.

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Dated at Rockville, MD and Washington, DC this 7th day of November, 1997.

For the U.S. Nuclear Regulatory Commission.

Carl J. Paperiello,

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For the U.S. Environmental Protection Agency.

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SUPPLEMENTARY INFORMATION:

Clarification of RCRA Hazardous Waste Testing Requirements for Low-Level Radioactive Mixed Waste—Final Guidance

Disclaimer: The policies discussed in this document are not final Agency actions, but are intended solely as guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. The Environmental Protection Agency and Nuclear Regulatory Commission may follow the guidance, or act at variance with the guidance, based on an analysis of specific site circumstances. The agencies also reserve the right to change the guidance at any time, without public notice.

ACRONYMS/ABBREVIATIONS USED IN THIS GUIDANCE

Acronym/abbreviation	Definition
AEA	Atomic Energy Act.
ALARA	As Low As Is Reasonably Achievable.
BDAT	Best Demonstrated Available Technology.
CFR	Code of Federal Regulations.
EP	Extraction Procedure (toxicity test).
EPA	Environmental Protection Agency.
FR	Federal Register.
HSWA	Hazardous and Solid Waste Amendments.
LDR	Land Disposal Restrictions.
NRC	Nuclear Regulatory Commission.
OSWER	Office of Solid Waste and Emergency Response.
RCRA	Resource Conservation and Recovery Act.
SW–846	Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods.
TC	Toxicity Characteristic.
TCLP	Toxicity Characteristic Leaching Procedure.
TSDF	Treatment, Storage or Disposal Facility.
WAP	Waste Analysis Plan.

I. Background

Mixed waste is defined as waste that contains both hazardous waste subject to the requirements of the Resource Conservation and Recovery Act (RCRA) and source, special nuclear, or by-product material subject to the requirements of the Atomic Energy Act (AEA).[1] This guidance addresses testing activities related to mixed low-level waste (LLW), which is a subset of mixed waste.[2] The term "mixed waste," for the purposes of this document, will refer to mixed LLW. Additional information on the testing of hazardous wastes, which could apply to both mixed LLW and other types of mixed waste (e.g., high-level and transuranic mixed waste), is found in Appendix A. The information below is intended for use by Nuclear Regulatory Commission (NRC) licensees that may not be familiar with the hazardous waste characterization and testing requirements that apply to mixed waste. The guidance assumes that the reader is familiar with the NRC's regulations and regulatory framework for the management of radioactive material and focuses on compliance with the Environmental Protection Agency's (EPA's) requirements for the management of hazardous waste. Although it is written for commercial mixed waste generators, the guidance may also be useful for Federal facilities that generate mixed waste.

Users of this guidance should have a good understanding of how mixed waste is defined (see above), and what authority, or authorities, regulate mixed waste testing activities. The hazardous component of mixed waste is regulated by EPA in those States where EPA implements the entire RCRA Subtitle C hazardous waste program (i.e., unauthorized States). Currently, EPA regulates mixed waste in Alaska, Hawaii, Iowa, Puerto Rico, the Virgin Islands, and American Samoa. In most instances mixed waste is regulated by State governments. Thirty-nine States and one territory (Guam) have been delegated authority by EPA to implement the base RCRA hazardous waste program and to regulate mixed waste activities (see 51 *FR* 24504, July 3, 1986, and Appendix B). These States are referred to as "mixed waste authorized States." Nine additional States are authorized for the RCRA base hazardous waste program but have not been delegated authority by EPA to

[1] See 42 U.S.C. §6903 (41), added by the Federal Facility Compliance Act of 1992 (FFCA).

[2] See revised *Guidance on the Definition and Identification of Commercial Low-Level Radioactive and Hazardous Waste and Answers to Anticipated Questions*, October 4, 1989.

regulate mixed waste.[3] In these States mixed waste is not regulated by EPA, but may be regulated by States under the authority of State law. It is important that licensees contact the State hazardous waste agencies in authorized States to determine the specific testing, analysis, and other hazardous waste requirements that may apply to mixed waste managed in their State, because their State may have more stringent requirements than the Federal requirements discussed in this guidance.

This guidance describes:

(1) The current regulatory requirements for determining if a waste is a RCRA hazardous waste;

(2) The role of waste knowledge for hazardous waste determinations;

(3) The waste analysis information necessary for proper treatment, storage, and disposal of mixed waste; and,

(4) The implications of the RCRA land disposal restrictions (LDRs) on the waste characterization and analysis requirements.

This information should be useful for: (1) radioactive waste generators, who must determine if their waste is a RCRA hazardous waste, and therefore a mixed waste; (2) for those generators storing mixed waste on-site in tanks, containers or containment buildings for longer than 90 days, that consequently become responsible for complying with RCRA and NRC storage requirements; and (3) those facilities that accept mixed waste for off-site treatment, storage, or disposal.

Generators and/or treatment, storage, and disposal facilities (TSDFs) handling wastes under RCRA must characterize their waste for several purposes:

(1) To determine if their waste is a hazardous waste (40 CFR 262.11);

(2) To comply with general waste analysis requirements for new or permitted TSDFs, for TSDFs operating under interim status, and for certain generators that treat land disposal prohibited wastes in 40 CFR 264.13, 265.13 and 268.7, respectively. These analysis requirements include:

(a) chemical/physical analysis of a representative sample (and/or, in some cases, use waste knowledge (see below); and,

(b) preparation of a waste analysis plan.

(3) To meet the waste analysis requirements that apply to the specific waste management methods in 40 CFR 264.17, 264.314, 264.341, 264.1034(d), and 268.7;

(4) To ensure, prior to land disposal, that the restricted waste meets the required treatment standard (40 CFR 268.7).[4]

This guidance addresses the need for chemical analysis of mixed wastes to meet these purposes. The guidance also emphasizes ways in which unnecessary testing of mixed waste may be avoided. This is important when handling mixed waste, since each sampling, workup, or analytical event may involve an incremental exposure to radiation. This guidance encourages mixed waste handlers to use waste knowledge, such as process knowledge, where possible, in making RCRA hazardous waste determinations involving mixed waste. It also encourages the elimination of redundant testing by off-site treatment and disposal facilities, where valid generator-supplied, and certified, data are available.

Because mixed waste testing may pose the possibility of increased radiation exposures, this guidance also describes methods by which individuals who analyze mixed waste samples may reduce their occupational radiation exposure and satisfy the intent of the RCRA testing requirements. Testing to determine whether wastes are hazardous under the RCRA toxicity characteristic may pose special concerns which are examined in Section III of this guidance.

All of the activities described in this guidance are subject to the requirements of both the AEA and RCRA. The focus of this guidance is the RCRA requirements. NRC and NRC Agreement State licensees are authorized to receive, possess, use (which includes storing, sampling, testing, and treating), and dispose of AEA-licensed materials. NRC licensees handling mixed waste should ensure that their RCRA hazardous waste testing activities are consistent with NRC, or Agreement State, regulations and license conditions. Flexibility in the RCRA requirements is emphasized so that the As Low As is Reasonably Achievable (ALARA) concept can be incorporated into the mixed waste testing activities.[5] If other AEA requirements, or RCRA requirements are difficult to meet in a specific mixed waste management situation, licensees should seek resolution by requesting license amendments, approval of modifications to their RCRA permits or interim status Part A applications, or resolution under both authorities.

Section 1006(a) of RCRA states "Nothing in this Act shall be construed to apply to (or authorize any State, interstate, or local authority to regulate) any activity or substance which is subject to * * * the Atomic Energy Act of 1954 * * * except to the extent that such application (or regulation) is not inconsistent with the requirements of such Acts." If a resolution cannot be achieved through the flexibility provided by the two regulatory frameworks, then and only then, should licensees seek resolution under Section 1006(a) of RCRA. Licensees should note that, if an inconsistency exists, relief will be limited to that specific RCRA requirement, and that the determination of an inconsistency would not relieve the licensee from all other RCRA requirements. Section 1006(a) and radiological hazard considerations are addressed more fully in Sections III and IV of this guidance. NRC licensees should also include the necessary flexibility in their RCRA permit waste analysis plans to accommodate the sampling and testing required to meet AEA requirements.

II. Use of Waste Knowledge for Hazardous Waste Determinations

The use of waste knowledge by a generator and/or a TSDF to characterize mixed waste is recommended throughout this document to eliminate unnecessary or redundant waste testing. EPA interprets "waste knowledge" or "acceptable knowledge" of a waste broadly to include, where appropriate:

- "Process knowledge";
- Records of analyses performed by generator or TSDF prior to the effective date of RCRA regulations; or,
- A combination of the above information, supplemented with chemical analysis.

Process knowledge refers to detailed information on processes that generate wastes subject to characterization, or to detailed information (e.g., waste analysis data or studies) on wastes generated from processes similar to that which generated the original waste. Process knowledge includes, for example, waste analysis data obtained by TSDFs from the specific generators that sent the waste off-site, and waste analysis data obtained by generators or TSDFs from other generators, TSDFs or areas within a facility that test chemically identical wastes.[6]

[3] The RCRA base hazardous waste program is the RCRA program initially made available for final authorization and includes Federal regulations up to July 26, 1982. However, authorized States have revised their programs to keep pace with Federal program changes that have taken place after 1982 in accordance with EPA regulation.

[4] Refer to Appendix A for specific EPA regulations pertaining to (1)–(4).

[5] ALARA, codified in 10 CFR Part 20, refers to the practice of maintaining all radiation exposures, to workers and the general public, as low as is reasonably achievable.

[6] For a more detailed discussion on process knowledge, see Section 1.5 in "Waste Analysis at

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Waste knowledge is allowed by RCRA regulations for the following hazardous waste characterization determinations:

- To determine if a waste is characteristically hazardous (40 CFR 262.11(c)(2)) or matches a RCRA listing in 40 CFR Part 261, Subpart D (40 CFR 262.11(a) and (b));
- To comply with the requirement to obtain a detailed chemical/physical analysis of a representative sample of the waste under 40 CFR 264.13(a);
- To determine whether a hazardous waste is restricted from land disposal (40 CFR 268.7(a)); and,
- To determine if a restricted waste the generator is managing can be land disposed without further treatment (see the generator certification in 40 CFR 268.7(a)(3) and information to support the waste knowledge determination in 40 CFR 268.7(a)(6)).

Hazardous waste, including mixed waste, may be characterized by waste knowledge alone, by sampling and laboratory analysis, or a combination of waste knowledge, and sampling and laboratory analysis. The use of waste knowledge alone is appropriate for wastes that have physical properties that are not conducive to taking a laboratory sample or performing laboratory analysis. As such, the use of waste knowledge alone may be the most appropriate method to characterize mixed waste streams where increased radiation exposures are a concern. Mixed waste generators should contact the appropriate EPA regional office to determine whether they possess adequate waste knowledge to characterize their mixed waste.

III. Determinations by Generators That a Waste Is Hazardous

A solid waste is a RCRA hazardous waste if it meets one of two conditions: (1) the waste is specifically "listed" in 40 CFR Part 261, Subpart D, or; (2) the waste exhibits one of the four "characteristics" identified in 40 CFR Part 261, Subpart C. These characteristics are:

- Ignitability;
- Corrosivity;
- Reactivity; or,
- Toxicity.

(a) Listed Hazardous Wastes

Generators of waste containing a radioactive and solid waste component must establish whether the solid waste component is a RCRA hazardous waste. Determinations of whether a waste is a listed hazardous waste can be made by comparing information on the waste stream origin with the RCRA listings set forth in 40 CFR Part 261, Subpart D. These listings are separated into three major categories or lists, and are identified by EPA hazardous waste numbers. Most hazardous waste numbers are associated with a specific waste description, specific processes that produce wastes, or certain chemical compounds. For example, K103 waste is defined as "process residues from aniline extraction from the production of aniline." A generator who produces such residues should know, without any sampling or analysis, that these wastes are "listed" RCRA hazardous wastes by examining the K103 hazardous waste description in the hazardous waste lists. Other hazardous waste numbers describe wastes generated from generic processes that are common to various industries and activities. These wastes are referred to as hazardous wastes from nonspecific sources. Radioactively contaminated spent solvents are the most likely mixed wastes to be nonspecific source listed wastes. For example, a generator using one of the F002 halogenated solvents (e.g., tetrachloroethylene, trichloroethylene, and chlorobenzene, etc.) to remove paint from a radiologically contaminated surface, can determine that this waste is a listed RCRA hazardous waste by examining the F002 waste definition for the solvent type, and for a solvent mixture/blend, the percent solvent by volume.

In addition to wastes that are specifically listed as hazardous, the "derived from" and "mixture" rules state that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste, or any solid waste mixed with a listed RCRA hazardous waste, respectively, is itself a listed RCRA hazardous waste until delisted (see 40 CFR 261.3).[7] (Note that soil and debris can be managed as hazardous wastes if they contain listed hazardous wastes or they exhibit one or more hazardous waste characteristics. See hazardous debris definition in 40 CFR 268.2.)

Exceptions to the "mixture rule" and "derived from" rules exist for certain solid wastes. For example, wastewater discharges subject to Clean Water Act permits, under certain circumstances, are not RCRA hazardous (see 40 CFR 261.3(a)(2)(iv)). Also, hazardous wastes which are listed solely for a characteristic identified in Subpart C of 40 CFR Part 261 (e.g., a F003 spent solvent which is listed only because it is ignitable) are not considered hazardous wastes when they are mixed with a solid waste and the resultant mixture no longer exhibits any characteristic of a hazardous waste (see 40 CFR 261.3(a)(2)(iii)). Likewise, waste pickle liquor sludge "derived from" the lime stabilization of spent pickle liquor (e.g., K062) is not a RCRA listed hazardous waste, if the sludge does not exhibit a hazardous waste characteristic (see discussion below on characteristic hazardous wastes). It should be noted, however, that wastes such as F003 and K062 *must* meet LDR treatment standards. Outside of the exceptions mentioned here and in the RCRA regulations, a hazardous waste that was generated via the "mixture rule" or the "derived from" rule must be delisted through a specific EPA petition process for the listed waste to be considered only a solid waste, and no longer managed as a listed hazardous waste under the RCRA Subtitle C system.

When applying the mixture rule to hazardous wastes, including mixed wastes, generators should be aware that EPA prohibits the dilution (i.e., mixing) of land disposal restricted waste or treatment residuals as a substitute for adequate treatment (see 40 CFR 268.3). An exception to the prohibition is the dilution of purely corrosive, and in some cases, reactive, or ignitable non-toxic wastes to eliminate the characteristic, or the aggregation of characteristic wastes in (pre)treatment systems regulated under the Clean Water Act (55 *FR* 22665).

(b) Characteristic Hazardous Wastes

Hazardous characteristics are based on the physical/chemical properties of wastes. Thus, physical/chemical testing of waste may be appropriate for determining whether a waste is a characteristic hazardous waste. *RCRA regulations, however, do not require testing. Rather, generators must determine whether the waste is a RCRA hazardous waste.* Such a determination may be made based on one's knowledge of the materials or chemical processes that were used. EPA's regulations are clear on this point. 40 CFR 262.11(c) states:

Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes" OSWER 9938.4–03, April 1994.

[7] The "mixture" and "derived-from" rules were vacated and remanded due to EPA's failure to provide adequate notice and opportunity for comment before their 1980 promulgation, in *Shell Oil* v. *EPA*, No. 80–1532 (D.C. Cir. Dec. 6, 1991). At the Court's suggestion, EPA reinstated the "mixture" and "derived-from" rules as interim final until the rules are revised through new EPA rulemaking. The "mixture" and "derived from" rules adopted by those States with authorized RCRA programs were not affected by the court case or the subsequent reinstatement by EPA. For further information, see 57 *FR* 49278, October 30, 1992, and 60 *FR* 66344, December 21, 1995.

". . . if the waste is not listed [as hazardous waste] in Subpart D [of 40 CFR Part 261], the generator must then determine whether the waste is identified in Subpart C of 40 CFR Part 261 by either:

(1) Testing the waste according to the methods set forth in Subpart C of 40 CFR Part 261, or according to an equivalent method approved by the Administrator under 40 CFR 260.21; or

(2) Applying knowledge (emphasis added) of the hazardous characteristic of the waste in light of the materials or the processes used."

Therefore, where sufficient material or process knowledge exists, the generator need not test the waste to make a hazardous characteristic determination, although generators and subsequent handlers would be in violation of RCRA, if they managed hazardous waste erroneously classified as non-hazardous, outside of the RCRA hazardous waste system. For this reason, facilities wishing to minimize testing often assume a questionable waste is hazardous and handle it accordingly.

A generator must also comply with the land disposal restriction regulations in 40 CFR 268 which require the generator to determine whether the waste is prohibited from land disposal (refer to Section V for a detailed discussion of these requirements).[8] With respect to the hazardous characteristic, and the determination as to whether a waste is restricted from land disposal under 40 CFR 268.7(a), a generator may select the option of using waste knowledge. However, if the waste is determined to be land disposal restricted in 40 CFR 268.7(a), some testing will generally be required prior to land disposal, except where technologies are specified as the treatment standard. For mixed waste, EPA recommends that the frequency of such testing be held to a minimum, in order to avoid duplicative testing and repeated exposure to radiation.

In determining whether a radioactive waste is a RCRA hazardous waste, the generator may test a surrogate material (i.e., a chemically identical material with significantly less or no radioactivity) to determine the RCRA status of the radioactive waste. This substitution of a surrogate material may either partially or completely supplant the testing of the waste. A surrogate material, however, should only be used if the surrogate material faithfully represents the hazardous constituents of the mixed waste.[9] The following example discusses the use of surrogates. A generator is required to determine if a process waste stream containing lead (D008) exceeds the regulatory level of 5.0 milligrams per liter for the toxicity characteristic (40 CFR 261.24). If this determination cannot be made based on material and process knowledge only, the generator would need to test the hazardous material. Rather than testing the radioactive waste stream, the generator may opt to test a surrogate or chemically identical non-radioactive, or lower activity, radioactive waste stream generated by similar maintenance activities in another part of the plant. This substitution of materials is acceptable as long as the surrogate material faithfully represents the characteristics of the actual waste, and testing provides sufficient information for the generator to reasonably determine if the waste is hazardous under RCRA. Non-radioactive or lower activity quality control samples/species and spiked solutions, for instance, are acceptable to minimize exposure to radiation from duplicative mixed waste testing.

As part of the hazardous waste determination, a generator must document test results or other data and methods that it used. Specifically, 40 CFR 262.40(c) states that "a generator must keep records of any test results, waste analyses, or other determinations made in accordance with 40 CFR 262.11 for at least three years from the date that the waste was last sent to on-site or off-site treatment, storage, or disposal." Section V of this guidance contains information on record keeping requirements for land disposal restricted hazardous (and mixed) wastes.

In summary, testing listed wastes to make the hazardous waste determination is not necessary, because most RCRA hazardous waste codes or listings identify specific waste streams from specific processes or specific categories of wastes. Testing will most often occur to determine if a waste exhibits a hazardous characteristic. However, testing is not required if a generator has sufficient knowledge about the waste and its physical/chemical properties to determine that it is non-hazardous.[10] It is recognized that certain mixed waste streams, such as wastes from remediation activities or wastes produced many years ago, may have to be identified using laboratory analysis, because of a lack of waste or process information on these waste streams. Nonetheless, hazardous waste determinations based on generator knowledge can be used to reduce the sampling of mixed waste and prevent unnecessary exposure to radioactivity. The same principle holds for a generator's determination that a waste is subject to the RCRA land disposal restrictions in 40 CFR 268.7(a).

IV. Testing Protocols for Characteristics

When testing is conducted to determine whether a waste is a RCRA hazardous waste, there are acceptable test protocols or criteria for each of the four characteristics. Testing for characteristics must be done on a representative sample of the waste or using any applicable sampling methods specified in Appendix I of 40 CFR 261.[11]

Ignitability—For liquid wastes, other than aqueous solutions containing by volume less than 24 percent alcohol, the flash point is to be determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society of Testing and Materials (ASTM) Standard D–93–79 or D–93–80, or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D–3278–78, or as determined by an equivalent test method approved by the Administrator under procedures set forth in 40 CFR 260.20 and 260.21 (see "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," 3rd Ed., as amended, EPA, OSWER, SW–846, Methods 1010 and 1020 [12]). (Non-liquid

[8] Generators who also treat their waste are subject to the requirements for treatment facilities unless they treat waste in accumulation tanks, containers, or containment buildings, for 90 days or less in accordance with 40 CFR 262.34(a). Treatment facilities must periodically test the treated waste residue from prohibited wastes to determine whether it meets the best demonstrated available technology (BDAT) treatment standards and may not rely on materials and process knowledge to make this determination (40 CFR 268.7(b)). This testing must be conducted according to the frequency specified in the facility's waste analysis plan (refer to Section IV of this guidance for a detailed discussion of treatment, storage, and disposal facility requirements).

[9] This definition of surrogate should not be confused with the definition of surrogate for the purposes of sampling and analysis quality control in Section 1.1.8 of "*Evaluating Solid Waste—Volume IA: Laboratory Test Methods Manual Physical/Chemical Methods.*"

[10] Note that characteristic only wastes (which are neither wastewater mixtures or RCRA listed hazardous wastes when generated) may be treated so that they no longer exhibit any of the four characteristics of a hazardous waste. However, these wastes may still be subject to the requirements of 40 CFR Part 268, even if they no longer exhibit a hazardous characteristic at the point of land disposal. After treatment this waste must not exhibit any RCRA hazardous waste characteristic *and* must meet applicable treatment standards before it can be considered a non-hazardous waste (see 57 *FR* 37263, August 18, 1992, and 58 *FR* 29869, May 24, 1993).

[11] Note that hazardous and mixed waste samples analyzed for waste characteristics or composition, and samples undergoing treatability studies may be exempt from all or part of the RCRA regulations if they are managed in accordance with 40 CFR 261.4 (d), (e) or (f).

[12] EPA incorporated by reference into the RCRA regulations (58 *FR* 46040, August 31, 1993), a third edition (and its updates) of "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods." The updates can be found in 60 *FR* 3089, January 13, 1995 (update II), 59 *FR* 458, January 4, 1994 (update IIA), 60 *FR* 17001, April 4, 1995

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wastes, compressed gases, and oxidizers may exhibit the characteristic of ignitability as described in 40 CFR 261.21 (a)(2–4).)

Corrosivity—For aqueous solutions, the pH is to be determined by a pH meter using either an EPA test method (i.e., SW–846, Method 9040 or an equivalent test method approved by the Administrator under procedures set forth in 40 CFR 260.20 and 260.21.) For liquids, steel corrosion is to be determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM–01–69 as standardized in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," 3rd Ed., as amended (EPA, OSWER, SW–846, Method 1110), or an equivalent test method approved by the Administrator under procedures set forth in 40 CFR 260.20 and 260.21.

Reactivity—There are no specified test protocols for reactivity. 40 CFR 261.23 defines reactive wastes to include wastes that have any of the following properties: (1) normally unstable and readily undergoes violent change without detonating; (2) reacts violently with water; (3) forms potentially explosive mixtures with water; (4) generates dangerous quantities of toxic fumes, gases, or vapors when mixed with water; (5) in the case of cyanide- or sulfide-bearing wastes, generates dangerous quantities of toxic fumes, gases, or vapors when exposed to acidic or alkaline conditions; (6) explodes when subjected to a strong initiating force or if heated under confinement; (7) explodes at standard temperature and pressure; or (8) fits within the Department of Transportation's forbidden explosives, Class A explosives, or Class B explosives classifications.[13]

EPA has elected to rely on a descriptive definition for these reactivity properties because of inherent deficiencies associated with available methodologies for measuring such a varied class of effects, with the exception of the properties discussed in No. 5, above. The method used, as guidance but not required, to quantify the reactive cyanide and sulfide bearing wastes is provided in Chapter 7 of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," 3rd Ed., as amended, EPA, OSWER, SW–846.

Toxicity Characteristic—The test method that may be used to determine whether a waste exhibits the toxicity characteristic (TC) is the Toxicity Characteristic Leaching Procedure (TCLP), as described in 40 CFR Part 261, Appendix II (SW–846, Method 1311). The TCLP was modified and revised in 55 *FR* 11798, March 29, 1990. Note that this revised TCLP is used (in most cases) for land disposal restriction compliance determinations as well. Differences between the TCLP and the previously required Extraction Procedure (EP) include improved analysis of the leaching of organic compounds, the elimination of constant pH adjustment, the addition of a milling or grinding requirement for solids (waste material solids must be milled to particles less than 9.5 mm in size), and other more detailed alterations.[14] Additionally, the TC rule added 25 organic compounds to the toxicity characteristic.

The TCLP (Method 1311) recommends the use of a minimum sample size of 100 grams (solid and liquid phases as described in Section 7.2). *For mixed waste testing, sample sizes of less than 100 grams can be used, if the analyst can demonstrate that the test is still sufficiently sensitive to measure the constituents of interest at the regulatory levels specified in the TCLP and representative of the waste stream being tested.* Other variances to the published testing protocols are permissible (under 40 CFR 260.20–21), but must be approved prior to implementation by EPA. Use of a sample size of less than 100 grams is highly recommended for mixed wastes with concentrations of radionuclides that may present serious radiation exposure hazards.

Additionally, Section 1.2 of the TCLP allows the option of performing a "total constituent analysis" on a hazardous waste or mixed waste sample, instead of the TCLP. Section 1.2 of Method 1311 states:

> If a total analysis of the waste demonstrated that the individual analytes are not present in the waste, or that they are present, but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run.

For homogenous samples, the use of total constituent analysis in this manner eliminates the need to grind or mill solid waste samples. The grinding or milling step in the TCLP has raised ALARA concerns for individuals who test mixed waste. The use of total constituent analysis, instead of the TCLP, may also minimize the generation of secondary mixed or radioactive waste through the use of smaller sample sizes and reduction, or elimination, of high dilution volume leaching procedures.

Flexibility in Mixed Waste Testing

Flexibility exists in the hazardous waste regulations for generators, TSDFs, and mixed waste permit writers to tailor mixed waste sampling and analysis programs to address radiation hazards. For example, upon the request of a generator, a person preparing a RCRA permit for a TSDF has the flexibility to minimize the frequency of mixed waste testing by specifying a low testing frequency in a facility's waste analysis plan. EPA believes, as stated in 55 FR 22669, June 1, 1990, that "the frequency of testing is best determined on a case-by-case basis by the permit writer."

EPA's hazardous waste regulations also allow a mixed waste facility the latitude to change or replace EPA's test methods (i.e., *Test Methods for Evaluating Solid Waste* (SW–846)) to address radiation exposure concerns. There are only fourteen sections of the hazardous waste regulations that require the use of specific test methods or appropriate methods found in SW–846 which are outlined in Appendix A.[15] However, any person can request EPA for an equivalent testing or analytical method that would replace the required EPA method (see 40 CFR 260.21).

In a recent amendment to the testing requirements, EPA added language to SW–846 that describes fourteen citations in the RCRA program (listed in Appendix A) where the use of SW–846 methods is mandatory (Update II, 60 FR 3089, January 13, 1995). In all other cases, the RCRA program functions under what we call the Performance Based Measurement System (PBMS) approach to monitoring. Language clarifying this approach was included in the final FR Notice which promulgated Update III (62 FR 32542, June 13, 1997) and in appropriate sections (Disclaimer, Preface and Overview, and Chapter 2) of SW–846. Under PBMS, the regulation and/or permit focus is on the question(s) to be answered by the monitoring, the degree of confidence (otherwise known as the Data Quality Objective (DQO)) or the measurement quality objectives (MQO) that must be achieved by the permittee to have demonstrated compliance, and the specific data that must be gathered and documented by the permittee to demonstrate that the objectives were actually achieved. "Any reliable method" may be used to demonstrate that one can see the analytes of concern in the matrix of

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(update IIB), and 62 *FR* 32452, June 13, 1996 (update III). Hazardous and mixed waste generators and management facilities should verify that the analytical method that they use to analyze hazardous waste has not been superseded in the third edition.

[13] When evaluating test protocols for explosive mixed waste, consideration should be given to the likelihood for dispersing radioactivity during detonation. Using process knowledge or a surrogate material would, in most instances, be appropriate for these wastes.

[14] Note that when using the TCLP, if any liquid fraction of the waste positively determines that hazardous constituents in the waste are above regulatory levels, then it is not necessary to analyze the remaining fractions of the waste. Extraction using the zero headspace extraction vessel (ZHE) is not required, furthermore, if the analysis of an extract obtained using a bottle extractor demonstrates that the concentration of a volatile compound exceeds the specified regulatory levels. The use of a bottle extractor, however, may not be used to demonstrate that the concentration of a volatile compound is below regulatory levels (40 CFR Part 261 Appendix II Sections 1.3 and .4).

[15] With the exception of the fourteen areas (see Appendix D) where test methods are required by hazardous waste regulation, use of EPA's *Test Methods for the Evaluation of Solid Waste* (SW–846) is not required, and should be viewed as guidance on acceptable sampling and analysis methods.

concern at the levels of concern. Additional reference documents on the characterization and testing methods are listed in Appendix C.

NRC regulations do not describe specific testing requirements for wastes to determine if a waste is radioactive. However, both NRC and Department of Transportation regulations contain requirements applicable to characterizing the radioactive content of the waste before shipment. For example, NRC's regulations in 10 CFR 20.2006 require that the waste manifest include, as completely as practicable, the radionuclide identity and quantity, and the total radioactivity. NRC regulations also require that generators determine the disposal Class of the radioactive waste, and outline waste form requirements that must be met before the waste is suitable for land disposal. These regulations are referenced in 10 CFR 20.2006, and are outlined in detail at 10 CFR 61.55 and 61.56. Mixed waste generators are reminded that both RCRA waste testing and NRC waste form requirements must be satisfied. Generators may also be required to amend their NRC or Agreement State licenses in order to perform the tests required under RCRA. In addition, if an NRC licensee uses an outside laboratory to test his or her waste, that laboratory may be required to possess an NRC or Agreement State license. It is the responsibility of the generator to determine if the outside laboratory possesses the proper license(s) prior to transferring the waste to the laboratory for testing.

Where radioactive wastes (or wastes suspected of being radioactive) are involved in testing, it has been suggested that the testing requirements of RCRA may run counter to the aims of the AEA. The AEA requirements that have raised inconsistency concerns with respect to RCRA testing procedures include ALARA, criticality, and security. Neither EPA nor NRC is aware of any specific instances where RCRA compliance has been inconsistent with the AEA. However, both agencies acknowledge the potential for an inconsistency to occur.[16] A licensee or applicant who suspects that an inconsistency may exist should contact both the AEA and RCRA regulatory agencies. These regulatory agencies may deliberate and consult on whether there is an unresolvable inconsistency and, if one exists, they may attempt to fashion the necessary relief from the particular RCRA provision that gives rise to the inconsistency. However, all other RCRA regulatory requirements would apply. That is, such a conclusion does not relieve hazardous waste facility owner/operators of the responsibility to ensure that the mixed waste is managed in accordance with all other applicable RCRA regulatory requirements. Owner/operators of mixed waste facilities are encouraged to address and document this potential situation and its resolution in the RCRA facility waste analysis plan which must be submitted with the Part B permit application, or addressed in a permit modification.

Both agencies also believe that the potential for inconsistencies can be reduced significantly by a better understanding of the RCRA requirements, a greater reliance on materials and process knowledge, the use of surrogate materials when possible, and the use of controlled atmosphere apparatuses for mixed waste testing. Where testing is conducted, the use of glove boxes and other controlled atmosphere apparatuses during the testing of the radioactive waste material lessens radiation exposure concerns significantly. These protective measures may also help to reconcile the required testing requirements (including milling) with concerns about maintaining exposures to radiation ALARA and complying with other AEA protective standards. If such protective measures do not exist, or do not adequately reduce individual exposure to radiation or address other factors of concern, relief may be available under Section 1006 of RCRA.

V. Determinations by Treatment, Storage, or Disposal Facility Owner/Operators and Certain Generators to Ensure Proper Waste MaNagement

General Waste Analysis

Owner/operators of facilities that treat, store, or dispose of hazardous wastes must obtain a chemical and physical analysis of a representative sample of the waste (see 40 CFR 264.13 for permitted facilities, or 40 CFR 265.13 for interim status facilities).[17] The purpose of this analysis is to assure that owner/operators have sufficient information on the properties of the waste to be able to treat, store, or dispose of the waste in a safe and appropriate manner.

The waste analysis may include data developed by the generator, and existing, published, or documented data on the hazardous waste or on hazardous waste generated from similar processes. In some instances, however, information supplied by the generator may not fully satisfy the waste analysis requirement. For example, in order to treat a particular waste, one may need to know not only the chemical composition of the waste, but also its compatibility with the techniques and chemical reagents used at the treatment facility. Where such information is not otherwise available, the owner/operator will be responsible for gathering relevant data on the waste in order to ensure its proper management.

The analysis must be repeated only if the previous analyses are inaccurate or needs updating. EPA regulations at 40 CFR 264.13(a)(3) do require that, at a minimum, a waste must be re-analyzed if:

(1) The owner/operator is notified, or has reason to believe, that the process or operation generating the waste has changed [in a way such that the hazardous property or characteristics of the waste would change]; and

(2) For off-site facilities, when the results of the verification analysis indicate that the [composition or characteristics of the] waste does not match the accompanying manifest or shipping paper.

The requirements and frequency of waste analysis for a given facility are described in the facility's waste analysis plan. As required by 40 CFR 264.13(b), the waste analysis plan must specify the parameters for which each hazardous waste will be analyzed; the rationale for selecting these parameters (i.e., how analysis for these parameters will provide sufficient information on the waste's properties); and the test methods that will be used to test for these parameters. The waste analysis plan also must specify the sampling method that will be used to obtain a representative sample of the waste to be analyzed; the frequency with which the initial analysis of the waste will be reviewed or repeated, to ensure that the analysis is accurate and up to date; and, for off-site facilities, the waste analyses to be supplied by the hazardous waste generators. Finally, the waste analysis plan must note any additional waste analysis requirements specific to the waste management method employed, such as the analysis of the waste feed to be burned in an incinerator.

The appropriate parameters for each waste analysis plan are determined on an individual basis as part of the permit

[16] An inconsistency occurs when compliance with one statute or set of regulations would necessarily cause non-compliance with the other. It may stem from a variety of considerations, including those related to occupational exposure, criticality, and other safeguards.

[17] A representative sample is defined in 40 CFR 260.10 as "a sample of a universe or whole (e.g., waste pile, lagoon, ground water) which can be expected to exhibit the average properties of the universe or whole." For further guidance see Chapter 9 of the EPA's testing guidance entitled *Test Methods for Evaluating Solid Waste* or SW-846.

application review process. To reduce the inherent hazards of sampling and analyzing radioactive material, and in particular, the potential risk to workers from exposure to radiation posed by duplicative testing of mixed wastes, redundant testing by the generator and off-site facilities should be avoided. In addition, waste analysis plans must include provisions to keep exposures to radiation ALARA, and incorporate relevant AEA-related requirements and regulations.

Analysis Required to Verify Off-site Shipments

The owner/operator of a facility that receives mixed waste from off-site must inspect and, *if necessary,* analyze each hazardous waste shipment received at the facility to verify that it matches the identity of the waste specified on the accompanying LDR notification or manifest (see 40 CFR 264.13 or 265.13(c)). This testing is known as verification testing. Such inspections and analysis will follow sampling and testing procedures set forth in the facility's waste analysis plan, which is kept at the facility.

It should also be emphasized that, where analysis is necessary, *RCRA regulations do not necessarily require the analysis of every movement of waste received at an off-site facility.* As explained above, the purpose of the waste analysis is to verify that the waste received at off-site facilities is correctly identified, and to provide enough information to ensure that it is properly managed by the facilities.

For example, if a facility receives a shipment of several sealed drums of mixed waste, a representative sample from only one drum may be adequate, if the owner/operator has reason to believe that the chemical composition of the waste is identical in every drum. In such a case, the drum containing the least amount of measurable radioactivity could be sampled to minimize radiation exposures (variations in radioactivity do not necessarily suggest different chemical composition). This procedure also would apply to a shipment of several types of waste. If the owner/operator has reason to believe that the drums in the shipment contain different wastes, then selecting a representative sample might involve drawing a sample from each drum or drawing a sample from one drum in each "set" of drums containing identical wastes. Once this waste analysis requirement has been satisfied, routine retesting of later shipments would not be required if the owner/operator can determine that the properties of the waste he or she manages will not change.

Fingerprint Analysis Versus Full Scale Analysis

Full scale analysis (i.e., detailed physical and chemical analysis) may be used to comply with the waste analysis plan, including verification of off-site shipments. However, for mixed waste, abbreviated analysis or "fingerprint analysis" may be more appropriate to meet general waste analysis requirements. The test procedure should be determined on a case-by-case basis.

Fingerprint analysis (which may involve monitoring pH, percent water, and cyanide content) is particularly recommended for mixed waste streams with high radiation levels that are received by an off-site TSDF for RCRA waste manifest verification purposes. It may be appropriate to use full scale analysis, instead of, or after, fingerprint analyses, if the facility suspects that the waste was not accurately characterized by the generator, information provided by a generator is incomplete, waste is received for the first time, or the generator changes a process or processes that produced the waste.

Generators Who Treat LDR Prohibited Waste In Tanks, Containers or Containment Buildings To Meet LDR Treatment Requirements

Hazardous waste generators may treat hazardous wastes in tanks or containers without obtaining a permit if the treatment is done in accordance with the accumulation timeframes and requirements in 40 CFR 262.34. However, generators who treat hazardous waste (including mixed wastes) to meet the EPA treatment standards for land disposal prohibited wastes must also prepare a waste analysis plan similar to that prepared by TSDFs. The plan must be based on a detailed analysis of a representative sample of the LDR prohibited waste that will be treated. In addition, the plan should include all the information that is necessary to treat the waste, including the testing frequency (See 40 CFR 268.7(a)(5)).

VI. Determinations Under the Land Disposal Restrictions

Generators, as well as treatment facilities and land disposal facilities, that handle mixed waste may have to obtain or amend their radioactive materials licenses if they test or treat mixed waste under the LDRs. The following discussion assumes that generators and treatment and disposal facilities have satisfied the requirement to obtain, or amend, their radioactive materials licenses, as appropriate.

Waste knowledge may also be used to satisfy certain waste characterization requirements imposed by the LDRs for mixed wastes. The Hazardous and Solid Waste Amendments (HSWA) to RCRA (P.L. 98-616), enacted on November 8, 1984, established the LDR program. This Congressionally mandated program set deadlines (RCRA Sections 3004(d)-(g)) for EPA to evaluate all hazardous wastes and required EPA to set levels, or methods, of treatment which would substantially diminish the toxicity of the waste, or minimize the likelihood of migration of hazardous constituents from any RCRA waste. Beyond specified dates, prohibited wastes that do not meet the treatment standards before they are disposed of, are banned from land disposal unless they are disposed of in a so-called "no-migration" unit (i.e., a unit where the EPA Administrator has granted a petition which successfully demonstrated to a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal unit for as long as the wastes remain hazardous)(40 CFR 268.6). Certain categories of prohibited wastes also may be granted extensions of the effective dates of the land disposal prohibitions (i.e., case-by-case and national capacity variances (40 CFR 268.5 and Subpart C, respectively). However, these wastes are still restricted and, if disposed in landfills or surface impoundments, must be disposed of in units meeting the minimum technology requirements.[18]

The requirements of the LDR program apply to generators, transporters, and owner/operators of hazardous waste treatment, storage, and disposal facilities. Not all hazardous wastes are subject to 40 CFR Part 268. For instance, certain wastes that are identified or listed after November 8, 1984, such as newly identified mineral processing wastes for which land disposal prohibitions or treatment standards have not yet been promulgated, are not regulated under 40 CFR Part 268.[19]

[18] A prohibited waste may not be land disposed unless it meets the treatment standards established by EPA. These standards are usually based on the performance of the BDAT. A waste that is subject to an extension, such as a national capacity variance, does not need to comply with the BDAT treatment standards, but is "restricted" and if it is going to be disposed in a landfill or surface impoundment, it can only be disposed of in a unit that meets the minimum technology requirements (MTRs). An exception exists for interim status surface impoundments which may continue receiving newly identified and restricted wastes for four years from the date of promulgation of the listings or characteristics before being retrofitted to meet the MTRs (RCRA Section 3005(j)(6)), so long as the only hazardous wastes in the impoundment are newly identified or listed.

[19] The treatment standards for mineral processing wastes and certain additional newly listed waste streams were proposed in 61 *FR* 2338, January 25,

Determinations by Generators

Under 40 CFR 268.7(a), generators must determine whether their waste is restricted from land disposal (or determine if they are subject to an exemption or variance from land disposal (40 CFR 268.1)) by testing their waste (or a leachate of the waste developed using the TCLP or, in certain cases, the Extraction Procedure Toxicity Test (EP), or by using waste or process knowledge). If the waste exhibits the characteristic of ignitability (and is not in the High Total Organic Constituents (TOC) Ignitable Liquids Subcategory or is not treated by the "CMBST" or "RORGS" treatment technology in 40 CFR 268.42, Table 1), corrosivity, reactivity and/or organic toxicity, the generator must also determine the underlying hazardous constituents (UHCs) in the waste. Two exceptions to this requirement are: (1) if these wastes are treated in wastewater treatment systems subject to the Clean Water Act (CWA) or CWA equivalent; or, (2) if they are injected into a Class I, non-hazardous Underground Injection Control well. A UHC is any constituent listed in 40 CFR 268.48, Table UTS-Universal Treatment Standards, with the exceptions of nickel, zinc and vanadium, which can reasonably be expected to be present at the point of generation of the hazardous waste, at a concentration above the constituent-specific UTS treatment standard. Determining the presence of the UHCs may be made based on testing or knowledge of the waste. The UHCs must meet the UTS before the waste may be land disposed.

If a generator chooses to test the waste rather than use waste or process knowledge for hazardous waste that is not listed and exhibits a characteristic only, the generator must use the TCLP. The only exception is TC metals.

Until the "Phase IV" LDR rule is promulgated in the spring of 1998, generators who characterize their wastes as TC toxic only for metals may use the EP instead of the TCLP result to determine if their waste is land disposal restricted, because the TC wastes do not have final EPA treatment standards whereas, at this time, the EP metals do. If the EP result is negative, the waste will still be considered hazardous, but is not prohibited from land disposal. The TCLP generally yields similar results as the EP. However, in certain matrices the TCLP yields higher lead and arsenic concentrations than the EP. The rationale for using the EP instead of the TCLP for characteristic wastes is explained in 55 FR 3865, January 31, 1991. For further guidance on using the EP for the land disposal restriction determination, refer to the Figures 1 and 2, of this guidance.

If a waste is found to be land disposal restricted, generators must determine if the waste can be land disposed without further treatment. A prohibited waste may be land disposed if it meets applicable treatment standards (whether through treatment or simply as generated), or is subject to a variance from the applicable standards. As explained above, this determination can be made either based on knowledge of the waste or by testing the waste, or waste leachate using the TCLP.

Generators who determine that their listed waste meets the applicable treatment standards must certify to this determination and notify the treatment, storage, or land disposal facility that receives the waste (40 CFR 268.7(a)(3)). Notification to the receiving facility must be made with the initial shipment of waste and must include the following information:

- EPA Hazardous Waste Number;
- Certification that the waste delivered to a disposal facility meets the treatment standard, and that the information included in the notice is true, accurate, and complete;
- Waste constituents that will be monitored for compliance if monitoring will not include all regulated constituents, for wastes F001-F005, F039, D001, D002, and D012-D043;
- Whether the waste is a non-wastewater or wastewater;
- The subcategory of the waste (e.g., "D003 reactive cyanide"), if applicable;
- Manifest number; and,
- Waste analysis data (if available).

If a generator determines that a waste that previously exhibited a characteristic is no longer hazardous, or is subject to an exclusion from the definition of hazardous waste, a one-time notification and certification must be place in the generator's files (40 CFR 268.7(a)(7) or 268.9).

Generators who determine that their waste does not meet the applicable treatment standards must ensure that this waste meets the applicable standards prior to disposal. These generators may treat (or store) their prohibited wastes on-site for 90 days or less in qualified tanks, containers (40 CFR 262.34), or containment buildings (40 CFR 268.50), and/or send their wastes off-site for treatment.[20] When prohibited listed wastes are sent off-site, generators must notify the treatment facility of the appropriate treatment standards (40 CFR 268.7(a)(2)). This notification must be made with the initial shipment of waste and must include the following information:

- EPA Hazardous Waste Number;
- Waste constituents that the treater will monitor if monitoring will not include all regulated constituents, for wastes F001–F005, F039, D001, D002, and D012–D043;
- Whether the waste is a non-wastewater or wastewater;
- The subcategory of the waste (e.g., "D003 reactive cyanide"), if applicable;
- Manifest number; and,
- Specified information for hazardous debris.

Generators whose wastes are subject to an exemption such as a case-by-case extension under 40 CFR 268.5, an exemption under 40 CFR 268.6 (a no-migration variance), or a nationwide capacity variance under 40 CFR 268, Subpart C must also notify the land disposal facility of the exemption. In addition, records of all notices, certifications, demonstrations, waste analysis data, process knowledge determinations, and other documentation produced pursuant to 40 CFR Part 268 must be maintained by the generator for at least three years from the date when the initial waste shipment was sent to on-site or off-site treatment, storage, or disposal (40 CFR 268.7(a)(8)).

Determinations by Treaters and Disposers

Owner/operators of treatment facilities that receive wastes that do not meet the treatment standards are responsible for treating the wastes to the applicable treatment standards or by the specified technology(ies). In addition, the owner/operators of treatment facilities must determine whether the wastes meet the applicable treatment standards or prohibition levels by testing:

(1) The treatment residues, or an extract of such residues using the TCLP, for wastes with treatment standards expressed as concentrations in the waste extract (40 CFR 268.40); and.

(2) The treated residues (not an extract of the treated residues) for wastes with

1996, and a second supplemental proposed rule signed April 18, 1997.

[20] Non-wastewater residues (e.g., slag) that result from high temperature metals recovery that are excluded from the definition of hazardous waste by meeting the conditions of 40 CFR 261.3(c)(2)(ii)(C), and hazardous debris that is excluded from the definition of hazardous waste in 40 CFR 261.3(f) have reduced LDR notification requirements. Specifically, these wastes, and characteristic hazardous wastes that are rendered non-hazardous, do not require a notification and certification accompanying each shipment. Instead, they may be sent to an AEA-licensed facility with a one-time notification and certification sent to the EPA Region or authorized State.

treatment standards expressed as concentrations in the waste extract (40 CFR 268.40).

This testing should be done at the frequency established in the facility's waste analysis plan. Owner/operators of treatment facilities, however, do not need to test the treated residues or an extract of the residues if the treatment standard is a specified-technology (i.e., a technology specified in 40 CFR 268.40 or 268.45, Table 1.—Alternative Treatment Standards for Hazardous Debris).

Owner/operators of land disposal facilities under the LDRs are responsible for ensuring that only waste meeting the treatment standards (i.e., wastes not prohibited from disposal or wastes that are subject to an exemption or variance) is land disposed. Like a treatment facility, a disposal facility must test a treatment residue or an extract of the treatment residue, except where the treatment standard is a specified technology.

Owner/operators must periodically test wastes received at the facility for disposal (i.e., independent corroborative testing) as specified in the waste analysis plan to ensure the treatment has been successful and the waste meets EPA treatment standards, except where the treatment standard is expressed as a technology.[21] The results of any waste analyses are placed in a TSDF's operating records along with a copy of all certifications and notices (40 CFR 264.73 or 40 CFR 265.73).[22]

Mixed Waste Under the LDRs

As clarified in the Land Disposal Restrictions rule published on June 1, 1990 (see EPA's "Third Third rule," 55 FR 22669, June 1, 1990), the frequency of testing, such as corroborative testing for treatment and disposal facilities, should be determined on a case-by-case basis and specified in the RCRA permit. This flexibility is necessary because of the variability of waste types that may be encountered. Mixed waste is unique for its radioactive/hazardous composition and dual management requirements. Each sampling or analytical event involving mixed waste may result in an incremental exposure to radiation, and EPA's responsibility to protect human health and the environment must show due regard for minimizing this unique risk. These are factors which should be considered in implementing the flexible approach to determining testing frequency spelled out in the Third Third Rule language. This flexible approach encourages reduction in testing where there is little or no variation in the process that generates the waste, or in the treatment process that treats the waste, and an initial analysis of the waste is available. Also, the approach may apply to mixed wastes shipped to off-site facilities, where redundant testing is minimized by placing greater reliance on the characterization developed and certified by earlier generators and treatment facilities. On the other hand, where waste composition is not well-known, testing frequency may be increased. Waste analysis plan conditions in the permits of mixed waste facilities should reflect these principles.

Revised Treatment Standards for Solvent Wastes

EPA promulgated revised treatment standards for wastewater and non-wastewater spent solvent wastes (F001–F005) in 57 FR 37194, August 18, 1992. The revision essentially converts the treatment standards for the organic spent solvent waste constituents (F001–F005) from TCLP based to total waste constituent concentration based. This conversion of the spent solvent treatment standards is particularly advantageous to mixed waste generators, since the entire waste stream or treatment residual must be analyzed (instead of a waste or treatment residual extract). This holds true for other mixed waste streams where the hazardous component is measured using a total waste analysis. As discussed in Section IV of this guidance, total constituent analysis has several advantages over the use of the TCLP for high activity waste streams.

EPA and NRC are aware of potential hazards attributable to testing hazardous waste. Moreover, EPA and NRC recognize that the radioactive component of mixed waste may pose additional hazards to laboratory personnel, inspectors, and others who may be exposed during sampling and analysis. All sampling should be conducted in accordance with procedures that minimize exposure to radiation and ensure personnel safety. Further, testing should be conducted in laboratories licensed by NRC or the appropriate NRC Agreement State authority. EPA and NRC believe that a combination of common sense, modified sampling procedures, and cooperation between State and Federal regulatory agencies will minimize any hazards associated with sampling and testing mixed waste.

Note: Section V, "Determinations under the Land Disposal Restrictions (LDRs)" and the following flow charts represent a brief summary of the Land Disposal Restriction Regulations. They are not meant to be a complete or detailed description of all applicable LDR regulations. For more information concerning the specific requirements, consult the **Federal Registers** cited in the document and the Code of Federal Regulations, Title 40 Parts 124, and 260 through 271.

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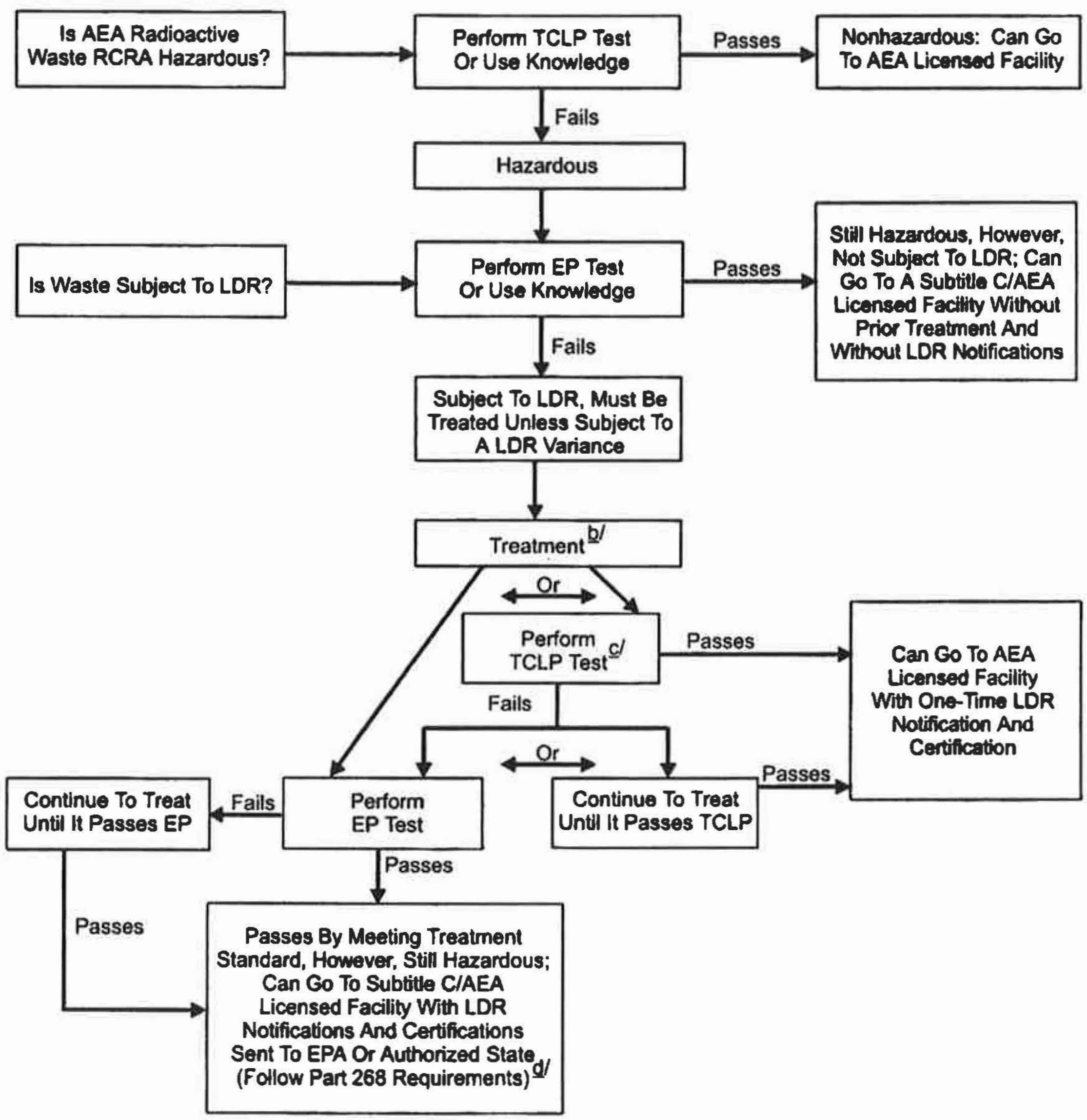
[21] Note that verification testing is a means to verify that the wastes received match the waste description on the manifest, which is required under 40 CFR 264.13 and 40 CFR 265.13(c). The main objective of corroborative testing is to provide an independent verification that a waste meets the LDR treatment standard.

[22] Land disposal facilities must maintain a copy of all LDR notices and certifications transmitted from generators and treaters (40 CFR 268.7(c)).

FIGURE ONE: TESTING REQUIREMENTS FOR CHARACTERISTIC LEAD AND ARSENIC NONWASTEWATERS ONLY[a/]



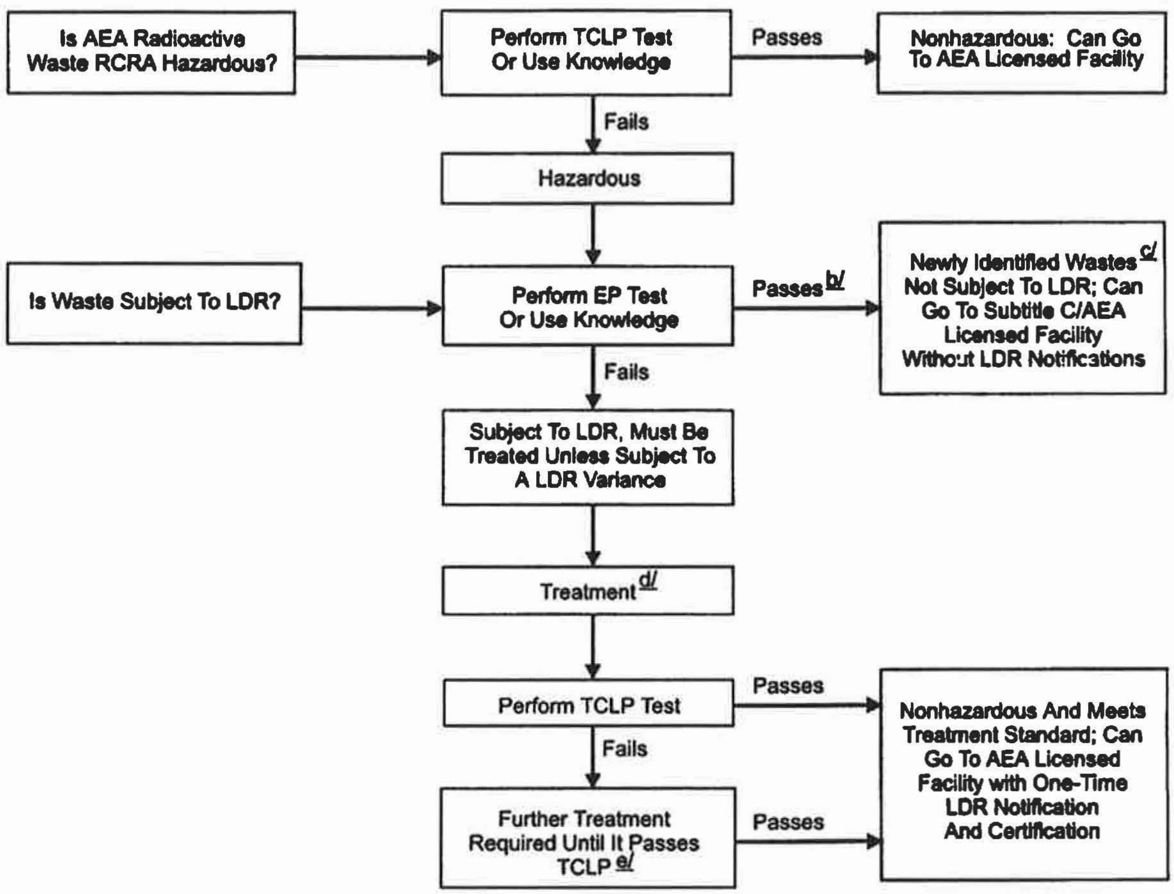
a/ Logic tree assumes the waste also contains AEA regulated radioactive waste.

b/ If the treatment standard is expressed as a specified technology, no further testing is required. However, the mixed waste must go to a Subtitle C/AEA licensed facility with LDR notifications and certifications.

c/ TCLP generally yields higher concentrations than EP for lead and arsenic in certain matrices.

d/ If the waste meets the treatment standard and passes the TCLP, it can go to an AEA licensed facility with one-time LDR notification and certification.

FIGURE TWO: TESTING REQUIREMENTS FOR ALL OTHER CHARACTERISTIC METALS[a/]



a/ Logic tree assumes the waste also contains AEA regulated radioactive waste.

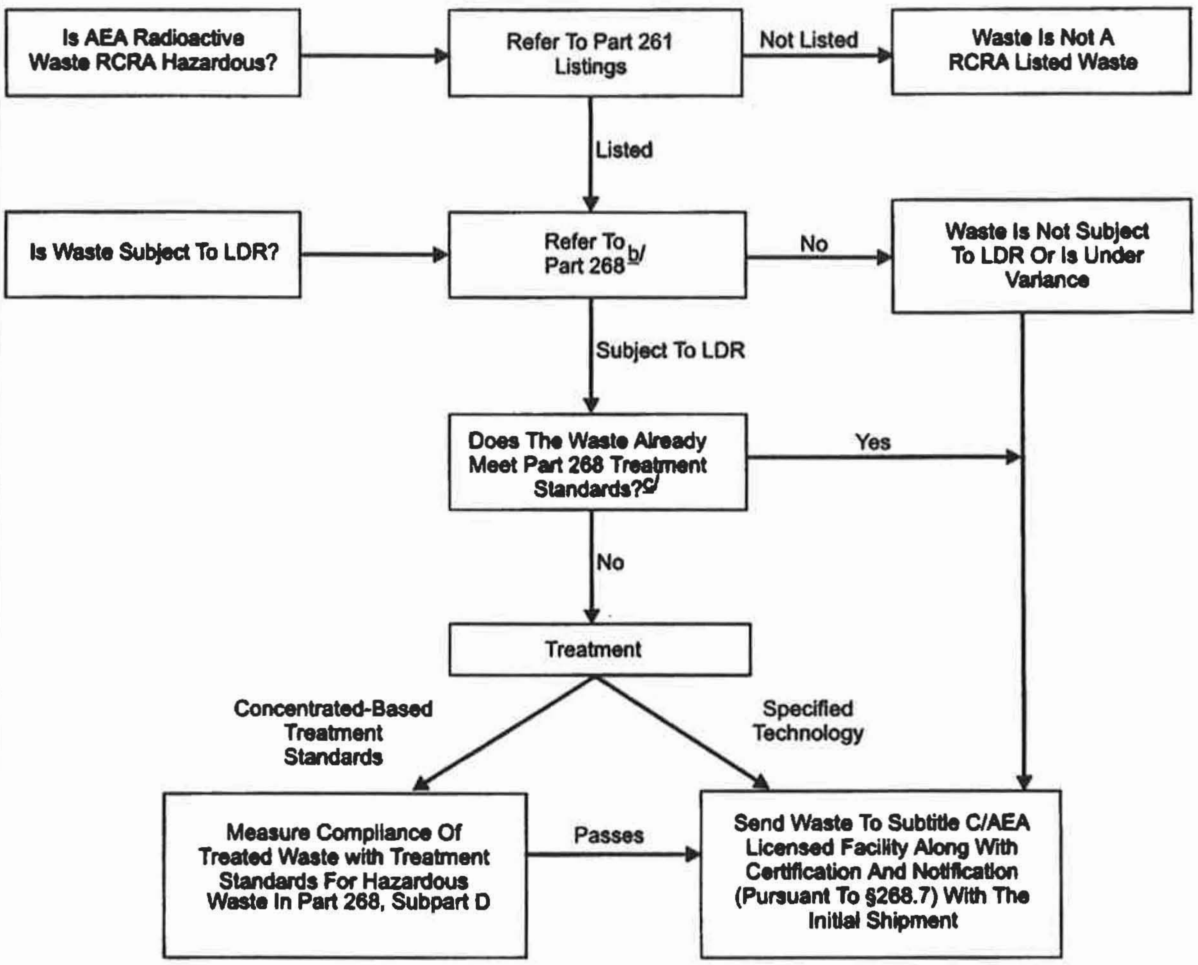
b/ This should be rare, since the two tests usually yield similar results.

c/ Wastes exhibiting the toxicity characteristic but not the EP are newly identified wastes and, therefore, are not subject to the land disposal restrictions at this time.

d/ If the treatment standard is expressed as a specified technology, no further testing is required. However, the mixed waste must go to a Subtitle C/AEA licensed facility with LDR notifications and certifications.

e/ Selenium is the one exception because it has a treatment standard slightly above the characteristic level.

FIGURE THREE: TESTING REQUIREMENTS FOR RCRA LISTED HAZARDOUS WASTES ONLY a/

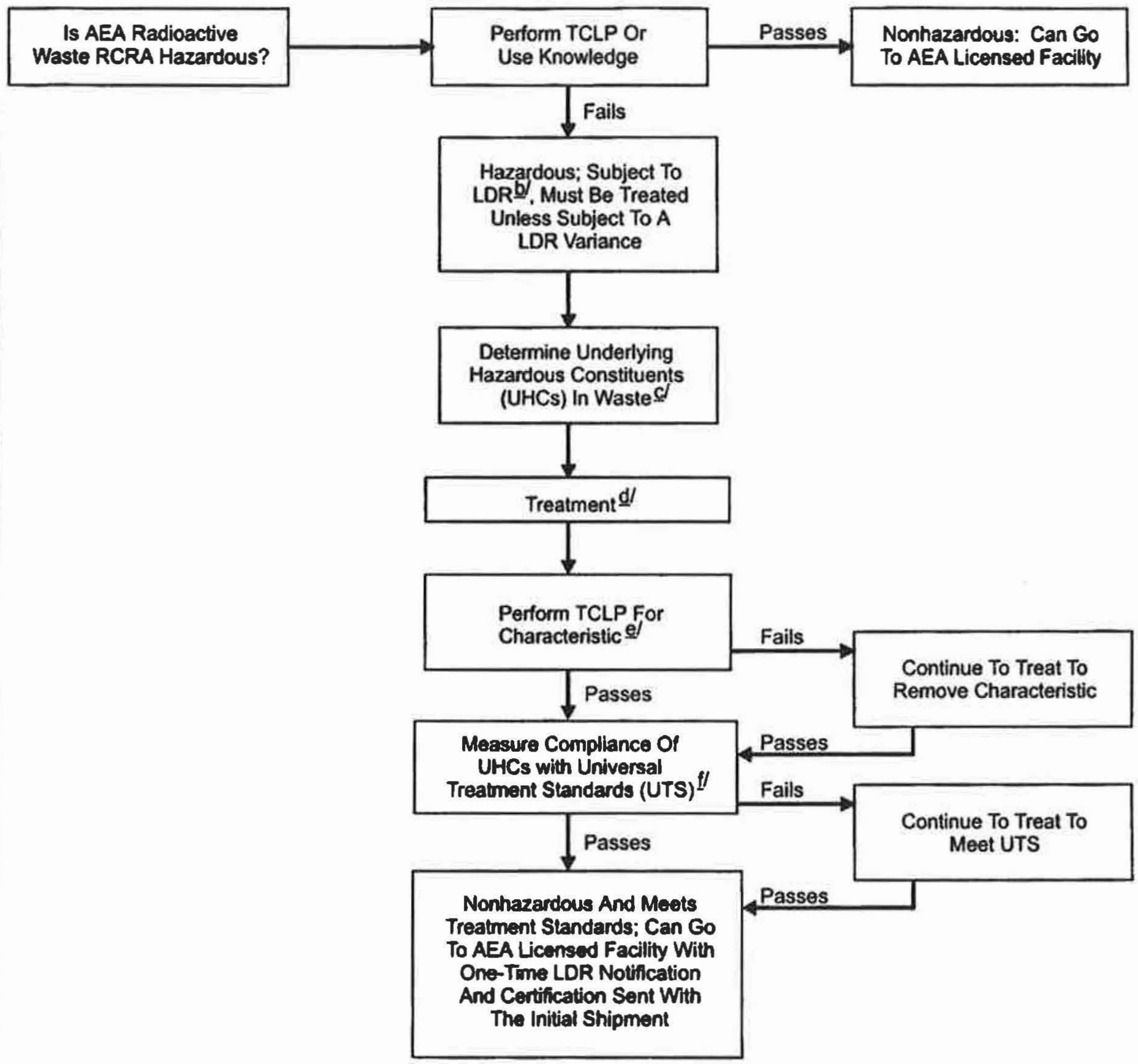


a/ Logic tree assumes the waste also contains AEA regulated radioactive waste.

b/ Refer to §268.1 to determine if LDR is applicable to waste. If so, test using TCLP or use process knowledge to determine if waste is restricted (§268.7).

c/ Test using TCLP or use process knowledge.

FIGURE FOUR: ORGANIC TOXICITY CHARACTERISTIC (TC) WASTES AND PESTICIDE WASTES[a/]



a/ Logic tree assumes the waste also contains AEA regulated radioactive waste.

b/ Restriction applies to TC organic and pesticide wastes managed in non-CWA/non-CWA equivalent/ non-Class I SDWA systems only.

c/ Testing or knowledge of waste may be used. A UHC is any constituent listed in§268.48 Table UTS, except zinc, that can reasonable be expected to be present at the point of generation of the hazardous waste, at a concentration above the constituent-specific UTS treatment standard.

d/ If the treatment standard is expressed as a specified technology, no further testing is required. However, the mixed waste must go to a Subtitle C/AEA facility with LDR notifications and certifications.

e/ Refer to the table "Treatment Standards for Hazardous Wastes" in 40 CFR Part 268, Subpart D.

f/ Compliance should be measured based on the appropriate testing protocols (see SW-846).

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Appendix A—RCRA Regulations That Require Specific EPA Test Methods

The use of an SW–846 method is mandatory for the following nine Resource Conservation and Recovery Act (RCRA) applications contained in 40 CFR Parts 260 through 270:

- Section 260.22(d)(1)(I)—Submission of data in support of petitions to exclude a waste produced at a particular facility (i.e., delisting petitions);
- Section 261.22(a)(1) and (2)—Evaluations of waste against the corrosivity characteristic;
- Section 261.24(a)—Leaching procedure for evaluation of waste against the toxicity characteristic;
- Section 261.35(b)(2)(iii)(A)—Evaluation of rinsates from wood preserving cleaning processes;
- Sections 264.190(a), 264.314(c), 265.190(a), and 265.314(d)—Evaluation of waste to determine if free liquid is a component of the waste;
- Sections 264.1034(d)(1)(iii) and 265.1034(d)(1)(iii)—Evaluation of organic emissions from process vents;
- Sections 264.1063(d)(2) and 265.1063(d)(2)—Evaluation of organic emissions from equipment leaks;
- Section 266.106(a)—Evaluation of metals from boilers and furnaces;
- Sections 266.112(b)(1) and (2)(I)—Certain analyses in support of exclusion from the definition of a hazardous waste for a residue which was derived from burning hazardous waste in boilers and industrial furnaces;
- Sections 268.7(a), 268.40(a), (b), and (f), 268.41(a), 268.43(a)—Leaching procedure for evaluation of waste to determine compliance with land disposal treatment standards;
- Sections § 270.19(c)(1)(iii) and (iv), and 270.62(b)(2)(I)(C) and (D)—Analysis and approximate quantification of the hazardous constituents identified in the waste prior to conducting a trial burn in support of an application for a hazardous waste incineration permit; and
- Sections 270.22(a)(2)(ii)(B) and 270.66(c)(2)(I) and (ii)—Analysis conducted in support of a destruction and removal efficiency (DRE) trial burn waiver for boilers and industrial furnaces burning low risk wastes, and analysis and approximate quantification conducted for a trial burn in support of an application for a permit to burn hazardous waste in a boiler and industrial furnace.

APPENDIX B.—STATES AND TERRITORIES WITH MIXED WASTE AUTHORIZATION

[As of June 30, 1997]

State/territory	FR date	Effective date	FR cite
Colorado	10/24/86	11/7/86	51 FR 37729.
Tennessee	6/12/87	8/11/87	52 FR 22443.
S. Carolina	7/15/87	9/13/87	52 FR 26476.
Washington	9/22/87	11/23/87	52 FR 35556
Georgia	7/28/88	9/26/88	53 FR 28383.
Nebraska	10/4/88	12/3/88	53 FR 38950.
Kentucky	10/20/88	12/19/88	53 FR 41164.
Utah	2/21/89	3/7/89	54 FR 7417.
Minnesota	4/24/89	6/23/89	54 FR 16361.
Ohio	6/28/89	6/30/89	54 FR 27170.
Guam	8/11/89	10/10/89	54 FR 32973.
N. Carolina	9/22/89	11/21/89	54 FR 38993.
Michigan	11/24/89	12/26/89	54 FR 48608.
Texas	3/1/90	3/15/90	55 FR 7318.
New York	3/6/90	5/7/90	55 FR 7896.
Idaho	3/26/90	4/9/90	55 FR 11015.
Illinois	3/1/90	4/30/90	55 FR 7320.
Arkansas	3/27/90	5/29/90	55 FR 11192.
Oregon	3/30/90	5/29/90	55 FR 11909.
Kansas	4/24/90	6/25/90	55 FR 17273.
N. Dakota	6/25/90	8/24/90	55 FR 25836.
New Mexico	7/11/90	7/25/90	55 FR 28397.
Oklahoma	9/26/90	11/27/90	55 FR 39274.
Connecticut	12/17/90	12/31/90	55 FR 51707.
Florida	12/14/90	2/12/91	55 FR 51416.
Mississippi	3/29/91	5/28/91	56 FR 13079.
S. Dakota	4/17/91	6/17/91	56 FR 15503.
Indiana	7/30/91	9/30/91	56 FR 41959.
Louisiana	8/26/91	10/26/91	56 FR 41959.
Wisconsin	4/24/92	4/24/92	57 FR 15092.
Nevada	4/29/92	6/29/92	57 FR 18083.
California	7/23/92	8/1/92	57 FR 32725.
Arizona	11/23/92	1/22/93	57 FR 54932.
Missouri	1/11/93	3/12/93	58 FR 3497.
Alabama	3/17/93	5/17/93	58 FR 14319.
Vermont	6/7/93	8/6/93	58 FR 31911.
Montana	1/19/94	3/21/94	59 FR 2752.
New Hampshire	11/14/94	1/13/95	59 FR 56397.
Wyoming	10/04/95	10/18/95	60 FR 51925.
Delaware	8/8/96	10/7/96	61 FR 41345.
Total: 39 States and 1 Territory.			

Appendix C: Testing Reference Documents

The following references provide information on approved methods for testing hazardous waste samples:

American Public Health Association, *Standard Methods for the Examination of Water and Wastewater, 17th Edition.* 1989. Available from the Water Pollution Control Federation, Washington, D.C., #S0037.
U.S. Environmental Protection Agency, *Design and Development of a Hazardous Waste Reactivity Testing Protocol.* EPA Document No. 600/2–84–057, February 1984.
U.S. Environmental Protection Agency, *Methods for Chemical Analysis of Water and Waste.* EPA–6001114–79–020. Washington, D.C., 1983.
U.S. Environmental Protection Agency, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* SW–846. Third Edition (1986) as amended. Avail able from the Government Printing Office, by subscription, 955–001–00000–1, or from the National Technical Information Service, PB88–239–223. Washington, D.C., January, 1995.
U.S. Environmental Protection Agency, *The New Toxicity Characteristic Rule: Information and Tips for Generators.* Office of Solid Waste, 530/SW–90–028, April, 1990.
U.S. Environmental Protection Agency, ORD, and U.S. Department of Energy, *Characterizing Heterogenous Wastes: Methods and Recommendations.* EPA/600/R-92/033, February 1992.
U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. "Joint EPA/NRC Guidance on the Definition and Identification of Commercial Mixed Low-Level Radioactive and Hazardous Waste," Directive No. 9432–00–2, October 4, 1989.

Appendix D: List of Regulations

Environmental Protection Agency General Regulations for Hazardous Waste Management, 40 CFR Part 260.
Environmental Protection Agency Regulations for Identifying Hazardous Waste, 40 CFR Part 261.
Environmental Protection Agency Regulations for Hazardous Waste Generators, 40 CFR Part 262.
Environmental Protection Agency Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities, 40 CFR Part 264.
Environmental Protection Agency Interim Status Standards for Owners and Operators of Hazardous Waste Facilities, 40 CFR Part 265.
Environmental Protection Agency Regulations on Land Disposal Restrictions, 40 CFR Part 268.
Nuclear Regulatory Commission Regulations—Standards for Protection Against Radiation, 10 CFR Part 20.
Nuclear Regulatory Commission Regulations—Rules of General Applicability to Domestic Licensing of Byproduct Material, 10 CFR Part 30.
Nuclear Regulatory Commission Regulations—Domestic Licensing of Source Material, 10 CFR Part 40.
Nuclear Regulatory Commission Regulations—Domestic Licensing of Production and Utilization Facilities, 10 CFR Part 50.
Nuclear Regulatory Commission Regulations—Licensing Requirements for Land Disposal of Radioactive Waste, 10 CFR Part 61.
Nuclear Regulatory Commission Regulations—Domestic Licensing of Special Nuclear Material, 10 CFR Part 70.

[FR Doc. 97–30528 Filed 11–19–97; 8:45 am]
BILLING CODE 7590–01–P

PRESIDENT'S COMMISSION ON CRITICAL INFRASTRUCTURE PROTECTION TRANSITION OFFICE

Advisory Committee for the President's Commission on Critical Infrastructure Protection; Meeting

Time & Date: 9:00 a.m.–6:00 p.m., Wednesday, December 3, 1997.

Action: Notice of Meeting.

Summary: Pursuant to the provisions of the Federal Advisory Committee Act (Pub.L. 92–463, 86 Stat. 770), notice is hereby given for the second meeting of the Advisory Committee on the President's Commission on Critical Infrastructure Protection.

Address: The Madison Hotel, 15th and M St., NW, Washington, D.C. 20005. Public seating is limited and is available on a first-come, first-served basis. This facility is accessible to persons with disabilities.

For Further Information Contact: Carla Sims, Public Affairs Officer, (703) 696–9395, comments@pccip.gov. Hearing-impaired individuals are advised to contact the Virginia Relay Center (Text Telephone (800) 828–1120 or Voice (800) 828–1140), or their local relay system.

Supplementary Information: The Advisory Committee was established by the President to provide expert advice to the Commission as it developed a comprehensive national policy and implementation strategy for protecting the nation's critical infrastructures. The Committee is co-chaired by the Honorable Jamie Gorelick, Vice Chair of Fannie Mae, and the Honorable Sam Nunn, Partner with the law firm of King & Spaulding. The Committee currently consists of 14 members representing various industry sectors.

Purpose of the Meeting: This is the second advisory meeting of the Committee. The Committee will review and discuss the recommendations contained in the Commission's report to the President, "Critical Foundations: Protecting America's Infrastructure's."

Tentative Agenda: The Advisory Committee meeting will review and discuss the recommendations contained in the Commission's report. The unclassified report is available electronically from the Commission's site on the World Wide Web (http://www.pccip.gov/).

Public Participation: The morning session of the meeting will be open to the public. Written comments may be filed with the Commission after the meeting. Written comments may be given to the Designated Federal Officer after the conclusion of the open meeting; mailed to the Commission at P.O. Box 46258, Washington, D.C. 20050–6258; or emailed to comments@pccip.gov/.

Closed Meeting Deliberations: In accordance with Section 10(d) of the Federal Advisory Committee Act, Pub. L. 92–463 [5 U.S.C. App II, (1982)], it has been determined that the afternoon session concerns matters listed in 5 U.S.C. 552b (c)(1)(1982). Therefore, the afternoon meeting will be closed to the public in order for the committee to discuss classified material.

Robert E. Giovagnoni,
General Counsel, President's Commission on Critical Infrastructure Protection Transition Office.

[FR Doc. 97–30501 Filed 11–19–97; 8:45 am]
BILLING CODE 3110–$$–P

OFFICE OF THE UNITED STATES TRADE REPRESENTATIVE

Notice of Meeting of the Advisory Committee for Trade Policy and Negotiations

AGENCY: Office of the United States Trade Representative.

ACTION: Notice that the December 4, 1997, meeting of the Advisory Committee for Trade Policy and Negotiations will be held from 10:00 a.m. to 2:00 p.m. The meeting will be closed to the public from 10:00 a.m. to 1:30 p.m. and open to the public from 1:30 p.m. to 2:00 p.m.

SUMMARY: The Advisory Committee for Trade Policy and Negotiation will hold a meeting on December 4, 1997 from 10:00 a.m. to 2:00 p.m. The meeting will be closed to the public from 10:00 a.m. to 1:30 p.m. The meeting will include a review and discussion of current issues which influence U.S. trade policy. Pursuant to Section 2155(f)(2) of Title 19 of the United States Code, I have determined that this meeting will be concerned with matters the disclosure of which would seriously compromise the development by the United States Government of trade policy, priorities, negotiating objectives or bargaining positions with respect to the operation of any trade agreement and other matters arising in connection with the development, implementation and administration of the trade policy of the United States. The meeting will be open

Appendix D
Evaluation of Approved Waste Stream Profile Forms (WSPFs) for Addition of EPA Hazardous Waste Numbers (HWNs) through Resolution of EPA HWN Assignment Using Chemical Sampling/Analysis as Required in the WIPP Hazardous Waste Facility Permit (Permit) Waste Analysis Plan (WAP)

Evaluation of Approved Waste Stream Profile Forms (WSPFs) for Addition of EPA Hazardous Waste Numbers (HWNs) through Resolution of EPA HWN Assignment Using Chemical Sampling/Analysis as Required in the WIPP Hazardous Waste Facility Permit (Permit) Waste Analysis Plan (WAP)

November 7, 2012

Summary

Two hundred fifty-one (251) approved waste stream profile forms (WSPFs) were evaluated. The 251 WSPFs were approved on or between April 8, 1999 and March 15, 2012.

Nineteen (7.6 percent) of the 251 WSPFs had Environmental Protection Agency (EPA) hazardous waste numbers (HWNs) added to the associated waste stream through resolution of EPA HWN assignment using chemical sampling/analysis (see Background section). Only four of the WSPFs examined had EPA HWNs added as a result of headspace gas sampling/analysis. Of the 19 WSPFs, both toxicity characteristic and listed EPA HWNs were added to the affected waste streams. Eighteen of the 19 affected WSPFs were in the homogeneous solids summary category group. Fifteen of the 19 had EPA HWNs added due just to solids sampling/analysis, two of the 19 had EPA HWNs added due just to headspace gas sampling/analysis and two of the 19 had EPA HWNs added due to both solids and headspace gas sampling/analysis. All added EPA HWNs added were allowed by the Permit (Permit Attachment C, Table C-9).

Ten revisions to WSPFs were received and approved between April 8, 1999 and March 15, 2012. None of the 10 had EPA HWNs added as a result of chemical sampling/analysis performed as specified in the WAP.

Background

The Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit (Permit) requires that waste streams be characterized initially using acceptable knowledge (AK). The requirements associated with AK are specified in Permit Attachment C4.

Permit Attachment C, Section C-3 requires representative headspace gas sampling and analysis and solids sampling and analysis to resolve the assignment of EPA HWNs for those waste streams for which an AK Sufficiency Determination Request has not been approved by DOE. Requirements for conducting headspace and solids sampling and analysis and the reporting of results are specified in Permit Attachments C, C1, C2 and C3. Headspace gas sampling/analysis and/or solids sampling/analysis is referred to here as chemical sampling/analysis.

Permit Attachment C4, Section C4-3e, in conjunction with Permit Attachment C2, describes a general procedure to be followed for re-evaluating AK for a waste stream and resolving the assignment of EPA HWNs with the data obtained from either Permit-required headspace or solids sampling/analysis results. In general, the sampling and analysis data are used to calculate an upper 90 percent confidence limit (UCL_{90}) value for each chemical analyte and then comparing that value to its regulatory threshold limit (RTL). If the UCL_{90} value for a chemical exceeds the RTL, and the associated EPA HWN is not assigned to the waste stream by AK and AK cannot account for its presence without assigning the associated EPA HWN, then the AK must be reevaluated and the associated EPA HWN is conservatively applied or additional samples may be taken per Permit Attachment C2 to demonstrate that the associated HWNs do not apply. This process will be referred to here as resolution of EPA HWN assignment using chemical sampling/analysis.

Permit Attachment C3, Section C3-12b(2) describes the contents for a characterization information summary (CIS). The CIS includes a summary of the chemical analysis results and identifies whether additional EPA HWNs were assigned to a waste stream due to resolution of EPA HWN assignment using chemical sampling/analysis. A CIS is included along with a WSPF for a waste stream when it is submitted to the Permittees for review and approval.

Purpose and Scope

The purpose of this paper is to present the results of an evaluation of approved WSPFs and associated CISs to determine the percentage of WSPFs where additional EPA HWNs were assigned as a result of chemical sampling/analysis performed to resolve EPA HWN assignment. The Permit does allow generator/storage sites to conservatively assign EPA HWNs based on a preliminary number of samples or in instances where a single sample may exceed a RTL even though the UCL_{90} does not. The scope of this evaluation is limited to situations where the UCL_{90} exceeded the RTL and does not consider such a conservative assignment as an instance of resolution of EPA HWN assignment using chemical sampling/analysis.

The WSPFs and associated CISs evaluated for this effort have approval dates ranging from April 8, 1999, to March 15, 2012. This encompasses a total of 251 WSPFs, of which 10 are revisions of previously approved WSPFs. In other words, there were a total of 241 individual waste stream profiles and 10 additional revisions to existing profiles analyzed.

Results and Discussion

The breakdown of the 251 WSPFs evaluated by summary category group is as follows:

- S3000 (homogeneous solids): 69 (27.5%)
- S4000 (soils/gravel): 5 (2.0%)
- S5000 (debris waste): 177 (70.5%)

Of the 251 WSPFs examined 19, or 7.6%, had EPA HWNs added as a result of the resolution of EPA HWN assignment using chemical sampling/analysis. Only four of the WSPFs examined had EPA HWNs added as a result of headspace gas sampling/analysis. The added EPA HWNs for the 19 WSPFs represented both toxicity characteristic and listed wastes. Eighteen of the 19 WSPFs were for S3000 (homogeneous solids) waste streams and one of the 19 WSPFs was for S5000 (debris waste). No EPA HWNs were added to the five soils/gravel waste streams.

Seventeen of the 19 WSPFs were approved on or before March 31, 2005. The other two WSPFs were approved in 2011 and 2012.

Fourteen of the 19 WSPFs were from the Rocky Flats Environmental Technology Site, 3 were from the Idaho National Laboratory, one from Savannah River Site and one from the Hanford Reservation. Fifteen of the 19 had EPA HWNs added due just to solids sampling/analysis, 2 of the 19 had EPA HWNs added due just to headspace gas sampling/analysis and 2 of the 19 had EPA HWNs added due to both solids and headspace gas sampling/analysis.

The information associated with the 19 WSPFs with added EPA HWNs due to resolution of EPA HWN assignment using chemical sampling/analysis is summarized in Table 1. All added EPA HWNs identified in Table 1 were listed as allowed EPA HWNs in the Permit (Permit Attachment C, Table C-9).

Table 1 – Summarized Information for 19 WSPFs with Added EPA HWNs Due to Resolution of EPA HWN Assignment Using Chemical Sampling/Analysis

WSPF #	HWNs Added Through Resolution of EPA HWN Assignment Process	Added HWNs listed in HWFP?	Summary Category Group	Sampling/Analysis Type Resulting in Addition of HWNs[1]	Approval Date
ID-LL-T004-S3141	F005 (butanol, pyridine)	Y	S3000	Solids (VOC)	02/08/11
SR-W026-221F-HOM	F004 (3&4-methylphenol [cresols])	Y	S3000	Solids (SVOC)	03/15/12
RLMHASH.001	D011 (silver)	Y	S3000	Solids (Metals)	07/15/04
INW222.001	D022 (chloroform)	Y	S3000	HSGS&A	04/24/02
INW276.004	F001, F002 (1,1,1-trichloroethane and trichloroethylene); D029 (1,1-dichloroethylene); D040 (trichloroethylene)	Y	S5000	HSGS&A	09/07/00
RF107.01	D008 (lead)	Y	S3000	Solids (Metals)	06/17/04
RF107.04	D022 (chloroform); D029 (1,1-dichloroethylene); D034 (hexachlorobenzene)	Y	S3000	HSGS&A (D022 and D029), Solids [SVOC] (D034)	01/12/05
RF113.01	D007 (chromium); D010 (selenium); F005 (toluene)	Y	S3000	Solids [Metals] (D007, D010), Solids [VOC] (F005)	03/17/05
RF122.04	D008 (lead); D009 (mercury)	Y	S3000	Solids (Metals)	08/05/04
RF122.05	D006 (cadmium); D007 (chromium); D008 (lead); D011 (silver)	Y	S3000	Solids (Metals)	01/27/05
RF122.06	D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury)	Y	S3000	Solids (Metals)	02/24/05
RF123.01	F005 (benzene, methyl ethyl ketone, toluene)	Y	S3000	Solids (VOC)	03/28/05
RF123.03	D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury)	Y	S3000	Solids (Metals)	08/11/04
RF123.04	D007 (chromium); D008 (lead); F005 (toluene)	Y	S3000	Solids [Metals] (D007, D008), Solids [VOC] (F005)	10/06/04
RF128.01	D011 (silver)	Y	S3000	Solids (Metals)	11/19/02
RF135.01	D022 (chloroform); D029 (1,1-dichloroethylene); D034 (hexachloroethane)	Y	S3000	HSGS&A (D022, D029), Solids [VOC] (D022), Solids [SVOC] (D034)	03/31/05
RF135.02	D034 (hexachloroethane)	Y	S3000	Solids (SVOC)	03/18/05
RF137.01	D007 (chromium)	Y	S3000	Solids (Metals)	01/30/05
RF141.01	D006 (cadmium)	Y	S3000	Solids (Metals)	04/28/04

Number of waste streams required to have HWNs added due to sampling and analysis: 19
Total number of waste streams reviewed: 251
% of total number of waste streams required to have HWNs added: 7.6%

[1] HSGS&A means headspace gas sampling and analysis

Additionally, from April 8, 1999 to March 15, 2012, ten WSPFs were revised. Of these 10 WSPFs, six of them were revised to add EPA HWNs. Four of the 6 WSPFs had HWNs added either at the request of the New Mexico Environement Department (NMED) or as a result of an observer inquiry issued during an NMED audit of the generator site. One of the remaining 2 WSPFs had EPA HWNs added as the result of combining three similar WSPFs into one. The EPA HWNs were added to insure that HWNs included on the three individual WSPFs were represented on the combined WSPF. The sixth WSPF was conservatively assigned EPA HWN F003. None of the WSPFs had EPA HWNs added as a result of chemical sampling/analysis performed as specified in the WAP. The remaining four WSPFs did not have EPA HWNs added during the revision. Table 2 provides a summary of the information pertaining to the ten WSPFs that were revised.

Table 2 – Summarized Information for WSPFs revised between April 8, 1999 and March 15, 2012

Original WSPF #	Rev. #	Reason for Revision	Date Revision Approved	Change to HWNs?	Comments
SR-W027-221F-HET-A	1	Combined waste streams SR-W027-221F-HET-A, SR-W027-221F-HET-C-D and SR-W027-221F-HET-E into SR-W027-221F-HET-A.	08/30/11	Y	Addition of HWNs D006 and D009 and removal of F003 was made to insure that the HWNs from all the combined WSPFs were captured on the resulting combined WSPF, SR-W027-221F-HET-A. These changes were not made as a result of headspace gas sampling and analysis.
ID-SDA-DEBRIS	1	Added HWNs P098 and P106 at the direction of NMED.	01/15/10	Y	HWNs were added in response to an NMED observer inquiry. The HWNS were not added as a result of headspace gas sampling and analysis.
ID-SDA-SOIL	1	Added HWNs P098 and P106 at the direction of NMED.	10/09/09	Y	HWNs were added in response to an NMED observer inquiry. The HWNS were not added as a result of headspace gas sampling and analysis.

Original WSPF #	Rev. #	Reason for Revision	Date Revision Approved	Change to HWNs?	Comments
ID-SDA-SLUDGE	1	Added HWNs P098 and P106 at the direction of NMED.	11/25/08	Y	HWNs were added in response to an NMED observer inquiry. The HWNS were not added as a result of headspace gas sampling and analysis.
INW216.001	WSPF # change	Added the F003 EPA HWN. Changed the waste stream number and the waste stream profile number to BNINW216.	03/08/04	Y	Revised as a result of a change in contractor at INL. The EPA HWN, F003, was originally assigned to this waste by the generator (Rocky Flats). Since the waste was rendered non-ignitable the F003 HWN was removed. F003 constituents were detected above the MDL, but below the PRQL during subsequent sampling. Therefore F003 was added to the WSPF as a conservative measure.
INW218.001	WSPF # change	Changed the waste stream number and the waste stream profile number to BNINW218.	03/19/04	N	Revised as a result of a change in contractor at INL.
BNINW216	1	Revised in response to compliance order HWB 04-07 to clarify how preliminary data was to be used.	09/17/04	N	Revison did not result in a change to EPA HWNs.
BNINW218	1	Revised in response to compliance order HWB 04-07 to clarify how preliminary data was to be used.	09/17/04	N	Revison did not result in a change to EPA HWNs.

Original WSPF #	Rev. #	Reason for Revision	Date Revision Approved	Change to HWNs?	Comments
INW211.001	1	Added HWN D009 at the direction of NMED.	05/03/01	Y	The HWN was added in response to an NMED recommendation to address the presence of D-Cell batteries in the waste stream. The HWN was not added as a result of headspace gas, total VOC, total SVOC, or total metals sampling and analysis.
INW296.001	1	Revised to add TRUCON codes and to add a Characterization Information Summary signature.	11/14/00	N	Revison did not result in a change to EPA HWNs.

Appendix E
Position Paper on the Classification of the Permit Modification entitled:
“Revise Waste Analysis Plan Waste Characterization Methods”

Position Paper on the Classification of the Permit Modification entitled:

"Revise Waste Analysis Plan Waste Characterization Methods"

Purpose: The purpose of this paper is to provide justification for the classification of the proposed Waste Isolation Pilot Plant (WIPP) Permit Modification Request (PMR) entitled "Revise Waste Analysis Plan Waste Characterization Methods." The Permittees have classified the modification as a Class 2 based on Item B.1.d in Appendix I of Title 40 of the Code of Federal Regulations (CFR), Part 270.42. This item is described as "B. General Facility Standards, 1. changes to waste sampling and analysis methods:, d. other changes." This paper provides background for the modification then discusses the regulatory framework, agency guidance, and precedent for the use of this classification. This paper also discusses the complexity of changes in terms of determining whether the Class 3 process is needed.

Background: In 1988, the U.S. Environmental Protection Agency (EPA) identified that it would be necessary to modify hazardous waste facility permits.[1] The EPA established a hierarchy for permit modifications that has two fundamental features: (1) a three-tiered classification system, and (2) specific procedures for processing modifications of each class. Included with the classification system is Appendix I to 40 CFR 270 that "identifies what types of facility changes [that] constitute Classes 1, 2, and 3 modifications. This classification list generally follows the organization of the facility standards in Part 264 and is designed to be self-explanatory."[2] This encourages a plain language reading of the items classified in Appendix I. The EPA further stated, regarding Section B of Appendix I: "The "General Facility Standards" portion of Appendix I encompasses changes that affect the general standards and requirements that apply to all hazardous waste facilities (Subparts B through E of Part 264). These changes primarily involve the various plans that must be maintained by the facility (e.g., contingency plan, training plan) and are self-explanatory."[3]

Section B.1 specifically applies to 40 CFR 264.13 General Waste Analysis. Of the four items listed under the "B.1" heading, only item "a" or item "d" are likely to apply to the WIPP facility. Particularly relevant to this PMR is 40 CFR 264.13(b), which requires the preparation of and adherence to a written waste analysis plan (WAP). This portion of the regulations requires that the WAP contain the following:

- Parameters
- Test methods
- Sampling method
- Frequency of analysis
- Analysis that generators have agreed to supply

Based on the plain reading of the requirements and the list in Appendix I, if the Permittees seek to change any of these items in the WAP, and the change is not the result of a change in the regulations, the general category of "other changes" found in item "B.1.d" would apply.

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[1] 53 FR 37912, Wednesday, September 28, 1988, p. 37913 states: "The Agency believes that permits must be viewed as living documents that can be modified to allow facilities to make technological improvements, comply with new environmental standards, respond to changing waste streams, and generally improve waste management practices. Since permits are usually written for ten years of operation, the facility or the permit writer cannot anticipate all or even most of the administrative, technical, or operational changes required over the permit term for the facility to maintain an up-to-date operation. Therefore, permit modifications are inevitable."

[2] 53 FR 37912, Wednesday, September 28, 1988, p. 37923.

[3] 53 FR 37912, Wednesday, September 28, 1988, p. 37925.

What the Permittees are proposing: The Permittees are proposing to change the portion of the WAP that contains the test methods that are used to determine the parameters of interest.

In response to 20.4.1.900 New Mexico Administrative Code (NMAC**)** (incorporating 40 CFR 270.42(b)(1)(ii)), which requires the applicant to identify that the modification is a Class 2 modification, the Permittees propose a Class 2 permit modification for several reasons. The first reason is related to the regulatory framework for preparing a waste analysis plan. The regulations at 20.4.1.500 NMAC (incorporating 40 CFR 264.13(b)) require a written WAP that specifies parameters for measurement and the test methods and sampling methods that will be used to determine the parameters. According to the EPA guidance document Office of Solid Waste and Emergency Response **(**OSWER**)** 9938.4-03, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste," methods are specified that are appropriate for each parameter. Only one method is needed for each parameter. One of the parameters identified in the Permit is the identification of hazardous waste number (HWNs). The Permit currently requires acceptable knowledge (AK) to be used for the identification of HWNs for a waste stream, but also requires the use of chemical sampling/analysis to resolve the assignment of HWNs identified using AK. Thus, the first reason for classifying the modification as a Class 2 is that the Permit requires the use of more than one method for determining this parameter: (1) AK, and (2) chemical sampling/analysis. Because only one method is required, the appropriate process to remove the redundant method is to change the WAP.

The requested modification proposes "changes to waste sampling and analysis methods" by utilizing solely AK, radiography, and visual examination, which are described in detail in the existing WAP, to provide the necessary detailed physical and chemical analysis of the waste. These methods are conducted on the waste within a waste stream and do not involve representative sampling followed by laboratory analysis. As such, the references to chemical "sampling" and associated "analysis" are proposed to be removed from the text of the Permit. For the purpose of this PMR, the term "waste analysis" refers to the requirements of 40 CFR 264.13. Additionally, "characterization" refers to activities performed by the generator/storage sites to identify the chemical and physical properties of the waste. The term "testing" refers specifically to the use of radiography or visual examination for waste analysis purposes.

The fact that redundant methods are in the Permit is an artifact of previous changes to the Permit sampling and analysis methods. Originally, the chemical sampling had an important role in determining the concentration of volatile organic compounds (VOCs) that would be emitted from disposed containers. The New Mexico Environment Department (NMED) established environmental performance standards for the underground repository at the WIPP facility that relied on the measurement of VOCs in every container of mixed and non-mixed waste. The amount of sampling was reduced in 2006 in response to a mandate by Congress to use monitoring in the underground as the method to demonstrate compliance with the environmental performance standards. The reduced sampling involved taking ten samples of the headspace from a representative portion of each debris waste stream and five samples of the waste matrix from a representative portion of solids or soil and gravel waste streams for the purpose of resolving the assignment of HWNs. The very purpose of these chemical sampling requirements underscores their redundant nature since they are related to a parameter that has already been established by another method and included in the AK record.

The Permittees have been unable to find federal or state guidance that recommends the use of redundant methods for determining waste parameters. In fact, the EPA guidance document OSWER 9938.4-03, cited above, only recommends a single method associated with waste parameters in each of the examples it provides, although multiple methods may be available. Furthermore, other Permits issued by the NMED allow Permittees to rely on AK to characterize waste and limit sampling and analysis methods to those needed when the generator determines that the AK information is insufficient to characterize the waste.

When AK is not sufficient, other methods are to be used to obtain the necessary information about the waste, for example:

- The White Sands Missile Range Permit requires sampling and analysis only when AK is insufficient.[4]
- The Los Alamos National Laboratory Permit requires sampling and analysis only when AK is insufficient.[5]
- The Sandia National Laboratories Draft Permit requires sampling and analysis to supplement AK when it is not sufficient.[6]

The second reason that the Permittees are submitting the modification as a Class 2 modification is that it is similar to other modifications that were processed by the NMED as Class 2. Several of these Class 2 modifications that are relevant to the classification of the subject PMR are discussed below. These PMRs are relevant because they propose the reduction or elimination of chemical sampling in specific cases where information in the AK record supported such reduction or elimination or, in one case, where an external regulation obviated the need for sampling and analysis under the Permit.

March 30, 2000, Item 2 Headspace Gas Sampling Requirements for Homogeneous Solids and Soil/Gravel Waste Streams with No VOC-related Hazardous Waste Codes: This modification request was written to reduce the headspace gas sampling requirements for waste streams that were documented in the AK record to have no VOC-related HWNs based on the AK record for the waste. Therefore, headspace gas sampling for the purpose of identifying HWNs was not needed. Headspace gas samples on a representative portion of the waste were needed to satisfy the requirement to assign a VOC concentration that may be associated with packaging materials to every container for room-based compliance to the WIPP facility underground environmental performance standards. (See the discussion above regarding the origin of the redundant methods.) This modification successfully proposed “changes to waste sampling and analysis methods” that are considered “other changes” (i.e., Item “B.1.d” in Appendix I of 40 CFR 270.42) by removing the headspace gas sampling/analysis method for certain thermally treated waste.

March 30, 2000, Item 3 Headspace Gas Sampling Requirements for Waste Streams Generated Using a Thermal Process: This modification request was written to reduce the headspace gas sampling requirements for waste streams that were documented in the AK record to have no VOCs because the wastes were generated by, or treated, using a thermal process that destroyed the organics. Therefore, headspace gas sampling for the purposes of identifying HWNs was not needed. Headspace gas samples on a representative portion of the waste were needed to satisfy the requirement to assign a VOC concentration that may be associated with packaging materials to every container for room-based compliance to the WIPP facility underground environmental performance standards. (See the discussion above regarding the origin of the redundant methods.) This modification successfully proposed “changes

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[4] The December 2009 White Sands Missile Range Permit states:

2.3 Selecting Waste Analysis Parameters

When acceptable (process) knowledge or historical analytical data are not available, testing of waste streams is conducted to obtain a detailed chemical and physical analysis in accordance with 40 CFR §264.13.

[5] The July 2012 Los Alamos National Laboratory Permit states:

C.3.1.2 Sampling and Analysis

For waste streams that can be representatively sampled (i.e., homogeneous), the Permittees shall conduct sampling and analysis when there is insufficient AK.

[6] The September 2012 Sandia National Laboratories Draft Permit states:

C.6 WASTE SAMPLING AND ANALYSIS

Sampling and analysis shall be performed to provide supplemental information when acceptable knowledge does not provide sufficient information to adequately and properly characterize a hazardous or mixed waste as needed for the activities conducted under this Permit.

to waste sampling and analysis methods" that are considered "other changes" (i.e., Item "B.1.d" in Appendix I of 40 CFR 270.42) by removing the headspace gas sampling/analysis method for certain thermally treated waste.

April 20, 2000, Item 1 Three Sub-sample Requirement for VOCs During Solid Sampling: This modification request proposed to reduce the solids sampling requirement from three sub-samples to a single sample. The PMR demonstrated that the redundant samples were not necessary to adequately characterize the waste. This modification successfully proposed "changes to waste sampling and analysis methods" that are considered "other changes" (i.e., Item "B.1.d" in Appendix I of 40 CFR 270.42) by demonstrating that one sample was sufficiently representative to provide data required for the intended purpose of resolution of HWNs.

May 13, 2003, Item 3 LANL Sealed Sources Waste Streams Headspace Gas Sampling and Analysis Requirements: This PMR established that the AK information for sealed sources at Los Alamos National Laboratories (LANL) was sufficient and, therefore, chemical sampling (headspace gas sampling/analysis) for the purposes of identifying HWNs was not needed. Headspace gas samples on a representative portion of the waste were needed to satisfy the requirement to assign a VOC concentration that may be associated with packaging materials to every container for room-based compliance to the WIPP facility underground environmental performance standards. (See the discussion above regarding the origin of the redundant methods.) This modification successfully proposed "changes to waste sampling and analysis methods" that are considered "other changes" (i.e., Item "B.1.d" in Appendix I of 40 CFR 270.42) by removing the headspace gas sampling/analysis method for LANL sealed source waste streams.

May 13, 2003, Item 4 Remove Formaldehyde as a Required Analytical Parameter for LANL: A review of LANL AK information revealed that no formaldehyde-contaminated waste was stored or disposed at LANL and as a result, mixed transuranic (TRU) waste should not carry the formaldehyde listed waste HWN. Analytical methods specific for this compound were required by the Permit. This modification successfully proposed "changes to waste sampling and analysis methods" that are considered "other changes" (i.e., Item "B.1.d" in Appendix I of 40 CFR 270.42) by removing the requirement for LANL to analyze samples from homogenous solids and soil/gravel waste for formaldehyde.

May 21, 2003, Revise PCB Prohibition: Following the approval by the EPA for the disposal of polychlorinated biphenyls (PCBs) at the WIPP facility under the Toxic Substances Control Act (TSCA), the prohibition in the Permit was proposed for revision, and the PCB sampling and analytical requirements were recommended for removal from the Permit. This modification successfully proposed "changes to waste sampling and analysis methods" that are considered "other changes" (i.e., Item "B.1.d" in Appendix I of 40 CFR 270.42) by revising the prohibition on PCBs and eliminating the sampling and analysis requirements for homogeneous solids and soil/gravels that contain PCBs.

A third reason the Permittees propose this modification as a Class 2 is because it is equivalent to what the Permit refers to as a Scenario 3 Acceptable Knowledge Sufficiency Determination (AKSD). In this regard, the concept of relying on AK and radiography and/or visual examination has already been thoroughly vetted during the Class 3 modification process in 2006 when the AKSD option was added to the Permit and is part of the Administrative Record for the WIPP Permit. Therefore, the public, the NMED, and the Hearing Officer considered the impacts of the actions proposed in this PMR and agreed that there may be situations where no chemical sampling/analysis is appropriate. Further review under the Class 3 process would not produce additional new information that would alter the previous decision to approve the use of Scenario 3 AKSDs. The current proposal removes chemical sampling/analysis requirements from the Permit by proposing that experience has demonstrated that these methods are not needed and that such sampling/analysis is redundant to other methods (as specified in Scenario 3) thereby obviating the need for the AKSD process which has proven to be overly burdensome and time consuming.

Complexity: The regulations at 20 CFR 270.42(b)(6)(i)(C)(2) state that the Director (Secretary of the NMED) may elevate the Class 2 modification request to a Class 3 if "The complex nature of the change requires the more extensive procedures of Class 3." This, of course, is aimed at assuring changes are "subject to the same review and public participation procedures as permit applications"[7] which is the goal of the Class 3 modification process. Worth noting is that this provision is restricted to the complexity of the change and not the complexity of the permit. This is consistent with the EPA regulation found in 40 CFR 270.41[8] that limits the scope of the portions of the permit that can be considered in a modification deliberation. One example that illustrates the use of complexity to elevate a PMR was the Permittees' 2001 proposal to define specific packaging configuration drum age criteria. The modification, originally proposed as a Class 2, was elevated since it involved physical models of packaging configurations and numerical simulation of the diffusion of gases from inner layers of confinement.[9] The specific modeling methods were not yet included in the Permit and had not been subjected to rigorous review or public participation when the Permit was issued. The public hearing on this modification was held in August 2002 and a final order issued in October 2002. Another example is when the Permittees proposed reapportionment of VOC concentration of concerns as a Class 2. The NMED deferred the reapportionment discussion to the Renewal Permit, thus accomplishing the same effect as a Class 3 modification. Reapportionment involved mathematical consideration of risk and how it is applied to each VOC. The discussion used equations and data that were considered too complex by the NMED for a Class 2 PMR.[10] These are both examples where the Applicant recognized the modification as falling within the definition of a specific Class 2 Item in 40 CFR 270.42 Appendix I; however, the justification for the change involved complex mathematical formulae and discussions.

No such complex discussions or formulae are involved in the current modification request. The modification request simply proposes to remove redundant waste characterization methods from the Permit. These methods are mentioned in numerous places in the WAP and, therefore, result in a large number of simple changes (principally deletions) to modify the Permit. Therefore, the PMR is large in terms of the number of pages that change, but it is not complex. Note that there is no Resource Conservation and Recovery Act (RCRA) requirement to include a mark-up of the Permit with a modification request. This is provided for the convenience of the public and the NMED in order to facilitate the review of the changes in context. Therefore, the determination of complexity should rely on the description of the change found in the Overview.

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[7] 53 FR 37912, Wednesday, September 28, 1988, p. 37919.

[8] 40 CFR 270.41 states: "When a permit is modified, only the conditions subject to modification are reopened."

[9] Concerning Intent to Approve a Class 3 Modification to the Hazardous Waste Facility Permit HWB 02-01 (M) for the Waste Isolation Pilot Plant, Carlsbad, New Mexico Proposed Findings of Fact and Conclusions of Law Offered by the New Mexico Environment Department Hazardous Waste Bureau dated October 9, 2002 states on p. 6: 16. On August 30, 2001, following public comment, the Class 2 request was elevated by NMED to a Class 3 modification request. Administrative Index #010840. NMED believed at that time that the record was sufficient for it to develop an appropriate mechanism to address issues raised in the previous Class 2 modification request, through the procedures available for Class 3 modification requests. Tr. 8-27-02, p.354.

[10] Letter dated July 2, 2010 from Marcy Leavit, Director, Water and Waste Management Division to David Moody, Manager, Carlsbad Field Office and Farok Sharif, Manger, Washington TRU Solutions LLC RE: Final Determination, Class 2 Modification Request WIPP Hazardous Waste Facility Permit EPA I.D. Number NM4890139088 stated: "NMED did not change any other concentrations of concern as proposed in the PMR that were based upon reapportioning the risk associated with carcinogenic VOCs. NMED's change to the table was limited to revising the concentration of concern for carbon tetrachloride based solely on the March 31, 2010 EPA change to the inhalation risk factor from 1.5 E-05 $m^3/\mu g$ to 6.0 E-06 $m^3/\mu g$."

Finally, the determination of whether or not the proposed change is complex enough to merit the Class 3 public participation process is left up to the Secretary of the NMED. The Permittees are required to classify modifications in accordance with the regulations and Appendix I of 40 CFR 270.42.

Conclusion: The following factors indicate this is a Class 2 modification:

REGULATIONS: 40 CFR 270.42, Appendix I, Item "B.1.d." covers the type of modification that the Permittees are proposing as an "other change" to the waste analysis plan as a Class 2.

PRECEDENT: NMED has approved the following modifications as Class 2 Permit Modifications, classified under Appendix I, Item "B.1.d":

- March 30, 2000, Item 2 Headspace Gas Sampling Requirements for Homogeneous Solids and Soil/Gravel Waste Streams with No VOC-related Hazardous Waste Codes.
- March 30, 2000, Item 3 Headspace Gas Sampling Requirements for Waste Streams Generated Using a Thermal Process.
- April 20, 2000, Item 1 Three Sub-sample Requirement for VOCs During Solid Sampling.
- May 13, 2003, Item 3 LANL Sealed Sources Waste Streams Headspace Gas Sampling and Analysis Requirements.
- May 13, 2003, Item 4 Remove Formaldehyde as a Required Analytical Parameter for LANL.
- May 21, 2003, Revise PCB Prohibition.

COMPLEXITY: The change is not complex. It simply removes redundant activities from the Permit. The text of the PMR documents that the methods are not required by the regulations and that the information gained is not used to make decisions regarding the management of waste at the WIPP facility. The PMR analysis is based on a simple examination of how the information gained from sampling and analysis has historically been used and concludes that eliminating the methods is appropriate.